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3RD GENERATION PARTNERSHIP PROJECT 2 "3GPP2"

Physical Layer Standard for cdma2000 Spread Spectrum Systems

Revision E

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FOREWORD

(This foreword is not part of this Standard)

This Specification was prepared by Technical Specification Group C of the Third Generation Partnership Project 2 (3GPP2). This Specification contains the physical layer of the IMT-2000 CDMA Multi-Carrier Mode, IMT-2000 CDMA MC, also known as cdma2000®[1]. It provides a specification for land mobile wireless systems based upon cellular principles. This Specification includes the capabilities of Telecommunications Industry Association Standard TIA/EIA-95-B.

This Specification provides the physical layer of the IMT-2000 CDMA MC air interface; however, other specifications are required to complete the air interface and the rest of the system. These specifications are listed in the References section.

This Specification consists of the following sections:

1. General. This section defines the terms and numeric indications used in this document. This section also describes the time reference used in the CDMA system and the tolerances used throughout this Specification.

2. Requirements for Mobile Station CDMA Operation. This section describes the physical layer requirements for mobile stations operating in the CDMA mode. A mobile station complying with these requirements will be able to operate with CDMA base stations complying with this Specification.

3. Requirements for Base Station CDMA Operation. This section describes the physical layer requirements for CDMA base stations. A base station complying with these requirements will be able to operate with mobile stations complying with this Specification.

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[1] cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

FOREWORD

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NOTES

1. Compatibility, as used in connection with this Standard, is understood to mean: Any mobile station is able to place and receive calls. Conversely all base stations are able to place and receive calls for any mobile station.
2. This compatibility Standard is based upon spectrum allocations that have been defined by various governmental administrations.
3. Standards [10] and [11] provide specifications and measurement methods for base stations and mobile stations.
4. Those wishing to deploy systems compliant with this standard should also take notice of the requirement to be compliant with the applicable rules and regulations of local administrations.
5. Those wishing to deploy systems compliant with this Standard should also take notice of the electromagnetic exposure criteria for the general public and for radio frequency carriers with low frequency amplitude modulation.
6. “Base station” refers to the functions performed on the land side, which are typically distributed among a cell, a sector of a cell, and a mobile switching center.
7. “Shall” and “shall not” identify requirements to be followed strictly to conform to the standard and from which no deviation is permitted. “Should” and “should not” indicate that one of several possibilities is recommended as particularly suitable, without mentioning or excluding others, that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is discouraged but not prohibited. “May” and “need not” indicate a course of action permissible within the limits of the standard. “Can” and “cannot” are used for statements of possibility and capability, whether material, physical, or causal.
8. Footnotes appear at various points in this Standard to elaborate and further clarify items discussed in the body of the Standard.
9. Unless indicated otherwise, this Standard presents numbers in decimal form. Binary numbers are distinguished in the text by the use of single quotation marks.
10. While communication between the Medium Access Control Layer and the Physical Layer is specified, there is no requirement to implement layering and the use of the word “shall” does not identify requirements to be followed strictly in order to conform to the standard.
11. The following operators define mathematical operations:

    $\times$ indicates multiplication.

    $\lfloor x \rfloor$ indicates the largest integer less than or equal to x: $\lfloor 1.1 \rfloor = 1$, $\lfloor 1.0 \rfloor = 1$.

    $\lceil x \rceil$ indicates the smallest integer greater or equal to x: $\lceil 1.1 \rceil = 2$, $\lceil 2.0 \rceil = 2$.

    $|x|$ indicates the absolute value of x: $|-17| = 17$, $|17| = 17$.

    $\oplus$ indicates exclusive OR (modulo-2 addition).

NOTES

min (x, y) indicates the minimum of x and y.

max (x, y) indicates the maximum of x and y.

x mod y indicates the remainder after dividing x by y: x mod y = $x - (y \times \lfloor x/y \rfloor)$.

12. Rounding to the nearest integer indicates the nearest integer: 1 for 1.4, –1 for –1.4, 2 for 1.5, and –2 for –1.5.
13. PAR[i…j] denotes the sequence of bits from the i-th bit position to the j-th bit position of the binary value PAR, where the bit in position 0 represents the most significant bit.
14. PAR[i] denotes the bit in position i of the binary value PAR, where the bit in position 0 represents the most significant bit.

REFERENCES

Normative References

The following specifications contain provisions which, through reference in this text, constitute provisions of this specification. At the time of publication, the editions indicated were valid. If the specification version number is included, the reference is specific. Parties implementing this Specification should use the specific versions of the indicated specification. If the specification version number is not included, the reference is non-specific. Parties implementing this Specification are encouraged to investigate the possibility of applying the most recent editions of the indicated specifications. .

—*Standards:*

1. Reserved.
2. Reserved
3. *C.S0003-E v1.0, Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems*, September 2009.
4. Reserved.
5. *C.S0005-E v1.0, Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems*, September 2009.
6. Reserved.
7. Reserved
8. Reserved
9. Reserved
10. *C.S0010-C v2.0, Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations*, March 2006.
11. *C.S0011-C v2.0, Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations*, March 2006.
12. C.S0057-*D v1.0*, *Band Class Specification for cdma2000 Spread Spectrum Systems,* September 2009.

REFERENCES

—*Other Documents:*

13. *Global Positioning System Standard Positioning Service Signal Specification*, 2nd Edition, June 1995.

Informative References

The following documents do not contain provisions of the Specification. They are listed to aid in better understanding this Specification.

1 GENERAL

1.1 Terms

16-QAM. 16-ary quadrature amplitude modulation.

8-PSK. 8-ary phase shift keying.

Access Channel. A Reverse CDMA Channel used by mobile stations for communicating with the base station. The Access Channel is used for short signaling message exchanges, such as call originations, responses to pages, and registrations. The Access Channel is a slotted random access channel.

Access Channel Preamble. The preamble of an access probe consisting of a sequence of all-zero frames that is sent at the 4800 bps rate.

Access Probe. One Access Channel transmission consisting of a preamble and a message. The transmission is an integer number of frames in length and transmits one Access Channel message. See also Access Probe Sequence.

Access Probe Sequence. A sequence of one or more access probes on the Access Channel. See also Access Probe.

Additional Preamble. A preamble sent after the last fractional preamble on the Reverse Pilot Channel prior to transmitting on the Enhanced Access Channel or the Reverse Common Control Channel.

Alternate Interleaver Pattern. An interleaver pattern used for convolutional coded frames for code combining soft handoff for Radio Configuration 12. The alternate interleaver pattern is used by some base stations in the mobile station active set to increase the probability of frame early termination.

Auxiliary Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA base station. An auxiliary pilot channel is required for forward link spot beam and antenna beam forming applications, and provides a phase reference for coherent demodulation of those forward link CDMA channels associated with the auxiliary pilot.

Auxiliary Transmit Diversity Pilot Channel. A transmit diversity pilot channel associated with an auxiliary pilot channel. The auxiliary pilot channel and the auxiliary transmit diversity pilot channel provide phase references for coherent demodulation of those forward link CDMA channels associated with the auxiliary pilot and that employ transmit diversity.

Bad Frame. A frame classified with insufficient frame quality, or, for Radio Configuration 1, a 9600 bps primary traffic only frame with bit errors. See also Good Frame.

Band Class. A set of frequency channels and a numbering scheme for these channels.

Base Station. A fixed station used for communicating with mobile stations. Depending upon the context, the term base station may refer to a cell, a sector within a cell, an MSC, or other part of the wireless system. See also MSC.

Basic Access Mode. A mode used on the Enhanced Access Channel where a mobile station transmits an Enhanced Access Channel preamble and Enhanced Access data in a method similar to that used on the Access Channel.

Block Code. A type of error-correcting code. A block of input bits are coded to form the output codewords. Examples include Hadamard Codes, Reed-Solomon Codes, etc.

bps. Bits per second.

BPSK. Binary phase shift keying.

Broadcast Control Channel. A code channel in a Forward CDMA Channel used for transmission of control information from a base station to a mobile station.

Candidate Frequency. The frequency for which the base station specifies a search set, when searching on other frequencies while performing mobile-assisted handoffs.

CCSH. See Code Combining Soft Handoff

CDMA. See Code Division Multiple Access.

CDMA Cellular System. The entire system supporting Domestic Public Cellular Service operation as embraced by this Standard.

CDMA Channel. The set of channels transmitted between the base station and the mobile stations within a given CDMA frequency assignment. See also Forward CDMA Channel and Reverse CDMA Channel.

CDMA Channel Number. An 11-bit number corresponding to the center of the CDMA frequency assignment.

CDMA Frequency Assignment. A 1.23 or 3.69 MHz segment of spectrum. The center of a CDMA frequency assignment is given by a CDMA Channel Number.

CDMA PCS System. The entire system supporting Personal Communications Services as embraced by this Standard.

CDMA Preferred Set. The set of CDMA channel numbers in a CDMA system corresponding to frequency assignments that a mobile station will normally search to acquire a CDMA Pilot Channel. For CDMA cellular systems, the primary and secondary channels comprise the CDMA Preferred Set.

Cell Switching. The act of selecting a member of the Forward Packet Data Channel active set from which the Forward Packet Data Channel is to be transmitted for a mobile station assigned to the Forward Packet Data Channel.

Chip Rate. Equivalent to the spreading rate of the channel. It is either 1.2288 Mcps or 3.6864 Mcps.

Code Channel. A subchannel of a Forward CDMA Channel or Reverse CDMA Channel. Each subchannel uses an orthogonal Walsh function or quasi-orthogonal function.

Code Combining Soft Handoff (CCSH). A soft handoff method for Fundamental Channels on the forward link in Radio Configuration 12 and Supplemental Channels on the forward link in Radio Configurations 4, 5, and 12. For Supplemental Channels using Turbo codes in this mode certain base stations encode and transmit the data with the default turbo encoder, whereas others use the complementary turbo encoder. Mobile stations in soft handoff can then combine both codes to achieve lower code rates. For Fundamental Channels and Supplemental Channels using Convolutional codes in this mode certain base stations transmit using the default interleaver pattern, whereas others use an alternate interleaver pattern. Mobile stations in handoff combine transmissions from both base stations to decode the frames earlier.

Code Division Multiple Access (CDMA). A technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences.

Code Symbol. The output of an error-correcting encoder. Input to the encoder are information bits while output from the encoder are code symbols. See Block Code, Convolutional Code, and Turbo Code.

Common Assignment Channel. A forward common channel used by the base station to acknowledge a mobile station accessing the Enhanced Access Channel, and in the case of Reservation Access Mode, to transmit the address of a Reverse Common Control Channel and associated indicator control subchannel.

Common Power Control Channel. A forward common channel used by the base station to transmit power control bits to multiple mobile stations. The Common Power Control Channel is the set of common power control subchannels within a Forward Indicator Control Channel. The Common Power Control Channel is used by mobile stations when operating in the Reservation Access Mode, when the Forward Packet Data Channel is assigned without a Forward Fundamental Channel or a Forward Dedicated Control Channel, or when the Forward Dedicated Control Channel is shared.

Common Power Control Subchannel. A subchannel on the Common Power Control Channel used by the base station to control the power of a mobile station when operating in the Reservation Access Mode on the Reverse Common Control Channel, when the Forward Packet Data Channel is assigned without a Forward Fundamental Channel or a Forward Dedicated Control Channel, or when the Forward Dedicated Control Channel is shared.

Complementary Turbo Code. A code generated by the turbo encoder with a puncturing pattern different from the default turbo encoder. The puncturing pattern for the complementary turbo code is chosen to reduce the effective code rate after combining with the default turbo code.

Continuous Transmission. A mode of operation in which Discontinuous Transmission is not permitted.

Convolutional Code. A type of error-correcting code. A code symbol can be considered as the convolution of the input data sequence with the impulse response of a generator function.

Coordinated Universal Time (UTC). An internationally agreed upon time scale maintained by the Bureau International des Poids et Mesures (BIPM) used as the time reference by nearly all commonly available time and frequency distribution systems (e.g., WWV, WWVH, LORAN-C, Transit, Omega, and GPS).

CRC. See Cyclic Redundancy Code.

Cyclic Redundancy Code (CRC). A class of linear error detecting codes, which generate parity check bits by finding the remainder of a polynomial division. See also Frame Quality Indicator.

Data Burst Randomizer. The function that determines which power control groups within a frame are transmitted on the Reverse Fundamental Channel with Radio Configurations 1 and 2 when the data rate is lower than the maximum rate for the radio configuration. The data burst randomizer determines, for each mobile station, the pseudorandom position of the transmitted power control groups in the frame while guaranteeing that every modulation symbol is transmitted exactly once.

dBm. A measure of power expressed in terms of its ratio (in dB) to one milliwatt.

dBm/Hz. A measure of power spectral density. The ratio, dBm/Hz, is the power in one Hertz of bandwidth, where power is expressed in units of dBm.

Deinterleaving. The process of unpermuting the symbols that were permuted by the interleaver. Deinterleaving is performed on received symbols prior to decoding.

Direct Spread. A CDMA mode in the International Telecommunications Union IMT-2000 family of standards.

Discontinuous Transmission (DTX). A mode of operation in which a base station or a mobile station switches its transmitter or a particular code channel on and off autonomously. For the case of DTX operation on the Forward Dedicated Control Channel, the forward power control subchannel is still transmitted.

DS. See Direct Spread.

E_b. The energy of an information bit.

E_b/N_t. The ratio in dB of the combined received energy per bit to the effective noise power spectral density.

E_c/I_0. The ratio in dB between the pilot energy accumulated over one PN chip period (E_c) to the total power spectral density (I_0) in the received bandwidth.

Effective Isotropically Radiated Power (EIRP). The product of the power supplied to the antenna and the antenna gain in a direction relative to an isotropic antenna.

Effective Radiated Power (ERP). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

EIB. See Erasure Indicator Bit.

EIRP. See Effective Isotropically Radiated Power.

Electronic Serial Number (ESN). A 32-bit number assigned by the mobile station manufacturer, uniquely identifying the mobile station equipment.

Encoder Packet. The encoder packet contains the input bits to the turbo encoder on the Forward Packet Data Channel or the Reverse Packet Data Channel. The encoder packet consists of the bits of a Forward Packet Data Channel or a Reverse Packet Data Channel information bits, the Frame Quality Indicator bits, and the turbo encoder tail allowance bits.

Encoder Tail Bits. A fixed sequence of bits added to the end of a block of data to reset the convolutional encoder to a known state.

Enhanced Access Channel. A reverse channel used by the mobile for communicating to the base station. The Enhanced Access Channel operates in the Basic Access Mode and the Reservation Access Mode. It is used for transmission of short messages, such as signaling, MAC messages, response to pages, and call originations. It can also be used to transmit moderate-sized data packets.

Enhanced Access Channel Preamble. A non-data bearing portion of the Enhanced Access probe sent by the mobile station to assist the base station in initial acquisition and channel estimation.

Enhanced Access Data. The data transmitted while in the Basic Access Mode on the Enhanced Access Channel or while in the Reservation Access Mode on a Reverse Common Control Channel.

Enhanced Access Header. A frame containing access origination information transmitted immediately after the Enhanced Access Channel preamble while in the Reservation Access Mode.

Enhanced Access Probe. One Enhanced Access Channel transmission consisting of an Enhanced Access Channel preamble, optionally an Enhanced Access header, and optionally Enhanced Access data. See also Enhanced Access Probe Sequence.

Enhanced Access Probe Sequence. A sequence of one or more Enhanced Access probes on the Enhanced Access Channel. See also Enhanced Access Probe.

Enhanced Rate Adaptation Mode (ERAM). A flexible and variable data rate mode for the Supplemental Channel operation with turbo codes. ERAM is defined on the forward link for Radio Configurations 4 and 5 and on the reverse link for Radio Configuration 4. In this mode, puncturing or repetition is performed on the code symbol output of the lower code rate turbo encoder to match the desired channel interleaver block size.

ERAM. See Enhanced Rate Adaptation Mode.

Erasure Indicator Bit (EIB). A bit used in the Radio Configuration 2 Reverse Traffic Channel frame structure to indicate an erased Forward Fundamental Channel frame and in the Radio Configurations 3, 4, 5, and 6 reverse power control subchannel to indicate frame erasure(s) and/or non-transmission on the Forward Fundamental Channel, the Forward Suppemental Channel, or the Forward Dedicated Control Channel.

ERP. See Effective Radiated Power.

ESN. See Electronic Serial Number.

Fixed Data Rate. The operation of a Traffic Channel where the data rate does not change from frame to frame. See Variable Data Rates.

Flexible Data Rate. The operation of a Traffic Channel with Radio Configuration 3 or above, where the frame format, including the number of information bits, the number of reserved bits, and the number of frame quality indicator bits, is configurable.

Forward CDMA Channel. A CDMA Channel from a base station to mobile stations. The Forward CDMA Channel contains one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset.

Forward Acknowledgment Channel. A portion of a Forward CDMA Channel used for the transmission of acknowledgments from a base station to multiple mobile stations in response to the data received on the Reverse Packet Data Channel or the Reverse Fundamental Channel.

Forward Common Acknowledgment Channel. A portion of the Forward CDMA Channel used for the transmission of Acknowledgments from a base station to multiple mobile stations in response to the Reverse Supplemental Channel from mobile stations operating with reverse link Radio Configuration 8. The Forward Common Acknowledgment Channel is used by the base station to early terminate Reverse Supplemental Channel frames.

Forward Common Acknowledgment Subchannel. A subchannel on the Forward Common Acknowledgment Channel used by the base station to early terminate the Reverse Supplemental Channel from a mobile station operating with reverse link Radio Configuration 8.

Forward Common Control Channel. A control channel used for the transmission of digital control information from a base station to one or more mobile stations.

Forward Dedicated Control Channel. A portion of a Radio Configuration 3 through 9 Forward Traffic Channel used for the transmission of higher-level data, control information, and power control information from a base station to a mobile station.

Forward Error Correction. A process whereby data is encoded with block, convolutional, or turbo codes to assist in error correction of the link.

Forward Fundamental Channel. A portion of a Forward Traffic Channel which carries higher-level data. The Forward Fundamental Channel can also carry power control information.

Forward Grant Channel. A control channel used by the base station to transmit messages to the mobile station controlling its transmission on the Reverse Packet Data Channel.

Forward Indicator Control Channel. A control channel used by the base station that contains one or two time division multiplexed channels. For Spreading Rate 1, the Forward Indicator Control Channel consists of the Common Power Control Channel and the Forward Rate Control Channel. For Spreading Rate 3, the Forward Indicator Control Channel only consists of the Common Power Control Channel. See Common Power Control Channel and Forward Rate Control Channel.

Forward Packet Data Channel. A portion of a Forward Traffic Channel which carries higher-level data.

Forward Packet Data Control Channel. A control channel used for the transmission of the control information for the subpacket being transmitted on the Forward Packet Data Channel or to transmit control information.

Forward Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted continuously by each CDMA base station. The Pilot Channel allows a mobile station to acquire the timing of the Forward CDMA Channel, provides a phase reference for coherent demodulation, and provides a means for signal strength comparisons between base stations for determining when to handoff and for forward link signal strength measurement.

Forward Power Control Subchannel. A subchannel on the Forward Fundamental Channel or the Forward Dedicated Control Channel used by the base station to control the power of a mobile station when operating on the Reverse Traffic Channel.

Forward Rate Control Channel. A control channel used by the base station to control the rate of the mobile station when operating on the Reverse Packet Data Channel. The Forward Rate Control Channel is the set of rate control subchannels within a Forward Indicator Control Channel.

Forward Supplemental Channel. A portion of a Radio Configuration 3, 4, 5, 6, 7, 8, 9, 11 and 12 Forward Traffic Channel which provides higher data rate services, and on which higher-level data is transmitted.

Forward Supplemental Code Channel. A portion of a Radio Configuration 1 and 2 Forward Traffic Channel which operates in conjunction with a Forward Fundamental Channel in that Forward Traffic Channel to provide higher data rate services, and on which higher-level data is transmitted.

Forward Traffic Channel. One or more code channels used to transport user and signaling traffic from the base station to the mobile station. See Forward Fundamental Channel, Forward Dedicated Control Channel, Forward Supplemental Channel, Forward Supplemental Code Channel, and Forward Packet Data Channel.

Fractional Preamble. A preamble in a sequence sent on the Reverse Pilot Channel prior to transmitting on the Enhanced Access Channel or the Reverse Common Control Channel.

Frame. A basic timing interval in the system. For the Sync Channel, a frame is 26.666... ms long. For the Access Channel, the Paging Channel, the Forward Supplemental Code Channel, and the Reverse Supplemental Code Channel, a frame is 20 ms long. For the Forward Supplemental Channel and the Reverse Supplemental Channel, a frame is 20, 40, or 80 ms long. For the Enhanced Access Channel, the Forward Common Control Channel, and the Reverse Common Control Channel, a frame is 5, 10, or 20 ms long. For the Forward Fundamental Channel, Forward Dedicated Control Channel, Reverse Fundamental Channel, and Reverse Dedicated Control Channel, a frame is 5 or 20 ms long. For the Common Assignment Channel, a frame is 5 ms long. For the Broadcast Control Channel, a frame is 40 ms long; the frame may be transmitted once, twice, or four times. For the Forward Packet Data Control Channel and the Forward Packet Data Channel, a frame could be 1.25, 2.5, or 5 ms long. For the Reverse Acknowledgment Channel and the Reverse Channel Quality Indicator Channel, a frame is 1.25 ms long. For the Reverse Packet Data Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Forward Indicator Control Channel, the Forward Grant Channel, and the Forward Acknowledgment Channel, a frame is 10 ms long.

Frame Early Termination. A method used to terminate transmission of a frame earlier than the nominal length of the frame (20 ms) if the receiver has successfully received the frame. The receiver transmits an acknowledgment to the transmitter following successful reception of the frame.

Frame Error Detection. A method used to detect whether the received frame is in error. Usually, the data is encoded with a Cyclic Redundancy Code to aid in this detection. See Cyclic Redundancy Code.

Frame Number. CDMA System Time, in integer multiples of 20 ms.

Frame Offset. A time skewing of Forward Traffic Channel or Reverse Traffic Channel frames from System Time in integer multiples of 1.25 ms.

Frame Quality Indicator. The CRC check applied to 9.6 and 4.8 kbps Traffic Channel frames of Radio Configuration 1, all the Forward Traffic Channel frames for Radio Configurations 2 through 10, all the Forward Packet Data Control Channel frames, the Forward Grant Channel, all the Reverse Traffic Channel frames for Radio Configurations 2 through 7, the Broadcast Control Channel, the Common Assignment Channel, the Forward Common Control Channel, the Enhanced Access Channel, the Reverse Request Channel, and the Reverse Common Control Channel.

Galois Field (GF). A Galois Field is a finite algebraic field with p^n elements where p is a prime number.

Gated Transmission. A mode of operation in which the mobile station transmitter is gated on and off during specific power control groups.

GF. See Galois Field.

GHz. Gigahertz (10^9 Hertz).

Global Positioning System (GPS). A US government satellite system that provides location and time information to users. See [13] for specifications.

Good Frame. A frame not classified as a bad frame. See also Bad Frame.

GPS. See Global Positioning System.

Hard Handoff. A handoff characterized by a temporary disconnection of the Traffic Channel. Hard handoffs occur when the mobile station is transferred between disjoint Active Sets, the CDMA frequency assignment changes, the frame offset changes, or the mobile station is directed from a CDMA Traffic Channel to an analog voice channel. See also Soft Handoff.

Indicator Control Subchannel. A subchannel on the Forward Indicator Control Channel used by the base station to control the power, the rate, or both of a mobile station. See Common Power Control Subchannel and Rate Control Subchannel.

Interleaving. The process of permuting a sequence of symbols.

kHz. Kilohertz (10^3 Hertz).

Ksps. Kilo-symbols per second (10^3 symbols per second).

Long Code. A PN sequence that is used for scrambling on the Forward CDMA Channel (the Forward Traffic Channel except the Forward Packet Data Channel, the Paging Channel, the Broadcast Control Channel, the Forward Common Acknowledgment Channel, the Common

Assignment Channel, the Forward Grant Channel, and the Forward Common Control Channel) and spreading on the Reverse CDMA Channel (the Reverse Pilot Channel, the Reverse Secondary Pilot Channel, the Reverse Traffic Channel, the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Channel Quality Indicator Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, and the Reverse Acknowledgment Channel). On the Forward Traffic Channel and the Reverse Traffic Channel, the long code provides limited privacy. On the Reverse Traffic Channel, the long code uniquely identifies a mobile station. See also Public Long Code and Private Long Code. On the Forward Indicator Control Channel, the long code is used to determine the location of the indicator control subchannel.

Long Code Mask. A 42-bit binary number that creates the unique identity of the long code. See also Public Long Code, Private Long Code, Public Long Code Mask, and Private Long Code Mask.

LSB. Least significant bit.

MAC Layer. Medium Access Control Layer.

Maximal Length Sequence (m-Sequence). A binary sequence of period $2^n - 1$, n being a positive integer, with no internal periodicities. A maximal length sequence can be generated by a tapped n-bit shift register with linear feedback.

MC. See Multi-Carrier.

Mcps. Megachips per second (10^6 chips per second).

Mean Input Power. The total received calorimetric power measured in a specified bandwidth at the antenna connector, including all internal and external signal and noise sources.

Mean Output Power. The total transmitted calorimetric power measured in a specified bandwidth at the antenna connector when the transmitter is active.

MHz. Megahertz (10^6 Hertz).

Mobile Station. A station that communicates with the base station.

Mobile Station Class. Mobile station classes define mobile station characteristics such as slotted operation and transmission power.

Mobile Status Indicator Bit (MSIB). A bit, sent on the Reverse Packet Data Control Channel, used by the mobile station to indicate whether it has enough power and data to increase the transmission rate on the Reverse Packet Data Channel. See [3] for more details.

Mobile Switching Center (MSC). A configuration of equipment that provides cellular radiotelephone service.

MSIB. See Mobile Status Indicator Bit.

Modulation Symbol. For the Forward Packet Data Channel, a modulation symbol is defined as the output of the QPSK/8-PSK/16-QAM modulator. For all other channels, a modulation symbol is defined as the input to the signal point mapping block and the output of the interleaver or the sequence repetition block, if present.

Multi-Carrier. A CDMA mode in the International Telecommunications Union IMT-2000 family of standards. The mode uses N (N ≥ 1) adjacent 1.2288 Mcps direct-sequence spread RF carriers on the Forward CDMA Channel and a single direct-sequence spread RF carrier on the Reverse CDMA Channel.

ms. Millisecond (10^{-3} second).

MSB. Most significant bit.

Ns. Nanosecond (10^{-9} second).

Orthogonal Transmit Diversity (OTD). A forward link transmission method which distributes forward link channel symbols among multiple antennas and spreads the symbols with a unique Walsh or quasi-orthogonal function associated with each antenna.

OTD. See Orthogonal Transmit Diversity.

Outer Coding Buffer. A buffer used by the Forward Supplemental Channel when supporting outer coding. Information bits in the buffer are divided into four Outer Coding Sub-Buffers. Each row of the Outer Coding Buffer is transmitted as a frame.

Outer Coding Sub-Buffer. See Outer Coding Buffer.

Paging Channel. A code channel in a Forward CDMA Channel used for transmission of control information and pages from a base station to a mobile station.

Paging Channel Slot. An 80 ms interval on the Paging Channel. Mobile stations operating in the slotted mode are assigned specific slots in which they monitor messages from the base station.

PCS. See Personal Communications Services.

PCS System. See Personal Communications Services System.

Personal Communications Services System. A configuration of equipment that provides PCS radiotelephone services.

Personal Communications Services (PCS). A family of mobile and portable radio communications services for individuals and businesses that may be integrated with a variety of competing networks. Broadcasting is prohibited and fixed operations are to be ancillary to mobile operations.

Physical Layer. The part of the communication protocol between the mobile station and the base station that is responsible for the transmission and reception of data. The physical layer in the transmitting station is presented a frame and transforms it into an over-the-air waveform. The physical layer in the receiving station transforms the waveform back into a frame.

Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted by a CDMA base station or mobile station. A pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength comparisons between base stations for determining when to handoff.

Pilot PN Sequence. A pair of modified maximal length PN sequences used to spread the Forward CDMA Channel and the Reverse CDMA Channel. Different base stations are identified by different pilot PN sequence offsets.

Pilot PN Sequence Offset Index. The PN offset in units of 64 PN chips of a pilot, relative to the zero offset pilot PN sequence.

PN. Pseudonoise.

PN Chip. One bit in the PN sequence.

PN Sequence. Pseudonoise sequence. A periodic binary sequence.

Power Control Bit. A bit sent on the forward power control subchannel, reverse power control subchannel, or common power control subchannel to signal the mobile station or base station to increase or decrease its transmit power except in the shared mode of operation on the forward link.

Power Control Group. A 1.25 ms interval on the Forward Traffic Channel except the Forward Packet Data Channel, the Reverse Traffic Channel, and the Reverse Pilot Channel. See also Power Control Bit.

Power Control Mode. Reverse Link Closed Loop power control bit update rate specified by the base station.

Power Up Function. A method by which the mobile station increases its output power to support location services.

Preamble. See Access Channel preamble, Enhanced Access Channel preamble, Reverse Common Control Channel preamble, and Reverse Traffic Channel Preamble.

Primary CDMA Channel. A pre-assigned channel in a CDMA Cellular System for Spreading Rate 1 used by the mobile station for initial acquisition. See also Secondary CDMA Channel.

Primary Paging Channel. The default code channel (code channel 1) assigned for paging on a CDMA Channel.

Primary Reverse Power Control Subchannel. A reverse power control subchannel used to control the Forward Dedicated Control Channel, the Forward Fundamental Channel, or the Forward Indicator Control Channel.

Private Long Code. The long code characterized by the private long code mask. See also Long Code.

Private Long Code Mask. The long code mask used to form the private long code. See also Public Long Code Mask and Long Code.

Public Long Code. The long code characterized by the public long code mask. See also Long Code.

Public Long Code Mask. The long code mask used to form the public long code. The mask contains a permutation of the bits of the mobile station's ESN or the particular mask specified by the base station. The mask also includes the channel number when used for a Supplemental Code Channel. See also Private Long Code Mask and Long Code.

PUF. See Power Up Function.

PUF Probe. One or more consecutive frames on the Reverse Traffic Channel within which the mobile station transmits the PUF pulse.

PUF Pulse. Portion of PUF probe which may be transmitted at elevated output power.

PUF Target Frequency. The CDMA frequency to which the base station directs a mobile station for transmitting the PUF probe.

Punctured Code. An error-correcting code generated from another error-correcting code by deleting (i.e., puncturing) code symbols from the encoder output.

QIB. See Quality Indicator Bit.

QPSK. Quadrature phase shift keying.

Quality Indicator Bit (QIB). A bit used in the Radio Configurations 3, 4, 5, and 6 reverse power control subchannel to indicate signal quality on the Forward Dedicated Control Channel. When the Forward Fundamental Channel is present, this bit is set the same as the Erasure Indicator Bits.

Quasi-Orthogonal Function. A function created by applying a quasi-orthogonal masking function to an orthogonal Walsh function.

Quick Paging Channel. An uncoded, spread, and On-Off-Keying (OOK) modulated spread spectrum signal sent by a base station to inform mobile stations operating in the slotted mode during the idle state whether to receive the Forward Common Control Channel or the Paging Channel starting in the next Forward Common Control Channel or Paging Channel frame.

Radio Configuration. A set of Forward Traffic Channel and Reverse Traffic Channel transmission formats that are characterized by physical layer parameters such as data rates, modulation characteristics, and spreading rate.

Rate Control Subchannel. A subchannel on the Forward Rate Control Channel used by the base station to control the rate of a mobile station when operating on the Reverse Packet Data Channel.

RC. See Radio Configuration.

Reservation Access Mode. A mode used on the Enhanced Access Channel and Reverse Common Control Channel where a mobile station transmits an Enhanced Access preamble and an Enhanced Access header in the Enhanced Access probe. The Enhanced Access data is transmitted on a Reverse Common Control Channel using closed loop power control.

Reverse Acknowledgment Channel. A portion of a Reverse CDMA Channel used for the transmission of acknowledgments from the mobile station to the base station in response to the data received on the Forward Packet Data Channel, the Forward Packet Data Control Channel, the Forward Fundamental Channel and the Forward Supplemental Channel.

Reverse CDMA Channel. The CDMA Channel from the mobile station to the base station. From the base station's perspective, the Reverse CDMA Channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

Reverse Channel Quality Indicator Channel. A portion of a Reverse CDMA Channel used by the mobile station to indicate to the base station the quality of the Forward Pilot Channel received at the mobile station, and to indicate switching between base stations.

Reverse Common Control Channel. A portion of a Reverse CDMA Channel used for the transmission of digital control information from one or more mobile stations to a base station. The Reverse Common Control Channel can operate in the Reservation Access Mode. It can be power controlled and may support soft handoff.

Reverse Common Control Channel Preamble. A non-data bearing portion of the Reverse Common Control Channel sent by the mobile station to assist the base station in initial acquisition and channel estimation.

Reverse Composite Code Channel. A channel composed of the sum of all the code channel transmissions by a mobile station on a CDMA frequency assignment.

Reverse Dedicated Control Channel. A portion of a Radio Configuration 3 through 6 Reverse Traffic Channel used for the transmission of higher-level data and control information from a mobile station to a base station.

Reverse Fundamental Channel. A portion of a Radio Configuration 1, 2, 3, 4, 5, 6, and 8 Reverse Traffic Channel which carries higher-level data and control information from a mobile station to a base station.

Reverse Packet Data Channel. A portion of a Radio Configuration 7 Reverse Traffic Channel which carries higher-level data and control information from a mobile station to a base station.

Reverse Packet Data Control Channel. A control channel used for the transmission of control information for the subpacket being transmitted on the Reverse Packet Data Channel and the Mobile Status Indicator Bit.

Reverse Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted by a CDMA mobile station. A reverse pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength measurement.

Reverse Power Control Subchannel. A subchannel on the Reverse Pilot Channel used by the mobile station to control the power of a base station when operating on the Forward Traffic Channel with Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11 or 12.

Reverse Request Channel. A control channel used by the mobile station to report available power headroom and buffer status.

Reverse Secondary Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted by a CDMA mobile station in conjunction with certain transmissions on the Reverse Packet Data Channel. The secondary pilot channel provides additional phase reference for the Reverse Packet Data Channel for coherent demodulation and may provide a means for signal strength measurement.

Reverse Supplemental Channel. A portion of a Radio Configuration 3, 4, 5, 6, and 8 Reverse Traffic Channel which operates in conjunction with the Reverse Fundamental Channel or the Reverse Dedicated Control Channel in that Reverse Traffic Channel to provide higher data rate services, and on which higher-level data is transmitted.

Reverse Supplemental Code Channel. A portion of a Radio Configuration 1 and 2 Reverse Traffic Channel which operates in conjunction with the Reverse Fundamental Channel in that Reverse Traffic Channel, and (optionally) with other Reverse Supplemental Code Channels to provide higher data rate services, and on which higher-level data is transmitted.

Reverse Supplemental Code Channel Preamble. A sequence of all-zero frames that is sent by the mobile station on the Reverse Supplemental Code Channel as an aid to Traffic Channel acquisition.

Reverse Traffic Channel. One or more code channels used to transport user and signaling traffic from the mobile station to the base station. See Reverse Fundamental Channel, Reverse Dedicated Control Channel, Reverse Supplemental Channel, Reverse Supplemental Code Channel, and Reverse Packet Data Channel.

Reverse Traffic Channel Preamble. A non-data bearing portion of the Reverse Pilot Channel sent by the mobile station to aid the base station in initial acquisition and channel estimation for the Reverse Dedicated Control Channel and the Reverse Fundamental Channel.

REV-FCH_BLANKING_DUTYCYCLE_IN_USE – The period of required non-zero rate transmissions by the mobile station on the Reverse Fundamental Channel when operating with Radio Configuration 8.

RF Carrier. A direct-sequence spread RF channel. For the Forward CDMA Channel, the number of RF carriers is equal to the Spreading Rate; for the Reverse CDMA Channel, there is one RF carrier.

Secondary CDMA Channel. A pre-assigned channel in a CDMA Cellular System for Spreading Rate 1 used by the mobile station for initial acquisition. See also Primary CDMA Channel.

Secondary Reverse Power Control Subchannel. A reverse power control subchannel used to control the shared Forward Fundamental Channel or the Forward Supplemental Channel.

Serving Frequency. The CDMA frequency on which a mobile station is currently communicating with one or more base stations.

Slot. A 1.25 ms interval on the Forward Packet Data Control Channel and the Forward Packet Data Channel. See also Frame.

Slotted Mode. An operation mode of the mobile station in which the mobile station monitors only selected slots on the Paging Channel.

Soft Handoff. A handoff occurring while the mobile station is in the Mobile Station Control on the Traffic Channel State. This handoff is characterized by commencing communications with a new base station on the same CDMA Frequency Assignment before terminating communications with an old base station. See also Hard Handoff.

Space Time Spreading (STS). A forward link transmission method which transmits all forward link channel symbols on multiple antennas and spreads the symbols with complementary Walsh or quasi-orthogonal functions.

Spreading Rate. The PN chip rate of the Forward CDMA Channel or the Reverse CDMA Channel, defined as a multiple of 1.2288 Mcps.

Spreading Rate 1. Spreading Rate 1 is often referred to as "1X." A Spreading Rate 1 Forward CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 1.2288 Mcps. A Spreading Rate 1 Reverse CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 1.2288 Mcps.

Spreading Rate 3. Spreading Rate 3 is often referred to as "3X." A Spreading Rate 3 Forward CDMA Channel uses three direct-sequence spread carriers (see Multiple-Carrier Forward Channel) each with a chip rate of 1.2288 Mcps. A Spreading Rate 3 Reverse CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 3.6864 Mcps.

Sps. Symbols per second.

SR. See Spreading Rate.

STS. See Space Time Spreading.

Subpacket Data Rate. The data rate for a subpacket transmission of the Forward Packet Data Channel or the Reverse Packet Data Channel. The subpacket data rate is equal to the number of bits in the encoder packet divided by the duration of the subpacket transmission.

Symbol. See Code Symbol and Modulation Symbol.

Sync Channel. A code channel in the Forward CDMA Channel which transports the synchronization message to the mobile station.

Sync Channel Superframe. An 80 ms interval consisting of three Sync Channel frames (each 26.666… ms in length).

System Time. The time reference used by the system. System Time is synchronous to UTC time (except for leap seconds) and uses the same time origin as GPS time. All base stations use the same System Time (within a small error tolerance). Mobile stations use the same System Time, offset by the propagation delay from the base station to the mobile station. See also Coordinated Universal Time.

TD. Transmit Diversity schemes, including OTD and STS.

Time Reference. A reference established by the mobile station that is synchronous with the earliest arriving multipath component used for demodulation.

Transmit Diversity Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA base station to support forward link transmit diversity. The pilot channel and the transmit diversity pilot channel provide phase references for coherent demodulation of forward link CDMA channels which employ transmit diversity.

Turbo Code. A type of error-correcting code. A code symbol is based on the outputs of the two recursive convolutional codes (constituent codes) of the Turbo code.

UTC. Coordinated Universal Time or Temps Universel Coordiné. See Coordinated Universal Time.

Variable Data Rates. The operation of a Traffic Channel where the transmitter can change the data rate among a set of possible choices on a frame-by-frame basis.

Variable-rate Supplemental Channel. The operation of the Forward Supplemental Channel and the Reverse Supplemental Channel where the transmitter can change the data rate among a set of possible choices on a frame-by-frame basis.

Walsh Chip. The shortest identifiable component of a Walsh or quasi-orthogonal function. There are 2^N Walsh chips in one Walsh function where N is the order of the Walsh function.

Walsh Function. One of 2^N time orthogonal binary functions (note that the functions are orthogonal after mapping '0' to 1 and '1' to –1). The n-th Walsh function (n = 0 to N – 1) after the mapping to ±1 symbols is denoted by W_n^N.

μs. Microsecond (10^{-6} second).

1.2 Numeric Information

1.2.1 Mobile Station Stored Parameters

$\mathbf{BASE\_ID_s}$ – Base station identification of the current base station.

$\mathbf{CURRENT\_PUF\_PROBE_s}$ – Number of the next PUF probe to be transmitted within the PUF attempt.

$\mathbf{EACH\_INIT\_PWR_s}$ – Initial power offset for the Enhanced Access Channel.

$\mathbf{EACH\_PREAMBLE\_ADD\_DURATION_s}$ – Length, in units of 1.25 ms, of the additional preamble sent prior to initializing the Enhanced Access Channel.

$\mathbf{EACH\_PREAMBLE\_FRAC\_DURATION_s}$ – Length less one, in units of 1.25 ms, of each fractional preamble sent prior to initializing the Enhanced Access Channel.

$\mathbf{EACH\_PREAMBLE\_ENABLED_s}$ – Indicates that a preamble will be sent on the Enhanced Access Channel.

$\mathbf{EACH\_PREAMBLE\_NUM\_FRAC_s}$ – Number of fractional preambles less one sent prior to initializing the Enhanced Access Channel.

$\mathbf{EACH\_PREAMBLE\_OFF\_DURATION_s}$ – Length, in units of 1.25 ms, of the off duration after each fractional preamble sent prior to initializing the Enhanced Access Channel.

$\mathbf{EACH\_PWR\_STEP_s}$ – Power increment for successive Enhanced Access probes on the Enhanced Access Channel, in units of 1.0 dB.

$\mathbf{EACH\_SLOT_s}$ – Enhanced Access Channel slot duration, in units of 1.25 ms.

$\mathbf{EACH\_SLOT\_OFFSET1_s}$ – Enhanced Access Channel first slot offset, in units of 1.25 ms. One of the slot offset values used to calculate the Enhanced Access Channel slot offset. The Enhanced Access Channel slot offset is derived from $EACH\_SLOT\_OFFSET1_s$ and EACH_SLOT OFFSET2$_s$.

$\mathbf{EACH\_SLOT\_OFFSET2_s}$ – Enhanced Access Channel second slot offset, in units of 1.25 ms. One of the slot offset values used to calculate the Enhanced Access Channel slot offset.

The Enhanced Access Channel slot offset is derived from EACH_SLOT_OFFSET1$_S$ and EACH_SLOT OFFSET2$_S$.

FOR-FCH_BLANKING_DUTYCYCLE$_S$ – The period of required non-zero rate transmissions by the base station on the Forward Fundamental Channel when operating with forward link Radio Configuration 11 or forward link Radio Configuration 12.

FPC_BCMC_CHAN$_S$ – An indicator of whether the Forward Fundamental Channel or Forward Supplemental Channel[FPC_SEC_CHAN$_S$] is associated with the secondary reverse power control subchannel. When FPC_BCMC_CHAN$_S$ is ‘1’, the Forward Fundamental Channel is associated with the secondary reverse power control subchannel; otherwise, the Forward Supplemental Channel[FPC_SEC_CHAN$_S$] is associated with the secondary reverse power control subchannel.

FCH_BCMC_IND$_S$ – Forward Fundamental Channel broadcast and multicast mode indicator.

FPC_DCCH_CURR_SETPT$_S$ – Current power control subchannel outer loop setpoint for the Forward Dedicated Control Channel.

FPC_DCCH_MAX_SETPT$_S$ – Maximum value of the power control subchannel outer loop setpoint for the Forward Dedicated Control Channel.

FPC_DCCH_MIN_SETPT$_S$ – Minimum value of the power control subchannel outer loop setpoint for the Forward Dedicated Control Channel.

FPC_FCH_CURR_SETPT$_S$ – Current power control subchannel outer loop setpoint for the Forward Fundamental Channel.

FPC_FCH_MAX_SETPT$_S$ – Maximum value of the power control subchannel outer loop setpoint for the Forward Fundamental Channel.

FPC_FCH_MIN_SETPT$_S$ – Minimum value of the power control subchannel outer loop setpoint for the Forward Fundamental Channel.

FPC_MODE$_S$ – Forward power control operating mode.

FPC_PRI_CHAN$_S$ – Indication of the channel that is associated with the primary reverse power control subchannel, i.e., the channel (either the Forward Dedicated Control Channel or the Forward Fundamental Channel) that includes a forward power control subchannel when the common power control subchannel is not assigned.

FPC_SCH_CURR_SETPT$_S$[i] – Current power control subchannel outer loop setpoint for the i-th Forward Supplemental Channel.

FPC_SCH_MAX_SETPT$_S$[i] – Maximum value of the power control subchannel outer loop setpoint for the i-th Forward Supplemental Channel.

FPC_SCH_MIN_SETPT$_S$[i] – Minimum value of the power control subchannel outer loop setpoint for the i-th Forward Supplemental Channel.

FPC_SEC_CHAN$_S$ – Index of Forward Supplemental Channel that is associated with the secondary power control subchannel.

FRAME_OFFSET$_s$ – Current Forward Traffic Channel and Reverse Traffic Channel frame offset, in units of 1.25 ms.

FSCH_OUTERCODE_OFFSET$_s$[i] – Current timing offset, in units of 20 ms, of the outer coding buffer for the i-th Forward Supplemental Channel.

FSCH_OUTERCODE_RATE$_s$[i] – Current outer code rate of the i-th Forward Supplemental Channel.

IC_MAX$_s$ – The maximum interference correction that can be applied.

IC_THRESH$_s$ – The threshold level at which the interference correction begins to be applied.

INIT_PWR$_s$ – Initial power offset for Access Channel probes.

NOM_PWR$_s$ – Nominal transmit power offset. A correction factor to be used by mobile stations in the open loop power estimate, initially applied on the Access Channel.

NOM_PWR_EXT$_s$ – Extended nominal transmit power offset. A correction factor to be used by mobile stations in the open loop power estimate.

NUM_PREAMBLE$_s$ – Duration of Reverse Traffic Channel preamble during handoff in multiples of 20 ms when operating in Radio Configuration 1 or 2 or the duration of the Reverse Traffic Channel preamble during hard handoff in multiples of 1.25 ms when operating in Radio Configurations 3, 4, 5, 6, or 8.

NUM_REV_CODES$_s$ – A storage variable in the mobile station which contains the number of Reverse Supplemental Code Channels which will be utilized in the next Reverse Supplemental Code Channel transmission beginning at time REV_START_TIME$_s$. A value of 0 indicates no Reverse Supplemental Code Channel transmission will be permitted (i.e., there is no pending Reverse Supplemental Code Channel transmission).

PAGECH$_s$ – The Paging Channel number.

PILOT_GATING_RATE$_s$ – The rate at which the Reverse Pilot Channel is gated on and off.

PILOT_GATING_USE_RATE$_s$ – Indication whether or not the Reverse Pilot Channel is gated.

PILOT_PN$_s$ – Pilot Channel PN sequence offset, in units of 64 PN chips, for a base station.

PUF_INIT_PWR$_s$ – Power increase (in dB) of the first PUF pulse in a PUF attempt.

PUF_PWR_STEP$_s$ – Amount (in dB) by which the mobile station is to increment the power of a PUF pulse above nominal power from one PUF pulse to the next.

RPC_MODE$_s$– Reverse Link Closed Loop Power control update rate assigned by the base station.

PWR_CNTL_STEP$_s$ – Power control step size assigned by the base station that the mobile station is to use for closed loop power control.

PWR_STEP$_s$ – Power increment for successive Access probes on the Access Channel, in units of 1.0 dB.

REV_ACKCH_GAIN_ADJ_ACS1$_s$ – Reverse Acknowledgment Channel gain adjust (relative to the nominal value) when operating with forward link Radio Configuration 11 or forward link Radio Configuration 12 if the number of cells in the active set equals one.

REV_ACKCH_GAIN_ADJ_ACS2PLUS$_s$ – Reverse Acknowledgment Channel gain adjust (relative to the nominal value) when operating with forward link Radio Configuration 11 or forward link Radio Configuration 12 if the number of cells in the active set is greater than or equal to two.

RCCCH_INIT_PWR$_s$ – Initial power offset for the Reverse Common Control Channel.

RCCCH_NOM_PWR$_s$ – Nominal transmit power offset for the Reverse Common Control Channel. A correction factor to be used by mobile stations in the open loop power estimate, initially applied on the Reverse Common Control Channel.

RCCCH_PREAMBLE_ADD_DURATION$_s$ – Length, in units of 1.25 ms, of the additional preamble sent prior to initializing the Reverse Common Control Channel in Reservation Access Mode.

RCCCH_PREAMBLE_FRAC_DURATION$_s$ – Length, less one, in units of 1.25 ms, of each fractional preamble sent prior to initializing the Reverse Common Control Channel in Reservation Access Mode.

RCCCH_PREAMBLE_ENABLED$_s$ – Indication that a preamble will be sent on Reverse Common Control Channel in the Reservation Access Mode.

RCCCH_PREAMBLE_NUM_FRAC$_s$ – Number of fractional preambles, less one, sent prior to initializing the Reverse Common Control Channel in Reservation Access Mode.

RCCCH_PREAMBLE_OFF_DURATION$_s$ – Length, in units of 1.25 ms, of the off duration after each fractional preamble sent prior to initializing the Reverse Common Control Channel in Reservation Access Mode.

RCCCH_SLOT$_s$ – Reverse Common Control Channel slot duration, in units of 1.25 ms.

RCCCH_SLOT_OFFSET1$_s$ – Reverse Common Control Channel first slot offset, in units of 1.25 ms. One of the slot offset values used to calculate the Reverse Common Control Channel slot offset. The Reverse Common Control Channel slot offset is derived from RCCCH_SLOT_OFFSET1$_s$ and RCCCH_SLOT OFFSET2$_s$.

RCCCH_SLOT_OFFSET2$_s$ – Reverse Common Control Channel second slot offset, in units of 1.25 ms. One of the slot offset values used to calculate the Reverse Common Control Channel slot offset. The Reverse Common Control Channel slot offset is derived from RCCCH_SLOT_OFFSET1$_s$ and RCCCH_SLOT OFFSET2$_s$.

RESUME_PREAMBLE$_s$ – The size of the preamble to be transmitted on a Reverse Supplemental Code Channel. This preamble is transmitted at the beginning of the transmission on a Reverse Supplemental Code Channel when resuming transmission following an interruption of discontinuous transmission.

REV_FCH_GATING_MODE$_s$ – A parameter that enables gating of the Reverse Fundamental Channel with Radio Configuration 3, 4, 5, or 6.

REV_PDCH_TABLE_SEL$_s$ – Selects between Reverse Packet Data Channel nominal attribute gain tables that can have different energies per subpacket transmission and tables that cannot have different energies per subpacket transmission.

REV_PWR_CNTL_DELAY$_s$ – Reverse link power control loop delay when the Reverse Fundamental Channel with Radio Configuration 3, 4, 5, or 6 is gated or when the Reverse Common Control Channel preamble is gated.

REV_SCH_FRAME_OFFSET$_s$[i] – Frame offset, in units of 20 ms, applied to the i-th Reverse Supplemental Channel.

REV_SPICH_EP_SIZEs – The smallest payload size on the Reverse Packet Data Channel for which the Reverse Secondary Pilot Channel is enabled.

RLGAIN_ACKCH_PILOT$_s$ – Gain adjustment for the Reverse Acknowledgment Channel relative to the Reverse Pilot Channel.

RLGAIN_ADJ$_s$ – Gain adjustment applied to the Traffic Channel output power relative to the transmission power on the Access Channel, the Enhanced Access Channel, or the Reverse Common Control Channel.

RLGAIN_COMMON_PILOT$_s$ – Gain adjustment of the Reverse Common Control Channel data relative to the Reverse Pilot Channel.

RLGAIN_CQICH_PILOT$_s$ – Gain adjustment for the Reverse Channel Quality Indicator Channel relative to the Reverse Pilot Channel.

RLGAIN_PDCCH_PILOT$_s$ – Gain adjustment for the Reverse Packet Data Control Channel relative to the Reverse Pilot Channel.

RLGAIN_TRAFFIC_PILOT$_s$ – Gain adjustment of the Reverse Traffic Channel with Radio Configurations 3 through 7 relative to the Reverse Pilot Channel.

RLGAIN_SCH_PILOT$_s$[i] – Gain adjustment of the i-th Reverse Supplemental Channel relative to the Reverse Pilot Channel.

RLGAIN_REQCH_PILOT$_s$ – Gain adjustment for the Reverse Request Channel relative to the Reverse Pilot Channel.

RLGAIN_SPICH_PILOT$_s$ – Gain adjustment of the Reverse Secondary Pilot Channel relative to the Reverse Pilot Channel.

RTC_NOM_PWR$_s$ – Reverse Traffic Channel Nominal Power. The nominal power to be used by the mobile station for its initial transmission on the Reverse Traffic Channel if RTC_NOM_PWR_USE_IND is set to '1'.

SCH_BCMC_IND$_s$[i] – Broadcast and multicast mode indicator for the i-th Forward Supplemental Channel.

TX_PWR_LIMIT$_s$ – Transmit Power Limit. If the mobile station is operating in the 1915MHz – 1920MHz block of the PCS band, the mobile station is to limit its transmission power to no more than the value indicated by this field.

1.2.2 Base Station Parameters

Since many mobile stations are in communication with each base station, many of these parameters will have multiple instantiations, with different values.

BCN – Index number of the Broadcast Control Channel.

CDM_IDX – Index value equal to ⌊FOR_ACKSCH_INDEX/3⌋ mod 32. CDM_IDX can be 0 through 31.

ESN – Electronic serial number of the mobile station with which the base station is communicating.

FOR_ACKSCH_INDEX – Integer value, ranging from 0 to 191, applied to the Forward Acknowledgment Channel.**FOR_CPCCH_RATE –** Power Control Rate on the Forward Indicator Control Channel.

FOR_FCH_CCSH_INTERLEAVER_TYPE – Interleaver type used by a base station in the active set when operating with Radio Configuration 12.

FOR_CPCCH_UPDATE_RATE – Update Rate of the common power control subchannel on the Forward Indicator Control Channel.

FOR_RCCH_REPITITION – Indicates the number of rate control symbols on the rate control subchannel per Forward Indicator Control Channel frame.

FOR_RCCH_UPDATE_RATE – Update Rate of the rate control subchannel on the Forward Indicator Control Channel.

FOR_SCH_FRAME_OFFSET[i] – Frame offset, in units of 20 ms, applied to the i-th Forward Supplemental Channel.

FPC_PRI_CHAN – Indication of the channel that is associated with the primary reverse power control subchannel, i.e., the channel (either the Forward Dedicated Control Channel or the Forward Fundamental Channel) that includes a forward power control subchannel when the common power subchannel is not assigned.

FRAME_OFFSET – Frame offset, in units of 1.25 ms, applied to the Forward Traffic Channel and Reverse Traffic Channel.

IFHHO_SRCH_CORR – The optional inter-frequency hard handoff correction to the Nominal Attribute Gain.

IQM_IDX – Index value equal to ⌊FOR_ACKSCH_INDEX/96⌋. IQM_IDX can be either 0 or 1

NGHBR_TX_DURATION – Transmit duration, in units of 80 ms, of the transmit window for the hopping pilot beacon base station.

NGHBR_TX_OFFSET – Time offset, in units of 80 ms, of the transmit window for the hopping pilot beacon base station.

NGHBR_TX_PERIOD – Period between subsequent windows, in units of 80 ms, of the transmit window for the hopping pilot beacon base station.

PCN – Index number of the Paging Channel.

PILOT_PN – Pilot PN sequence offset index for the Forward CDMA Channel.

QPCH_POWER_LEVEL_PAGE – Power level of the transmitted Quick Paging Channel Paging Indicator modulation symbols, relative to the Forward Pilot Channel.

QPCH_POWER_LEVEL_CONFIG – Power level of the transmitted Quick Paging Channel Configuration Change Indicator modulation symbols, relative to the Forward Pilot Channel.

QPCH_POWER_LEVEL_BCAST – Power level of the transmitted Quick Paging Channel Broadcast Indicator modulation symbols, relative to the Forward Pilot Channel.

RTC_NOM_PWR_USE_IND – Reverse Traffic Channel Nominal Power Used Indicator. Indicates if the mobile station uses $RTC\_NOM\_PWR_s$. See $RTC\_NOM\_PWR_s$.

TDM_IDX – Index value equal to FOR_ACKSCH_INDEX mod 3. TDM_IDX can be 0, 1 or 2.

1.2.3 MAC Interface

1.2.3.1 Service Interfaces

This section describes the service interface primitives (or primitives in short) to and from the MAC Layer. Service interface primitives are abstract, atomic, implementation-independent representations of interactions between a service user and its service provider. No requirement is placed on the mobile station or the base station to implement specific service primitives. See ITU-T Recommendation X.210.

The following sections contain a summary of the service interface primitive definitions. The conventions that are used for service interface primitives are shown in Table 1.2.3.1-1, and conform to ITU-T Recommendation X.210.

Table 1.2.3.1-1. Service Interface Primitive Types

Primitive Type	Source	Destination	Purpose
Request	service user	service provider	Request a service, resource, etc.
Indication	service provider	service user	Indicates that data has arrived or an event for the service user has occurred.
Response	service user	service provider	Acknowledgment of an indication.

The invocation of service interface primitives is notated as follows:

RX-Primitive.Primitive_Type(parameters)

where:

RX -	An abbreviation for the service provider entity (e.g., PHY for the Physical Layer);
Primitive -	The name of the specific primitive to or from the service provider (e.g., FCH)
Primitive_Type -	The specific Primitive Type as defined in Table 1.2.3.1-1, (e.g., Request)
parameters -	A list of parameters for the primitive (e.g., NUM_BITS)

For example, a request from the MAC Layer to the Physical Layer to transmit a Forward or Reverse Fundamental Channel frame with frame duration specified by FRAME_DURATION, information bits specified by SDU, and number of bits in a frame specified by NUM_BITS, is notated as follows:

PHY-FCH.Request(SDU, FRAME_DURATION, NUM_BITS)

1.2.3.2 MAC Interface Parameters

This section describes the parameters of the service interface primitives.

ACID – The ARQ Channel identifier for the encoder packet to be decoded on the Forward Packet Data Channel.

ACK_OR_NAK – This parameter is set to NAK to indicate that the physical layer is to send a NAK on the Reverse Acknowledgment Channel or the Forward Acknowledgment Channel, or is set to ACK to indicate that the physical layer is to send an ACK on the Reverse Acknowledgment Channel or the Forward Acknowledgment Channel.

BASE_ID – Base station identification.

BOOST – A parameter used to distinguish between the normal and enhanced QoS mode of operation on the Reverse Packet Data Channel.

CACH_ID – Common Assignment Channel number.

CACKCH_ID – Forward Common Acknowledgment Channel number.

COMMAND – A parameter that can take three values: ‘UP’, ‘DOWN’, or ‘HOLD’.

CPCCH_ID – Common Power Control Channel number.

CQI_GAIN – An indicator for the relative gain of the Reverse Channel Quality Indicator Channel with respect to the Reverse Pilot Channel.

CQI_VALUE – The value of the channel quality indicator, the increment or decrement of the channel quality indicator, or the indication that the channel quality indicator is not to be transmitted.

EACH_ID – Enhanced Access Channel number.

EP – Encoder packet.

EP_NEW – Indicates if a new encoder packet is being transmitted on the Forward Packet Data Channel.

EP_SIZE – The size (in bits) of the encoder packet on the Forward Packet Data Channel or the Reverse Packet Data Channel to be decoded.

FCCCH_ID – Forward Common Control Channel number.

FRAME_QUALITY – An indication of the quality of the frame.

FRAME_DURATION – The duration of the frame.

HEADER – Enhanced Access Header, sent in the PHY-EACHHeader.Request primitive.

NUM_BITS – The number of bits in the frame.

NUM_FRAME_QUALITY[0…NUM_FRAMES-1] – An array of indications of frame quality. Each element of the array indicates the quality of the corresponding frame.

NUM_FRAMES – Number of elements contained in NUM_FRAME_QUALITY.

NUM_PREAMBLE_FRAMES – The number of Access Channel preamble frames, sent in the PHY-ACHPreamble.Request primitive; the number of Enhanced Access Channel preamble frames sent in the PHY-EACHPreamble.Request primitive; or the number of Reverse Supplemental Code Channel preamble frames sent in the PHY-SCCHPreamble.Request primitive.

NUM_SLOTS – The number of 1.25 ms slots in the Forward Packet Data Control Channel or the Forward Packet Data Channel.

PDCCH_ID – Forward Packet Data Control Channel number.

PILOT_PN – Pilot PN sequence offset index for the Forward CDMA Channel.

PN – Pilot PN sequence offset index for the Forward CDMA channel.

PWR_LVL – Power level adjustment of the Access probe, in units of PWR_STEP_S, sent in the PHY-ACHPreamble.Request primitive and PHY-ACH.Request primitive; or the power level adjustment of the Enhanced Access probe, in units of $\text{EACH\_PWR\_STEP}_\text{S}$, sent in the PHY-EACHPreamble.Request primitive, the PHY-EACHHeader.Request primitive, and the PHY-EACH.Request primitive.

RA – The Access Channel number.

RC_VEC – An array of rate control commands. Each element of the array indicates the rate control command of the base station with a corresponding pilot PN offset.

RES_SCH_ADDR – The indicator control subchannel Index.

RETURNED_EP – Symbols of the encoded packet.

RCCCH_ID – Reverse Common Control Channel number.

RN – The pseudo-random offset of the Access probe from a zero-offset Access Channel frame.

SDU – Service data unit.

SDU[0…NUM_FRAMES – 1] – Service data units for frames numbered 0 through NUM_FRAMES **–** 1.

SLOT_OFFSET – Slot offset associated with the Enhanced Access Channel.

SPID – Subpacket identifier for the encoder packet to be decoded.

SYS_TIME – The system time, in units of 1.25 ms, for the first slot of the received subpacket.

WALSH_COVER – The Walsh cover associated with the pilot in the packet data active set to which the Reverse Channel Quality Indicator Channel is to be transmitted.

WALSH_INDEX – Walsh code or Walsh channel for the Forward CDMA Channel.

WCI_SET – The Walsh code indices to be used in decoding the encoder packet.

1.2.3.3 Service Interface Primitives Received by the Physical Layer

The primitives sent from the MAC Layer to the Physical Layer are summarized in Table 1.2.3.3-1 (see [3]).

1 **Table 1.2.3.3-1. Service Interface Primitives Received by the Physical Layer**

Primitive Type	Primitive	Parameters
Request	PHY-RSPICH	SYS_TIME
	PHY-ACHPreamble	RA, PWR_LVL, RN, NUM_PREAMBLE_FRAMES
	PHY-ACH	RA, PWR_LVL, RN, SDU
	PHY-DecodeFPDCCH	PDCCH_ID, PILOT_PN, WALSH_INDEX, SYS_TIME, NUM_SLOTS
	PHY-DecodeFPDCH	PILOT_PN, ACID, SPID, EP_SIZE, WCI_SET, EP_NEW, SYS_TIME, NUM_SLOTS
	PHY-EACHPreamble	PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET
	PHY-EACHHeader	PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, SDU
	PHY-EACH	PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, SDU, FRAME_DURATION, NUM_BITS
	PHY-RCCCHPreamble	FCCCH_ID, RCCCH_ID, BASE_ID
	PHY-RCCCH	FCCCH_ID, RCCCH_ID, BASE_ID, SDU, FRAME_DURATION, NUM_BITS
	PHY-RPDCCH	SDU, BOOST, EP_SIZE, MSIB, SYS_TIME
	PHY-RREQCH	SDU, SYS_TIME
	PHY-DCCH	SDU, FRAME_DURATION, NUM_BITS
	PHY-RACKCH	ACK_OR_NAK
	PHY-RCQICH	WALSH_COVER, CQI_VALUE, CQI_GAIN
	PHY-FCH	SDU, FRAME_DURATION, NUM_BITS
	PHY-RPICH	
	PHY-SCH	SDU, FRAME_DURATION, NUM_BITS
	PHY-SCHOuterCode	SDU, NUM_BITS, SYS_TIME

Primitive Type	Primitive	Parameters
	PHY-SCCHPreamble	NUM_PREAMBLE_ FRAMES
	PHY-SCCH	SDU, FRAME_DURATION, NUM_BITS
	PHY-EncodeRPDCH	SDU, NUM_BITS, SYS_TIME
	PHY-RPDCH	EP, SPID, BOOST, SYS_TIME
	PHY-SYNCH	SDU
	PHY-PCH	SDU
	PHY-BCCH	SDU, NUM_BITS
	PHY-CPCCH	PN, CPCCH_ID, RES_SCH_ADDR
	PHY-CACH	SDU, CACH_ID, NUM_BITS
	PHY-CACKCH	PN, CACKCH_ID, RES_SCH_ADDR
	PHY-FCCCH	SDU, FCCCH_ID, FRAME_DURATION, NUM_BITS
	PHY-DecodeFRCCH	SYS_TIME
	PHY-FRCCH	COMMAND, SYS_TIME
	PHY-DecodeFGCH	PILOT_PN, WALSH_INDEX, SYS_TIME
	PHY-FGCH	SDU, SYS_TIME
	PHY-DecodeFACKCH	SYS_TIME
	PHY-FACKCH	ACK_OR_NAK, SYS_TIME
	PHY-FPDCCH	PDCCH_ID, SDU, NUM_SLOTS, SYS_TIME
	PHY-FPDCH	EP, SPID, NUM_SLOTS, WCI_SET, SYS_TIME

1.2.3.4 Service Interface Primitives Sent from the Physical Layer

The primitives sent from the Physical Layer to the MAC Layer are summarized in Table 1.2.3.4-1.

Table 1.2.3.4-1. Service interface Primitives Sent from the Physical Layer

Primitive-Type	Primitive	Parameters
Indication	PHY-RPDCCH	SDU, MSIB, BOOST, SYS_TIME
	PHY-RREQCH	SDU, SYS_TIME
	PHY-RACKCH	ACK_OR_NAK
	PHY-RCQICH	CQI_VALUE, WALSH_COVER
	PHY-RPDCH	SDU, FRAME_QUALITY, SYS_TIME
	PHY-DecodeFPDCCH	PDCCH_ID, SDU, SYS_TIME, NUM_SLOTS
	PHY-SYNCH	SDU
	PHY-PCH	SDU
	PHY-BCCH	SDU, NUM_BITS, FRAME_QUALITY
	PHY-CACH	SDU, FRAME_QUALITY
	PHY-FCCCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-DCCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-FCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-SCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-SCHOuterCode	SDU[0…NUM_FRAMES-1], NUM_BITS, NUM_FRAMES, FRAME_QUALITY[0,..,NUM_FRAMES-1], SYS_TIME
	PHY-SCCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-ACH	SDU, FRAME_QUALITY
	PHY-EACHPreamble	
	PHY-EACHHeader	SDU, FRAME_QUALITY
	PHY-EACH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-RCCCHPreamble	

Primitive-Type	Primitive	Parameters
	PHY-RCCCH	SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY
	PHY-EncodeRPDCH	RETURNED_EP, SYS_TIME
	PHY-DecodeFRCCH	RC_VEC, SYS_TIME
	PHY-DecodeFGCH	WALSH_INDEX, SDU, SYS_TIME
	PHY-DecodeFACKCH	ACK_OR_NAK, SYS_TIME
Response	PHY-DecodeFPDCH	ACID, EP, SYS_TIME, NUM_SLOTS

1.3 CDMA System Time

All base station digital transmissions are referenced to a common CDMA system-wide time scale that uses the Global Positioning System (GPS) time scale, which is traceable to, and synchronous with, Coordinated Universal Time (UTC). GPS and UTC differ by an integer number of seconds, specifically the number of leap second corrections added to UTC since January 6, 1980. The start of CDMA System Time is January 6, 1980 00:00:00 UTC, which coincides with the start of GPS time.

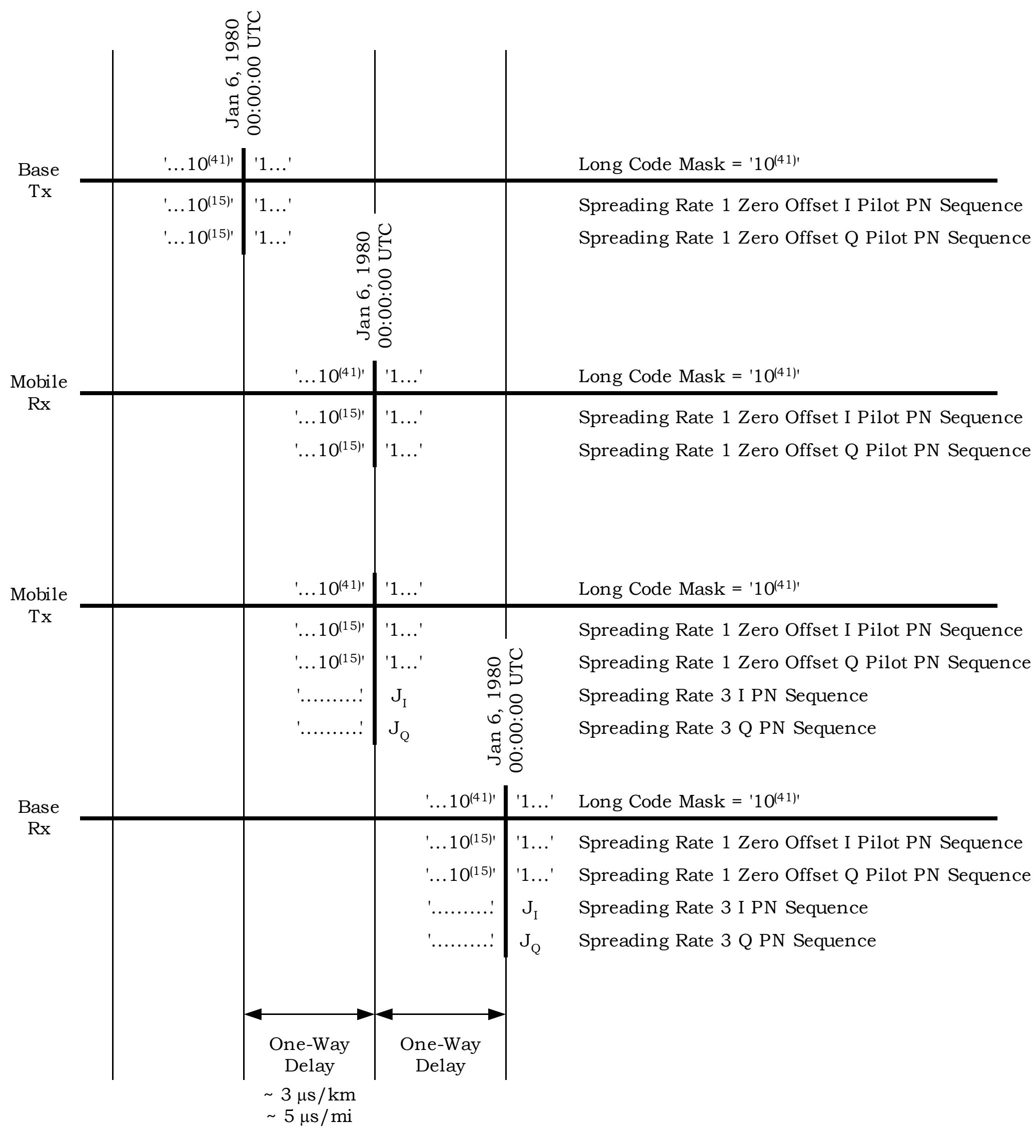
System Time keeps track of leap second corrections to UTC but does not use these corrections for physical adjustments to the System Time clocks.

Figure 1.3-1 shows the relation of System Time at various points in the CDMA system. The long code and the zero offset PN sequences for the I and Q channels (see 2.1.3.1.16, 2.1.3.1.17, and 3.1.3.1.19) are shown in their initial states at the start of System Time. The initial state of the long code is that state in which the output of the long code generator is the first ‘1’ output following 41 consecutive ‘0’ outputs, with the binary mask consisting of ‘1’ in the MSB followed by 41 ‘0’s. Referring to the shift register in Figure 2.1.3.1.17-1, this implies that the 42nd bit in the shift register equals ‘1’ and that all other bits in the shift register are equal to ‘0’.

A pair of 2^{15} length PN sequences are used for the Forward CDMA Channel and the Spreading Rate 1 Reverse CDMA Channel. The initial state of the 2^{15} PN sequence, for both I and Q channels, is the state in which the output of the PN sequence generator is the first ‘1’ output following 15 consecutive ‘0’ outputs. A pair of 3×2^{15} length PN sequences are used for the Spreading Rate 3 Reverse CDMA Channel. The initial state of the 3×2^{15} PN sequence for the I channel is the state in which the first 20 outputs of the I PN sequence generator are ‘1000 0000 0001 0001 0100’. The initial state of the 3×2^{15} PN sequence for the Q channel is the state in which the first 20 outputs of the Q PN sequence generator are ‘1001 0000 0010 0100 0101’.

From Figure 1.3-1, note that the System Time at various points in the transmission and reception processes is the absolute time referenced at the base station antenna offset by the one-way or round-trip delay of the transmission, as appropriate. Time measurements are referenced to the transmit and receive antennas of the base station and the RF connector of the mobile station. The precise zero instant of System Time is the midpoint between the last ‘0’ of the 41 consecutive ‘0’ outputs and the succeeding ‘1’ of the long code using the binary mask consisting of ‘1’ in the MSB followed by 41 ‘0’s.

Wherever this document refers to CDMA System time in 20 ms frames, it is taken to mean an integer value t such that: $t = \lfloor s/0.02 \rfloor$, where s represents System Time in seconds.



Note: Time measurements are made at the antennas of base stations and the RF connectors of the mobile stations.
$0^{(n)}$ denotes a sequence of n consecutive zeroes.
J_I = '1000, 0000, 0001, 0001, 0100'.
J_Q = '1001, 0000, 0010, 0100, 0101'.

Figure 1.3-1. System Time Line

1.4 Tolerances

Unless otherwise specified, all values indicated are exact unless an explicit tolerance is stated. Also refer to [10] and [11].

1.5 Reserved Bits

Some bits are marked as reserved bits in the frame structure of some channels. Some or all of these reserved bits may be used in the future. The mobile station and the base station shall set all bits that are marked as reserved bits to ‘0’ in all frames that they transmit. The mobile station and the base station shall ignore the state of all bits that are marked as reserved bits in all frames that they receive.

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2 REQUIREMENTS FOR MOBILE STATION CDMA OPERATION

This section defines requirements that are specific to CDMA mobile station equipment and operation. A CDMA mobile station may support operation in one or more band classes and spreading rates.

2.1 Transmitter

2.1.1 Frequency Parameters

2.1.1.1 Channel Spacing and Designation

See [12] for a description of the band classes that a mobile station may support.

2.1.1.2 Frequency Tolerance

The mobile station shall meet the requirements in Section 4.1 of the current version of [11].

2.1.2 Power Output Characteristics

All power levels are referenced to the mobile station antenna connector unless otherwise specified.

2.1.2.1 Maximum Output Power

The mobile station shall meet the requirements in Sections 4.4.5 and 5.1 of the current version of [11]. The mobile station shall limit its transmission power to no more than the value indicated by the $TX\_PWR\_LIMIT_S$ when operating in the 1915MHz – 1920MHz block of the PCS band.

The mobile station shall be capable of transmitting at the minimum specified power level when transmitting only on the Access Channel, Enhanced Access Channel, Reverse Common Control Channel, or Reverse Fundamental Channel and when commanded to maximum output power. The output power may be lower when transmitting on more than one of the following: Reverse Dedicated Control Channel, Reverse Fundamental Channel, Reverse Supplemental Channel, Reverse Supplemental Code Channel, Reverse Acknowledgment Channel, Reverse Channel Quality Indicator Channel, Reverse Secondary Pilot Channel, Reverse Packet Data Channel, Reverse Packet Data Control Channel, or Reverse Request Channel. The mobile station shall not exceed the maximum specified power levels under any circumstances.

2.1.2.2 Output Power Limits

2.1.2.2.1 Minimum Controlled Output Power

The mobile station shall meet the requirements in Section 4.4.6 of the current version of [11].

2.1.2.2.2 Gated Output Power

2.1.2.2.2.1 Gated Output Power Except During a Serving Frequency PUF Probe

The transmitter noise floor should be less than –60 dBm/1.23 MHz and shall be less than –54 dBm/1.23 MHz.

The mobile station transmits at nominal controlled power levels only during gated-on periods, which are defined as a power control group.

During gated-off periods, between the transmissions of power control groups, the mobile station shall reduce its mean output power, either by at least 20 dB with respect to the mean output power of the most recent gated-on power control group or to the transmitter noise floor, whichever is the greater power.

Given an ensemble of K gated-on power control groups, all with the same mean output power, the time response of the ensemble average shall be within the limits shown in Figure 2.1.2.2.2.1-1.

This section applies to the following cases:

- When operating with Radio Configuration 1 or 2 in variable data rate transmission mode (see 2.1.3.1.14.1),
- When operating with Reverse Pilot Channel gating (see 2.1.3.2.3),
- When transmitting the Enhanced Access Channel preamble or the Reverse Common Control Channel preamble (see 2.1.3.5.2.3 and 2.1.3.6.2.3),
- When operating the Reverse Fundamental Channel gating with Reverse Radio Configurations 3, 4, 5, 6, or 8, and gating is used.
- When operating with Reverse Channel Quality Indicator Channel gating.

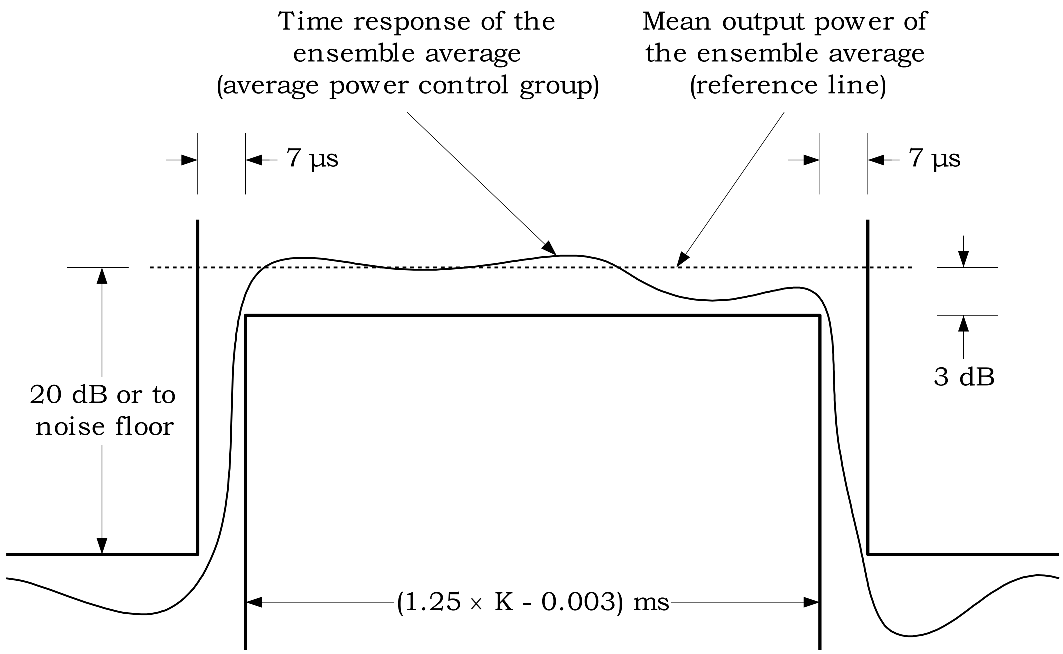

Figure 2.1.2.2.2.1-1. Transmission Envelope Mask (Average Gated-on Power Control Group)

2.1.2.2.2.2 Gated Output Power During a Serving Frequency PUF Probe

If the mobile station transmits gated-off power control groups during the PUF recovery time, the mobile station shall reduce its mean output power, either by at least 20 dB with respect to the mean output power of the power control group prior to the final power control group of the PUF Setup time, or to the transmitter noise floor, whichever is the greater power.

2.1.2.2.3 Standby Output Power

The mobile station shall disable its transmitter except when transmitting on the Reverse CDMA Channel.

When the transmitter of a mobile station is disabled, the output noise power spectral density of the mobile station shall be less than –61 dBm/1 MHz for all frequencies within the transmit bands that the mobile station supports.

2.1.2.3 Controlled Output Power

The mobile station shall provide three independent means for output power adjustment: an open loop estimation performed by the mobile station, a closed loop correction involving both the mobile station and the base station, and, for Radio Configurations 3 through 8, a code channel attribute adjustment performed by the mobile station and the base station.

Accuracy requirements on the controlled range of mean output power (see 2.1.2.4) need not apply for the following three cases: mean output power levels exceeding the minimum EIRP at the maximum output power for the corresponding mobile station class (see 2.1.2.1);

mean output power levels less than the minimum controlled output power (see 2.1.2.2.1); or mean input power levels exceeding -25 dBm within the 1.23 MHz CDMA bandwidth for Spreading Rate 1 or –20 dBm within the 3.69 MHz CDMA bandwidth for Spreading Rate 3.

2.1.2.3.1 Estimated Open Loop Output Power

In all equations in this section, mean power is referenced to the nominal CDMA Channel bandwidth of 1.23 MHz for Spreading Rate 1 or 3.69 MHz for Spreading Rate 3.See Table 2.3.1-1 in [12] for the recommended open loop power offsets.

2.1.2.3.1.1 Open Loop Output Power When Transmitting on the Access Channel

The mobile station shall transmit each Access probe at a mean output power level defined by[2]

$$\begin{aligned}\text{mean output power (dBm)} = \; & -\text{mean input power (dBm)} \\ & + \text{offset power (from Table 2.3.1-1 in [12])} \\ & + \text{interference correction} \\ & + \mathrm{NOM\_PWR_S} - 16 \times \mathrm{NOM\_PWR\_EXT_S} \\ & + \mathrm{INIT\_PWR_S} \\ & + \mathrm{PWR\_LVL} \times \mathrm{PWR\_STEP_S},\end{aligned}$$

where interference correction = min(max(–7 – ECIO, 0), 7), ECIO is the E_c/I_0 (dB) per carrier of the strongest active set pilot, measured within the previous 500 ms, and PWR_LVL is a non-negative integer which is the power level adjustment step.

The mobile station shall determine E_c/I_0 (dB) by taking the ratio of the received pilot energy per chip, E_c, to the total received power spectral density (noise and signals), of at most k usable multipath components, where k is the number of demodulating elements supported by the mobile station. The mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz.

During an Access probe transmission, the mobile station shall update the mean output power in response to changes in the mean input power. For subsequent Access probes in an Access probe sequence, the mobile station shall update the mean output power in response to changes in the mean input power, the interference correction, and PWR_LVL.

Table 2.3.1-2 of [12] specifies the range of $\mathrm{NOM\_PWR_S} - 16 \times \mathrm{NOM\_PWR\_EXT_S}$ and $\mathrm{NOM\_PWR\_EXT_S}$. The range of the $\mathrm{INIT\_PWR_S}$ parameter is –16 to +15 dB, with a nominal

[2]The purpose of having both an $\mathrm{INIT\_PWR_S}$ and a $\mathrm{NOM\_PWR\_EXT_S}$ value is to distinguish between their use. If $\mathrm{INIT\_PWR_S}$ were 0, then $\mathrm{NOM\_PWR_S} - 16 \times \mathrm{NOM\_PWR\_EXT_S}$ would be the correction that should provide the correct received power at the base station. $\mathrm{NOM\_PWR_S} - 16 \times \mathrm{NOM\_PWR\_EXT_S}$ allows the open loop estimation process to be adjusted for different operating environments. $\mathrm{INIT\_PWR_S}$ is the adjustment that is made to the first Access Channel probe so that it should be received at somewhat less than the required signal power. This conservatism partially compensates for occasional, partially decorrelated path losses between the Forward CDMA Channel and the Reverse CDMA Channel.

value of 0 dB. The range of the PWR_STEP_s parameter is 0 to 7 dB. The accuracy of the adjustment to the mean output power due to NOM_PWR_s, $NOM\_PWR\_EXT_s$, $INIT\_PWR_s$, or a single Access probe correction of PWR_STEP_s shall be ±0.5 dB or ±20% of the value in dB, whichever is greater.

The mobile station shall support a total combined range of interference correction, NOM_PWR_s, $NOM\_PWR\_EXT_s$, $INIT\_PWR_s$, and PWR_LVL × PWR_STEP_s as specified in Table 2.3.1-3 of [12].

Prior to application of corrections from PWR_LVL × PWR_STEP_s, closed loop power control corrections, and with $INIT\_PWR_s$ set to zero, the mobile station's estimated open loop mean output power should be within ±6 dB and shall be within ±9 dB of the value determined by the following relationship:

mean output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ NOM_PWR_s – 16 × $NOM\_PWR\_EXT_s$.

This requirement shall be met over the full range of NOM_PWR_s – 16 × $NOM\_PWR\_EXT_s$ (as specified in Table 2.3.1-3 of [12]).

2.1.2.3.1.2 Open Loop Output Power When Transmitting on the Enhanced Access Channel

The mobile station shall transmit the Enhanced Access preamble (see 2.1.3.5.2.3) at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ $EACH\_NOM\_PWR_s$
+ $EACH\_INIT\_PWR_s$
+ 6
+ PWR_LVL × $EACH\_PWR\_STEP_s$,

where interference correction = min(max(IC_THRESH_s – ECIO, 0), IC_MAX_s), ECIO is the E_c/I_0 (dB) per carrier of the strongest active set pilot, measured within the previous 500 ms, and PWR_LVL is a non-negative integer which is the power level adjustment step.

The mobile station shall determine E_c/I_0 (dB) by taking the ratio of the received pilot energy per chip, E_c, to the total received power spectral density (noise and signals), of at most k usable multipath components, where k is the number of demodulating elements supported by the mobile station. While receiving Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; while receiving Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. While receiving Spreading Rate 3, the mobile station shall determine E_c/I_0 by summing the E_c from each multipath component for all three carriers and normalizing by I_0.

During an initial Enhanced Access probe transmission, the mobile station shall update the mean output power in response to changes in the mean input power. For subsequent Enhanced Access probes in an Enhanced Access probe sequence, the mobile station shall update the mean output power in response to changes in the mean input power, the interference correction, and PWR_LVL.

After transmitting the Enhanced Access Channel preamble, the mobile station shall transmit the Reverse Pilot Channel at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ EACH_NOM_PWR_s
+ EACH_INIT_PWR_s
+ PWR_LVL × EACH_PWR_STEP_s.

The range of the EACH_NOM_PWR_s correction is –16 to +15 dB. The range of the EACH_INIT_PWR_s parameter is –16 to +15 dB, with a nominal value of 0 dB. The range of the EACH_PWR_STEP_s parameter is 0 to 7 dB. The accuracy of the adjustment to the mean output power due to EACH_NOM_PWR_s, EACH_INIT_PWR_s, or a single Enhanced Access probe correction of EACH_PWR_STEP_s shall be ±0.5 dB or ±20% of the value in dB, whichever is greater.

The mobile station shall support a total combined range of interference correction, EACH_NOM_PWR_s, EACH_INIT_PWR_s, and PWR_LVL × EACH_PWR_STEP_s as specified in Table 2.3.1-3 of [12].

Prior to application of corrections from PWR_LVL × EACH_PWR_STEP_s, with EACH_INIT_PWR_s set to zero, and with the mobile station only transmitting on the Reverse Pilot Channel, the mobile station's estimated open loop mean output power should be within ±6 dB and shall be within ±9 dB of the value determined by the following relationship:

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ EACH_NOM_PWR_s.

This requirement shall be met over the full range of EACH_NOM_PWR_s (from –16 to +15 dB).

2.1.2.3.1.3 Open Loop Output Power When Transmitting on the Reverse Common Control Channel

When operating in the Reservation Access Mode, the mobile station shall transmit the Reverse Common Control Channel preamble (see 2.1.3.6.2.3) at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ RCCCH_NOM_PWR_s
+ RCCCH_INIT_PWR_s
+ PREV_CORRECTIONS
+ 6,

where interference correction = min(max(IC_THRESH_s – ECIO, 0), IC_MAX_s), and ECIO is the E_c/I_0 (dB) per carrier of the strongest active set pilot, measured within the previous 500 ms.

The mobile station shall determine E_c/I_0 (dB) by taking the ratio of the received pilot energy per chip, E_c, to the total received power spectral density (noise and signals), of at most k usable multipath components, where k is the number of demodulating elements supported by the mobile station. While receiving Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; while receiving Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. While receiving Spreading Rate 3, the mobile station shall determine E_c/I_0 by summing the E_c from each multipath component for all three carriers and normalizing by I_0.

The mobile station shall set PREV_CORRECTIONS to PWR_LVL × EACH_PWR_STEP_s.

After transmitting the Reverse Common Control Channel preamble while in the Reservation Access Mode, and before receiving the first valid power control bit, the mobile station shall transmit the Reverse Pilot Channel at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ RCCCH_NOM_PWR_s
+ RCCCH_INIT_PWR_s
+ PREV_CORRECTIONS.

After the first valid power control bit is received while in the Reservation Access Mode, the mobile station shall transmit the Reverse Pilot Channel at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ RCCCH_NOM_PWR_s
+ RCCCH_INIT_PWR_s
+ PREV_CORRECTIONS
+ the sum of all closed loop power control corrections (dB).

The mobile station shall not update the interference correction after the first power control bit is received.

The range of the $RCCCH\_NOM\_PWR_s$ correction is –16 to +15 dB. The range of the $RCCCH\_INIT\_PWR_s$ parameter is –16 to +15 dB, with a nominal value of 0 dB. The accuracy of the adjustment to the mean output power due to $RCCCH\_NOM\_PWR_s$ or $RCCCH\_INIT\_PWR_s$ shall be ±0.5 dB or ±20% of the value in dB, whichever is greater.

The mobile station shall support a total combined range of interference correction, $RCCCH\_NOM\_PWR_s$, $RCCCH\_INIT\_PWR_s$, PREV_CORRECTIONS, and closed loop power control corrections as specified in Table 2.3.1-3 of [12].

Prior to application of closed loop power control corrections, with $RCCCH\_INIT\_PWR_s$ set to zero, and with the mobile station only transmitting on the Reverse Pilot Channel, the mobile station's estimated open loop mean output power should be within ±6 dB and shall be within ±9 dB of the value determined by the following relationship:

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ $RCCCH\_NOM\_PWR_s$
+ PREV_CORRECTIONS.

This requirement shall be met over the full range of $RCCCH\_NOM\_PWR_s$ (from –16 to +15 dB).

2.1.2.3.1.4 Open Loop Output Power When Transmitting on the Reverse Traffic Channel with Radio Configuration 1 or 2

The initial transmission on the Reverse Fundamental Channel with Radio Configurations 1 or 2 shall be at a mean output power defined by

mean output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ ACC_CORRECTIONS
+ $RLGAIN\_ADJ_s$,

where interference correction = min(max(–7 – ECIO, 0), 7), and ECIO is the E_c/I_0 (dB) per carrier of the strongest active set pilot, measured within the previous 500 ms.

The mobile station shall determine E_c/I_0 (dB) by taking the ratio of the received pilot energy per chip, E_c, to the total received power spectral density (noise and signals), of at most k usable multipath components, where k is the number of demodulating elements supported by the mobile station. The mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz.

If the last channel used prior to operation on the Reverse Traffic Channel was the Access Channel, the mobile station shall set ACC_CORRECTIONS to $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s + INIT\_PWR_s + PWR\_LVL \times PWR\_STEP_s$.

If the last channel used prior to operation on the Reverse Traffic Channel was the Enhanced Access Channel, the mobile station shall set ACC_CORRECTIONS to $EACH\_NOM\_PWR_s + EACH\_INIT\_PWR_s + PWR\_LVL \times EACH\_PWR\_STEP_s$.

If the last channel used prior to operation on the Reverse Traffic Channel was the Reverse Common Control Channel, the mobile station shall set ACC_CORRECTIONS to $RCCCH\_NOM\_PWR_s + RCCCH\_INIT\_PWR_s$ + PREV_CORRECTIONS + sum of all closed loop power control corrections (dB), if applicable.

After the first power control bit is received, the mean output power shall be defined by

mean output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ ACC_CORRECTIONS
+ $RLGAIN\_ADJ_s$
+ the sum of all closed loop power control corrections (dB)
+ $10 \times \log_{10}(1 + NUM\_RSCCH)$ (dB),

where NUM_RSCCH is the number of Reverse Supplemental Code Channels on which the mobile station is transmitting. The range of NUM_RSCCH is from 0 to 7.

The mobile station shall not update the interference correction after the first power control bit is received.

The mobile station shall support a total combined range of interference correction, ACC_CORRECTIONS, $RLGAIN\_ADJ_s$, and closed loop power control corrections as specified in Table 2.3.1-3 of [12].

During a PUF pulse, the mean output power shall be defined by

mean output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ ACC_CORRECTIONS
+ $RLGAIN\_ADJ_s$
+ the sum of all closed loop power control corrections (dB)
+ $PUF\_INIT\_PWR_s$
+ $CURRENT\_PUF\_PROBE_s \times PUF\_PWR\_STEP_s$.

The mobile station shall not begin to increase power for a PUF pulse earlier than one power control group before the beginning of the PUF pulse. The mean output power should reach the PUF pulse power by the beginning of the PUF pulse, and shall reach the PUF pulse power by the end of the first power control group of the PUF pulse. After the end of a PUF pulse transmitted on the serving frequency, the mean output power shall return to either the gated-on or gated-off level by the end of the first power control group of the PUF recovery time. After the end of a PUF pulse transmitted on a PUF target frequency, the mobile station shall disable the transmitter by the end of the first power control group of the PUF recovery time.

During a PUF pulse, the mobile station shall support power increases from the nominal up to the maximum output power. Immediately following the PUF pulse, the mobile station shall decrement its output power to the nominal power or to the gated-off power level with respect to the nominal output power.

The range of $PUF\_INIT\_PWR_S$ is 0 to 63 dB. The range of $PUF\_PWR\_STEP_S$ is 0 to 31 dB. The range of $CURRENT\_PUF\_PROBE_S$ is 1 to 16. The accuracy of the adjustment to the mean output power due to $PUF\_INIT\_PWR_S + (CURRENT\_PUF\_PROBE_S \times PUF\_PWR\_STEP_S)$ shall be ±1/3 of that value (in dB), or ±3 dB, whichever is greater, unless the resulting mean output power exceeds the mobile station's maximum output power. If the output power exceeds the mobile station's maximum output power, the mean output power shall be within 3 dB of the maximum output power. See Figure 2.1.2.3.1.4-1.

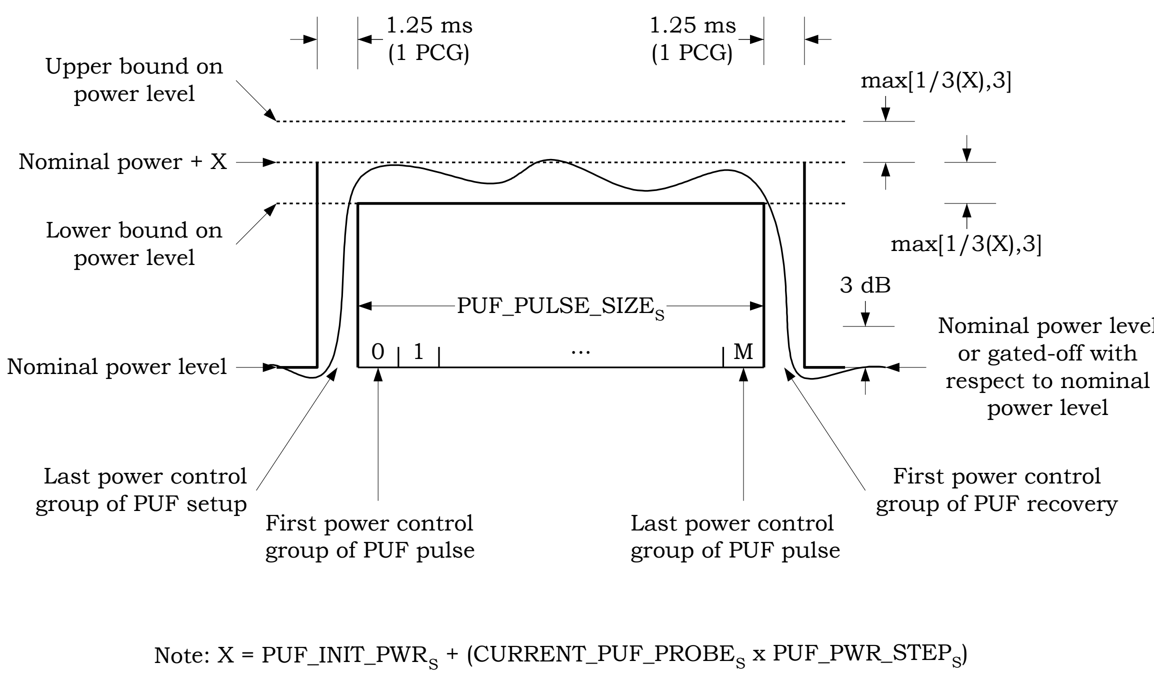

Figure 2.1.2.3.1.4-1. Power Up Function Transmission Envelope Mask

2.1.2.3.1.5 Open Loop Output Power When Transmitting on the Reverse Traffic Channel with Radio Configuration 3, 4, 5, 6,7, or 8

The initial transmission on the Reverse Pilot Channel when transmitting a Reverse Traffic Channel with Radio Configuration 3, 4, 5, 6,7, or 8 shall be at a mean output power defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ ACC_CORRECTIONS
+ $RTC\_NOM\_PWR_s$
+ $RLGAIN\_ADJ_s$,

where interference correction = min(max(IC_THRESH_s – ECIO, 0), 7), and ECIO is the E_c/I_0 (dB) per carrier of the strongest active set pilot, measured within the previous 500 ms.

The mobile station shall determine E_c/I_0 (dB) by taking the ratio of the received pilot energy per chip, E_c, to the total received power spectral density (noise and signals), of at most k usable multipath components, where k is the number of demodulating elements supported by the mobile station. While receiving Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; while receiving Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. While receiving Spreading Rate 3 operation, the mobile station shall determine E_c/I_0 by summing the E_c from each multipath component for all three carriers and normalizing by I_0.

If the last channel used prior to operation on the Reverse Traffic Channel was the Access Channel, the mobile station shall set ACC_CORRECTIONS to $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s + INIT\_PWR_s + PWR\_LVL \times PWR\_STEP_s$.

If the last channel used prior to operation on the Reverse Traffic Channel was the Enhanced Access Channel, the mobile station shall set ACC_CORRECTIONS to $EACH\_NOM\_PWR_s + EACH\_INIT\_PWR_s + PWR\_LVL \times PWR\_STEP_s$ + sum of all closed loop power control corrections (dB), if applicable.

If the last channel used prior to operation on the Reverse Traffic Channel was the Reverse Common Control Channel, the mobile station shall set ACC_CORRECTIONS to $RCCCH\_NOM\_PWR_s + RCCCH\_INIT\_PWR_s$ + PREV_CORRECTIONS.

If RTC_NOM_PWR_USE_IND = '1', the mobile station shall set ACC_CORRECTIONS to 0. If RTC_NOM_PWR_USE_IND = '0', the mobile station shall set $RTC\_NOM\_PWR_s$ to 0.

After the first valid power control bit is received, the mean output power shall be defined by

mean pilot channel output power (dBm) =
– mean input power (dBm)
+ offset power (from Table 2.3.1-1 in [12])
+ interference correction
+ ACC_CORRECTIONS
+ $RTC\_NOM\_PWR_s$
+ $RLGAIN\_ADJ_s$
+ the sum of all closed loop power control corrections.

The mobile station shall not update the interference correction after the first power control bit is received.

The mobile station shall support a total combined range of interference correction, ACC_CORRECTIONS, $RTC\_NOM\_PWR_s$, $RLGAIN\_ADJ_s$, and closed loop power control corrections as specified in Table 2.3.1-3 of [12].

2.1.2.3.2 Closed Loop Output Power

For closed loop correction on the Reverse Common Control Channel (with respect to the open loop estimate), the mobile station shall adjust its mean output power level in response to each valid power control bit (see 3.1.3.10) received on the Common Power Control Channel. The nominal change in mean output power per single power control bit shall be 1 dB.

For closed loop correction on the Reverse Traffic Channel, the Reverse Secondary Pilot Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, and the Reverse Channel Quality Indicator Channel (with respect to the open loop estimate), the mobile station shall adjust its mean output power level in response to each valid power control bit (see 3.1.3.1.12) received on the Forward Fundamental Channel, the Forward Dedicated Control Channel, or the Common Power Control Channel.

For Radio Configuration 1 and 2, a power control bit shall be considered valid if it is received in the second 1.25 ms time slot following a time slot in which the mobile station transmitted (see 3.1.3.1.12), except during a PUF probe. During a PUF probe, the mobile station shall consider a power control bit to be valid if it is received on the serving frequency in the second 1.25 ms time slot following a time slot in which the mobile station transmitted at the nominal power on the serving frequency. A power control bit received on the forward power control subchannel is considered invalid if it is received in the second 1.25 ms time slot following a time slot in which the mobile station transmitter was gated off, was changing power levels to increase power for the PUF pulse, was transmitting at the PUF pulse power level, or was changing power levels to decrease power after the PUF pulse.

For Reverse Pilot Channel gating (see 2.1.3.2.3) with Radio Configurations 3 through 6, a power control bit shall be considered valid if it is received during a power control group in which the forward power control subchannel or on the assigned subchannel of the Common Power Control Channel was transmitted (see 3.1.3.1.12). Otherwise, it shall be considered invalid. For gated transmission other than the Reverse Pilot Channel gating mode with Radio Configurations 3 through 6, a power control bit shall be considered valid if it is received in the 1.25 ms time slot that starts $(REV\_PWR\_CNTL\_DELAY_s + 1) \times 1.25$ ms following the end of a time slot in which the mobile station transmitted (see 3.1.3.1.12). For gated transmission other than the Reverse Pilot Channel gating mode with Radio Configurations 3 through 6, a power control bit received on the forward power control subchannel or on the assigned common power control subchannel is considered invalid if it is received in the 1.25 ms time slot that starts $(REV\_PWR\_CNTL\_DELAY_s + 1) \times 1.25$ ms following the end of a time slot in which the mobile station transmitter was gated off.

For reverse link Radio Configuration 8, when RPC_MODE_s = '00', the base station transmits power control bits in power control groups 1, 3, 5, 7, 9, 11, 13, and 15. For Reverse link Radio Configuration 8, when RPC_MODE_s = '01', the base station transmits power control bits in power control groups 1, 5, 9, and 13. When the mobile station transmits a 0 bps frame, the Reverse Pilot Channel is gated and transmitted only in power control groups 0, 3, 4, 7, 8, 11, 12, and 15 (see 3.1.3.1.12). When the mobile station transmits a non-zero rate frame, all power control bits received shall be considered valid. When the mobile station transmits a 0 bps frame, only power control bits received in power control groups 1, 5, 9, and 13 shall be considered valid (see 3.1.3.1.12). The mobile station shall ignore power control bits received in power control groups 3, 7, 11, and 15 if they are not considered valid. If the mobile station does not support operation on the Reverse Supplemental Channel, the Reverse Packet Data Channel, or the Reverse Supplemental Code Channel, then the mobile station shall support a 1 dB step size. Otherwise, the mobile station shall support 0.5 dB and 1 dB step sizes. The mobile station may also support any additional step sizes in Table 2.1.2.3.2-1. If a 0.25 dB step size is supported, then the 0.5 dB and 1 dB step sizes shall be supported. For Reverse link Radio Configuration 8, the mobile station shall support two additional power control step sizes, 1.5 dB and 2 dB (see Table 2.1.2.3.2-1). The nominal change in mean output power per single power control bit shall be as specified in Table 2.1.2.3.2-1 for the corresponding power control step size ($PWR\_CNTL\_STEP_S$). The total change in the closed loop mean output power shall be the accumulation of the valid level changes. The mobile station shall lock the accumulation of valid level changes and shall ignore received power control bits when the transmitter is disabled. The total changed closed loop mean output power shall be applied to the total transmit power of the mobile station.

Table 2.1.2.3.2-1. Closed Loop Power Control Step Size

$PWR\_CNTL\_STEP_S$	Power Control Step Size (dB nominal)	Tolerance (dB)
0	1	±0.5
1	0.5	±0.3
2	0.25	±0.2
3	1.5	±0.5
4	2	±0.5

The change in mean output power per single power control bit shall be within the tolerance specified in Table 2.1.2.3.2-1 for the corresponding power control step size. For the 2.0 dB step size, the change in mean output power level per 10 valid power control bits of the same sign shall be within ±4.0 dB of 10 times the nominal change (20 dB). For the 1.5 dB step size, the change in mean output power level per 10 valid power control bits of the same sign shall be within ±3.0 dB of 10 times the nominal change (15 dB). For the 1.0 dB step size, the change in mean output power level per 10 valid power control bits of the same sign shall be within ±2.0 dB of 10 times the nominal change (10 dB). For the 0.5 dB step size, the change in mean output power level per 20 valid power control bits of the same sign shall be within ±2.5 dB of 20 times the nominal change (10 dB). For the 0.25 dB step size, the change in mean output power level per 40 valid power control bits of the same sign shall be within ±3.0 dB of 40 times the nominal change (10 dB). A ‘0’ power control bit implies an increase in transmit power; and a ‘1’ power control bit implies a decrease in transmit power.

The mobile station shall provide a closed loop adjustment range greater than ±24 dB around its open loop estimate.

For the Reverse Traffic Channel with Radio Configuration 1 or 2, if the mobile station is unable to transmit at the requested output power level, it shall discontinue transmission on at least one active Reverse Supplemental Code Channel, not later than the transmission of the next 20 ms frame to maintain the requested output power on the Reverse Fundamental Channel.

For the Reverse Traffic Channel with Radio Configuration 3 through 7, if the mobile station is unable to transmit at the requested output power level, it shall reduce the data rate on the Reverse Fundamental Channel, or reduce the transmission power or discontinue transmission on at least one of the following code channels that are active: the Reverse Packet Data Channel, the Reverse Request Channel, the Reverse Secondary Pilot Channel, the Reverse Packet Data Control Channel, the Reverse Channel Quality Indicator Channel, the Reverse Acknowledgment Channel, the Reverse Fundamental Channel, the Reverse Supplemental Channels, or the Reverse Dedicated Control Channel. The mobile station shall not reduce the transmission power or discontinue the transmissions on the Reverse Packet Data Control Channel without discontinuing the transmissions on the Reverse Packet Data Channel. The mobile station should not discontinue transmission on the Reverse Acknowledgment Channel without first reducing the data rate on the Reverse Packet Data Channel. The mobile station should not discontinue transmission on the Reverse Channel Quality Indicator Channel without first reducing the data rate on the Reverse Packet Data Channel. The mobile station should not discontinue transmission on the Reverse Channel Quality Indicator Channel while switching to a target base station. If the mobile station is not able to transmit at the computed mean code channel output power (dBm) (see 2.1.2.3.3.8) on the Reverse Packet Data Channel with an EP_SIZE equal to 408 and BOOST is equal to ‘1’, then the mobile station should use a BOOST value equal to ‘0’. The mobile station shall perform this action not later than the 20 ms frame boundary occurring no later than 40 ms after determining that the mobile station is unable to transmit at the requested output power level. The mobile station should attempt to reduce the transmission power, the data rate, or discontinue transmission first on the code channel with the lowest priority. The mobile station shall transmit at the commanded output power level on the Reverse Pilot Channel.

For the Reverse Traffic Channel with Radio Configuration 8, if the mobile station is unable to transmit at the requested output power level, the mobile station shall reduce the data rate on the Reverse Fundamental Channel or reduce the power of the Reverse Fundamental Channel, any active Reverse Supplemental Channels, and any active Reverse Acknowledgment Channels accordingly. The maximum power reduction for a Reverse Supplemental Channel corresponds to gating off that Reverse Supplemental Channel. The maximum power reduction for a Reverse Acknowledgment Channel corresponds to gating off that Reverse Acknowledgment Channel. If any Reverse Acknowledgment Channel is active, its power reduction shall occur only after all Reverse Supplemental Channels have been gated off (during the fraction of the power control group when the Reverse

Acknowledgment Channels are transmitted). The reduction of data rate or power for the Reverse Fundamental Channel shall occur only after all Reverse Supplemental Channels and all Reverse Acknowledgment Channels have been gated off. The mobile station shall transmit the Reverse Pilot Channel at the commanded output power level.

2.1.2.3.3 Code Channel Output Power for Other than the Reverse Pilot Channel

2.1.2.3.3.1 Code Channel Output Power for the Reverse Secondary Pilot Channel

The mobile station shall set the output power of the Reverse Secondary Pilot Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Secondary Pilot Channel at an output power given by[3]

$$\begin{aligned}\text{mean code channel output power (dBm)} = \\ &\text{mean pilot channel output power (dBm)} \\ &+ 0.125 \times (\text{Nominal\_Reverse\_Secondary\_Pilot\_Channel\_Attribute\_Gain} \\ &+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\ &- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\ &+ \text{RLGAIN\_SPICH\_PILOT}_s),\end{aligned}$$

where Channel identifies the Reverse Secondary Pilot Channel. The definitions for some of the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Secondary Pilot Channel attribute gain table, providing the value for Nominal_Reverse_Secondary_Pilot_Channel_Attribute_Gain, which is the relative gain for the Reverse Secondary Pilot Channel given in Table 2.1.2.3.3.1-1.

Table 2.1.2.3.3.1-1. Nominal Reverse Secondary Pilot Channel Attribute Gain Table

Nominal_Reverse_Secondary_Pilot_Channel_Attribute_Gain	Pilot_Reference_Level
21	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

[3] The values of

Nominal_Reverse_Secondary_Pilot_Channel_Attribute_Gain,
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
and $\text{RLGAIN\_SPICH\_PILOT}_s$

are integers, specified in units of 0.125 dB.

$$0.125 \times (\text{Nominal\_Reverse\_Secondary\_Pilot\_Channel\_Attribute\_Gain} + \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} - \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} + \text{RLGAIN\_SPICH\_PILOT}_s),$$

if the Reverse Secondary Pilot Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Secondary Pilot Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Secondary Pilot Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –2 dB to +6 dB for adjustment to the nominal mean code channel output power given by

$$\text{mean code channel output power (dBm)} = \text{mean pilot channel output power (dBm)} + 0.125 \times \text{Nominal\_Reverse\_Secondary\_Pilot\_Channel\_Attribute\_Gain}.$$

The adjustment to the mean code channel output power (dB) is given by

$$0.125 \times (\text{Nominal\_Reverse\_Secondary\_Pilot\_Channel\_Attribute\_Adjustment\_Gain} + \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} - \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} + \text{RLGAIN\_SPICH\_PILOT}_s).$$

2.1.2.3.3.2 Code Channel Output Power for the Enhanced Access Channel Header, Enhanced Access Channel Data, and Reverse Common Control Channel Data

The mobile station shall set the output power of the Enhanced Access Channel Header, Enhanced Access Channel Data, and the Reverse Common Control Channel Data relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Enhanced Access Channel Header, Enhanced Access Channel Data, and Reverse Common Control Channel Data at an output power given by[4]

$$\text{mean code channel output power (dBm)} = \text{mean pilot channel output power (dBm)} + 0.125 \times \text{Nominal\_Reverse\_Common\_Channel\_Attribute\_Gain [Rate, Frame Duration]} + 0.125 \times \text{RLGAIN\_COMMON\_PILOT}_s.$$

The mobile station shall maintain a nominal Reverse Common Channel attribute gain table, providing the values for Nominal_Reverse_Common_Channel_Attribute_Gain, which is the

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[4] The values of

Nominal_Reverse_Common_Channel_Attribute_Gain[Rate, Frame Duration]
and $\text{RLGAIN\_COMMON\_PILOT}_s$

are integers, specified in units of 0.125 dB.

relative header gain for the Enhanced Access Channel Header, and the relative data gain for the Enhanced Access Channel Data and Reverse Common Channel Data for each data rate and frame duration supported by the mobile station. The mobile station shall use the values given in Table 2.1.2.3.3.2-1.

Table 2.1.2.3.3.2-1. Nominal Reverse Common Channel Attribute Gain Table

Data Rate (bps)	Frame Length (ms)	Nominal_Reverse _Common_Channel _Attribute_Gain
9,600	5 (Header)	54
9,600	20	30
19,200	10	64
19,200	20	50
38,400	5	88
38,400	10	80
38,400	20	72

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

$$0.125 \times \text{Nominal\_Reverse\_Common\_Channel\_Attribute\_Gain}$$
$$[\text{Rate, Frame Duration}]$$
$$+\ 0.125 \times \text{RLGAIN\_COMMON\_PILOT}_s.$$

2.1.2.3.3.3 Code Channel Output Power for the Reverse Packet Data Control Channel

The mobile station shall set the output power of the Reverse Packet Data Control Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Packet Data Control Channel at an output power given by[5]

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × (Nominal_Reverse_Packet_Data_Control_Channel_Attribute_Gain[EP_SIZE, BOOST]
+ Reverse_Packet_Data_Control_Channel_Attribute_Adjustment_Gain[EP_SIZE, BOOST]
+ Reverse_Packet_Data_Control_Channel_Boost_Adjustment_Gain[BOOST]
+ Reverse_Packet_Data_Control_Channel_Payload_Adjustment_Gain[EP_SIZE]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_PDCCH_PILOT$_s$),

where Channel identifies the Reverse Packet Data Control Channel. The definitions for some of the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Packet Data Control Channel attribute gain table, providing the values for Nominal_Reverse_Packet_Data_Control_Channel_Attribute_Gain, which is the relative gain for the Reverse Packet Data Control Channel for each value of EP_SIZE and BOOST as indicated by the MAC Layer. The mobile station shall use the values given in Table 2.1.2.3.3.3-1 and Table 2.1.2.3.3.3-2. The mobile station shall maintain a Reverse Packet Data Control Channel attribute adjustment gain table, providing the values for Reverse_Packet_Data_Control_Channel_Attribute_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of EP_SIZE and BOOST as indicated by the MAC Layer. The mobile station shall initialize each entry in this table to 0. The mobile station shall maintain a Reverse Packet Data Control Channel boost adjustment gain table, providing the values for Reverse_Packet_Data_Control_Channel_Boost_Adjustment_Gain, which is an offset relative

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[5] The values of

Nominal_Reverse_Packet_Data_Control_Channel_Attribute_Gain[EP_SIZE, BOOST],
Reverse_Packet_Data_Control_Channel_Attribute_Adjustment_Gain[EP_SIZE, BOOST],
Reverse_Packet_Data_Control_Channel_ Boost_Adjustment_Gain[BOOST],
Reverse_Packet_Data_Control_Channel_Payload_Adjustment_Gain[EP_SIZE],
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
and RLGAIN_PDCCH_PILOT$_s$

are integers, specified in units of 0.125 dB.

to the Reverse Pilot Channel power for each value of BOOST as indicated by the MAC Layer. The mobile station shall initialize each entry in this table to 0. The mobile station shall maintain a Reverse Packet Data Control Channel payload adjustment gain table, providing the values for Reverse_Packet_Data_Control_Channel_Payload_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of EP_SIZE as indicated by the MAC Layer. The mobile station shall initialize each entry in this table to 0.

Table 2.1.2.3.3.3-1. Nominal Reverse Packet Data Control Channel Attribute Gain Table for BOOST = '0'

EP_SIZE	Nominal_Reverse_Packet_Data_Control_Channel_Attribute_Gain	Pilot_Reference_Level
192	–40	0
408	–40	0
792	–32	0
1,560	–32	0
3,096	–32	0
4,632	–24	0
6,168	–24	0
9,240	–24	0
12,312	–24	0
15,384	–24	0
18,456	-24	0

Table 2.1.2.3.3.3-2. Nominal Reverse Packet Data Control Channel Attribute Gain Table for BOOST = ‘1’

EP_SIZE	Nominal_Reverse_Packet_Data_Control_ Channel_Attribute_Gain	Pilot_Reference_ Level
192	–24	0
408	–24	0
792	–16	0
1,560	–16	0
3,096	–16	0
4,632	–8	0
6,168	–8	0
9,240	–8	0
12,312	–8	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

0.125 × (Nominal_Reverse_Packet_Data_Control_Channel_
Attribute_Gain[EP_SIZE, BOOST]
+Reverse_Packet_Data_Control_Channel_
Attribute_Adjustment_Gain[EP_SIZE, BOOST]
+ Reverse_Packet_Data_Control_Channel_
Boost_Adjustment_Gain[BOOST]
+ Reverse_Packet_Data_Control_Channel_
Payload_Adjustment_Gain[EP_SIZE]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ $\text{RLGAIN\_PDCCH\_PILOT}_s$),

if the Reverse Packet Data Control Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Packet Data Control Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Packet Data Control Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –4 dB to +4 dB for adjustment to the nominal mean code channel output power given by

$$\text{mean code channel output power (dBm)} = \text{mean pilot channel output power (dBm)} + 0.125 \times \text{Nominal\_Reverse\_Packet\_Data\_Control\_Channel\_Attribute\_Gain[EP\_SIZE, BOOST]}$$

for each value of EP_SIZE and BOOST.

The adjustment to the mean code channel output power (dB) is given by

$$0.125 \times (\text{Reverse\_Packet\_Data\_Control\_Channel\_Attribute\_Adjustment\_Gain[EP\_SIZE, BOOST]} + \text{Reverse\_Packet\_Data\_Control\_Channel\_Boost\_Adjustment\_Gain[BOOST]} + \text{Reverse\_Packet\_Data\_Control\_Channel\_Payload\_Adjustment\_Gain[EP\_SIZE]} + \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} - \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} + \text{RLGAIN\_PDCCH\_PILOT}_s).$$

2.1.2.3.3.4 Code Channel Output Power for the Reverse Request Channel

The mobile station shall set the output power of the Reverse Request Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Request Channel at an output power given by[6]

$$\text{mean code channel output power (dBm)} = \text{mean pilot channel output power (dBm)} + 0.125 \times (\text{Nominal\_Reverse\_Request\_Channel\_Attribute\_Gain} + \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} - \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} + \text{RLGAIN\_REQCH\_PILOT}_s),$$

where Channel identifies the Reverse Request Channel. The definitions for some of the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Request Channel attribute gain, providing the values for Nominal_Reverse_Request_Channel_Attribute_Gain, which is the relative gain for the Reverse Request Channel. The mobile station shall use the value given in Table 2.1.2.3.3.4-1.

[6] The values of

Nominal_ Reverse_Request_Channel_Attribute_Gain,
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
and $\text{RLGAIN\_REQCH\_PILOT}_s$

are integers, specified in units of 0.125 dB.

Table 2.1.2.3.3.4-1. Nominal Reverse Request Channel Attribute Gain Table

Nominal_Reverse_Request_Channel_Attribute_Gain	Pilot_Reference_Level
–8	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

$$\begin{aligned}&0.125 \times (\text{Nominal\_Reverse\_ Request \_Channel\_Attribute\_Gain}\\&+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]}\\&- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]}\\&+ \text{RLGAIN\_REQCH\_PILOT}_s),\end{aligned}$$

if the Reverse Request Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Request Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Request Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –3 dB to +5 dB for adjustment to the nominal mean code channel output power given by

$$\begin{aligned}&\text{mean code channel output power (dBm)} =\\&\qquad \text{mean pilot channel output power (dBm)}\\&\qquad + 0.125 \times \text{Nominal\_Reverse\_Request\_Channel\_Attribute\_Gain}.\end{aligned}$$

The adjustment to the mean code channel output power (dB) is given by

$$\begin{aligned}&0.125 \times (\text{Reverse\_Channel\_Adjustment\_Gain[Channel]}\\&- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]}\\&+ \text{RLGAIN\_REQCH\_PILOT}_s).\end{aligned}$$

2.1.2.3.3.5 Code Channel Output Power for the Reverse Acknowledgment Channel

The mobile station shall set the output power of the Reverse Acknowledgment Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Acknowledgment Channel at an output power given by[7]

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × (Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ $\text{RLGAIN\_ACKCH\_PILOT}_s$),

where Channel identifies the Reverse Acknowledgment Channel. The definitions for the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Acknowledgment Channel attribute gain table, providing the value for Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain, which is the relative gain for the Reverse Acknowledgment Channel given in Table 2.1.2.3.3.5-1.

Table 2.1.2.3.3.5-1. Nominal Reverse Acknowledgment Channel Attribute Gain Table (Radio Configuration 7)

Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain	Pilot_Reference_Level
0	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

0.125 × (Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ $\text{RLGAIN\_ACKCH\_PILOT}_s$),

[7] The values of

Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain,
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
and $\text{RLGAIN\_ACKCH\_PILOT}_s$

are integers, specified in units of 0.125 dB.

if the Reverse Acknowledgment Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Acknowledgment Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Acknowledgment Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –(0.125 × Maximum_Pilot_Reference_Level + 4) dB to +4 dB for adjustment to the nominal mean code channel output power given by

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain.

The adjustment to the mean code channel output power (dB) is given by

0.125 × (Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_ACKCH_PILOT$_s$).

Maximum_Pilot_Reference_Level is the Nominal_Pilot_Reference_Level given in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2 for the highest data rate transmitted by the mobile station.

The mobile station shall set the output power of the Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3 relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3 at an output power given by[8]

mean code channel output power (dBm) =
mean pilot channel output power (dBm)

+ 0.125 × (Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ REV_ACKCH_GAIN_ADJ_ACS1$_s$)

if the number of cells in the active set = 1 and

mean pilot channel output power (dBm)

---

[8] The values of

Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain,
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
REV_ACKCH_GAIN_ADJ_ACS1$_s$, and REV_ACKCH_GAIN_ADJ_ACS2PLUS$_s$

are integers, specified in units of 0.125 dB.

$$
\begin{aligned}
&+ 0.125 \times (\text{Nominal\_Reverse\_Acknowledgment\_Channel\_Attribute\_Gain} \\
&+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\
&- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\
&+ \text{REV\_ACKCH\_GAIN\_ADJ\_ACS2PLUS}_{S})
\end{aligned}
$$

if the number of cells in the active set ≥ 2,

where Channel identifies the Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, or Reverse Acknowledgment Channel 3. The definitions for the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Acknowledgment Channel attribute gain table, providing the value for Nominal_Reverse_Acknowledgment_Channel_Attribute_Gain, which is the relative gain for the Reverse Acknowledgment Channel given in Table 2.1.2.3.3.5-2.

Table 2.1.2.3.3.5-2. Nominal Reverse Acknowledgment Channel Attribute Gain Table (Reverse link Radio Configuration 8)

Modulation	Nominal_Reverse_Acknowledgment_ Channel_Attribute_Gain	Pilot_Reference_ Level
BPSK	24	0
OOK	72	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

$$
\begin{aligned}
&0.125 \times (\text{Nominal\_Reverse\_Acknowledgment\_Channel\_Attribute\_Gain} \\
&+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\
&- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\
&+ \text{REV\_ACKCH\_GAIN\_ADJ\_ACS1})
\end{aligned}
$$

if the number of cells in the active set = 1

and

$$
\begin{aligned}
&0.125 \times (\text{Nominal\_Reverse\_Acknowledgment\_Channel\_Attribute\_Gain} \\
&+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\
&- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\
&+ \text{REV\_ACKCH\_GAIN\_ADJ\_ACS2PLUS}_{S})
\end{aligned}
$$

if the number of cells in the active set ≥ 2,

if the Reverse Acknowledgment Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Acknowledgment Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Acknowledgment Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –(0.125 × Maximum_Pilot_Reference_Level + 8) dB to +8 dB for adjustment to the nominal mean code channel output power given by

$$\begin{aligned}&\text{mean code channel output power (dBm)} = \\ &\qquad \text{mean pilot channel output power (dBm)} \\ &\qquad + 0.125 \times \text{Nominal\_Reverse\_Acknowledgment\_Channel\_Attribute\_Gain}.\end{aligned}$$

The adjustment to the mean code channel output power (dB) is given by

$$\begin{aligned}&0.125 \times (\text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\ &- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\ &+ \text{REV\_ACKCH\_GAIN\_ADJ\_ACS1}_s)\end{aligned}$$

if the number of cells in the active set = 1 and

$$\begin{aligned}&0.125 \times (\text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\ &- \text{Multiple\_Channel\_Adjustment\_Gain[Channel]} \\ &+ \text{REV\_ACKCH\_GAIN\_ADJ\_ACS2PLUS}_s)\end{aligned}$$

if the number of cells in the active set ≥ 2.

Maximum_Pilot_Reference_Level is the Nominal_Pilot_Reference_Level given in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2 for the highest data rate transmitted by the mobile station.

2.1.2.3.3.6 Code Channel Output Power for the Reverse Channel Quality Indicator Channel

The mobile station shall set the output power of the Reverse Channel Quality Indicator Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Channel Quality Indicator Channel at an output power given by[9]

[9] The values of

Nominal_ Reverse_Channel_Quality_Indicator_Channel_Attribute_Gain[CQI_GAIN],
Reverse_Channel_Quality_Indicator_Channel_Attribute_Adjustment_Gain[CQI_GAIN],
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Channel],
and $\text{RLGAIN\_CQICH\_PILOT}_s$

are integers, specified in units of 0.125 dB.

mean code channel output power (dBm) =

mean pilot channel output power (dBm)
+ 0.125 × (Nominal_Reverse_Channel_Quality_Indicator_
Channel_Attribute_Gain[CQI_GAIN]
+ Reverse_Channel_Quality_Indicator_Channel_Attribute_
Adjustment_Gain[CQI_GAIN]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_CQICH_PILOT$_S$),

where Channel identifies the Reverse Channel Quality Indicator Channel. The definitions for the terms in the above equation can be found in 2.1.2.3.3.7.

The mobile station shall maintain a nominal Reverse Channel Quality Indicator Channel attribute gain table, providing the values for by Nominal_Reverse_Channel_Quality_Indicator_ChannelAttribute_Adjustment_Gain, which is the relative gain for the Reverse Channel Quality Indicator Channel for each value of CQI_GAIN as indicated by the MAC Layer. The mobile station shall use the values given in Table 2.1.2.3.3.6-1.

The mobile station shall maintain a Reverse Link attribute adjustment gain table, providing the value for Reverse_Channel_Quality_Indicator_Channel_Attribute_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of CQI_GAIN as indicated by the MAC Layer. The mobile station shall initialize each entry in this table to 0.

Table 2.1.2.3.3.6-1. Nominal Reverse Channel Quality Indicator Channel Attribute Gain Table

CQI_GAIN	Nominal_Reverse_Channel_Quality_Indicator_Channel_ Attribute_Gain	Pilot_Reference_ Level
LOW	–56	0
HIGH	16	0

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

0.125 × (Nominal_Reverse_Channel_Quality_Indicator_Channel_
Attribute_Gain[CQI_GAIN]
+ Reverse_Channel_Quality_Indicator_Channel_Attribute_
Adjustment_Gain[CQI_GAIN]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_CQICH_PILOT$_S$),

if the Reverse Channel Quality Indicator Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Channel Quality Indicator Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for the Reverse Channel Quality Indicator Channel having an output power less than 1/60 of the total output power of the mobile station.

The mobile station shall support a total range of at least –(0.125 × Maximum_Pilot_Reference_Level + 5) dB to +2 dB for adjustment to the nominal mean code channel output power given by

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × Nominal_Reverse_Channel_Quality_Indicator_Channel_Attribute_Gain[CQI_GAIN]

for each value of CQI_GAIN. The adjustment to the mean code channel output power (dB) is given by

0.125 × (Reverse_Channel_Quality_Indicator_Channel_Attribute_Adjustment_Gain[CQI_GAIN]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ $RLGAIN\_CQICH\_PILOT_S$).

Maximum_Pilot_Reference_Level is the Nominal_Pilot_Reference_Level given in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2 for the highest data rate transmitted by the mobile station.

2.1.2.3.3.7 Code Channel Output Power for the Reverse Traffic Channel with Radio Configuration 3, 4, 5, 6, or 8

The mobile station shall set the output power of the Reverse Fundamental Channel, the Reverse Supplemental Channel, and the Reverse Dedicated Control Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit each of the Reverse Fundamental Channel, Reverse Supplemental Channel, and Reverse Dedicated Control Channel at an output power given by[10]

---

[10] The values of

Nominal_Attribute_Gain[Rate, Frame Duration, Coding],
Attribute_Adjustment_Gain[Rate, Frame Duration, Coding],
Reverse_Channel_Adjustment_Gain[Channel],
Multiple_Channel_Adjustment_Gain[Rate, Channel],
$RLGAIN\_TRAFFIC\_PILOT_S$, and $RLGAIN\_SCH\_PILOT_S$[Channel]

are integers, specified in units of 0.125 dB.

$$
\begin{aligned}
\text{mean code channel output power (dBm)} = \\
&\text{mean pilot channel output power (dBm)} \\
&+ 0.125 \times (\text{Nominal\_Attribute\_Gain[Rate, Frame Duration, Coding]} \\
&+ \text{Attribute\_Adjustment\_Gain[Rate, Frame Duration, Coding]} \\
&+ \text{Reverse\_Channel\_Adjustment\_Gain[Channel]} \\
&- \text{Multiple\_Channel\_Adjustment\_Gain[Rate, Channel]} \\
&- \text{Variable\_Supplemental\_Adjustment\_Gain[Rate, Channel]} \\
&+ \text{RLGAIN\_TRAFFIC\_PILOT}_s \\
&+ \text{RLGAIN\_SCH\_PILOT}_s\text{[Channel]}) \\
&+ \text{IFHHO\_SRCH\_CORR},
\end{aligned}
$$

where Channel identifies the Fundamental Channel, the Dedicated Control Channel, and each Supplemental Channel.

The mobile station shall maintain a Reverse Link nominal attribute gain table providing the values for Nominal_Attribute_Gain, which is the nominal Reverse Fundamental Channel, Reverse Supplemental Channel, or Reverse Dedicated Control Channel power relative to the Reverse Pilot Channel power for each data rate listed in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2, frame duration, and type of coding supported by the mobile station. The mobile station shall use the values given in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2.

If flexible data rates are supported, and if the specified data rate, coding, and frame length are not specified in the reverse link attribute gain table, the gain shall be determined by linearly interpolating the values of Nominal_Attribute_Gain and the Nominal_Pilot_ Reference_Level to the nearest integer from the nearest data rates above and below the specified data rate with the same frame length and coding. If the specified data rate is below the lowest listed data rate with the same frame length and coding, the gain shall be determined by linearly extrapolating the values of Nominal_Attribute_Gain and the Nominal_Pilot_Reference_Level to the nearest integer from the two lowest data rates with the same frame length and coding in the reverse link attribute gain table.

When the transmission on the Reverse Fundamental Channel is gated at the 1500 bps data rate in Radio Configuration 3 or 5, or at the 1800 bps data rate in Radio Configuration 4 or 6, the mobile station shall use the reverse link nominal attribute gain values given in Table 2.1.2.3.3.7-3.The mobile station shall maintain a reverse link attribute adjustment gain table providing the values for Attribute_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each data rate, frame duration, and type of coding supported by the mobile station. The mobile station shall initialize each entry in this table to 0.[11]

The mobile station shall maintain a reverse link pilot attribute adjustment gain table providing the values for Pilot_Attribute_Adjustment_Gain, which is an adjustment to the reverse pilot reference level for each data rate, frame duration, and type of coding supported by the mobile station. The mobile station shall initialize each entry in these two tables to 0.

[11] The format of this table is similar to that of the reverse link nominal attribute gain table.

The mobile station shall maintain a reverse channel adjustment gain table providing the values for Reverse_Channel_Adjustment_Gain, which is an offset relative to Reverse Pilot Channel power for each reverse link code channel supported by the mobile station. The mobile station shall initialize each entry in this table to 0.

The adjustment $\mathrm{RLGAIN\_SCH\_PILOT_s}$[Channel] is valid for the Reverse Supplemental Channel.

The mobile station shall adjust the mean code channel output power for each of the Reverse Fundamental Channel, Reverse Supplemental Channel, and Reverse Dedicated Control Channel by $0.125 \times \mathrm{RLGAIN\_TRAFFIC\_PILOT_s}$ (dB).

If the mobile station is assigned only one code channel in addition to the Reverse Pilot Channel, then the mobile station shall set Multiple_Channel_Adjustment_Gain[Rate, Channel] to 0 for all assigned data rates on the code channel. If the mobile station is assigned two or more code channels in addition to the Reverse Pilot Channel, then the mobile shall set Multiple_Channel_Adjustment_Gain[Rate, Channel] for assigned data rate on each channel as follows[12]:

- Set Pilot_Reference_Level[Rate, Channel] to Nominal_Pilot_Reference_Level[Rate, Channel] + Pilot_Attribute_Adjustment_Gain[Rate, Channel].
- Let Max_Channel identify the code channel with the assigned data rate that has the highest Pilot_Reference_Level among the code channels on which the mobile station is assigned.
- Set Multiple_Channel_Adjustment_Gain[Rate, Max_Channel] to 0 for all assigned data rates on Max_Channel.
- For all assigned data rates on other code channels, set Multiple_Channel_Adjustment_Gain[Rate, Channel] to Pilot_Reference_Level[Max_Rate, Max_Channel] – Pilot_Reference_Level[Rate, Channel], where Max_Rate is the data rate on the Max_Channel with the highest Pilot_Reference_Level among all assigned data rates.

If variable-rate Reverse Supplemental Channel operation is supported and the mobile station is assigned to transmit using these rates on a Reverse Supplemental Channel, then the mobile station shall set Variable_Supplemental_Adjustment_Gain[Rate, Channel] for each assigned data rate on channel as follows:

- Set Pilot_Reference_Level[Rate, Channel] to Nominal_Pilot_Reference_Level[Rate, Channel] + Pilot_Attribute_Adjustment_Gain[Rate, Channel].
- Let Max_Channel identify the code channel with the assigned data rate that has the highest Pilot_Reference_Level among the code channels on which the mobile station is assigned.

[12] Multiple_Channel_Adjustment_Gain, Nominal_Pilot_Reference_Level and Pilot_Reference_Level can be referred without the parameter 'Rate' for certain channels where the rate information is not available, or Pilot_Reference_Level is not a function of data rate.

- If Max_Channel is not a Reverse Supplemental Channel with variable data rates, set all Variable_Supplemental_Adjustment_Gain[Rate, Channel] to 0.
- Otherwise, set Variable_Supplemental_Adjustment_Gain[Rate, Max_Channel] to Pilot_Reference_Level[Max_Rate, Max_Channel] – Pilot_Reference_Level[Rate, Max_Channel] for all rates on the Max_Channel except the Max_Rate on that channel, where Max_Rate is the data rate on the Max_Channel with the highest Pilot_Reference_Level among all assigned data rates. Set Variable_Supplemental_Adjustment_Gain[Rate, Channel] to 0 for the Max_Rate on the Max_Channel and for all the assigned data rates on the other channels.

Table 2.1.2.3.3.7-1. Reverse Link Nominal Attribute Gain Table (Part 1 of 2)

Data Rate (bps)	Frame Length (ms)	Coding	Nominal_ Attribute _Gain	Nominal_Pilot_ Reference _Level	Target Error Rate[13]
1,200	80	Convolutional	–56	0	0.05
1,350	40	Convolutional	–54	0	0.05
1,500	20	Convolutional	–47	0	0.01
1,800	20	Convolutional	–42	3	0.01
1,800	40 or 80	Convolutional	–45	3	0.05
2,400	40 or 80	Convolutional	–30	0	0.05
2,700	20	Convolutional	–22	0	0.01
3,000	20	Convolutional	–18	0	0.01
3,600	20	Convolutional	–13	3	0.01
3,600	40 or 80	Convolutional	–17	3	0.05
4,800	20	Convolutional	–2	0	0.01
4,800	40 or 80	Convolutional	–3	0	0.05
5,000	20	Convolutional	0	0	0.01
7,200	20	Convolutional	15	3	0.01
7,200	40 or 80	Convolutional	10	3	0.05
9,600	20	Convolutional	30	0	0.01
9,600	40 or 80	Convolutional	24	0	0.05
9,600 (RC 3 and 5)	5	Convolutional	58	0	0.01
9,600 (RC 4 and 6)	5	Convolutional	54	3	0.01
14,400	20	Convolutional	44	3	0.01
14,400	40 or 80	Convolutional	40	3	0.05
19,200	20, 40, or 80	Convolutional	50	1	0.05
28,800	20, 40, or 80	Convolutional	56	11	0.05
38,400	20, 40, or 80	Convolutional	60	11	0.05
57,600	20, 40, or 80	Convolutional	72	18	0.05

[13] The error rate is the frame error rate when a single transmission unit is used; otherwise, the Logical Transmission Unit (LTU) error rate is used. This applies to the cases in which the Target Error Rate is 0.05.

Table 2.1.2.3.3.7-2. Reverse Link Nominal Attribute Gain Table (Part 2 of 2)

Data Rate (bps)	Frame Length (ms)	Coding	Nominal_ Attribute _Gain	Nominal_Pilot_ Reference _Level	Target Error Rate
76,800	20, 40, or 80	Convolutional	72	21	0.05
115,200	20, 40, or 80	Convolutional	80	32	0.05
153,600	20, 40, or 80	Convolutional	84	36	0.05
230,400	20 or 40	Convolutional	88	46	0.05
259,200	80	Convolutional	96	50	0.05
307,200	20 or 40	Convolutional	96	54	0.05
460,800	20	Convolutional	104	61	0.05
518,400	40	Convolutional	104	64	0.05
614,400	20	Convolutional	112	68	0.05
1,036,800	20	Convolutional	128	83	0.05
4,800	80	Turbo	2	0	0.05
7,200	80	Turbo	24	0	0.05
9,600	40 or 80	Turbo	34	0	0.05
14,400	40 or 80	Turbo	42	0	0.05
19,200	20, 40, or 80	Turbo	44	2	0.05
28,800	20, 40, or 80	Turbo	52	9	0.05
38,400	20, 40, or 80	Turbo	56	10	0.05
57,600	20, 40, or 80	Turbo	64	19	0.05
76,800	20, 40, or 80	Turbo	68	19	0.05
115,200	20, 40, or 80	Turbo	76	29	0.05
153,600	20, 40, or 80	Turbo	76	33	0.05
230,400	20 or 40	Turbo	88	39	0.05
259,200	80	Turbo	88	48	0.05
307,200	20 or 40	Turbo	88	50	0.05
460,800	20	Turbo	104	54	0.05
518,400	40	Turbo	108	56	0.05
614,400	20	Turbo	112	58	0.05
1,036,800	20	Turbo	125	78	0.05

Table 2.1.2.3.3.7-3. Reverse Link Nominal Attribute Gain Values for the Reverse Fundamental Channel at the 1500 bps or 1800 bps Data Rate during Gated Transmission

Data Rate (bps)	Frame Length (ms)	Coding	Nominal_ Attribute _Gain	Nominal_Pilot_ Reference _Level	Target Error Rate
1,500	20	Convolutional	–10	0	0.01
1,800	20	Convolutional	–2	3	0.01

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by

$$\begin{aligned}
&0.125 \times (\text{Nominal_Attribute_Gain[Rate, Frame Duration, Coding]} \\
&+ \text{Attribute_Adjustment_Gain[Rate, Frame Duration, Coding]} \\
&+ \text{Reverse_Channel_Adjustment_Gain[Channel]} \\
&- \text{Multiple_Channel_Adjustment_Gain[Rate, Channel]} \\
&- \text{Variable_Supplemental_Adjustment_Gain[Rate, Channel]} \\
&+ \text{RLGAIN_TRAFFIC_PILOT}_s \\
&+ \text{RLGAIN_SCH_PILOT}_s\text{[Channel]}) \\
&+ \text{IFHHO_SRCH_CORR}
\end{aligned}$$

for every code channel (i.e., the Reverse Fundamental Channel, the Reverse Supplemental Channel, or the Reverse Dedicated Control Channel) having an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB for every code channel having an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB for code channel having an output power less than 1/60 of the total output power of the mobile station.

If the mobile station reduces the data rate or terminates transmission on a code channel for any other reason than being commanded by the base station or reaching the end of an allowed transmission period, the mobile station shall not change Multiple_Channel_Adjustment_Gain for any code channel.

The mobile station shall support a total range of at least –(0.125 × Maximum_Pilot_Reference_Level + 4) dB to +6 dB for adjustment to the nominal mean code channel output power given by

$$\begin{aligned}
&\text{mean code channel output power (dBm)} = \\
&\quad \text{mean pilot channel output power (dBm)} \\
&\quad + 0.125 \times \text{Nominal_Attribute_Gain[Rate, Frame Duration, Coding]}.
\end{aligned}$$

The adjustment to the mean code channel output power (dB) is given by

0.125 × (Attribute_Adjustment_Gain[Rate, Frame Duration, Coding]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Rate, Channel]
– Variable_Supplemental_Adjustment_Gain[Rate, Channel]
+ RLGAIN_TRAFFIC_PILOT$_S$
+ RLGAIN_SCH_PILOT$_S$[Channel])
+ IFHHO_SRCH_CORR.

Maximum_Pilot_Reference_Level is the Nominal_Pilot_Reference_Level given in Table 2.1.2.3.3.7-1 and Table 2.1.2.3.3.7-2 for the highest data rate transmitted by the mobile station.

The mobile station may suspend its current Reverse Traffic Channel processing in order to tune to a Candidate Frequency for possible hard handoff, and re-tune to the Serving Frequency. If the mobile station transmission is suspended for d ms in a frame of length T ms, and if d is less than T/2, the mobile station may set IFHHO_SRCH_CORR to an amount no greater than (1 + 10log (T/(T – d))) dB (rounded to the nearest 0.125 dB) for the remainder of the frame that is transmitted. Otherwise, the mobile station shall set IFHHO_SRCH_CORR to zero. See Figure 2.1.2.3.3.7-1.

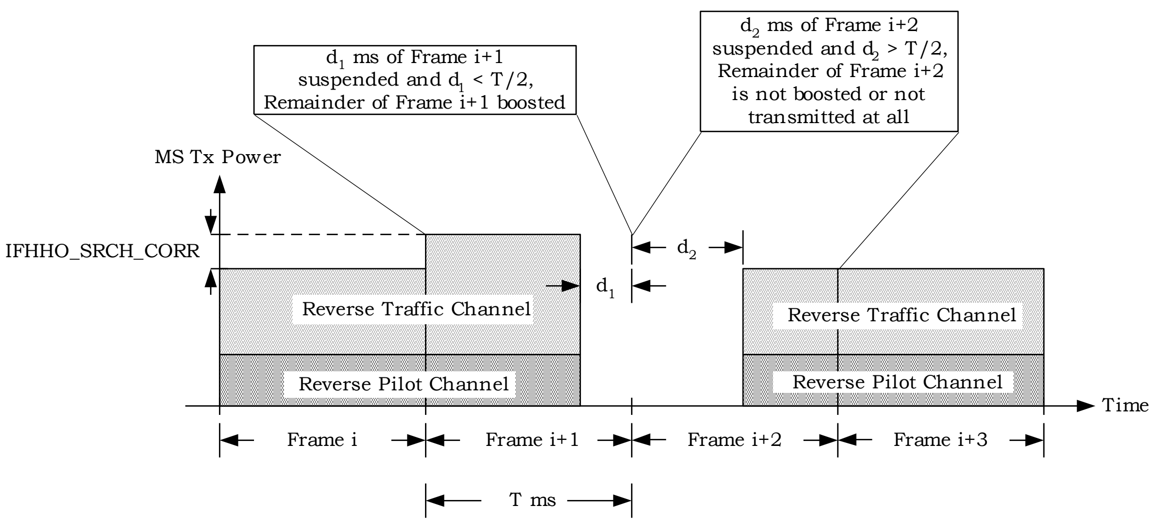


Figure 2.1.2.3.3.7-1. Increased Reverse Traffic Channel Power for Inter-frequency Hard Handoff

2.1.2.3.3.8 Code Channel Output Power for the Reverse Packet Data Channel with Radio Configuration 7

The mobile station shall set the output power of the Reverse Packet Data Channel relative to the output power of the Reverse Pilot Channel. The mobile station shall transmit the Reverse Packet Data Channel at an output power given by[14]

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × (Nominal_Reverse_Packet_Data_Channel_Attribute_Gain[EP_SIZE, SPID, BOOST, REV_PDCH_TABLE_SEL$_s$]
+ Reverse_Packet_Data_Channel_Attribute_Adjustment_Gain[EP_SIZE, SPID, BOOST]
+ Reverse_Packet_Data_Channel_Payload_Adjustment_Gain[EP_SIZE]
+ Reverse_Packet_Data_Channel_Subpacket_Adjustment_Gain[SPID]
+ Reverse_Packet_Data_Channel_Boost_Adjustment_Gain[BOOST]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_TRAFFIC_PILOT$_s$),

where Channel identifies the Reverse Packet Data Channel. The definitions for some of the terms in the above equation can be found in 2.1.2.3.3.7.

The term

---

[14] The values of

Nominal_Reverse_Packet_Data_Channel_Attribute_Gain[EP_SIZE, SPID, BOOST, REV_PDCH_TABLE_SEL$_s$],

Reverse_Packet_Data_Channel_Attribute_Adjustment_Gain[EP_SIZE, SPID, BOOST],

Reverse_Packet_Data_Channel_Payload_Adjustment_Gain[EP_SIZE],

Reverse_Packet_Data_Channel_Subpacket_Adjustment_Gain[SPID],

Reverse_Packet_Data_Channel_Boost_Adjustment_Gain[BOOST],

Reverse_Channel_Adjustment_Gain[Channel],

Multiple_Channel_Adjustment_Gain[Channel], and
RLGAIN_TRAFFIC_PILOT$_s$

are integers, specified in units of 0.125 dB.

$$
\begin{aligned}
&0.125 \times (\text{Nominal\_Reverse\_Packet\_Data\_Channel\_}\\
&\text{Attribute\_Gain}[\text{EP\_SIZE, SPID, BOOST, REV\_PDCH\_TABLE\_SEL}_s]\\
&+ \text{Reverse\_Packet\_Data\_Channel\_Attribute\_}\\
&\text{Adjustment\_Gain}[\text{EP\_SIZE, SPID, BOOST}]\\
&+ \text{Reverse\_Packet\_Data\_Channel\_}\\
&\text{Payload\_Adjustment\_Gain}[\text{EP\_SIZE}]\\
&+ \text{Reverse\_Packet\_Data\_Channel\_Subpacket\_Adjustment\_Gain}[\text{SPID}]\\
&+ \text{Reverse\_Packet\_Data\_Channel\_Boost\_Adjustment\_Gain}[\text{BOOST}]\\
&+ \text{Reverse\_Channel\_Adjustment\_Gain}[\text{Channel}]\\
&- \text{Multiple\_Channel\_Adjustment\_Gain}[\text{Channel}]\\
&+ \text{RLGAIN\_TRAFFIC\_PILOT}_s)
\end{aligned}
$$

is denoted by RPDCH_TPR_Table[EP_SIZE, SPID, BOOST].

The mobile station shall maintain a nominal Reverse Packet Data Channel attribute gain table for each value of EP_SIZE, SPID, BOOST, and $\text{REV\_PDCH\_TABLE\_SEL}_s$. The mobile station shall use the values given in Table 2.1.2.3.3.8-1 through Table 2.1.2.3.3.8-4.[15]

The mobile station shall maintain a Reverse Packet Data Channel attribute adjustment gain table providing the values for Reverse_Packet_Data_Channel_Attribute_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of EP_SIZE, SPID, and BOOST. The mobile station shall maintain a Reverse Packet Data Channel payload adjustment gain table providing the values for Reverse_Packet_Data_Channel_Payload_ Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of EP_SIZE. The mobile station shall maintain a Reverse Packet Data Channel subpacket adjustment gain table providing the values for Reverse_Packet_Data_Channel_Subpacket_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of SPID. The mobile station shall maintain a Reverse Packet Data Channel boost adjustment gain table providing the values for Reverse_Packet_Data_Channel_Boost_Adjustment_Gain, which is an offset relative to the Reverse Pilot Channel power for each value of BOOST. The mobile station shall initialize each entry in these four tables to 0.[16]

---

[15] These tables were calculated using a REV_SPICH_EP_SIZE set equal to 3096.

[16] The format of these tables is similar to that of the Reverse Link nominal attribute gain table.

Table 2.1.2.3.3.8-1. Reverse Packet Data Channel Nominal Attribute Gain Table for BOOST= '0' and REV_PDCH_TABLE_SELs = '0'

EP_SIZE	Nominal_Reverse_Packet_Data_Attribute_Gain for SPID=0,1,2	Pilot_Reference_Level
192	6	0
408	30	0
792	54	0
1,560	77	0
3,096	95	0
4,632	109	0
6,168	119	0
9,240	133	0
12,312	144	0
15,384	153	0
18,456	170	0

Table 2.1.2.3.3.8-2. Reverse Packet Data Channel Nominal Attribute Gain Table for BOOST= '0' and REV_PDCH_TABLE_SELs = '1'

EP_SIZE	Nominal_Reverse_Packet_Data_Attribute_Gain			Pilot_Reference_Level
	SPID=0	SPID=1	SPID=2	
192	18	-6	-6	0
408	44	20	20	0
792	67	43	43	0
1,560	90	66	66	0
3,096	95	95	95	0
4,632	109	109	109	0
6,168	119	119	119	0
9,240	133	133	133	0
12,312	144	144	144	0
15,384	153	153	153	0
18,456	170	170	170	0

Table 2.1.2.3.3.8-3. Reverse Packet Data Channel Nominal Attribute Gain Table for BOOST= '1' and REV_PDCH_TABLE_SEL$_S$ = '0'

EP_SIZE	Nominal_Reverse_Packet_Data_Attribute_Gain for SPID=0,1,2	Pilot_Reference_Level
192	20	0
408	44	0
792	68	0
1,560	91	0
3,096	109	0
4,632	123	0
6,168	133	0
9,240	147	0
12,312	158	0

Table 2.1.2.3.3.8-4. Reverse Packet Data Channel Nominal Attribute Gain Table for BOOST= '1' and REV_PDCH_TABLE_SEL$_S$ = '1'

EP_SIZE	Nominal_Packet_Data_Channel_Attribute_Gain			Pilot_Reference_Level
	SPID=0	SPID=1	SPID=2	
192	32	8	8	0
408	58	34	34	0
792	81	57	57	0
1,560	104	80	80	0
3,096	109	109	109	0
4,632	123	123	123	0
6,168	133	133	133	0
9,240	147	147	147	0
12,312	158	158	158	0

The mobile station shall support a total range of at least –5 dB to +7 dB for adjustment to the nominal traffic to pilot ratio given by

$0.125 \times$ Nominal_Reverse_Packet_Data_Channel_
Attribute_Gain[EP_SIZE, SPID, BOOST, $\text{REV\_PDCH\_TABLE\_SEL}_s$].

The adjustment to the traffic to pilot ratio (dB) is given by

$0.125 \times$ (Reverse_Packet_Data_Channel_
Attribute_Adjustment_Gain[EP_SIZE, SPID, BOOST]
+ Reverse_Packet_Data_Channel_Payload_Adjustment_Gain[EP_SIZE]
+ Reverse_Packet_Data_Channel_Subpacket_Adjustment_Gain[SPID]
+ Reverse_Packet_Data_Channel_Boost_Adjustment_Gain[BOOST]
+ Reverse_Channel_Adjustment_Gain[Channel]
– Multiple_Channel_Adjustment_Gain[Channel]
+ $\text{RLGAIN\_TRAFFIC\_PILOT}_s$).

The mobile station shall maintain the ratio

$$\frac{\text{mean code channel output power}}{\text{mean pilot channel output power}}$$

within ±0.25 dB of the number specified by RPDCH_TPR_Table[EP_SIZE, SPID, BOOST] if the Reverse Packet Data Channel has an output power greater than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.35 dB if the Reverse Packet Data Channel has an output power greater than 1/60 and less than 1/30 of the total output power of the mobile station. The mobile station shall maintain the above ratio to within ±0.6 dB if the Reverse Packet Data Channel has an output power less than 1/60 of the total output power of the mobile station.

2.1.2.4 Power Transition Characteristics

2.1.2.4.1 Open Loop Estimation

Following a step change in mean input power, ΔP_{in}, the mean output power of the mobile station shall transition to its final value in a direction opposite in sign to ΔP_{in}, with magnitude contained between mask limits defined by the following:

upper limit:

for $0 < t < 24$ ms: $\max [1.2 \times |\Delta P_{in}| \times (t/24), |\Delta P_{in}| \times (t/24) + 2.0 \text{ dB}] + 1.5$ dB,[17]

for $t \geq 24$ ms: $\max [1.2 \times |\Delta P_{in}|, |\Delta P_{in}| + 0.5 \text{ dB}] + 1.5$ dB;

lower limit:

for $t > 0$: $\max [0.8 \times |\Delta P_{in}| \times [1 - e^{(1.25 - t)/36}] - 2.0 \text{ dB}, 0] - 1$ dB;

where t is expressed in units of milliseconds and ΔP_{in} is expressed in units of dB.

These limits shall apply for a step change ΔP_{in} of ±20 dB or less. The absolute value of the change in mean output power due to open loop power control shall be a monotonically increasing function of time. If the change in mean output power consists of discrete

[17]The mask limits allow for the effect of alternating closed loop power control bits.

increments, no single increment shall exceed 1.2 dB. See 2.1.2.3 for the valid range of the mobile station's mean output power.

2.1.2.4.2 Closed Loop Correction

Following the reception of a valid closed loop power control bit on the forward power control subchannel or the common power control subchannel, the mean output power of the mobile station shall be within 0.3 dB of the final value in less than 500 μs. For power control step sizes of 0.5 dB and 0.25 dB, the mean output power of the mobile station should be within 0.15 dB of the final value in less than 500 μs.

2.1.2.4.3 Phase Continuity Requirements for Radio Configurations 3 through 8

When operating with Radio Configurations 3 through 8, the mobile station may have transmitted phase discontinuities. The mobile station shall meet the requirements set forth in the current version of [11].

2.1.3 Modulation Characteristics

2.1.3.1 Reverse CDMA Channel Signals

Signals transmitted on the Reverse Traffic Channel (i.e., the Reverse Dedicated Control Channel, the Reverse Fundamental Channel, the Reverse Supplemental Channel, the Reverse Supplemental Code Channel, or the Reverse Packet Data Channel) are specified by radio configurations. There are eight radio configurations for the Reverse Traffic Channel (see Table 2.1.3.1-1).

A mobile station shall support operation in Radio Configuration 1, 3, 5, or 8. A mobile station may support operation on Radio Configuration 2, 4, 6, or 7. A mobile station supporting operation in Radio Configuration 2 shall support Radio Configuration 1. A mobile station supporting operation in Radio Configuration 4 shall support Radio Configuration 3. A mobile station supporting operation in Radio Configuration 6 shall support Radio Configuration 5.

A mobile station shall not use Radio Configuration 1 or 2 simultaneously with Radio Configuration 3, 4, 5, 6, 7, or 8 on the Reverse Traffic Channel. A mobile station shall not use Radio Configuration 8 simultaneously with Radio Configurations 1 through 7 on the Reverse Traffic Channel.

If the mobile station supports the Forward Fundamental Channel with Radio Configuration 1, then it shall support the Reverse Fundamental Channel with Radio Configuration 1. If the mobile station supports the Forward Fundamental Channel with Radio Configuration 2, then it shall support the Reverse Fundamental Channel with Radio Configuration 2. If the mobile station supports the Forward Fundamental Channel with Radio Configuration 3 or 4, then it shall support the Reverse Fundamental Channel with Radio Configuration 3. If the mobile station supports the Forward Fundamental Channel with Radio Configuration 5, then it shall support the Reverse Fundamental Channel with Radio Configuration 4.

If the mobile station supports the Forward Fundamental Channel with Radio Configuration 6 or 7, then it shall support the Reverse Fundamental Channel with Radio Configuration 3 or 5. If the mobile station supports the Forward Fundamental Channel with Radio Configuration 8 or 9, then it shall support the Reverse Fundamental Channel with Radio Configuration 4 or 6.

If the mobile station supports the Forward Fundamental Channel with Radio Configuration 11, then it shall support the Reverse Fundamental Channel with Radio Configuration 8. If the mobile station supports the Forward Fundamental Channel with Radio Configuration 12, then it shall support the Forward Fundamental Channel with Radio Configuration 11.

If the mobile station supports the Forward Dedicated Control Channel with Radio Configuration 3 or 4, then it shall support the Reverse Dedicated Control Channel with Radio Configuration 3. If the mobile station supports the Forward Dedicated Control Channel with Radio Configuration 5, then it shall support the Reverse Dedicated Control Channel with Radio Configuration 4. If the mobile station supports the Forward Dedicated Control Channel with Radio Configuration 6 or 7, then it shall support the Reverse Dedicated Control Channel with Radio Configuration 3 or 5. If the mobile station supports the Forward Dedicated Control Channel with Radio Configuration 8 or 9, then it shall support the Reverse Dedicated Control Channel with Radio Configuration 4 or 6.

If the mobile station supports the Forward Packet Data Channel with Radio Configuration 10, then it shall support either the Reverse Fundamental Channel, the Reverse Dedicated Control Channel, or both, with Radio Configuration 3. If the mobile station supports the Forward Packet Data Channel with Radio Configuration 10, then it may support either the Reverse Fundamental Channel, the Reverse Dedicated Control Channel, or both, with Radio Configuration 4. If the mobile station supports the Forward Packet Data Channel with Radio Configuration 10, then it shall support the Reverse Acknowledgment Channel and the Reverse Channel Quality Indicator Channel.

If the mobile station supports the Reverse Packet Data Channel with Radio Configuration 7, then it shall support the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, the Reverse Packet Data Control Channel, and the Reverse Request Channel.

If the mobile station supports the Forward Fundamental Channel with Radio Configuration 11 or Radio Configuration 12, then it shall support the Reverse Acknowledgment Channel 1. If F_SCH_EARLY_TERM_SUPPORTED = ‘1’ as specified in [5], and the mobile station supports the Forward Supplemental Channel 1 with Radio Configuration 11 or Radio Configuration 12, then it shall support the Reverse Acknowledgment Channel 2. If F_SCH_EARLY_TERM_SUPPORTED = ‘1’ as specified in [5], and the mobile station supports the Forward Supplemental Channel 2 with Radio Configuration 11 or Radio Configuration 12, then it shall support the Reverse Acknowledgment Channel 3.

Table 2.1.3.1-1. Radio Configuration Characteristics for the Reverse CDMA Channel

Radio Config.	Associated Spreading Rate	Data Rates, Forward Error Correction, and General Characteristics
1	1	1200, 2400, 4800, and 9600 bps data rates with R = 1/3, 64-ary orthogonal modulation
2	1	1800, 3600, 7200, and 14400 bps data rates with R = 1/2, 64-ary orthogonal modulation
3	1	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, and 153600 bps data rates with R = 1/4, 307200 bps data rate with R = 1/2, BPSK modulation with a pilot
4	1	1800, 3600, 7200, 14400, 28800, 57600, 115200, and 230400 bps data rates with R = 1/4, BPSK modulation with a pilot
5	3	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, and 153600 bps data rates with R = 1/4, 307200 and 614400 bps data rate with R = 1/3, BPSK modulation with a pilot
6	3	1800, 3600, 7200, 14400, 28800, 57600, 115200, 230400, and 460800 bps data rates with R = 1/4, 1036800 bps data rate with R = 1/2, BPSK modulation with a pilot
7	1	19200, 40800, and 79200 bps subpacket data rates with R = 1/5, BPSK modulation with a pilot; 156000, 309600, 463200, 616800, 924000, 1231200, and 1538400 bps subpacket data rates with R = 1/5, QPSK modulation with one or two pilots; and 1845600 bps subpacket data rate with R = 1/5, 8-PSK modulation with one or two pilots (see Table 2.1.3.1.11.4-1)
8	1	1800, 3000, 5000, 9600, 19200, 38400, 76800, and 153600 bps data rates with R = 1/4, 307200 bps data rate with R = 1/2, BPSK modulation with a pilot

Note: For Radio Configurations 3 through 6, the Reverse Dedicated Control Channel and Reverse Fundamental Channel also allow a 9600 bps, 5 ms format.

2.1.3.1.1 Channel Structures

The structure of the code channels transmitted by a mobile station is shown in Figure 2.1.3.1.1-1.

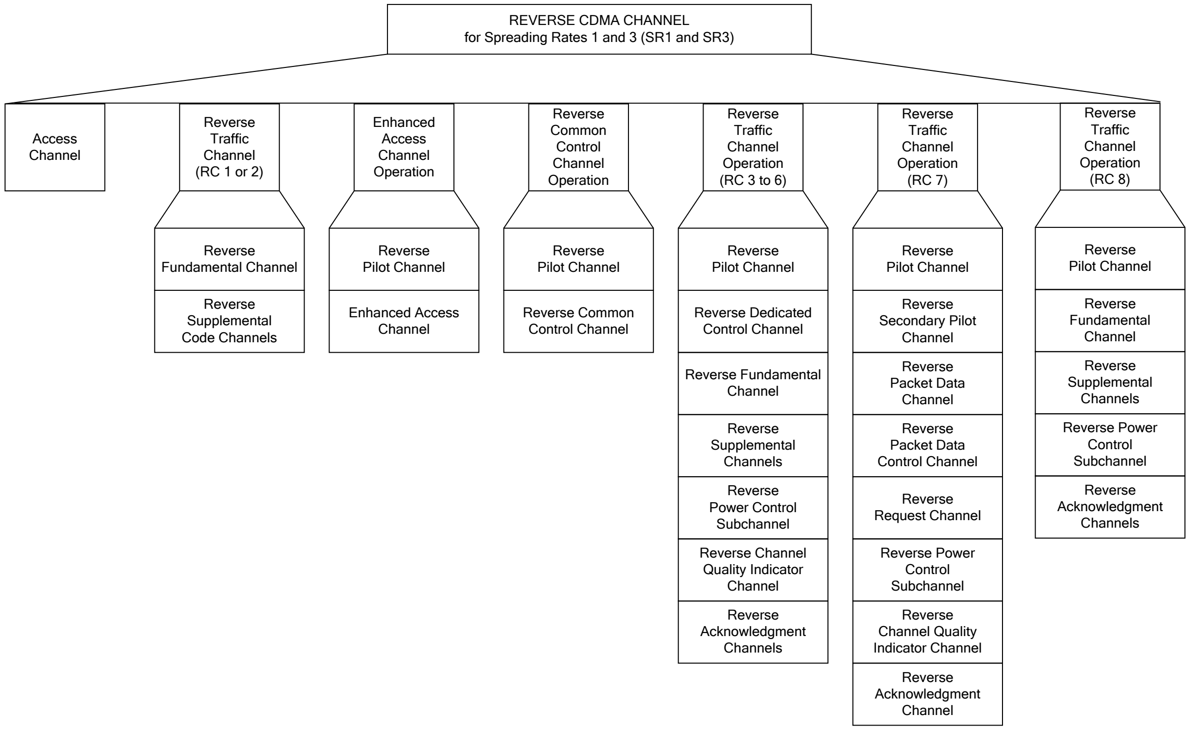


Figure 2.1.3.1.1-1. Reverse CDMA Channels Received at the Base Station

2.1.3.1.1.1 Spreading Rate 1

The Reverse CDMA Channel consists of the channels specified in Table 2.1.3.1.1.1-1. Table 2.1.3.1.1.1-1 states the maximum number of channels that can be transmitted by each mobile station for each channel type.

Table 2.1.3.1.1.1-1. Channel Types per Mobile Station on the Reverse CDMA Channel for Spreading Rate 1

Channel Type	Maximum Number
Reverse Pilot Channel	1
Reverse Secondary Pilot Channel	1
Access Channel	1
Enhanced Access Channel	1
Reverse Common Control Channel	1
Reverse Packet Data Control Channel	1
Reverse Request Channel	1
Reverse Dedicated Control Channel	1
Reverse Acknowledgment Channel	3
Reverse Channel Quality Indicator Channel	1
Reverse Fundamental Channel	1
Reverse Supplemental Code Channel (RC 1 and 2 only)	7
Reverse Supplemental Channel (RC 3, 4, and 8 only)	2
Reverse Packet Data Channel (RC 7 only)	1

The structure of the Reverse Pilot Channel is shown in Figure 2.1.3.1.1.1-1. The structure of the Reverse Secondary Pilot Channel is shown in Figure 2.1.3.1.1.1-2.

The structure of the Access Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-3. The structure of the Enhanced Access Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-4 and Figure 2.1.3.1.1.1-5. The structure of the Reverse Common Control Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-5.

The structure of the Reverse Packet Data Control Channel is shown in Figure 2.1.3.1.1.1-6. The structure of the Reverse Request Channel is shown in Figure 2.1.3.1.1.1-7.

The structure of the Reverse Dedicated Control Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-8 and Figure 2.1.3.1.1.1-9.

The structure of the Reverse Acknowledgment Channel for Radio Configurations 6 and 7 is shown in Figure 2.1.3.1.1.1-10. The structure of the Reverse Acknowledgment Channel for Radio Configuration 8 is shown in Figure 2.1.3.1.1.1-11. The structure of the Reverse Channel Quality Indicator Channel is shown in Figure 2.1.3.1.1.1-12.

The Reverse Fundamental Channel and the Reverse Supplemental Code Channel for Radio Configuration 1 have the overall structure shown in Figure 2.1.3.1.1.1-13. The Reverse Fundamental Channel and the Reverse Supplemental Code Channel for Radio

Configuration 2 have the overall structure shown in Figure 2.1.3.1.1.1-14. The Reverse Fundamental Channel and the Reverse Supplemental Channel for Radio Configuration 3 have the overall structure shown in Figure 2.1.3.1.1.1-15. The Reverse Fundamental Channel and the Reverse Supplemental Channel for Radio Configuration 4 have the overall structure shown in Figure 2.1.3.1.1.1-16. The Reverse Packet Data Channel for Radio Configuration 7 has the overall structure shown in Figure 2.1.3.1.1.1-17 - Figure 2.1.3.1.1.1-20.

The Reverse Fundamental Channel and the Reverse Supplemental Channel for Radio Configuration 8 have the overall structure shown in Figure 2.1.3.1.1.1-21 through Figure 2.1.3.1.1.1-23.

The reverse power control subchannel is shown in Figure 2.1.3.1.15.1-1.

The I and Q mapping for the Reverse Pilot Channel, the Reverse Secondary Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, the Reverse Traffic Channel with Radio Configurations 3 and 4, and the Reverse Packet Data Channel with Radio Configuration 7 is shown in Figure 2.1.3.1.1.1-22.

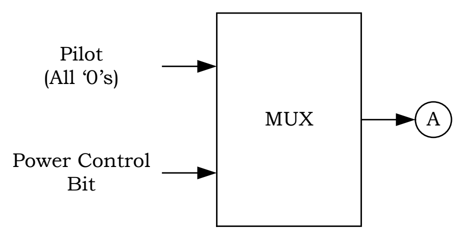


Figure 2.1.3.1.1.1-1. Reverse Pilot Channel Structure

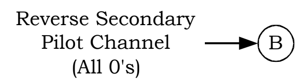


Figure 2.1.3.1.1.1-2. Reverse Secondary Pilot Channel Structu

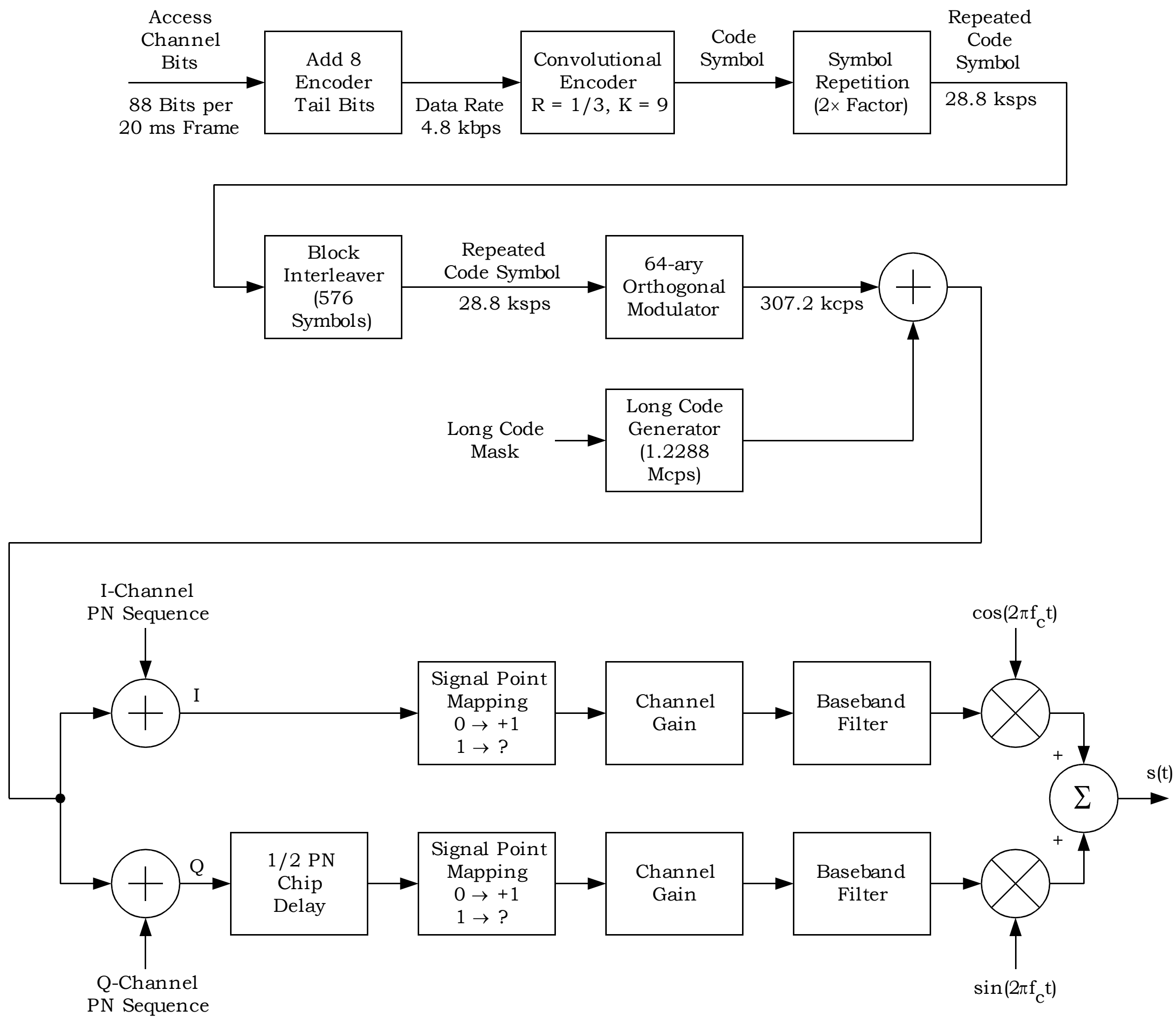


Figure 2.1.3.1.1.1-3. Access Channel Structure for Spreading Rate 1

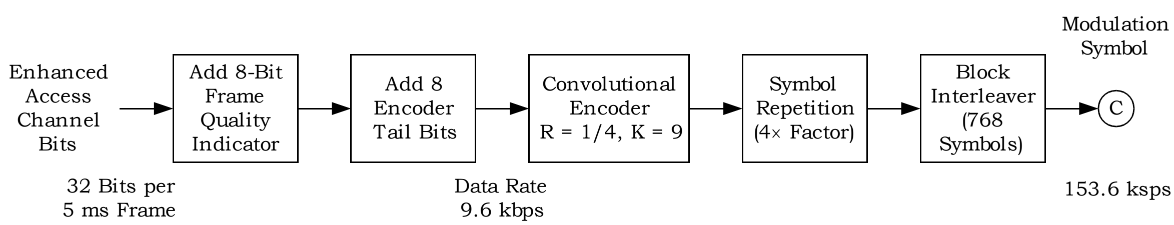
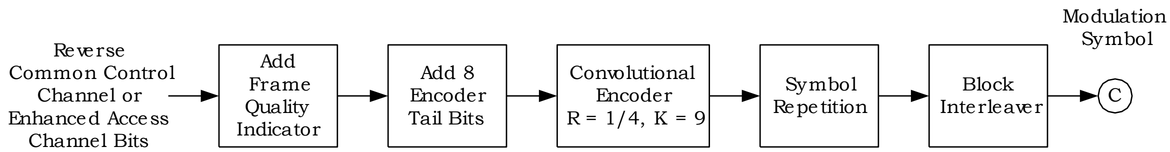


Figure 2.1.3.1.1.1-4. Enhanced Access Channel Header Structure for Spreading Rate 1



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
172 Bits/5 ms	12	38.4	1×	768	153.6
360 Bits/10 ms	16	38.4	1×	1,536	153.6
172 Bits/10 ms	12	19.2	2×	1,536	153.6
744 Bits/20 ms	16	38.4	1×	3,072	153.6
360 Bits/20 ms	16	19.2	2×	3,072	153.6
172 Bits/20 ms	12	9.6	4×	3,072	153.6

Figure 2.1.3.1.1.1-5. Enhanced Access Channel Data and the Reverse Common Control Channel Structure for Spreading Rate 1

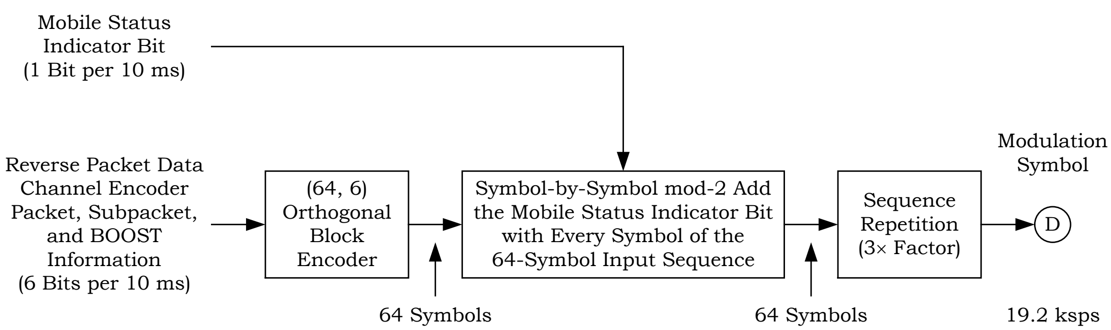


Figure 2.1.3.1.1.1-6. Reverse Packet Data Control Channel Structure

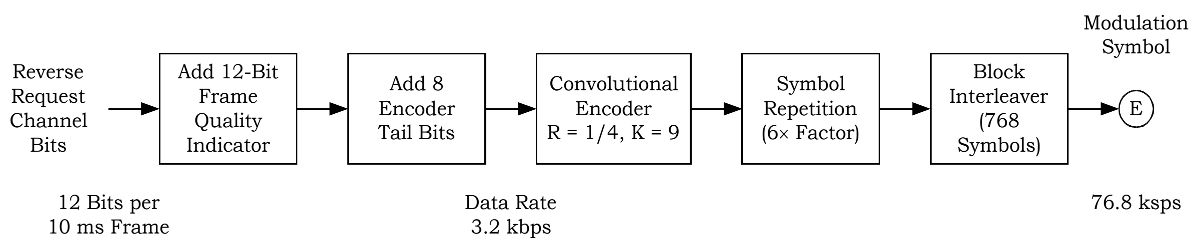
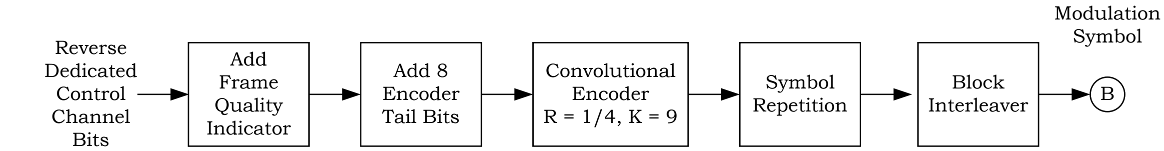


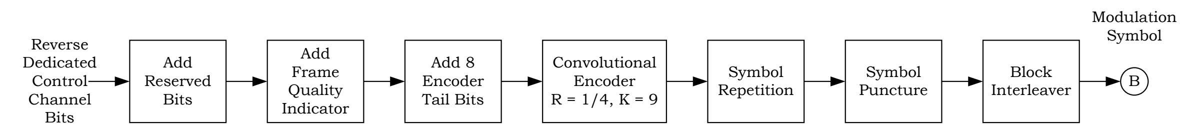
Figure 2.1.3.1.1.1-7. Reverse Request Channel Structure



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	2×	384	76.8
172 Bits/20 ms	12	9.6	2×	1,536	76.8
1 to 171 Bits/20 ms	12 or 16	1.05 to 9.55		1,536	76.8

Note: If flexible data rates are supported, there can be 1 to 171 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 1,536.

Figure 2.1.3.1.1.1-8. Reverse Dedicated Control Channel Structure for Radio Configuration 3



Bits/Frame	Bits	Bits	Data Rate (kbps)	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	2×	None	384	76.8
267 Bits/20 ms	1	12	14.4	2×	8 of 24	1,536	76.8
1 to 268 Bits/20 ms	0	12 or 16	1.05 to 14.4			1,536	76.8

Notes: If flexible data rates are supported, there can be 1 to 268 channel bits in a 20 ms frame. Symbol repetition factor and puncturing are calculated to achieve the interleaver block size of 1,536.

Figure 2.1.3.1.1.1-9. Reverse Dedicated Control Channel Structure for Radio Configuration 4

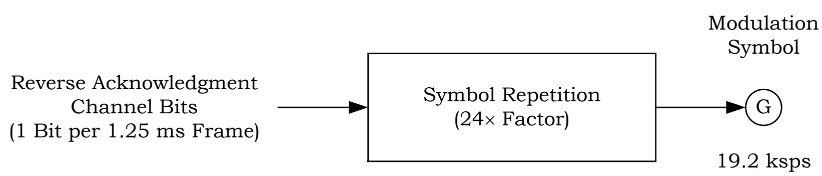


Figure 2.1.3.1.1.1-10. Reverse Acknowledgment Channel Structure for Radio Configurations 6 and 7

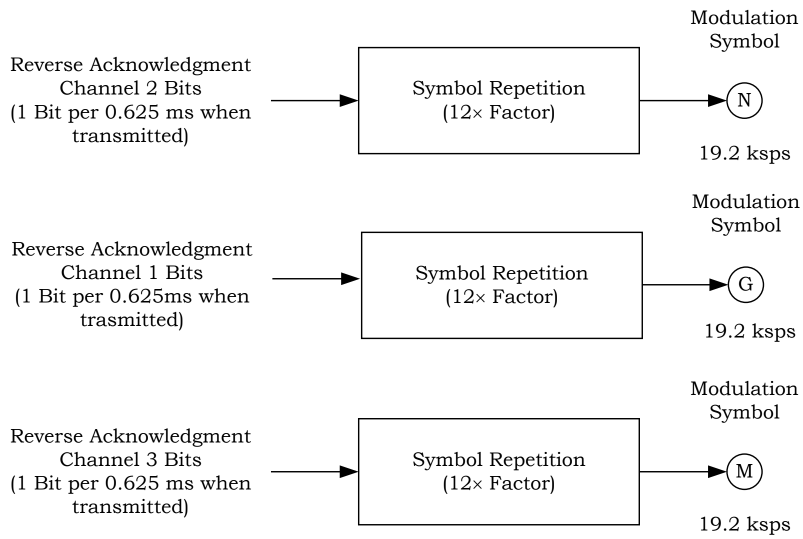


Figure 2.1.3.1.1.1-11. Reverse Acknowledgment Channel Structure for Radio Configuration 8

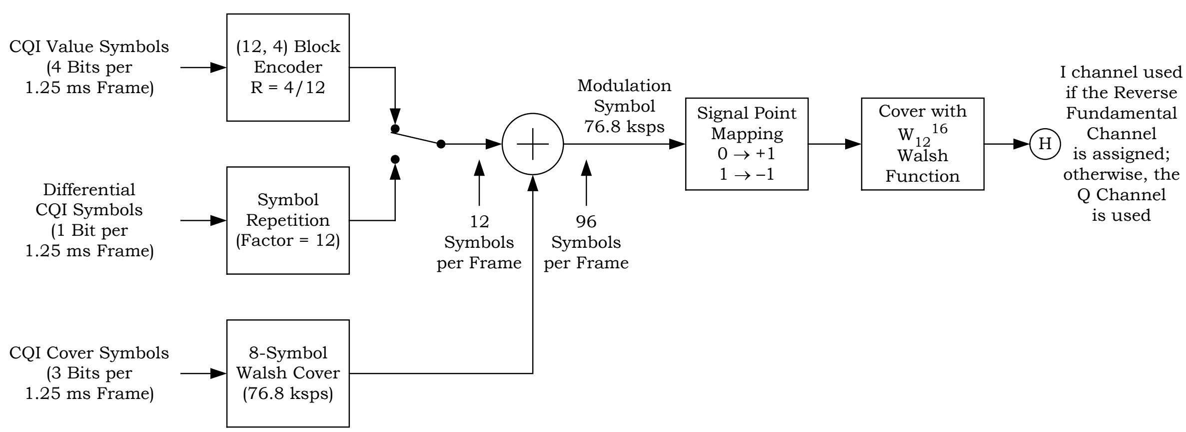


Figure 2.1.3.1.1.1-12. Reverse Channel Quality Indicator Channel Structure

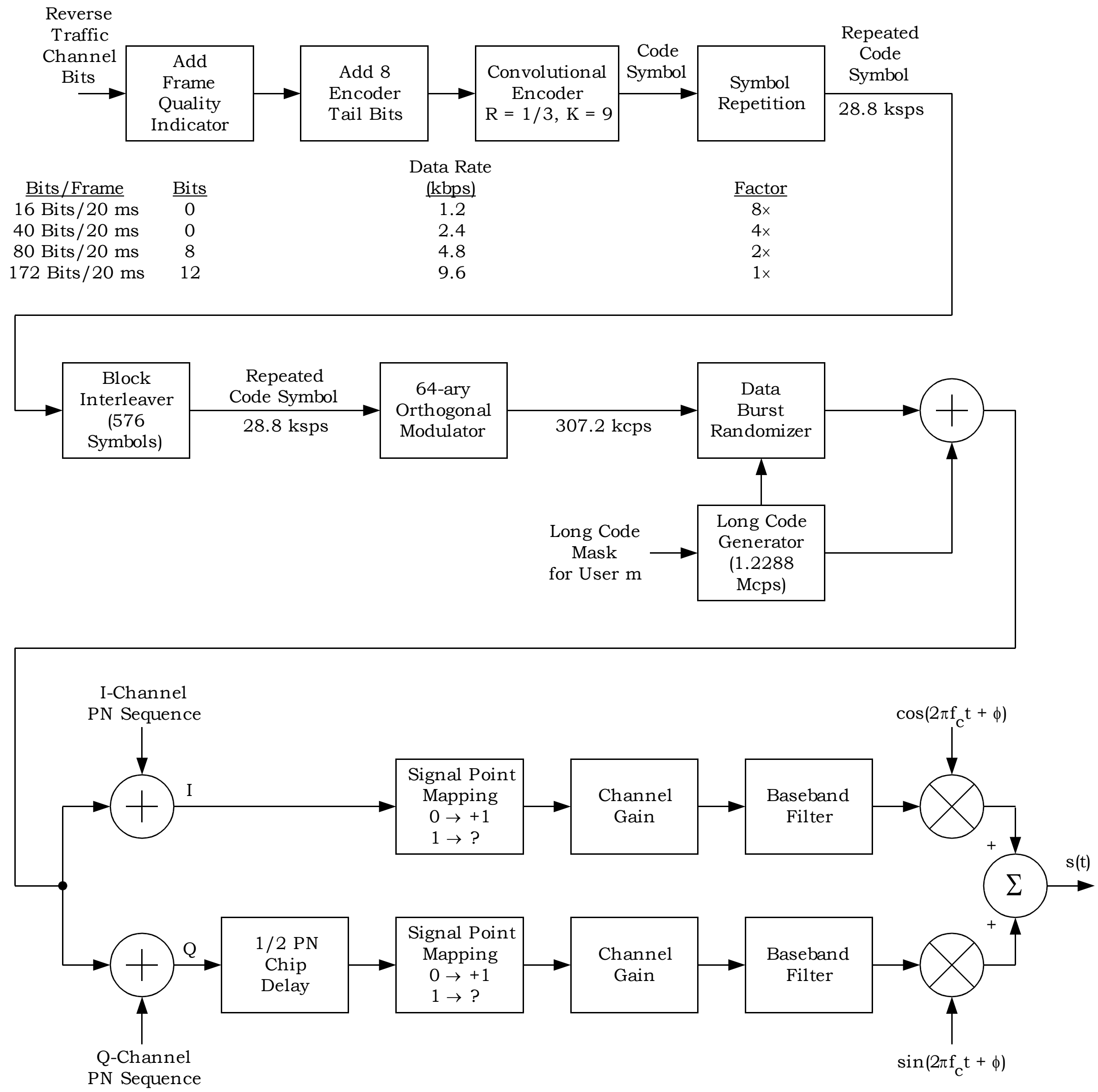


Figure 2.1.3.1.1.1-13. Reverse Fundamental Channel and Reverse Supplemental Code Channel Structure for Radio Configuration 1

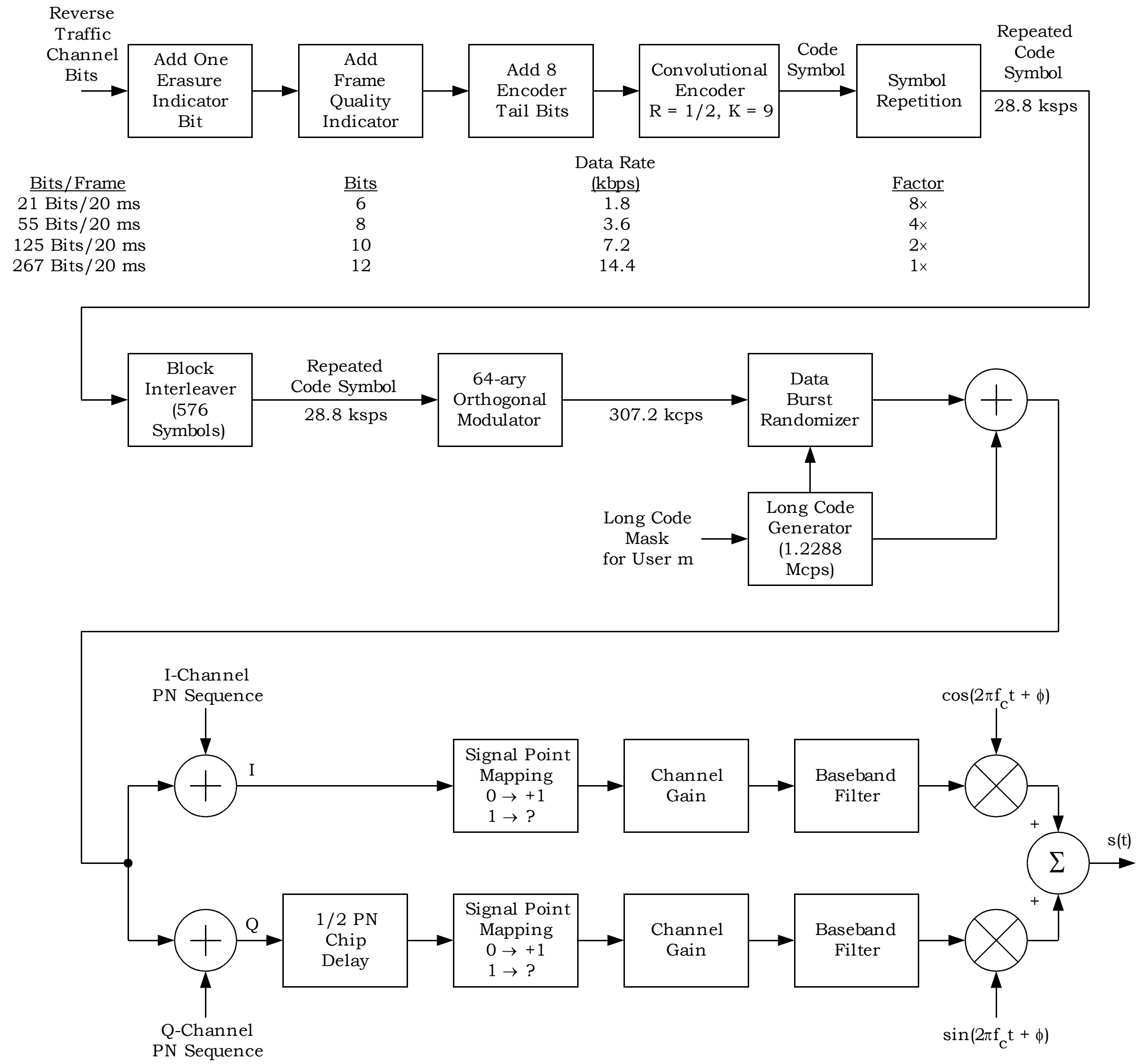
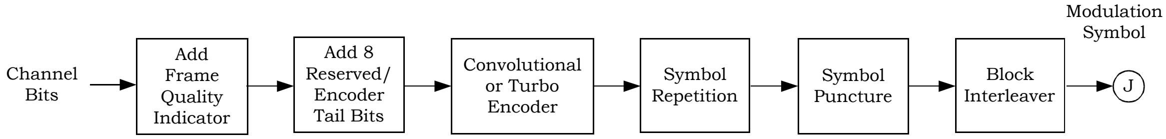


Figure 2.1.3.1.1.1-14. Reverse Fundamental Channel and Reverse Supplemental Code Channel Structure for Radio Configuration 2

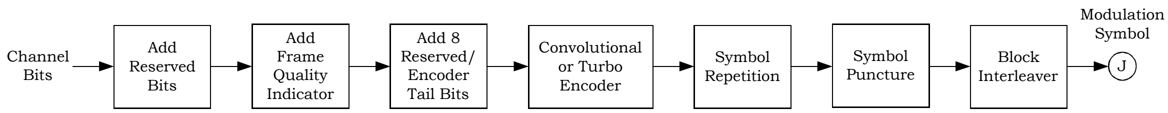


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/4	2×	None	384	76.8
16 Bits/20 ms	6	1.5	1/4	16×	1 of 5	1,536	76.8
40 Bits/20n ms	6	2.7/n	1/4	8×	1 of 9	1,536	76.8/n
80 Bits/20n ms	8	4.8/n	1/4	4×	None	1,536	76.8/n
172 Bits/20n ms	12	9.6/n	1/4	2×	None	1,536	76.8/n
360 Bits/20n ms	16	19.2/n	1/4	1×	None	1,536	76.8/n
744 Bits/20n ms	16	38.4/n	1/4	1×	None	3,072	153.6/n
1,512 Bits/20n ms	16	76.8/n	1/4	1×	None	6,144	307.2/n
3,048 Bits/20n ms	16	153.6/n	1/4	1×	None	12,288	614.4/n
6,120 Bits/20n ms	16	307.2/n	1/2	1×	None	12,288	614.4/n
1 to 6,119 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel.
3. The Reverse Fundamental Channel only uses 15 to 192 encoder input bits per frame with n = 1.
4. Turbo coding may be used for the Reverse Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
5. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
6. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
   - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
   - The code rate is 1/2 for more than 3,072 encoder input bits per frame; otherwise, it is 1/4. If the number of encoder input bits per frame is less than 384, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 2.1.3.1.1.1-15. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 3



Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/4	2×	None	384	76.8
21 Bits/20 ms	1	6	1.8	1/4	16×	8 of 24	1,536	76.8
55 Bits/20n ms	1	8	3.6/n	1/4	8×	8 of 24	1,536	76.8/n
125 Bits/20n ms	1	10	7.2/n	1/4	4×	8 of 24	1,536	76.8/n
267 Bits/20n ms	1	12	14.4/n	1/4	2×	8 of 24	1,536	76.8/n
552 Bits/20n ms	0	16	28.8/n	1/4	1×	4 of 12	1,536	76.8/n
1,128 Bits/20n ms	0	16	57.6/n	1/4	1×	4 of 12	3,072	153.6/n
2,280 Bits/20n ms	0	16	115.2/n	1/4	1×	4 of 12	6,144	307.2/n
4,584 Bits/20n ms	0	16	230.4/n	1/4	1×	4 of 12	12,288	614.4/n
1 to 4,583 Bits/20n ms								

Notes:

1. n is the length of the frame in multiples of 20 ms. For 37 to 72 encoder input bits per frame, n = 1 or 2. For more than 72 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel.
3. The Reverse Fundamental Channel only uses 15 to 288 encoder input bits per frame with n = 1.
4. Turbo coding may be used for the Reverse Supplemental Channels with 576 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
5. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
6. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
   - When the number of channel bits per frame is 21, 55, 125, or 267 and the corresponding number of frame quality indicator bits is 6, 8, 10, and 12, an initial reserved bit is used; otherwise, no initial reserved bits are used.
   - The frame quality indicator length is 16 for more than 288 encoder input bits per frame; 12 or 16 for 145 to 288 encoder input bits per frame; 10, 12, or 16 for 73 to 144 encoder input bits per frame; 8, 10, 12, or 16 for 37 to 72 encoder input bits per frame; and 6, 8, 10, 12, or 16 otherwise.
   - If the number of encoder input bits per frame is less than 576, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.
   - If ERAM is disabled, the code rate is 1/4. If ERAM is enabled, the code rate of the turbo encoder shall be selected as follows:
     $R = 1/3$, if $8/3 < N/I \le 3$; $R = 1/4$, if $3 < N/I \le 4$ or $N/I = 8/3$; $R = 1/5$, if $N/I > 4$
     where I denotes the number of encoder input bits per frame, and N denotes the interleaver block size.

Figure 2.1.3.1.1.1-16. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 4

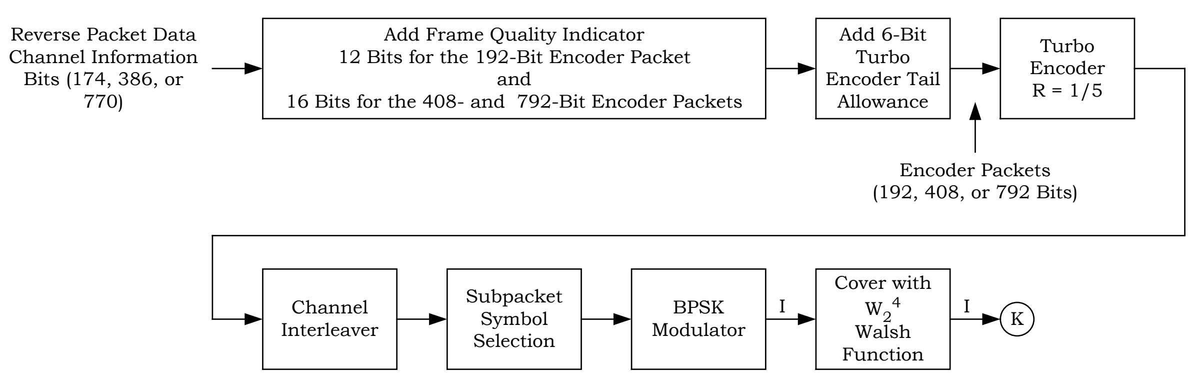


Figure 2.1.3.1.1.1-17. Reverse Packet Data Channel Structure for Radio Configuration 7 with Encoder Packet Sizes of 192, 408, and 792 Bits

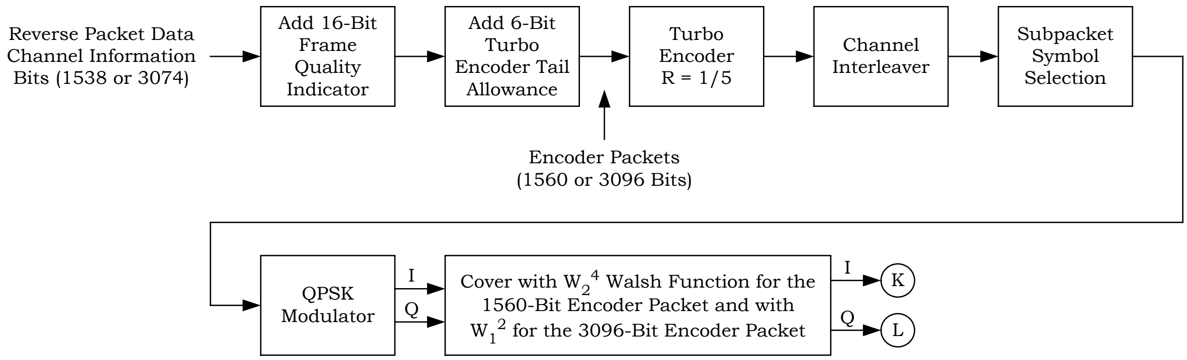


Figure 2.1.3.1.1.1-18 Reverse Packet Data Channel Structure for Radio Configuration 7 with Encoder Packet Sizes of 1560 and 3096 Bits

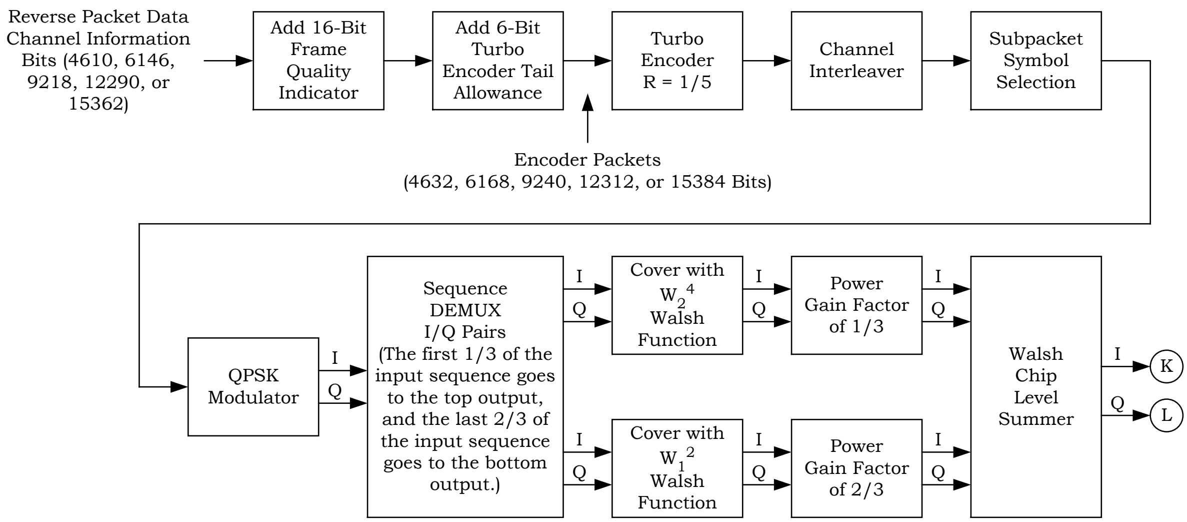


Figure 2.1.3.1.1.1-19. Reverse Packet Data Channel Structure for Radio Configuration 7 with Encoder Packet Sizes of 4632, 6168, 9240, 12312, and 15384 Bits

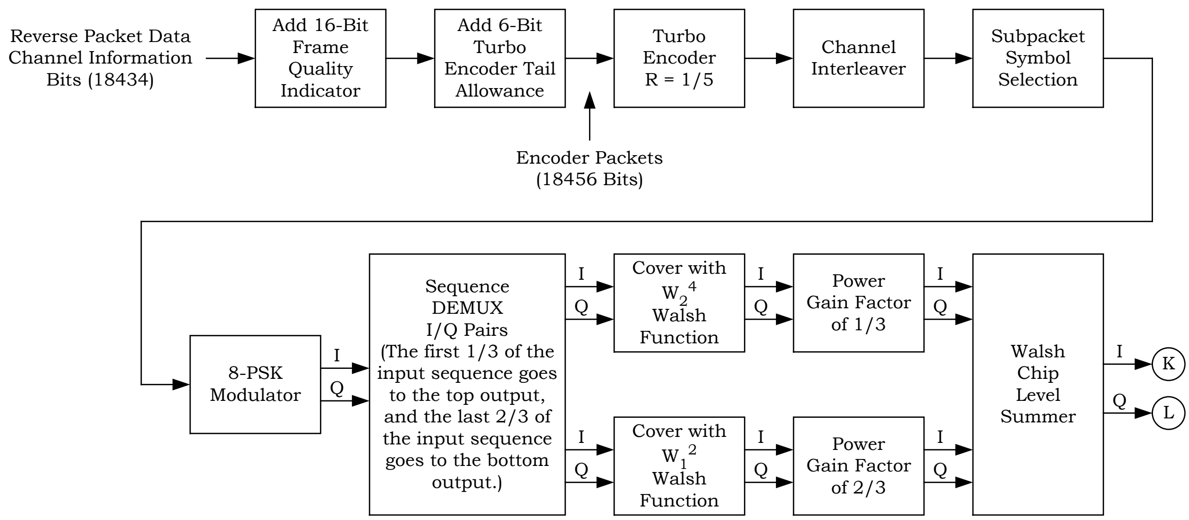
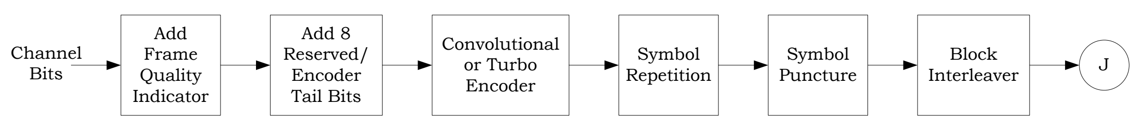


Figure 2.1.3.1.1.1-20. Reverse Packet Data Channel Structure for Radio Configuration 7 with Encoder Packet Size of 18456 Bits



Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
16 Bits/20 ms	12	1.8	1/4	16x	8 of 24	1,536	76.8
40 Bits/20 ms	12	3.0	1/4	8x	1 of 5	1,536	76.8
80 Bits/20 ms	12	5.0	1/4	4x	1 of 25	1,536	76.8
172 Bits/20 ms	12	9.6	1/4	2x	None	1,536	76.8
360 Bits/20 ms	16	19.2	1/4	1x	None	1,536	76.8
744 Bits/20 ms	16	38.4	1/4	1x	None	3,072	153.6
1,512 Bits/20 ms	16	76.8	1/4	1x	None	6,144	307.2
3,048 Bits/20 ms	16	153.6	1/4	1x	None	12,288	614.4
6,120 Bits/20 ms	16	307.2	1/2	1x	None	12,288	614.4

Notes:
1. The Reverse Fundamental channel only uses 36 to 192 encoder input bits per frame
2. Turbo coding is used for the Reverse Supplemental Channels with data rate greater than 9.6 kbps
3. With Convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail

Figure 2.1.3.1.1.1-21. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 8

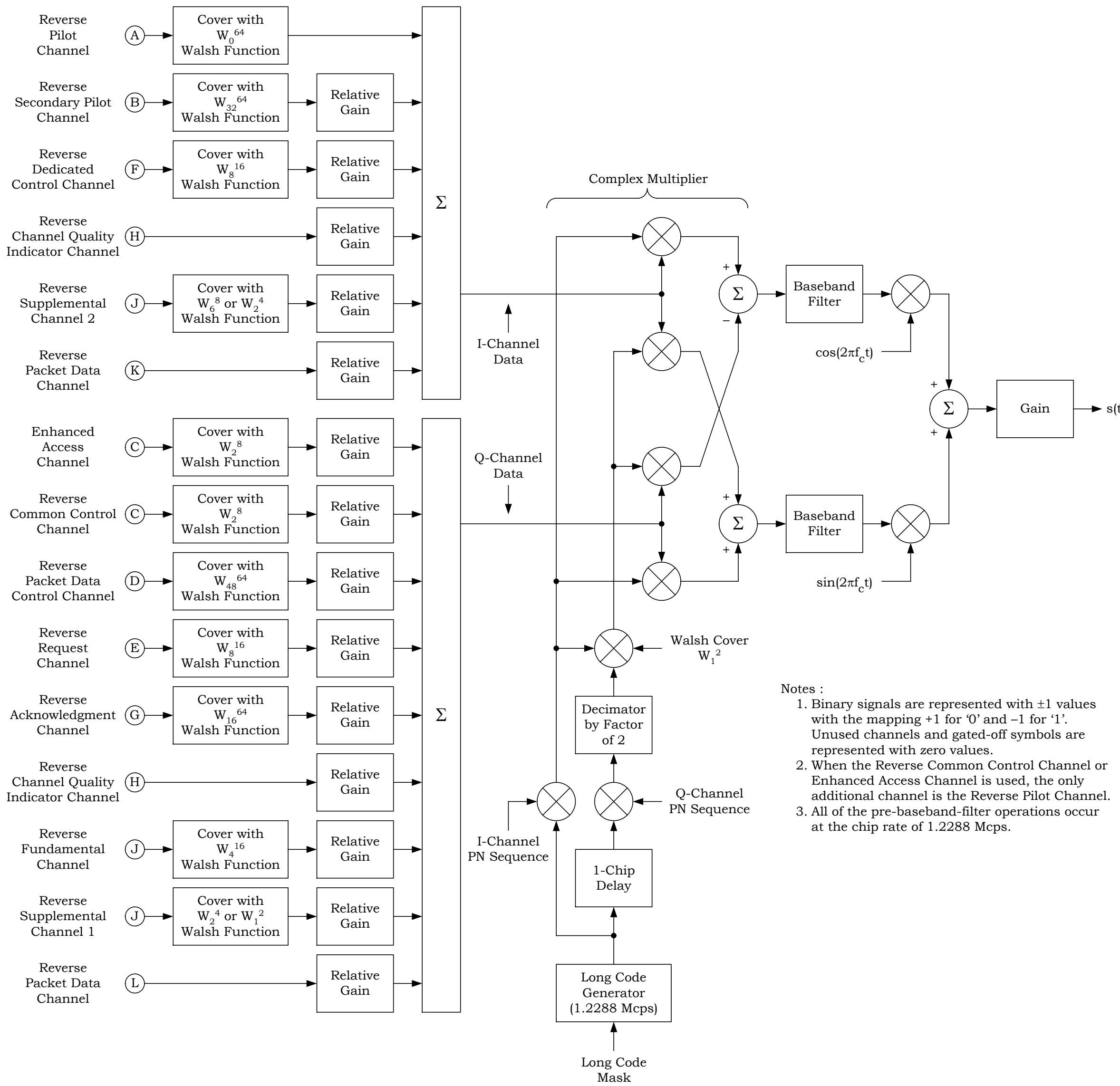


Figure 2.1.3.1.1.1-22. Spreading Rate 1 I and Q Mapping for the Reverse Pilot Channel, the Reverse Secondary Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, the Reverse Traffic Channel with Radio Configurations 3 and 4, and the Reverse Packet Data Channel with Radio Configuration 7

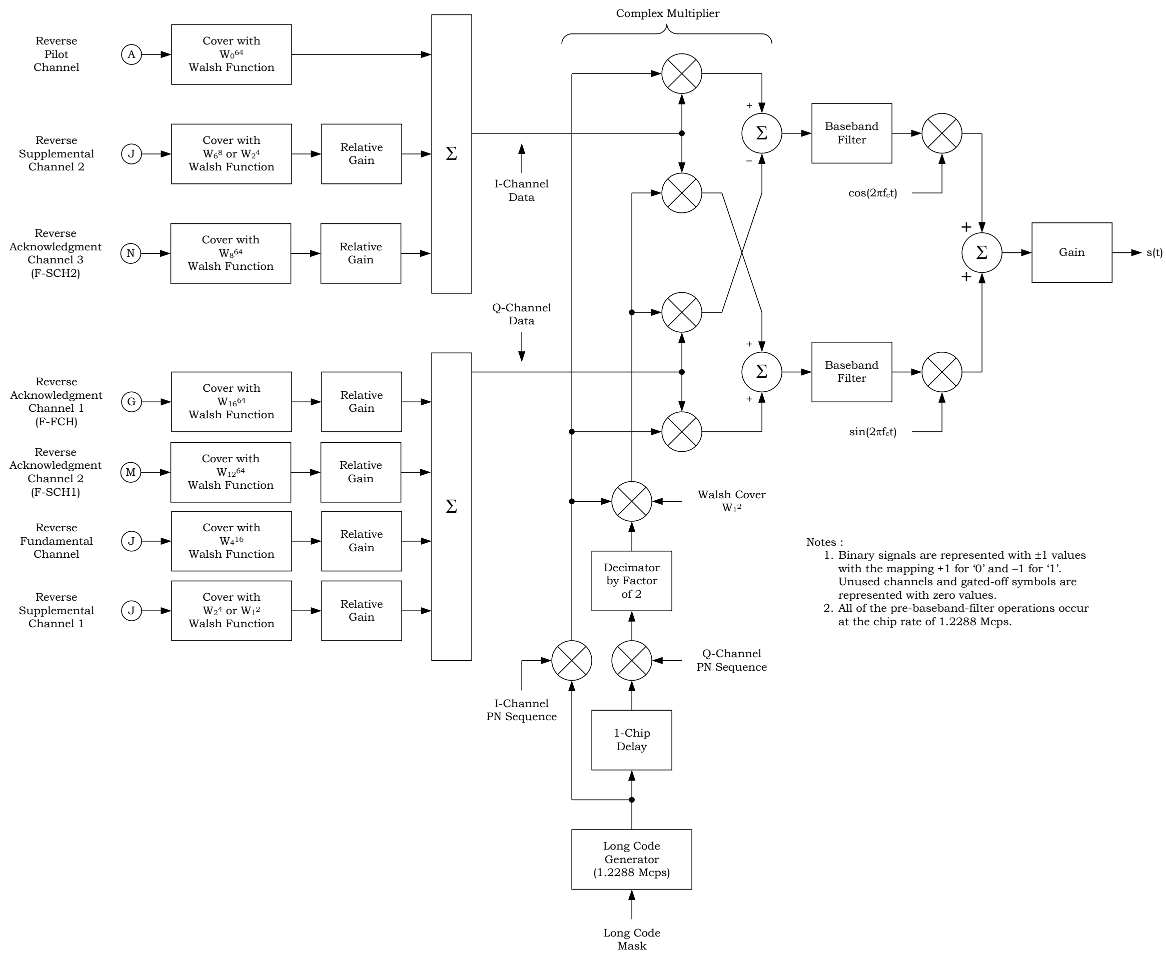


Figure 2.1.3.1.1.1-23. Spreading Rate 1 I and Q Mapping for the Reverse Pilot Channel, the Reverse Acknowledgment Channels, and the Reverse Traffic Channel with Radio Configuration 8

2.1.3.1.1.2 Spreading Rate 3

The Reverse CDMA Channel consists of the channels specified in Table 2.1.3.1.1.2-1. Table 2.1.3.1.1.2-1 states the maximum number of channels that can be transmitted by each mobile station for each channel type.

Table 2.1.3.1.1.2-1. Channel Types per Mobile Station on the Reverse CDMA Channel for Spreading Rate 3

Channel Type	Maximum Number
Reverse Pilot Channel	1
Enhanced Access Channel	1
Reverse Common Control Channel	1
Reverse Dedicated Control Channel	1
Reverse Fundamental Channel	1
Reverse Supplemental Channel	2

The structure of the Enhanced Access Channel for Spreading Rate 3 is shown in Figure 2.1.3.1.1.2-1 and Figure 2.1.3.1.1.2-2. The structure of the Reverse Common Control Channel for Spreading Rate 3 is shown in Figure 2.1.3.1.1.2-2. The structure of the Reverse Dedicated Control Channel for Spreading Rate 3 is shown in Figure 2.1.3.1.1.2-3 and Figure 2.1.3.1.1.2-4.

The Reverse Fundamental Channel and Reverse Supplemental Channel for Radio Configuration 5 have the overall structure shown in Figure 2.1.3.1.1.2-5. The Reverse Fundamental Channel and Reverse Supplemental Channel for Radio Configuration 6 has the overall structure shown in Figure 2.1.3.1.1.2-6.

The Reverse Pilot Channel and the reverse power control subchannel are shown in Figure 2.1.3.1.15.1-1.

The I and Q mapping for Spreading Rate 3 is shown in Figure 2.1.3.1.1.2-7.

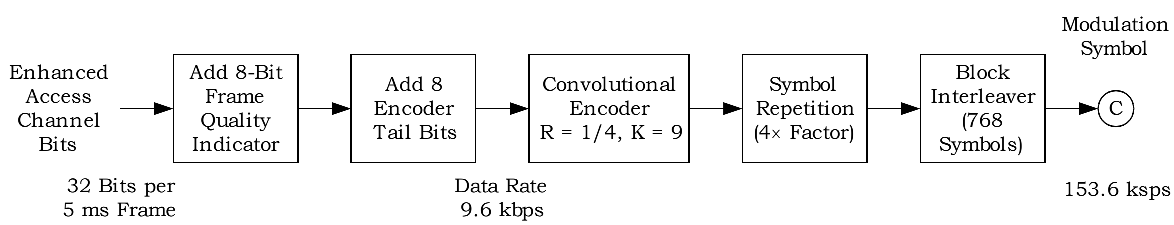
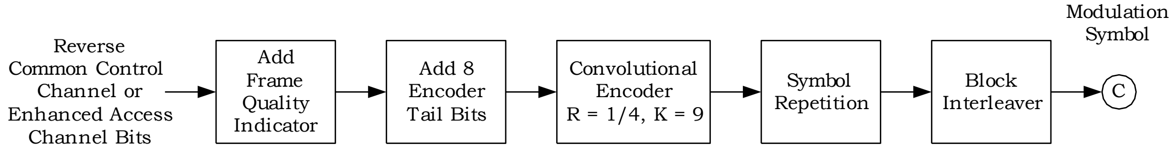
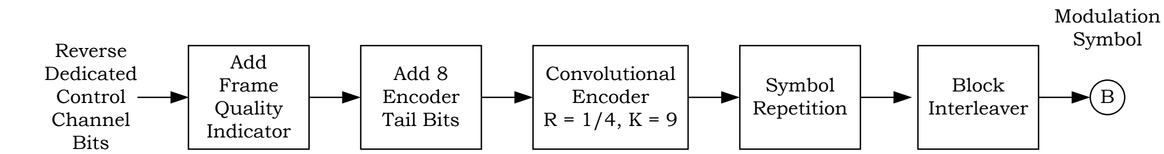


Figure 2.1.3.1.1.2-1. Enhanced Access Channel Header Structure for Spreading Rate 3



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
172 Bits/5 ms	12	38.4	1×	768	153.6
360 Bits/10 ms	16	38.4	1×	1,536	153.6
172 Bits/10 ms	12	19.2	2×	1,536	153.6
744 Bits/20 ms	16	38.4	1×	3,072	153.6
360 Bits/20 ms	16	19.2	2×	3,072	153.6
172 Bits/20 ms	12	9.6	4×	3,072	153.6

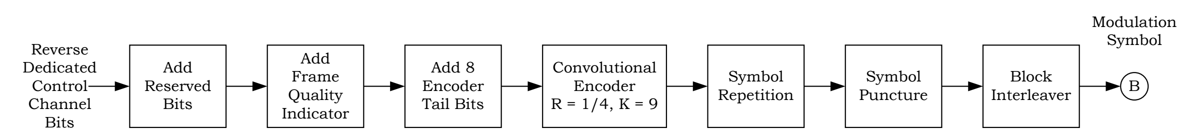
Figure 2.1.3.1.1.2-2. Enhanced Access Channel Data and the Reverse Common Control Channel Structure for Spreading Rate 3



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	2×	384	76.8
172 Bits/20 ms	12	9.6	2×	1,536	76.8
1 to 171 Bits/20 ms	12 or 16	1.05 to 9.55		1,536	76.8

Note: If flexible data rates are supported, there can be 1 to 171 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 1,536.

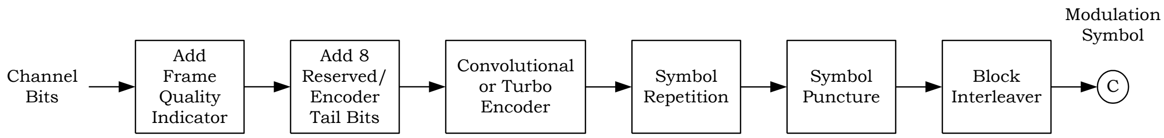
Figure 2.1.3.1.1.2-3. Reverse Dedicated Control Channel Structure for Radio Configuration 5



Bits/Frame	Bits	Bits	Data Rate (kbps)	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	2×	None	384	76.8
267 Bits/20 ms	1	12	14.4	2×	8 of 24	1,536	76.8
1 to 268 Bits/20 ms	0	12 or 16	1.05 to 14.4			1,536	76.8

Notes: If flexible data rates are supported, there can be 1 to 268 channel bits in a 20 ms frame. Symbol repetition factor and puncturing are calculated to achieve the interleaver block size of 1,536.

Figure 2.1.3.1.1.2-4. Reverse Dedicated Control Channel Structure for Radio Configuration 6

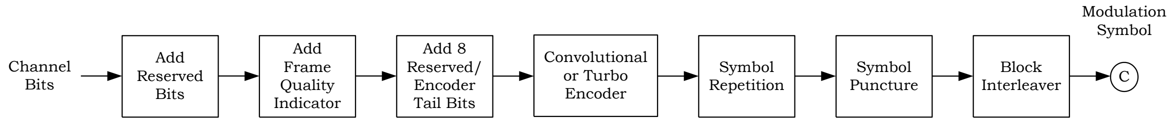


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/4	2×	None	384	76.8
16 Bits/20 ms	6	1.5	1/4	16×	1 of 5	1,536	76.8
40 Bits/20n ms	6	2.7/n	1/4	8×	1 of 9	1,536	76.8/n
80 Bits/20n ms	8	4.8/n	1/4	4×	None	1,536	76.8/n
172 Bits/20n ms	12	9.6/n	1/4	2×	None	1,536	76.8/n
360 Bits/20n ms	16	19.2/n	1/4	1×	None	1,536	76.8/n
744 Bits/20n ms	16	38.4/n	1/4	1×	None	3,072	153.6/n
1,512 Bits/20n ms	16	76.8/n	1/4	1×	None	6,144	307.2/n
3,048 Bits/20n ms	16	153.6/n	1/4	1×	None	12,288	614.4/n
6,120 Bits/20n ms	16	307.2/n	1/3	1×	None	18,432	921.6/n
12,264 Bits/20n ms	16	614.4/n	1/3	1×	None	36,864	1,843.2/n
1 to 12,263 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel.
3. The Reverse Fundamental Channel only uses from 15 to 192 encoder input bits per frame with n = 1.
4. Turbo coding may be used for the Reverse Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
5. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
6. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
   - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
   - The code rate is 1/3 for more than 3,072 encoder input bits per frame; otherwise, it is 1/4. If the number of encoder input bits per frame is less than 384, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 2.1.3.1.1.2-5. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 5



Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/4	2×	None	384	76.8
21 Bits/20 ms	1	6	1.8	1/4	16×	8 of 24	1,536	76.8
55 Bits/20n ms	1	8	3.6/n	1/4	8×	8 of 24	1,536	76.8/n
125 Bits/20n ms	1	10	7.2/n	1/4	4×	8 of 24	1,536	76.8/n
267 Bits/20n ms	1	12	14.4/n	1/4	2×	8 of 24	1,536	76.8/n
552 Bits/20n ms	0	16	28.8/n	1/4	1×	None	2,304	115.2/n
1,128 Bits/20n ms	0	16	57.6/n	1/4	1×	None	4,608	230.4/n
2,280 Bits/20n ms	0	16	115.2/n	1/4	1×	None	9,216	460.8/n
4,584 Bits/20n ms	0	16	230.4/n	1/4	1×	None	18,432	921.6/n
9,192 Bits/20n ms	0	16	460.8/n	1/4	1×	None	36,864	1,843.2/n
20,712 Bits/20n ms	0	16	1,036.8/n	1/2	1×	2 of 18	36,864	1,843.2/n
1 to 20,711 Bits/20n ms								

Notes:

1. n is the length of the frame in multiples of 20 ms. For 37 to 72 encoder input bits per frame, n = 1 or 2. For more than 72 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel.
3. The Reverse Fundamental Channel only uses from 15 to 288 encoder input bits per frame with n = 1.
4. Turbo coding may be used for the Reverse Supplemental Channels with 576 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
5. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
6. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
   - When the number of channel bits per frame is 21, 55, 125, or 267 and the corresponding frame quality indicator length is 6, 8, 10, and 12, an initial reserved bit is used; otherwise, no initial reserved bits are used.
   - The frame quality indicator length is 16 for more than 288 encoder input bits per frame; 12 or 16 for 145 to 288 encoder input bits per frame; 10, 12, or 16 for 73 to 144 encoder input bits per frame; 8, 10, 12, or 16 for 37 to 72 encoder input bits per frame; and 6, 8, 10, 12, or 16 otherwise.
   - The code rate is 1/2 for more than 9216 encoder input bits; otherwise, it is 1/4. If the number of encoder input bits per frame is less than 576, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 2.1.3.1.1.2-6. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 6

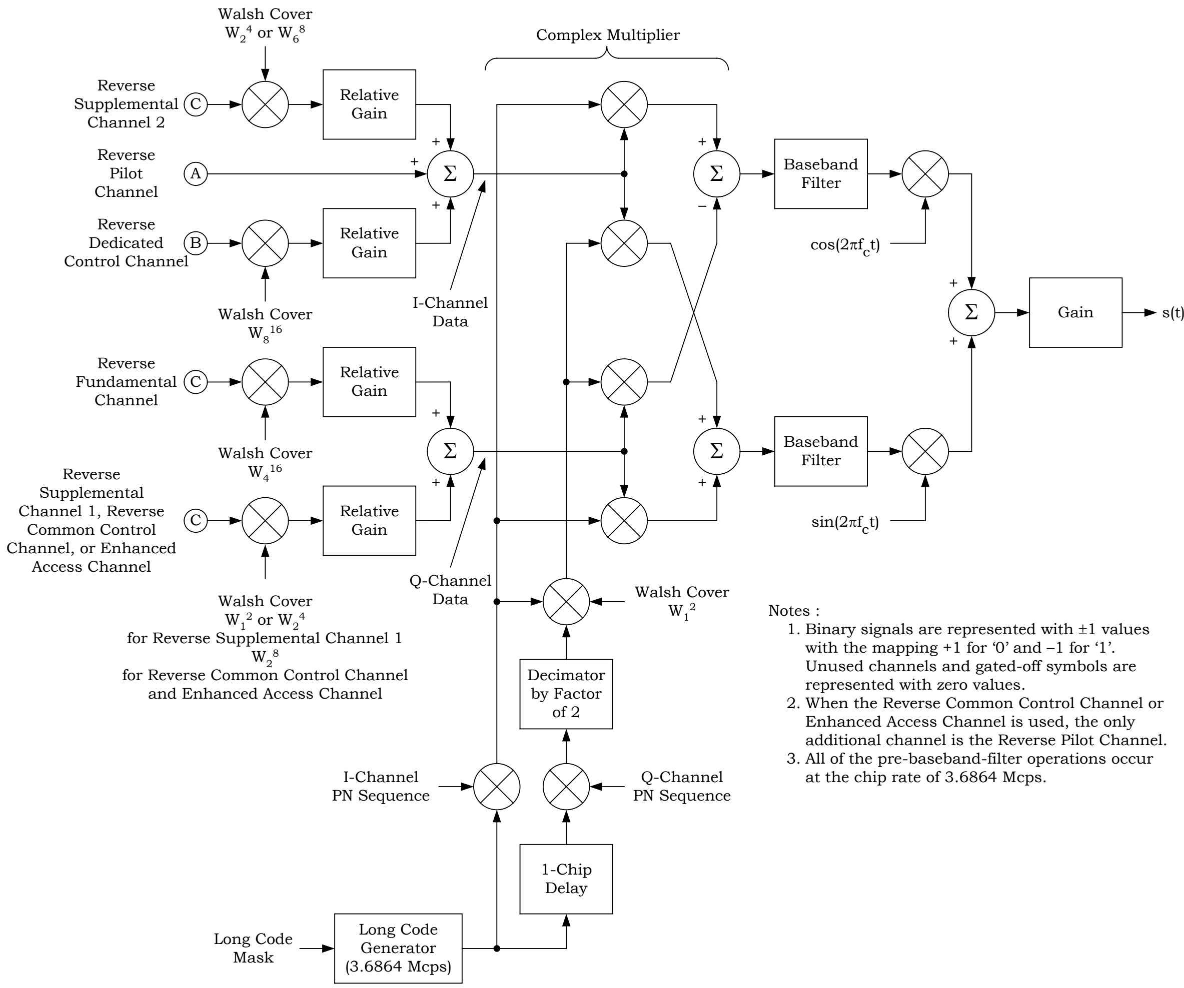


Figure 2.1.3.1.1.2-7. Spreading Rate 3 I and Q Mapping for the Reverse Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, and the Reverse Traffic Channel with Radio Configurations 5 and 6

2.1.3.1.2 Modulation Parameters

2.1.3.1.2.1 Spreading Rate 1

The modulation parameters for the Reverse CDMA Channel operating in Spreading Rate 1 are shown in Table 2.1.3.1.2.1-1 through Table 2.1.3.1.2.1-21, and Table 2.1.3.1.11.4-1.

Table 2.1.3.1.2.1-1. Access Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)	
Parameter	**4,800**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/3	bits/code symbol
Code Symbol Repetition	2	repeated code symbols/code symbol
Repeated Code Symbol Rate	28,800	sps
Modulation	6	repeated code symbols/modulation symbol
Modulation Symbol Rate	4800	sps
Walsh Chip Rate	307.20	kcps
Modulation Symbol Duration	208.33	μs
PN Chips/Repeated Code Symbol	42.67	PN chips/repeated code symbol
PN Chips/Modulation Symbol	256	PN chips/modulation symbol
Transmit Duty Cycle	100.0	%
PN Chips/Walsh Chip	4	PN chips/Walsh chip

Table 2.1.3.1.2.1-2. Enhanced Access Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)			
Parameter	**9,600**	**19,200**	**38,400**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	4	2	1	repeated code symbols/code symbol
Modulation Symbol Rate	153,600	153,600	153,600	sps
Walsh Length	8	8	8	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	%
Processing Gain	128	64	32	PN chips/bit

Note: The Enhanced Access header uses the 9600 bps data rate only, while the Enhanced Access data uses 9600, 19200, and 38400 bps data rates.

Table 2.1.3.1.2.1-3. Reverse Common Control Channel Modulation Parameters for Spreading Rate 1

Parameter	Data Rate (bps) 9,600	19,200	38,400	Units
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	4	2	1	repeated code symbols/code symbol
Modulation Symbol Rate	153,600	153,600	153,600	sps
Walsh Length	8	8	8	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	%
Processing Gain	128	64	32	PN chips/bit

Table 2.1.3.1.2.1-4. Reverse Packet Data Control Channel Modulation Parameters

Parameter	Data Rate (bps) 700	Units
PN Chip Rate	1.2288	Mcps
Code Rate	7/64	bits/code symbol
Code Symbol Repetition	3	repeated code symbols/code symbol
Modulation Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	1755.43	PN chips/bit

Table 2.1.3.1.2.1-5. Reverse Request Channel Modulation Parameters

	Data Rate (bps)	
Parameter	**3,200**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	6	repeated code symbols/code symbol
Modulation Symbol Rate	76,800	sps
Walsh Length	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	384	PN chips/bit

Table 2.1.3.1.2.1-6. Reverse Dedicated Control Channel Modulation Parameters for Radio Configuration 3

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	2	repeated code symbols/code symbol
Modulation Symbol Rate	76,800	sps
Walsh Length	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	128	PN chips/bit

Note: If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 2.1.3.1.2.1-7. Reverse Dedicated Control Channel Modulation Parameters for Radio Configuration 4

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	bits/code symbol
Code Symbol Repetition	2	2	repeated code symbols/code symbol
Puncturing Rate	1	16/24	modulation symbols/repeated code symbol
Modulation Symbol Rate	76,800	76,800	sps
Walsh Length	16	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	%
Processing Gain	128	85.33	PN chips/bit

Notes:

1. The 9600 bps data rate is used for 5 ms frames and the 14400 bps data rate is used for 20 ms frames.
2. If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 2.1.3.1.2.1-8. Reverse Acknowledgment Channel Modulation Parameters (Radio Configuration 6 and 7)

	Data Rate (bps)	
Parameter	**800**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/1	bits/code symbol
Code Symbol Repetition	24	repeated code symbols/code symbol
Modulation Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Processing Gain	1,536	PN chips/bit

Note: The code symbol repetition and processing gain are multiplied by a factor of 1, 2, or 4, and the data rate is divided by the same factor (see [3]).

Table 2.1.3.1.2.1-9. Reverse Acknowledgment Channel 1 Modulation Parameters (Radio Configuration 8)

	Data Rate (bps)	
Parameter	**800**	**Units**
PN Chip Rate	1.2288	Mcps
Code Symbol Repetition	12	repeated code symbols/code symbol
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Processing Gain	768	PN chips/bit

Note: The code symbol repetition and processing gain are multiplied by a factor of 1, 2, or 4, and the data rate is divided by the same factor (see [3]).

Table 2.1.3.1.2.1-10. Reverse Acknowledgment Channel 2 and 3 Modulation Parameters (Radio Configuration 8)

	Data Rate (bps)	
Parameter	**800**	**Units**
PN Chip Rate	1.2288	Mcps
Code Symbol Repetition	12	repeated code symbols/code symbol
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Processing Gain	768	PN chips/bit

Note: The code symbol repetition and processing gain are multiplied by a factor of 1, 2, or 4, and the data rate is divided by the same factor (see [3]).

Table 2.1.3.1.2.1-11. Reverse Channel Quality Indicator Channel Modulation Parameters

	Data Rate (bps)		
Parameter	**800**	**3,200**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps
Code Rate	1/1	4/12	bits/code symbol
Code Symbol Repetition	12	1	repeated code symbols/code symbol
Modulation Symbol Rate	76,800	76,800	sps
Walsh Length	16	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	Walsh functions/ modulation symbol
Processing Gain	1,536	384	PN chips/bit

Note: The code symbol repetition and processing gain is actually multiplied by a factor of 1, 2, or 4, and the data rate is divided by the same factor (see [3]).

Table 2.1.3.1.2.1-12. Reverse Fundamental Channel and Reverse Supplemental Code Channel Modulation Parameters for Radio Configuration 1

	Data Rate (bps)				
Parameter	**9,600**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/3	1/3	1/3	1/3	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Repeated Code Symbol Rate	28,800	28,800	28,800	28,800	sps
Modulation	6	6	6	6	repeated code symbols/modulation symbol
Modulation Symbol Rate	4,800	4,800	4,800	4,800	sps
Walsh Chip Rate	307.20	307.20	307.20	307.20	kcps
Modulation Symbol Duration	208.33	208.33	208.33	208.33	μs
PN Chips/Repeated Code Symbol	42.67	42.67	42.67	42.67	PN chips/repeated code symbol
PN Chips/Modulation Symbol	256	256	256	256	PN chips/modulation symbol
PN Chips/Walsh Chip	4	4	4	4	PN chips/Walsh chip
Transmit Duty Cycle	100.0	50.0	25.0	12.5	%
Processing Gain	128	128	128	128	PN chips/bit

Note: The 1200, 2400, and 4800 bps data rates are applicable to the Reverse Fundamental Channel only.

Table 2.1.3.1.2.1-13. Reverse Fundamental Channel and Reverse Supplemental Code Channel Modulation Parameters for Radio Configuration 2

	Data Rate (bps)				
Parameter	**14,400**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Repeated Code Symbol Rate	28,800	28,800	28,800	28,800	sps
Modulation	6	6	6	6	repeated code symbols/modulation symbol
Modulation Symbol Rate	4,800	4,800	4,800	4,800	sps
Walsh Chip Rate	307.20	307.20	307.20	307.20	kcps
Modulation Symbol Duration	208.33	208.33	208.33	208.33	μs
PN Chips/Repeated Code Symbol	42.67	42.67	42.67	42.67	PN chips/repeated code symbol
PN Chips/Modulation Symbol	256	256	256	256	PN chips/modulation symbol
PN Chips/Walsh Chip	4	4	4	4	PN chips/Walsh chip
Transmit Duty Cycle	100.0	50.0	25.0	12.5	%
Processing Gain	85.33	85.33	85.33	85.33	PN chips/bit

Note: The 1800, 3600, and 7200 bps data rates are applicable to the Reverse Fundamental Channel only.

Table 2.1.3.1.2.1-14. Reverse Fundamental Channel and Reverse Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4 (N < 32) 1/2 (N = 32)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	2 (N = 1) 1 (N > 1)	4	8	16	repeated code symbols/code symbol
Puncturing Rate	1	1	8/9	4/5	interleaver symbols/repeated code symbol
Modulation Symbol Rate	76,800 (N ≤ 2) 38,400 × N (N = 4 or 8) 614,400 (N ≥ 16)	76,800	76,800	76,800	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 (N ≤ 4) 4 or 2 (N = 8) 2 (N ≥ 16)	16 (Reverse Fundamental Channel) 8, 4, or 2 (Reverse Supplemental Channel)			PN chips
Number of Walsh Function Repetitions per Modulation Symbol	For Reverse Fundamental Channel: 1 For Reverse Supplemental Channel: 2, 4, or 8 (N ≤ 2) 1, 2, or 4 (N = 4) 1 or 2 (N = 8) 1 (N ≥ 16)	1 (Reverse Fundamental Channel) 2, 4, or 8 (Reverse Supplemental Channel)			Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0 or 50.0	%
Processing Gain	128/N	256	455.1	819.2	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
3. The 50% transmit duty cycle at 1500 bps data rate corresponds to the Reverse Fundamental Channel gating.

Table 2.1.3.1.2.1-15. Reverse Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4 (N < 16) 1/2 (N = 16)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1	1	1	8/9	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	38,400 × N (N < 8) 307,200 (N ≥ 8)	38,400	38,400	38,400	sps
Walsh Length	8, 4, or 2 (N < 8) 4 or 2 (N ≥ 8)	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4, 8, or 16 (N = 1) 2, 4, or 8 (N = 2) 1, 2, or 4 (N = 4) 1 or 2 (N ≥ 8)	4, 8, or 16	4, 8, or 16	4, 8, or 16	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	128/N	256	512	910.22	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.1-16. Reverse Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4 (N < 8) 1/2 (N = 8)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Modulation Symbol Rate	38,400 × N (N < 4) 153,600 (N ≥ 4)	19,200	19,200	19,200	sps
Walsh Length	8, 4, or 2	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4, 8, or 16 (N = 1) 2, 4, or 8 (N = 2) 1, 2, or 4 (N ≥ 4)	8, 16, or 32	8, 16, or 32	8, 16, or 32	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	128/N	256	512	1024	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.1-17. Reverse Fundamental Channel and Reverse Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	2 (N = 1) 1 (N > 1)	4	8	16	repeated code symbols/code symbol
Puncturing Rate	16/24 (N = 1) 8/12 (N > 1)	16/24	16/24	16/24	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	76,800 (N = 1) 38,400 × N (N ≥ 2)	76,800	76,800	76,800	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 (N ≤ 4) 4 or 2 (N = 8) 2 (N = 16)	16 (Reverse Fundamental Channel) 8, 4, or 2 (Reverse Supplemental Channel)			PN chips
Number of Walsh Function Repetitions per Modulation Symbol	For Reverse Fundamental Channel: 1 For Reverse Supplemental Channel: 2, 4, or 8 (N ≤ 2) 1, 2, or 4 (N = 4) 1 or 2 (N = 8) 1 (N = 16)	1 (Reverse Fundamental Channel) 2, 4, or 8 (Reverse Supplemental Channel)			Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0 or 50.0	%
Processing Gain	85.33/N	170.67	341.33	682.67	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
3. The 50% transmit duty cycle at 1800 bps data rate corresponds to the Reverse Fundamental Channel gating.

Table 2.1.3.1.2.1-18. Reverse Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	8/12	16/24	16/24	16/24	interleaver symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	38,400	38,400	38,400	sps
Walsh Length	8, 4, or 2 (N ≤ 4) 4 or 2 (N = 8)	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4, 8, or 16 (N = 1) 2, 4, or 8 (N = 2) 1, 2, or 4 (N = 4) 1 or 2 (N = 8)	4, 8, or 16	4, 8, or 16	4, 8, or 16	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	85.33/N	170.67	341.33	682.67	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.1-19. Reverse Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Puncturing Rate	8/12	8/12	16/24	16/24	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	38,400 × N	19,200	19,200	19,200	sps
Walsh Length	8, 4, or 2	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4, 8, or 16 (N = 1) 2, 4, or 8 (N = 2) 1, 2, or 4 (N = 4)	8, 16, or 32	8, 16, or 32	8, 16, or 32	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	85.33/N	170.67	341.33	682.67	PN chips/bit

Notes:

1. N = 1, 2, or 4, which yields data rates of 14400, 28800, or 57600 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.1-20. Reverse Fundamental Channel and Reverse Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 8

	Data Rate (bps)					
Parameter	**9,600 × N**	**5,000**	**3,000**	**1,800**	**0**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	N/A	Mcps
Code Rate	1/4 (N < 32) 1/2 (N = 32)	1/4	1/4	1/4	N/A	bits/code symbol
Code Symbol Repetition	2 (N = 1) 1 (N > 1)	4	8	16	N/A	repeated code symbols/code symbol
Puncturing Rate	1	24/25	4/5	16/24	N/A	interleaver symbols/repeated code symbol
Modulation Symbol Rate	76,800 (N ≤ 2) 38,400 × N (N = 4 or 8) 614,400 (N ≥ 16)	76,800	76,800	76,800	N/A	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 (N ≤ 4) 4 or 2 (N = 8) 2 (N ≥ 16)	16 (Reverse Fundamental Channel) 8, 4, or 2 (Reverse Supplemental Channel[18])			N/A	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	For Reverse Fundamental Channel: 1 For Reverse Supplemental Channel: 2, 4, or 8 (N ≤ 2) 1, 2, or 4 (N = 4) 1 or 2 (N = 8) 1 (N ≥ 16)	1 (Reverse Fundamental Channel) 2, 4, or 8 (Reverse Supplemental Channel)			N/A	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	0	%
Processing Gain	128/N	245.76	409.6	682.67	N/A	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.

[18] For Radio Configuration 8 the minimum data rate supported for the Reverse Supplemental Channel is 9600bps.

Table 2.1.3.1.2.1-21. Reverse Fundamental Channel Modulation Parameters for 5 ms Frames

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	2	repeated code symbols/code symbol
Puncturing Rate	1	interleaver symbols/repeated code symbol
Modulation Symbol Rate	76,800	sps
Walsh Length	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	128	PN chips/bit

2.1.3.1.2.2 Spreading Rate 3

The modulation parameters for the Reverse CDMA Channel operating in Spreading Rate 3 are shown in Table 2.1.3.1.2.2-1 through Table 2.1.3.1.2.2-11.

Table 2.1.3.1.2.2-1. Enhanced Access Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)			
Parameter	**9,600**	**19,200**	**38,400**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	4	2	1	repeated code symbols/code symbol
Modulation Symbol Rate	153,600	153,600	153,600	sps
Walsh Length	8	8	8	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	3	3	3	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	%
Processing Gain	384	192	96	PN chips/bit

Note: The Enhanced Access header uses the 9600 bps data rate only, while the Enhanced Access data uses 9600, 19200, and 38400 bps data rates.

Table 2.1.3.1.2.2-2. Reverse Common Control Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)			
Parameter	**9,600**	**19,200**	**38,400**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	4	2	1	repeated code symbols/code symbol
Modulation Symbol Rate	153,600	153,600	153,600	sps
Walsh Length	8	8	8	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	3	3	3	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	%
Processing Gain	384	192	96	PN chips/bit

Table 2.1.3.1.2.2-3. Reverse Dedicated Control Channel Modulation Parameters for Radio Configuration 5

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	3.6864	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	2	repeated code symbols/code symbol
Modulation Symbol Rate	76,800	sps
Walsh Length	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	3	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	384	PN chips/bit

Note: If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 2.1.3.1.2.2-4. Reverse Dedicated Control Channel Modulation Parameters for Radio Configuration 6

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	3.6864	3.6864	Mcps
Code Rate	1/4	1/4	bits/code symbol
Code Symbol Repetition	2	2	repeated code symbols/code symbol
Puncturing Rate	1	16/24	modulation symbols/repeated code symbol
Modulation Symbol Rate	76,800	76,800	sps
Walsh Length	16	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	3	3	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	%
Processing Gain	384	256	PN chips/bit

Note: The 9600 bps data rate is used for 5 ms frames and the 14400 bps data rate is used for 20 ms frames. If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 2.1.3.1.2.2-5. Reverse Fundamental Channel and Reverse Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 (N ≤ 16) 1/3 (N ≥ 32)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	2 (N = 1) 1 (N > 1)	4	8	16	repeated code symbols/ code symbol
Puncturing Rate	1	1	8/9	4/5	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	76,800 (N ≤ 2) 38,400 × N (4 ≤ N ≤ 16) 28,800 × N (N ≥ 32)	76,800	76,800	76,800	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 (N ≤ 4) 4 or 2 (N = 8 or 32) 2 (N = 16 or 64)	16 (Reverse Fundamental Channel) 8, 4, or 2 (Reverse Supplemental Channel)			PN chips
Number of Walsh Function Repetitions per Modulation Symbol	For Reverse Fundamental Channel: 3 For Reverse Supplemental Channel: 6, 12, or 24 (N ≤ 2) 3, 6, or 12 (N = 4) 3 or 6 (N = 8) 3 (N = 16) 1 or 2 (N = 32) 1 (N = 64)	3 (Reverse Fundamental Channel) 6, 12, or 24 (Reverse Supplemental Channel)			Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0 or 50.0	%
Processing Gain	384/N	768	1,365.33	2,457.60	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, 32, or 64, which yields data rates of 9600, 19200, 38400, 76800, 153600, 307200, or 614400 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
3. The 50% transmit duty cycle at 1500 bps data rate corresponds to the Reverse Fundamental Channel gating.

Table 2.1.3.1.2.2-6. Reverse Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 (N ≤ 8) 1/3 (N ≥ 16)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1	1	1	8/9	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	38,400 × N (N ≤ 8) 28,800 × N (N ≥ 16)	38,400	38,400	38,400	sps
Walsh Length	8, 4, or 2 (N = 1, 2, 4, or 16) 4 or 2 (N = 8 or 32)	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	12, 24, or 48 (N = 1) 6, 12, or 24 (N = 2) 3, 6, or 12 (N = 4) 3 or 6 (N = 8) 1, 2, or 4 (N = 16) 1 or 2 (N = 32)	12, 24, or 48	12, 24, or 48	12, 24, or 48	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	384/N	768	1,536	2,730.67	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.2-7. Reverse Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 ($N \le 4$) 1/3 ($N \ge 8$)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Modulation Symbol Rate	38,400 × N ($N \le 4$) 28,800 × N ($N \ge 8$)	19,200	19,200	19,200	sps
Walsh Length	8, 4, or 2	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	12, 24, or 48 (N = 1) 6, 12, or 24 (N = 2) 3, 6, or 12 (N = 4) 2, 4, or 8 (N = 8) 1, 2, or 4 (N = 16)	24, 48, or 96	24, 48, or 96	24, 48, or 96	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	384/N	768	1,536	3,072	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.2-8. Reverse Fundamental Channel and Reverse Supplemental Channel
Modulation Parameters for 20 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 (N ≤ 32) 1/2 (N = 72)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	2 (N = 1) 1 (N > 1)	4	8	16	repeated code symbols/code symbol
Puncturing Rate	16/24 (N = 1) 1 (2 ≤ N ≤ 32) 16/18 (N = 72)	16/24	16/24	16/24	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	76,800 (N = 1) 57,600 × N (2 ≤ N ≤ 16) 1,843,200 (N ≥ 32)	76,800	76,800	76,800	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 (N ≤ 8) 4 or 2 (N = 16) 2 (N ≥ 32)	16 (Reverse Fundamental Channel) 8, 4, or 2 (Reverse Supplemental Channel)			PN chips
Number of Walsh Function Repetitions per Modulation Symbol	For Reverse Fundamental Channel: 3 For Reverse Supplemental Channel: 6, 12, or 24 (N = 1) 4, 8, or 16 (N = 2) 2, 4, or 8 (N = 4) 1, 2, or 4 (N = 8) 1 or 2 (N = 16) 1 (N ≥ 32)	3 (Reverse Fundamental Channel) 6, 12, or 24 (Reverse Supplemental Channel)			Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0 or 50.0	%
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, 32, or 72, which yields data rates of 14400, 28800, 57600, 115200, 230400, 460800, or 1036800 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Fundamental Channel or the Reverse Supplemental Channel, and the specified frame quality indicator length.
3. The 50% transmit duty cycle at 1800 bps data rate corresponds to the Reverse Fundamental Channel gating.

Table 2.1.3.1.2.2-9. Reverse Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 (N ≤ 16) 1/2 (N = 36)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1 (N ≤ 16) 16/18 (N = 36)	16/24	16/24	16/24	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	57,600 × N (N ≤ 8) 921,600 (N ≥ 16)	38,400	38,400	38,400	sps
Walsh Length	8, 4, or 2 (N ≤ 8) 4 or 2 (N ≥ 16)	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	8, 16, or 32 (N = 1) 4, 8, or 16 (N = 2) 2, 4, or 8 (N = 4) 1, 2, or 4 (N = 8) 1 or 2 (N ≥ 16)	12, 24, or 48	12, 24, or 48	12, 24, or 48	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 36, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 518400 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.2-10. Reverse Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	3.6864	Mcps
Code Rate	1/4 (N ≤ 8) 1/2 (N = 18)	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Puncturing Rate	1 (N ≤ 8) 16/18 (N = 18)	1	16/24	16/24	interleaver symbols/repeated code symbol
Modulation Symbol Rate	57,600 × N (N < 8) 460,800 (N ≥ 8)	28,800	19,200	19,200	sps
Walsh Length	8, 4, or 2	8, 4, or 2	8, 4, or 2	8, 4, or 2	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	8, 16, or 32 (N = 1) 4, 8, or 16 (N = 2) 2, 4, or 8 (N = 4) 1, 2, or 4 (N ≥ 8)	16, 32, or 64	24, 48, or 96	24, 48, or 96	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	100.0	100.0	100.0	%
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 18, which yields data rates of 14400, 28800, 57600, 115200, or 259200 bps, respectively.
2. If variable-rate Reverse Supplemental Channel operation, flexible reverse link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Reverse Supplemental Channel, and the specified frame quality indicator length.

Table 2.1.3.1.2.2-11. Reverse Fundamental Channel Modulation Parameters for 5 ms Frames for Radio Configurations 5 and 6

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	3.6864	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	2	repeated code symbols/code symbol
Puncturing Rate	1	modulation symbols/repeated symbol
Modulation Symbol Rate	76,800	sps
Walsh Length	16	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	3	Walsh functions/ modulation symbol
Transmit Duty Cycle	100.0	%
Processing Gain	384	PN chips/bit

2.1.3.1.3 Data Rates

The data rates for channels operating with Spreading Rate 1 shall be as specified in Table 2.1.3.1.3-1. The data rates for channels operating with Spreading Rate 3 shall be as specified in Table 2.1.3.1.3-2.

Flexible data rates may be supported with Radio Configurations 3, 4, 5, and 6. If flexible data rates are supported, frame formats that do not match those listed in Table 2.1.3.9.2-1 for the Reverse Dedicated Control Channel, Table 2.1.3.12.1-1 for the Reverse Fundamental Channel, or Table 2.1.3.12.1-1, Table 2.1.3.13.2-2, and Table 2.1.3.13.2-3 for the Reverse Supplemental Channel may be supported in Radio Configurations 3, 4, 5, and 6. These frame formats correspond to a range of data rates up to the highest dedicated channel data rate listed in Table 2.1.3.1.3-1 and Table 2.1.3.1.3-2. These non-listed data rates are called flexible data rates.

Table 2.1.3.1.3-1. Data Rates for Spreading Rate 1

Channel Type		Data Rates (bps)
Access Channel		4800
Enhanced Access Channel	Header	9600
	Data	38400 (5, 10, or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Reverse Common Control Channel		38400 (5, 10, or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Reverse Packet Data Control Channel		700 (10 ms frames)
Reverse Request Channel		3200 (10 ms frames)
Reverse Dedicated Control Channel	RC 3	9600
	RC 4	14400 (20 ms frames) or 9600 (5 ms frames)
Reverse Acknowledgment Channel		800
Reverse Acknowledgment Channel 1		800[19]
Reverse Acknowledgment Channel 2		800[20]
Reverse Acknowledgment Channel 3		800[21]
Reverse Channel Quality Indicator Channel		3200 or 800
Reverse Fundamental Channel	RC 1	9600, 4800, 2400, or 1200
	RC 2	14400, 7200, 3600, or 1800
	RC 3	9600, 4800, 2700, or 1500 (20 ms frames) or 9600 (5 ms frames)
	RC 4	14400, 7200, 3600, or 1800 (20 ms frames) or 9600 (5 ms frames)
	RC8	9600, 5000, 3000, 1800, or 0 (20 ms frames)
Reverse Supplemental Code Channel	RC 1	9600
	RC 2	14400
Reverse Supplemental Channel	RC 3	307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 76800, 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)

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[19] Maximum rate. Actual rate is determined by the Acknowledgment mask

[20] Maximum rate. Actual rate is determined by the Acknowledgment mask

[21] Maximum rate. Actual rate is determined by the Acknowledgment mask

Channel Type		Data Rates (bps)
	RC 4	230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (20 ms frames) 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (40 ms frames) 57600, 28800, 14400, 7200, 3600, or 1800 (80 ms frames)
	RC8	307200, 153600, 76800, 38400, 19200, or 9600 (20 ms frames)
Reverse Packet Data Channel	RC 7	19200, 40800, 79200, 156000, 309600, 463200, 616800, 924000, 1231200, 1538400, 1845600 (10 ms frames)

Table 2.1.3.1.3-2. Data Rates for Spreading Rate 3

Channel Type		Data Rates (bps)
Enhanced Access Channel	Header	9600
	Data	38400 (5, 10, or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Reverse Common Control Channel		38400 (5, 10, or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Reverse Dedicated Control Channel	RC 5	9600
	RC 6	14400 (20 ms frames) or 9600 (5 ms frames)
Reverse Fundamental Channel	RC 5	9600, 4800, 2700, or 1500 (20 ms frames) or 9600 (5 ms frames)
	RC 6	14400, 7200, 3600, or 1800 (20 ms frames) or 9600 (5 ms frames)
Reverse Supplemental Channel	RC 5	614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)
	RC 6	1036800, 460800, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (20 ms frames) 518400, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (40 ms frames) 259200, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (80 ms frames)

2.1.3.1.4 Frame Error Detection

Frame quality indicator bits are used to detect errors in the received frames for some reverse link channels. They may also assist in determining the data rate of the channel if the receiver performs blind rate detection like the Reverse Fundamental Channel supporting voice calls. The frame quality indicator bits are appended to the input bits, and form a Cyclic Redundancy Code.

The input bits to the frame quality indicator calculator and the number of frame quality indicator bits generated for channels with Spreading Rate 1 shall be as specified in Table 2.1.3.1.4-1, and for Spreading Rate 3 shall be as specified in Table 2.1.3.1.4-2.

Table 2.1.3.1.4-1. Frame Error Detection for Spreading Rate 1

Channel Type	Input Bits	Number of Frame Quality Indicator Bits
Access Channel	None	–
Enhanced Access Channel	Information	16, 12, or 8
Reverse Common Control Channel	Information	16 or 12
Reverse Packet Data Control Channel	None	–
Reverse Request Channel	Information	12
Reverse Dedicated Control Channel	Information and Reserved	16 or12
Reverse Channel Quality Indicator Channel	None	–
Reverse Fundamental Channel	Information and Reserved / Erasure Indicator	16, 12, 10, 8, or 6
Reverse Supplemental Code Channel	Information and Reserved	12
Reverse Supplemental Channel	Information and Reserved	16, 12, 10, 8, or 6
Reverse Packet Data Channel	Information	16 or 12

Table 2.1.3.1.4-2. Frame Error Detection for Spreading Rate 3

Channel Type	Input Bits	Number of Frame Quality Indicator Bits
Enhanced Access Channel	Information	16, 12, or 8
Reverse Common Control Channel	Information	16 or 12
Reverse Dedicated Control Channel	Information and Reserved	16 or 12
Reverse Fundamental Channel	Information and Reserved / Erasure Indicator	16, 12, 10, 8, or 6
Reverse Supplemental Channel	Information and Reserved	16, 12, 10, 8, or 6

2.1.3.1.4.1 Generation of the Frame Quality Indicator Bits

The frame quality indicators shall be computed according to the following procedure (see Figure 2.1.3.1.4.1.1-1 through Figure 2.1.3.1.4.1.6-1):

- Initially, all the switches shall be set in the up position and the shift register elements shall be set to logical one.
- The register shall be clocked a number of times equal to the number of input bits in the frame with those bits as input.
- The switches shall be set in the down position so that the output is a modulo-2 addition with a ‘0’ and the successive shift register inputs are ‘0’s.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16, 12, 10, 8, or 6).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

2.1.3.1.4.1.1 Frame Quality Indicator of Length 16

The generator polynomial for the 16-bit frame quality indicator shall be

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1.$

The Cyclic Redundancy Code of length 16 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.1-1 and as described in 2.1.3.1.4.1.

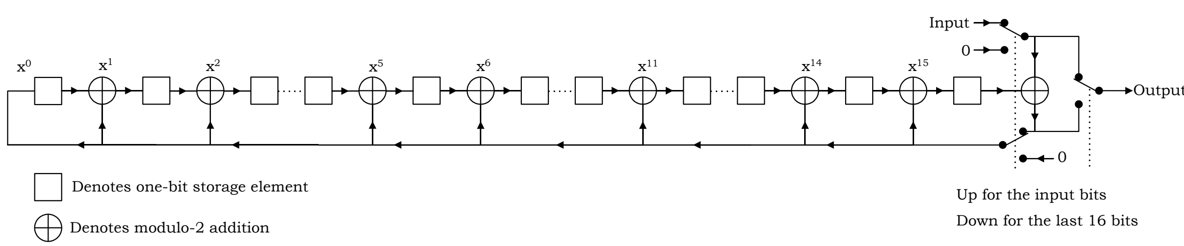

Figure 2.1.3.1.4.1.1-1. Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

2.1.3.1.4.1.2 Frame Quality Indicator of Length 12

The generator polynomial for the 12-bit frame quality indicator shall be

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$

The Cyclic Redundancy Code of length 12 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.2-1 and as described in 2.1.3.1.4.1.

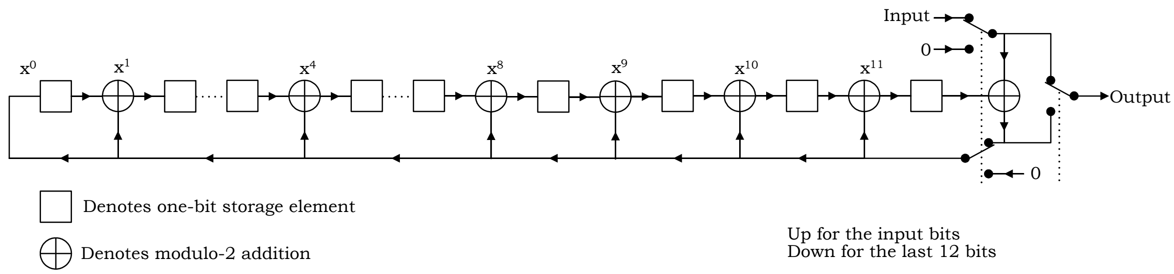

Figure 2.1.3.1.4.1.2-1. Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

2.1.3.1.4.1.3 Frame Quality Indicator of Length 10

The generator polynomial for the 10-bit frame quality indicator shall be

$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1.$

The Cyclic Redundancy Code of length 10 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.3-1 and as described in 2.1.3.1.4.1.

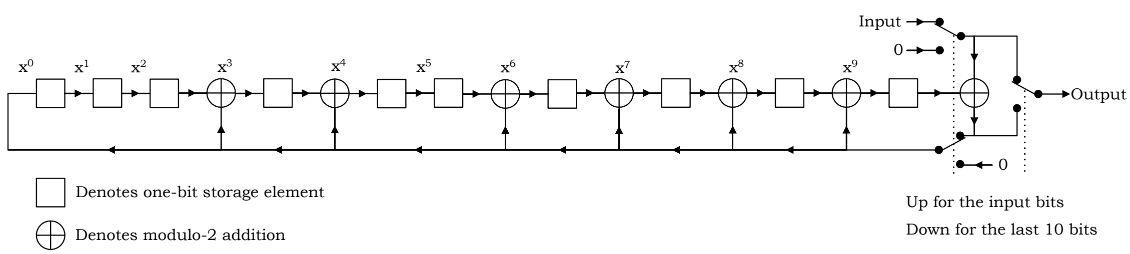

Figure 2.1.3.1.4.1.3-1. Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

2.1.3.1.4.1.4 Frame Quality Indicator of Length 8

The generator polynomial for the 8-bit frame quality indicator shall be

$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$

The Cyclic Redundancy Code of length 8 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.4-1 and as described in 2.1.3.1.4.1.

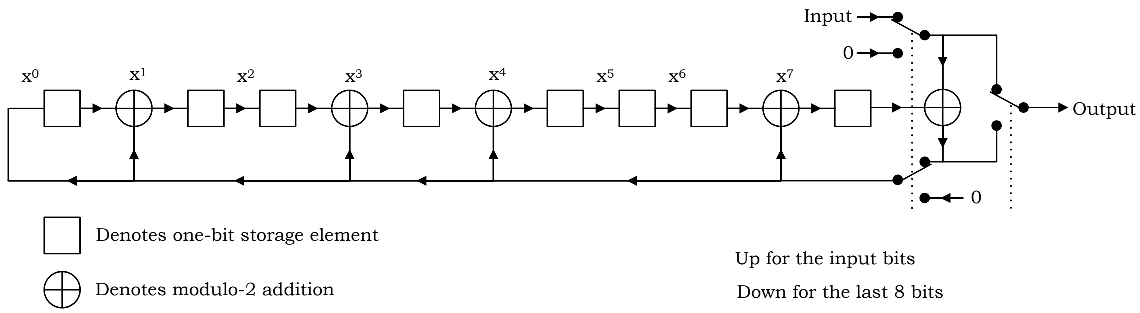

Figure 2.1.3.1.4.1.4-1. Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

2.1.3.1.4.1.5 Frame Quality Indicator of Length 6 except for the Reverse Fundamental Channel with Radio Configuration 2

The generator polynomial for the 6-bit frame quality indicator for all reverse link channels except the Reverse Fundamental Channel with Radio Configuration 2 shall be

$g(x) = x^6 + x^5 + x^2 + x + 1.$

The Cyclic Redundancy Code of length 6 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.5-1 and as described in 2.1.3.1.4.1.

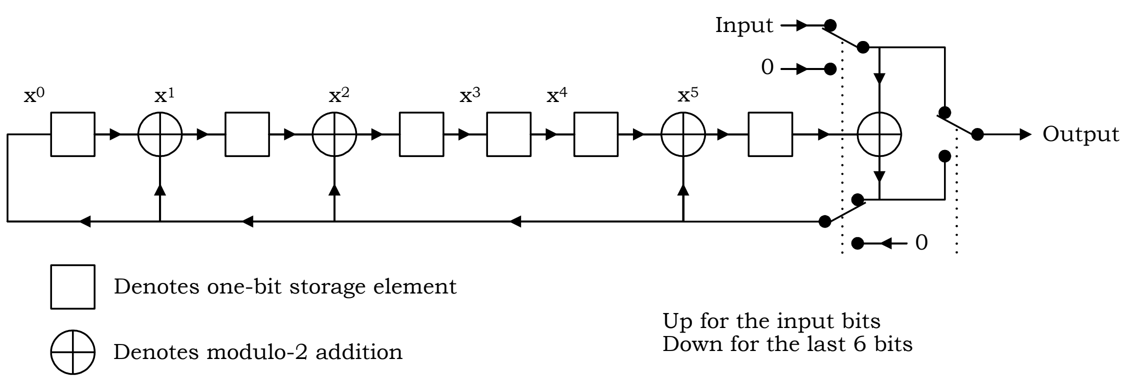

Figure 2.1.3.1.4.1.5-1. Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator except for the Reverse Fundamental Channel with Radio Configuration 2

2.1.3.1.4.1.6 Frame Quality Indicator of Length 6 for the Reverse Fundamental Channel with Radio Configuration 2

The generator polynomial for the 6-bit frame quality indicator for the Reverse Fundamental Channel with Radio Configuration 2 shall be

$g(x) = x^6 + x^2 + x + 1.$

The Cyclic Redundancy Code of length 6 can be generated by the shift register structure shown in Figure 2.1.3.1.4.1.6-1 and as described in 2.1.3.1.4.1.

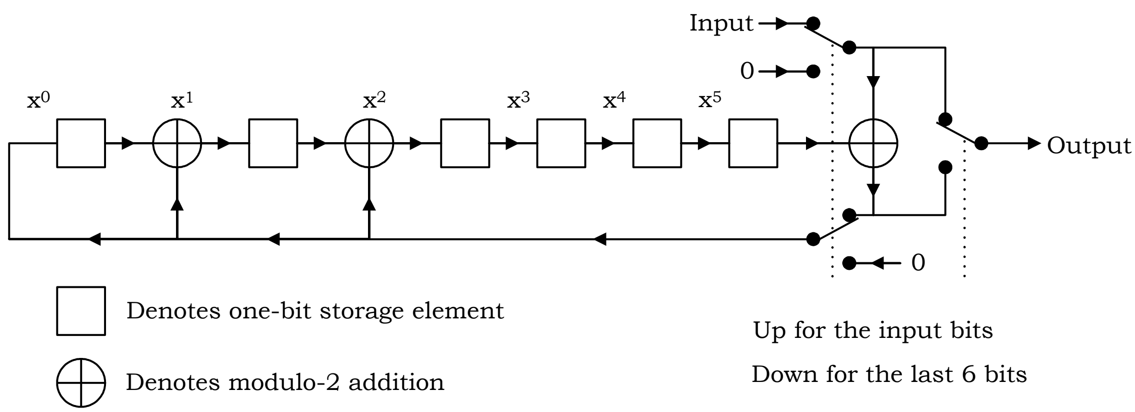

Figure 2.1.3.1.4.1.6-1. Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator of the Reverse Fundamental Channel with Radio Configuration 2

2.1.3.1.5 Forward Error Correction

The forward error correction types for channels with Spreading Rate 1 shall be as specified in Table 2.1.3.1.5-1. The forward error correction types for channels with Spreading Rate 3 shall be as specified in Table 2.1.3.1.5-2.

If the mobile station supports variable-rate Reverse Supplemental Channel operation, flexible data rates, or both, and the specified number of reserved bits, information bits and frame quality indicator bits per frame do not match one of those listed in Table 2.1.3.13.2-1, Table 2.1.3.1.13.2-2, or Table 2.1.3.13.2-3 for the Reverse Supplemental Channel, the forward error correction type of the Reverse Supplemental Channel shall be the same as that of the maximum assigned data rate for that channel if turbo coding is available for the specified data rate, otherwise convolutional coding shall be used. The forward error correction code rate of a specified frame format, not listed in Table 2.1.3.13.2-1, Table 2.1.3.13.2-2, or Table 2.1.3.1.13.2-3 for the Reverse Supplemental Channel, shall be the same as that of the lowest listed data rate in the same radio configuration that is higher than the specified data rate.

If ERAM is enabled for Radio Configuration 4, the code rate of the turbo encoder shall be selected as follows:

$$R = \begin{cases} 1/3, \text{ if } 8/3 < N/I \le 3 \\ 1/4, \text{ if } 3 < N/I \le 4 \text{ or } N/I = 8/3 \\ 1/5, \text{ if } N/I > 4 \end{cases}$$

where I denotes the number of encoder input bits per frame and N denotes the interleaver block size.

Table 2.1.3.1.5-1. Forward Error Correction for Spreading Rate 1

Channel Type	Forward Error Correction	R
Access Channel	Convolutional	1/3
Enhanced Access Channel	Convolutional	1/4
Reverse Common Control Channel	Convolutional	1/4
Reverse Packet Data Control Channel	Block	7/64
Reverse Request Channel	Convolutional	1/4
Reverse Dedicated Control Channel	Convolutional	1/4
Reverse Channel Quality Indicator Channel	Block	4/12
	None	–
Reverse Fundamental Channel	Convolutional	1/3 (RC 1) 1/2 (RC 2) 1/4 (RC 3, 4, and 8)
Reverse Supplemental Code Channel	Convolutional	1/3 (RC 1) 1/2 (RC 2)
Reverse Supplemental Channel	Convolutional	1/4 (RC 3 and 8, $N \leq 3048$) 1/2 (RC 3, $N > 3048$) 1/4 (RC 4)
	Turbo ($N \geq 360$ for RC 3 and 8 or $N \geq 552$ for RC4)	1/4 (RC 3 and 8, $N \leq 3048$) 1/2 (RC 3 and 8, $N > 3048$) 1/3, 1/4, or 1/5 (RC 4)
Reverse Packet Data Channel	Turbo	1/5 (RC 7)

Note: N is the number of channel bits per frame.

Table 2.1.3.1.5-2. Forward Error Correction for Spreading Rate 3

Channel Type	Forward Error Correction	R
Enhanced Access Channel	Convolutional	1/4
Reverse Common Control Channel	Convolutional	1/4
Reverse Dedicated Control Channel	Convolutional	1/4
Reverse Fundamental Channel	Convolutional	1/4
Reverse Supplemental Channel	Convolutional or Turbo ($N \geq 360$ for RC 5 or $N \geq 552$ for RC 6)	1/4 (RC 5, $N \leq 3048$) 1/3 (RC 5, $N > 3048$) 1/4 (RC 6, $N \leq 9192$) 1/2 (RC 6, $N > 9192$)

Note: N is the number of channel bits per frame.

2.1.3.1.5.1 Convolutional Encoding

All convolutional codes shall have a constraint length of 9.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K – 1, where K is the constraint length of the code.

2.1.3.1.5.1.1 Rate 1/4 Convolutional Code

The generator functions for the rate 1/4 code shall be g_0 equals 765 (octal), g_1 equals 671 (octal), g_2 equals 513 (octal), and g_3 equals 473 (octal). This code generates four code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 is output first, the code symbol (c_1) encoded with generator function g_1 is output second, the code symbol (c_2) encoded with generator function g_2 is output third, and the code symbol (c_3) encoded with generator function g_3 is output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol that is output after initialization shall be a code symbol encoded with generator function g_0. The encoder for this code is illustrated in Figure 2.1.3.1.5.1.1-1.

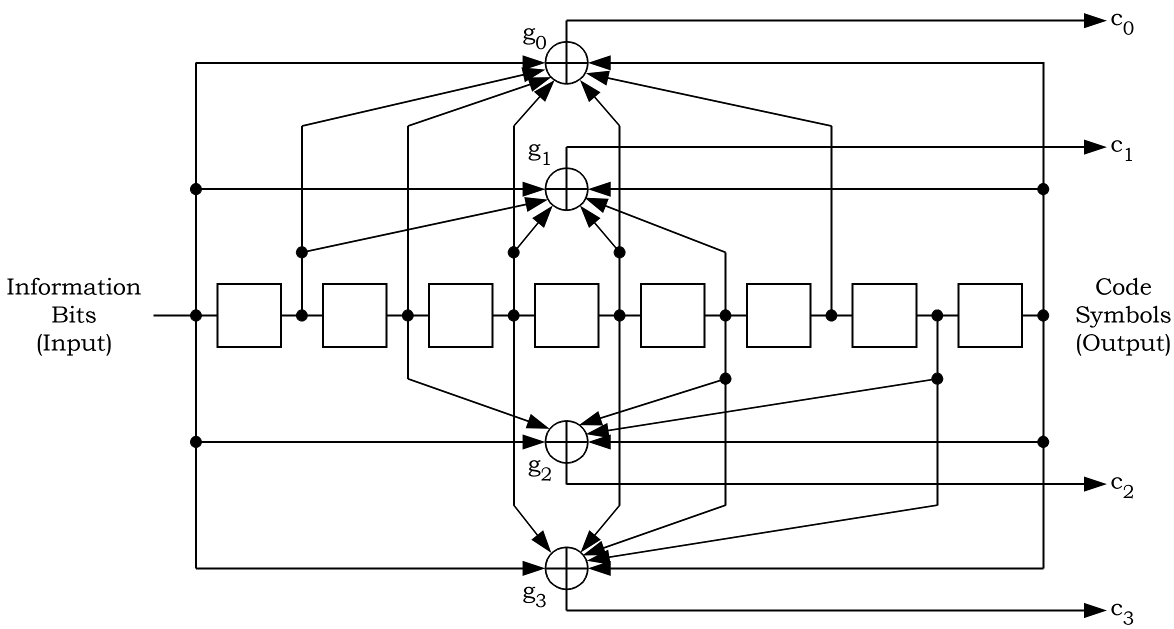

Figure 2.1.3.1.5.1.1-1. K = 9, Rate 1/4 Convolutional Encoder

2.1.3.1.5.1.2 Rate 1/3 Convolutional Code

The generator functions for this code shall be g_0 equals 557 (octal), g_1 equals 663 (octal), and g_2 equals 711 (octal). This code generates three code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 shall be output first, the code symbol (c_1) encoded with generator function g_1 shall be output second, and the code symbol (c_2) encoded with generator function g_2 shall be output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function g_0. The encoder for this code is illustrated in Figure 2.1.3.1.5.1.2-1.

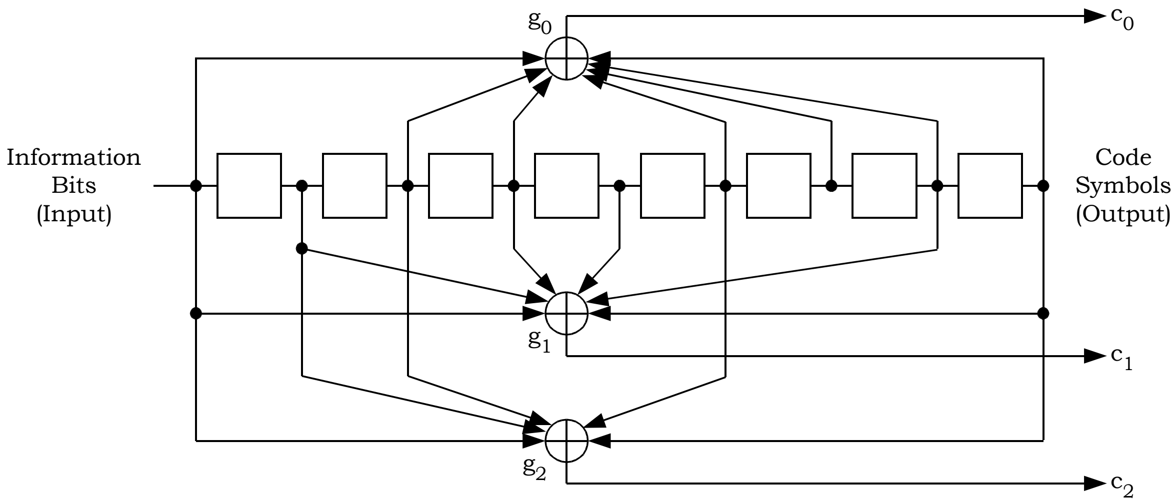

Figure 2.1.3.1.5.1.2-1. K = 9, Rate 1/3 Convolutional Encoder

2.1.3.1.5.1.3 Rate 1/2 Convolutional Code

The generator functions for this code shall be g_0 equals 753 (octal) and g_1 equals 561 (octal). This code generates two code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 shall be output first and the code symbol (c_1) encoded with generator function g_1 shall be output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function g_0. The encoder for this code is illustrated in Figure 2.1.3.1.5.1.3-1.

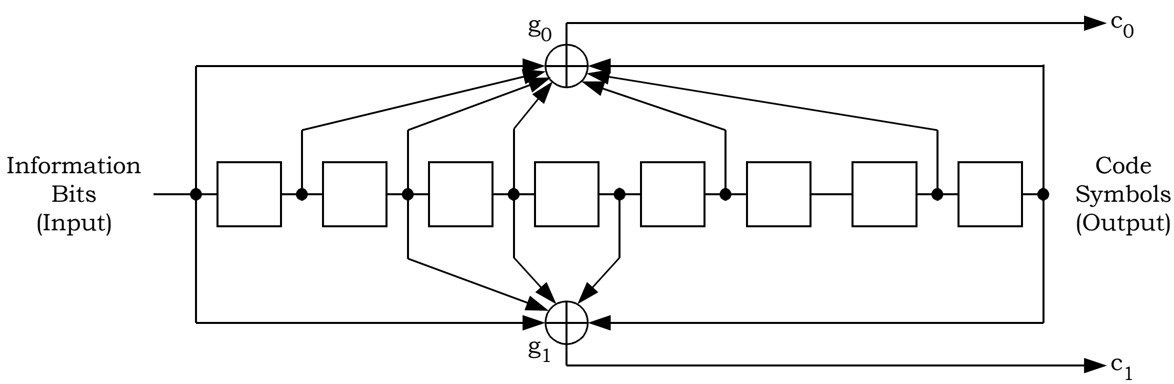

Figure 2.1.3.1.5.1.3-1. K = 9, Rate 1/2 Convolutional Encoder

2.1.3.1.5.2 Turbo Encoding

For Radio Configurations 3, 4, 5, 6, and 8, the turbo encoder encodes the data, frame quality indicator (CRC), and two reserved bits. For Radio Configuration 7, the turbo encoder encodes the data and frame quality indicator (CRC) bits. During encoding, an encoder output tail sequence is added. If the total number of bits encoded by the turbo encoder is N_{turbo}, the turbo encoder generates N_{turbo}/R encoded data output symbols followed by 6/R tail output symbols, where R is the code rate of 1/2, 1/3, 1/4, or 1/5. The turbo encoder employs two systematic, recursive, convolutional encoders connected in parallel, with an interleaver, the turbo interleaver, preceding the second recursive convolutional encoder.

The two recursive convolutional codes are called the constituent codes of the turbo code. The outputs of the constituent encoders are punctured and repeated to achieve the $(N_{turbo} + 6)/R$ output symbols.

2.1.3.1.5.2.1 Rate 1/2, 1/3, 1/4, and 1/5 Turbo Encoders

A common constituent code shall be used for the turbo codes of rate 1/2, 1/3, 1/4, and 1/5. The transfer function for the constituent code shall be

$$G(D) = \begin{bmatrix} 1 & \frac{n_0(D)}{d(D)} & \frac{n_1(D)}{d(D)} \end{bmatrix}$$

where $d(D) = 1 + D^2 + D^3$, $n_0(D) = 1 + D + D^3$, and $n_1(D) = 1 + D + D^2 + D^3$.

The turbo encoder shall generate an output symbol sequence that is identical to the one generated by the encoder shown in Figure 2.1.3.1.5.2.1-1. Initially, the states of the constituent encoder registers in this figure are set to zero. Then, the constituent encoders are clocked with the switches in the positions noted.

The encoded data output symbols are generated by clocking the constituent encoders N_{turbo} times with the switches in the up positions and puncturing the outputs as specified in Table 2.1.3.1.5.2.1-1. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. The constituent encoder outputs for each bit period shall be output in the sequence X, Y_0, Y_1, X′, Y'_0, Y'_1 with the X output first. Symbol repetition is not used in generating the encoded data output symbols.

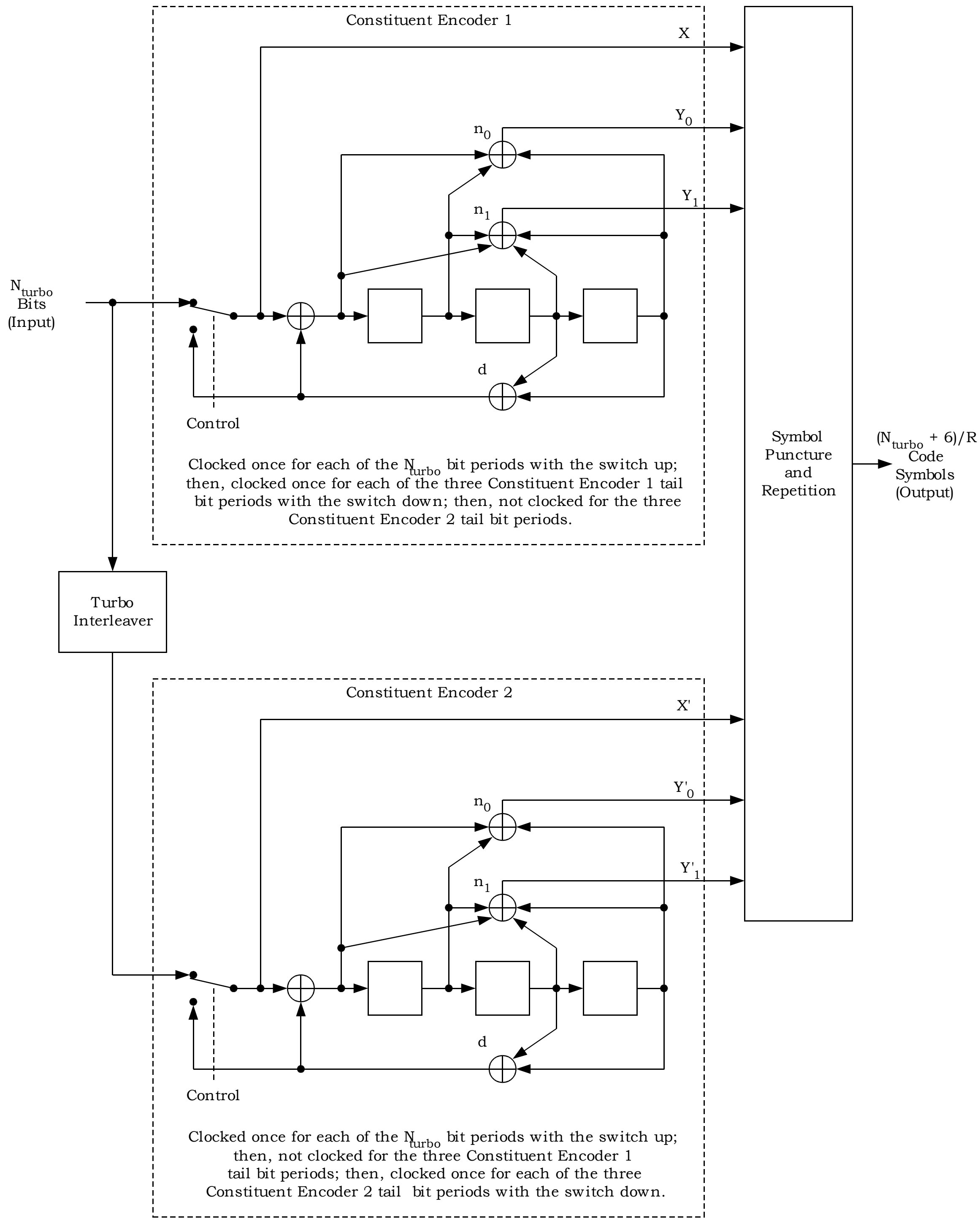

Figure 2.1.3.1.5.2.1-1. Turbo Encoder

Table 2.1.3.1.5.2.1-1. Puncturing Patterns for the Data Bit Periods

	Code Rate			
Output	**1/2**	**1/3**	**1/4**	**1/5**
X	11	11	11	11
Y_0	10	11	11	11
Y_1	00	00	10	11
X′	00	00	00	00
Y'_0	01	11	01	11
Y'_1	00	00	11	11

Note: For each rate, the puncturing table shall be read first from top to bottom and then from left to right.

2.1.3.1.5.2.2 Turbo Code Termination

The turbo encoder shall generate 6/R tail output symbols following the encoded data output symbols. This tail output symbol sequence shall be identical to the one generated by the encoder shown in Figure 2.1.3.1.5.2.1-1. The tail output symbols are generated after the constituent encoders have been clocked N_{turbo} times with the switches in the up position. The first 3/R tail output symbols are generated by clocking Constituent Encoder 1 three times with its switch in the down position while Constituent Encoder 2 is not clocked and puncturing and repeating the resulting constituent encoder output symbols. The last 3/R tail output symbols are generated by clocking Constituent Encoder 2 three times with its switch in the down position while Constituent Encoder 1 is not clocked and puncturing and repeating the resulting constituent encoder output symbols. The constituent encoder outputs for each bit period shall be output in the sequence X, Y_0, Y_1, X′, Y'_0, Y'_1 with the X output first.

The tail output symbol puncturing and symbol repetition shall be as specified in Table 2.1.3.1.5.2.2-1. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. A 2 or a 3 means that two or three copies of the symbol shall be passed. For rate 1/2 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XY_0, and the tail output symbols for each of the last three tail bit periods shall be $X'Y'_0$. For rate 1/3 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XXY_0, and the tail output symbols for each of the last three tail bit periods shall be $X'X'Y'_0$.

For rate 1/4 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XXY_0Y_1, and the tail output symbols for each of the last three tail bit periods shall be $X'X'Y'_0Y'_1$. For rate 1/5 turbo codes, the tail output symbols for each of the first three tail bit periods shall be $XXXY_0Y_1$, and the tail output symbols for each of the last three tail bit periods shall be $X'X'X'Y'_0Y'_1$.

Table 2.1.3.1.5.2.2-1. Puncturing and Symbol Repetition Patterns for the Tail Bit Periods

	Code Rate			
Output	**1/2**	**1/3**	**1/4**	**1/5**
X	111 000	222 000	222 000	333 000
Y_0	111 000	111 000	111 000	111 000
Y_1	000 000	000 000	111 000	111 000
X′	000 111	000 222	000 222	000 333
Y'_0	000 111	000 111	000 111	000 111
Y'_1	000 000	000 000	000 111	000 111

Note: The puncturing table shall be read first from top to bottom and then from left to right with the number of repetitions for each symbol indicated by the number in the table.

2.1.3.1.5.2.3 Turbo Interleavers

The turbo interleaver, which is part of the turbo encoder, shall block interleave the data, frame quality indicator (CRC), and reserved bits input to the turbo encoder.

The turbo interleaver shall be functionally equivalent to an approach where the entire sequence of turbo interleaver input bits are written sequentially into an array at a sequence of addresses, and then the entire sequence is read out from a sequence of addresses that are defined by the procedure described below.

Let the sequence of input addresses be from 0 to $N_{turbo} - 1$, where N_{turbo} is the total number of information bits, frame quality indicator bits, and reserved bits in the turbo interleaver. Then, the sequence of interleaver output addresses shall be equivalent to those generated by the procedure illustrated in Figure 2.1.3.1.5.2.3-1 and described below.[22]

1. Determine the turbo interleaver parameter, n, where n is the smallest integer such that $N_{turbo} \le 2^{n+5}$. Table 2.1.3.1.5.2.3-1 gives this parameter for the numbers of bits per frame that are available without flexible data rates.
2. Initialize an (n + 5) –bit counter to 0.
3. Extract the n most significant bits (MSBs) from the counter and add one to form a new value. Then, discard all except the n least significant bits (LSBs) of this value.

[22] This procedure is equivalent to one where the counter values are written into a 2^5-row by 2^n-column array by rows, the rows are shuffled according to a bit-reversal rule, the elements within each row are permuted according to a row-specific linear congruential sequence, and tentative output addresses are read out by column. For i = 0, 1, … , $2^n - 1$, the linear congruential sequence rule is $x(i + 1) = (x(i) + c) \bmod 2^n$, where $x(0) = c$ and c is a row-specific value from a table lookup.

4. Obtain the n-bit output of the table lookup defined in Table 2.1.3.1.5.2.3-2 with a read address equal to the five LSBs of the counter. Note that this table depends on the value of n.

5. Multiply the values obtained in Steps 3 and 4, and discard all except the n LSBs.

6. Bit-reverse the five LSBs of the counter.

7. Form a tentative output address that has its MSBs equal to the value obtained in Step 6 and its LSBs equal to the value obtained in Step 5.

8. Accept the tentative output address as an output address if it is less than N_{turbo}; otherwise, discard it.

9. Increment the counter and repeat Steps 3 through 8 until all N_{turbo} interleaver output addresses are obtained.

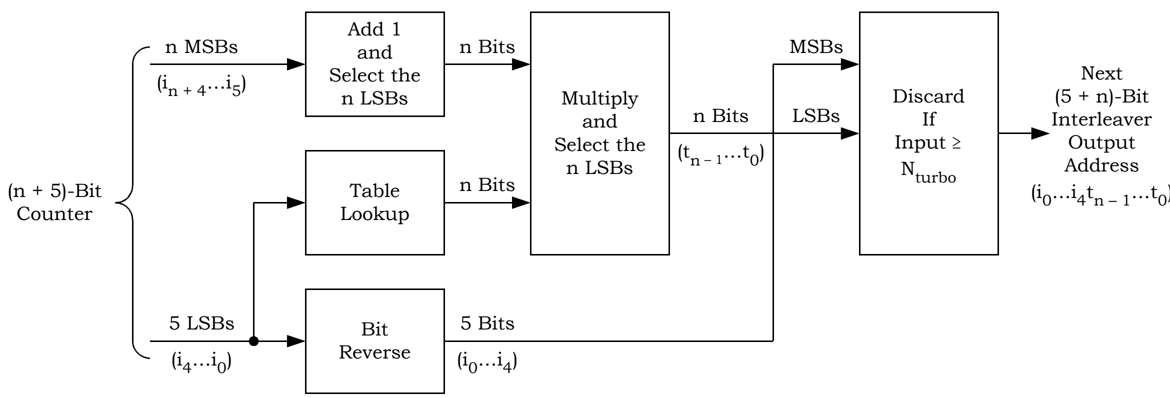

Figure 2.1.3.1.5.2.3-1. Turbo Interleaver Output Address Calculation Procedure

Table 2.1.3.1.5.2.3-1. Turbo Interleaver Parameter

Turbo Interleaver Block Size N_{turbo}	Turbo Interleaver Parameter n
186	3
378	4
402	4
570	5
762	5
786	5
1,146	6
1,530	6
1,554	6
2,298	7
3,066	7
3,090	7
4,602	8
4,626	8
6,138	8
6,162	8
9,210	9
9,234	9
12,282	9
12,306	9
15,378	9
18,450	10
20,730	10

Table 2.1.3.1.5.2.3-2. Turbo Interleaver Lookup Table Definition

Table Index	n = 3 Entries	n = 4 Entries	n = 5 Entries	n = 6 Entries	n = 7 Entries	n = 8 Entries	n = 9 Entries	n = 10 Entries
0	1	5	27	3	15	3	13	1
1	1	15	3	27	127	1	335	349
2	3	5	1	15	89	5	87	303
3	5	15	15	13	1	83	15	721
4	1	1	13	29	31	19	15	973
5	5	9	17	5	15	179	1	703
6	1	9	23	1	61	19	333	761
7	5	15	13	31	47	99	11	327
8	3	13	9	3	127	23	13	453
9	5	15	3	9	17	1	1	95
10	3	7	15	15	119	3	121	241
11	5	11	3	31	15	13	155	187
12	3	15	13	17	57	13	1	497
13	5	3	1	5	123	3	175	909
14	5	15	13	39	95	17	421	769
15	1	5	29	1	5	1	5	349
16	3	13	21	19	85	63	509	71
17	5	15	19	27	17	131	215	557
18	3	9	1	15	55	17	47	197
19	5	3	3	13	57	131	425	499
20	3	1	29	45	15	211	295	409
21	5	3	17	5	41	173	229	259
22	5	15	25	33	93	231	427	335
23	5	1	29	15	87	171	83	253
24	1	13	9	13	63	23	409	677
25	5	1	13	9	15	147	387	717
26	1	9	23	15	13	243	193	313
27	5	15	13	31	15	213	57	757
28	3	11	13	17	81	189	501	189
29	5	3	1	5	57	51	313	15
30	5	15	13	15	31	15	489	75
31	3	5	13	33	69	67	391	163

2.1.3.1.5.3 Block Encoding

2.1.3.1.5.3.1 (12, 4) Block Code

The (12, 4) block code for the Reverse Channel Quality Indicator Channel shall consist of the last 12 symbols of each of the 16-symbol Walsh functions as shown in Table 2.1.3.1.5.3.1-1. The encoder output symbols shown in Table 2.1.3.1.5.3.1-1 shall be provided in the order from the left-most symbol to the right-most symbol.

Table 2.1.3.1.5.3.1-1. Codewords for the Reverse Channel Quality Indicator Channel (12, 4) Block Code

Input	Output
‘0000’	‘0000 0000 0000’
‘0001’	‘0101 0101 0101’
‘0010’	‘0011 0011 0011’
‘0011’	‘0110 0110 0110’
‘0100’	‘1111 0000 1111’
‘0101’	1010 0101 1010’
‘0110’	‘1100 0011 1100’
‘0111’	‘1001 0110 1001’
‘1000’	‘0000 1111 1111’
‘1001’	‘0101 1010 1010’
‘1010’	‘0011 1100 1100’
‘1011’	‘0110 1001 1001’
‘1100’	‘1111 1111 0000’
‘1101’	‘1010 1010 0101’
‘1110’	‘1100 1100 0011’
‘1111’	‘1001 1001 0110’

2.1.3.1.5.3.2 (64, 6) Orthogonal Block Code

The (64, 6) orthogonal block code for the Reverse Packet Data Control Channel shall consist of the 64 orthogonal functions shown in Table 2.1.3.1.5.3.2-1. The encoder output symbols shown in Table 2.1.3.1.5.3.2-1 shall be provided in the order from the left-most symbol to the right-most symbol. Note that this is the same mapping used to obtain the Walsh functions described in 2.1.3.1.13.1.

For the Reverse Packet Data Control Channel, the output of the (64, 6) orthogonal block code shall be symbol-by-symbol modulo-2 added to the Mobile Status Indicator Bit to form a (64, 7) bi-orthogonal block code.

Table 2.1.3.1.5.3.2-1. Codewords for the Reverse Packet Data Control Channel (64, 6) Block Code

Input	Output
'000000'	'00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000'
'000001'	'01010101 01010101 01010101 01010101 01010101 01010101 01010101 01010101'
'000010'	'00110011 00110011 00110011 00110011 00110011 00110011 00110011 00110011'
'000011'	'01100110 01100110 01100110 01100110 01100110 01100110 01100110 01100110'
'000100'	'00001111 00001111 00001111 00001111 00001111 00001111 00001111 00001111'
'000101'	'01011010 01011010 01011010 01011010 01011010 01011010 01011010 01011010'
'000110'	'00111100 00111100 00111100 00111100 00111100 00111100 00111100 00111100'
'000111'	'01101001 01101001 01101001 01101001 01101001 01101001 01101001 01101001'
'001000'	'00000000 11111111 00000000 11111111 00000000 11111111 00000000 11111111'
'001001'	'01010101 10101010 01010101 10101010 01010101 10101010 01010101 10101010'
'001010'	'00110011 11001100 00110011 11001100 00110011 11001100 00110011 11001100'
'001011'	'01100110 10011001 01100110 10011001 01100110 10011001 01100110 10011001'
'001100'	'00001111 11110000 00001111 11110000 00001111 11110000 00001111 11110000'
'001101'	'01011010 10100101 01011010 10100101 01011010 10100101 01011010 10100101'
'001110'	'00111100 11000011 00111100 11000011 00111100 11000011 00111100 11000011'
'001111'	'01101001 10010110 01101001 10010110 01101001 10010110 01101001 10010110'
'010000'	'00000000 00000000 11111111 11111111 00000000 00000000 11111111 11111111'
'010001'	'01010101 01010101 10101010 10101010 01010101 01010101 10101010 10101010'
'010010'	'00110011 00110011 11001100 11001100 00110011 00110011 11001100 11001100'
'010011'	'01100110 01100110 10011001 10011001 01100110 01100110 10011001 10011001'
'010100'	'00001111 00001111 11110000 11110000 00001111 00001111 11110000 11110000'
'010101'	'01011010 01011010 10100101 10100101 01011010 01011010 10100101 10100101'
'010110'	'00111100 00111100 11000011 11000011 00111100 00111100 11000011 11000011'
'010111'	'01101001 01101001 10010110 10010110 01101001 01101001 10010110 10010110'
'011000'	'00000000 11111111 11111111 00000000 00000000 11111111 11111111 00000000'
'011001'	'01010101 10101010 10101010 01010101 01010101 10101010 10101010 01010101'
'011010'	'00110011 11001100 11001100 00110011 00110011 11001100 11001100 00110011'
'011011'	'01100110 10011001 10011001 01100110 01100110 10011001 10011001 01100110'
'011100'	'00001111 11110000 11110000 00001111 00001111 11110000 11110000 00001111'
'011101'	'01011010 10100101 10100101 01011010 01011010 10100101 10100101 01011010'
'011110'	'00111100 11000011 11000011 00111100 00111100 11000011 11000011 00111100'
'011111'	'01101001 10010110 10010110 01101001 01101001 10010110 10010110 01101001'
'100000'	'00000000 00000000 00000000 00000000 11111111 11111111 11111111 11111111'
'100001'	'01010101 01010101 01010101 01010101 10101010 10101010 10101010 10101010'
'100010'	'00110011 00110011 00110011 00110011 11001100 11001100 11001100 11001100'
'100011'	'01100110 01100110 01100110 01100110 10011001 10011001 10011001 10011001'
'100100'	'00001111 00001111 00001111 00001111 11110000 11110000 11110000 11110000'
'100101'	'01011010 01011010 01011010 01011010 10100101 10100101 10100101 10100101'
'100110'	'00111100 00111100 00111100 00111100 11000011 11000011 11000011 11000011'
'100111'	'01101001 01101001 01101001 01101001 10010110 10010110 10010110 10010110'
'101000'	'00000000 11111111 00000000 11111111 11111111 00000000 11111111 00000000'
'101001'	'01010101 10101010 01010101 10101010 10101010 01010101 10101010 01010101'
'101010'	'00110011 11001100 00110011 11001100 11001100 00110011 11001100 00110011'
'101011'	'01100110 10011001 01100110 10011001 10011001 01100110 10011001 01100110'
'101100'	'00001111 11110000 00001111 11110000 11110000 00001111 11110000 00001111'
'101101'	'01011010 10100101 01011010 10100101 10100101 01011010 10100101 01011010'
'101110'	'00111100 11000011 00111100 11000011 11000011 00111100 11000011 00111100'
'101111'	'01101001 10010110 01101001 10010110 10010110 01101001 10010110 01101001'
'110000'	'00000000 00000000 11111111 11111111 11111111 11111111 00000000 00000000'
'110001'	'01010101 01010101 10101010 10101010 10101010 10101010 01010101 01010101'
'110010'	'00110011 00110011 11001100 11001100 11001100 11001100 00110011 00110011'
'110011'	'01100110 01100110 10011001 10011001 10011001 10011001 01100110 01100110'
'110100'	'00001111 00001111 11110000 11110000 11110000 11110000 00001111 00001111'
'110101'	'01011010 01011010 10100101 10100101 10100101 10100101 01011010 01011010'
'110110'	'00111100 00111100 11000011 11000011 11000011 11000011 00111100 00111100'
'110111'	'01101001 01101001 10010110 10010110 10010110 10010110 01101001 01101001'
'111000'	'00000000 11111111 11111111 00000000 11111111 00000000 00000000 11111111'
'111001'	'01010101 10101010 10101010 01010101 10101010 01010101 01010101 10101010'
'111010'	'00110011 11001100 11001100 00110011 11001100 00110011 00110011 11001100'
'111011'	'01100110 10011001 10011001 01100110 10011001 01100110 01100110 10011001'
'111100'	'00001111 11110000 11110000 00001111 11110000 00001111 00001111 11110000'
'111101'	'01011010 10100101 10100101 01011010 10100101 01011010 01011010 10100101'
'111110'	'00111100 11000011 11000011 00111100 11000011 00111100 00111100 11000011'
'111111'	'01101001 10010110 10010110 01101001 10010110 01101001 01101001 10010110'

2.1.3.1.6 Code Symbol Repetition

Code symbols output from the forward error correction encoder shall be repeated as specified in Table 2.1.3.1.6-1, except for the cases listed below. Since the Reverse Acknowledgment Channel is not coded, the code symbol repetition is with respect to the Reverse Acknowledgment Channel bits.

If variable-rate Reverse Supplemental Channel operation is supported and the specified data rate on the Reverse Supplemental Channel is not the maximum assigned data rate, the symbol repetition factor for the specified data rate is the ratio of the interleaver block size of the maximum assigned data rate and the specified number of encoded symbols per frame. See N_FSCH_BITS_SET[FOR_SCH_ID][SCCL_INDEX] in [5].

If flexible data rates are used, the repetition factor is calculated as follows:

- If the specified data rate is the maximum assigned, the repetition factor is the ratio of the interleaver block size of the next higher listed rate and the specified number of encoded symbols per frame on the Reverse Dedicated Control Channel, the Reverse Fundamental Channel, and the Reverse Supplemental Channel.
- Otherwise, the repetition factor is the ratio of the interleaver block size of the maximum assigned data rate and the specified number of encoded symbols per frame.

If the repetition factor is less than 1, then code symbol repetition shall be disabled. Otherwise, the symbol repetition[23] shall be performed as follows:

The k-th output symbol from the repetition block shall be the $\lfloor kL/N \rfloor$-th input symbol where

k = 0 to N – 1,

L = Number of specified encoded symbols per frame at encoder output, and

N = Desired channel interleaver block size ($N \geq L$).

[23] The symbol repetition factor is N/L.

Table 2.1.3.1.6-1. Code Symbol Repetition

Channel Type		Number of Repeated Code Symbols/Code Symbol
Access Channel (Spreading Rate 1 only)		2
Enhanced Access Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Common Control Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Request Channel		6
Reverse Acknowledgment Channel		12 (RC 8) or 24
Reverse Channel Quality Indicator Channel		1 (3200 bps) 12 (800 bps)
Reverse Dedicated Control Channel		2
Reverse Fundamental Channel	RC 1 or 2	8 (1200 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (9600 or 14400 bps)
	RC 3, 4, 5, or 6	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps)
	RC 8	0 (0 bps) 16 (1800 bps) 8 (3000 bps) 4 (5000 bps) 2 (9600 bps)
Reverse Supplemental Code Channel (RC 1 or 2)		1
Reverse Supplemental Channel	20 ms frames	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps) 1 (> 14400 bps)
	40 ms frames	8 (1350 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (> 7200 bps)

Channel Type		Number of Repeated Code Symbols/Code Symbol
	80 ms frames	4 (1200 or 1800 bps) 2 (2400 or 3600 bps) 1 (> 3600 bps)

2.1.3.1.7 Puncturing

2.1.3.1.7.1 Convolutional Code Symbol Puncturing

Table 2.1.3.1.7.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and ‘1’ means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncturing pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.7.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/4	8 of 24	‘111010111011 101011101010’	4, 6, and 8
1/4	4 of 12	‘110110011011’	4
1/4	1 of 5	‘11110’	3, 5, and 8
1/4	1 of 25	‘1111111111111 111111111110’	8
1/4	1 of 9	‘111111110’	3 and 5
1/2	2 of 18	‘111011111 111111110’	6

For example, the 5-symbol puncturing pattern for Radio Configuration 3 is ‘11110’, meaning that the first, second, third, and fourth symbols are passed, while the fifth symbol of each consecutive group of five symbols is removed.

2.1.3.1.7.2 Turbo Code Symbol Puncturing

Table 2.1.3.1.7.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncturing pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.7.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	'111110101 111111111'	6
1/4	4 of 12	'110111011010'	4

2.1.3.1.7.3 Flexible and Variable Rate Puncturing

If variable-rate Reverse Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, note that the puncturing in 2.1.3.1.7.1 and 2.1.3.1.7.2 is used for the frame formats listed in Table 2.1.3.9.2-1 for the Reverse Dedicated Control Channel, Table 2.1.3.12.1-1 for the Reverse Fundamental Channel, or Table 2.1.3.13.2-1, Table 2.1.3.13.2-2, or Table 2.1.3.13.2-3 for the Reverse Supplemental Channel.

If the number of specified encoded symbols per frame at the encoder output, L, is less than or equal to the desired channel interleaver block size, N, puncturing after symbol repetition shall be disabled.

Otherwise, code symbol puncturing shall be applied to the encoder output as follows.

- For turbo codes with ERAM disabled or for convolutional codes, the k-th output symbol from the puncturing block shall be the $\lfloor kL/N \rfloor$-th input symbol, where k = 0 to N – 1.
- For turbo codes with ERAM enabled for Radio Configuration 4, puncturing shall be as follows:
  - Let I denote the number of information bits per frame, including reserved and tail bits.
  - If N/I = 8/3, puncturing as specified in 2.1.3.1.7.2 shall be used.
  - Otherwise, let

    $J = \lfloor I/2 \rfloor$ and

    $K = \lfloor (L - N)/2 \rfloor$.

    All symbols for a frame shall be sequentially grouped into groups of L/I symbols each so that the first symbol at the encoder output is in symbol group 0 and the last symbol at the encoder output is in symbol group I – 1. Symbol puncturing shall be enabled for symbol groups with indices 2j and 2j + 1 if (j·K) mod J < K where j = 0 to J – 1. The pattern used to puncture the i-th symbol group shall be

$P_{(i \bmod 2)}$, as defined in Table 2.1.3.1.7.3-1. Symbol groups corresponding to data bit periods of the turbo encoded frame shall be punctured with the data puncturing pattern, whereas symbol groups corresponding to tail bit periods shall be punctured with the tail puncturing pattern. If L is odd, the (I – 1)-th symbol group shall also be punctured.

Table 2.1.3.1.7.3-1. Puncturing Pattern for Turbo Codes with ERAM Enabled

	8/3 < N/I ≤ 3 R = 1/3		**3 < N/I ≤ 4 R = 1/4**		**4 < N/I < 5 R = 1/5**	
	P_0	**P_1**	**P_0**	**P_1**	**P_0**	**P_1**
Data Puncturing Pattern	‘110’	‘101’	‘1011’	‘1110’	‘11101’	‘11011’
Tail Puncturing Pattern	‘101’	‘101’	‘1011’	‘1011’	‘11011’	‘11011’

2.1.3.1.8 Block Interleaving

The mobile station shall interleave all repeated code symbols and subsequent puncturing, if used, on the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Request Channel, and the Reverse Traffic Channel prior to modulation and transmission.

2.1.3.1.8.1 Interleaving for the Reverse Traffic Channel with Radio Configurations 1 and 2

For the Reverse Traffic Channel with Radio Configurations 1 and 2, the interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Repeated code symbols shall be written into the interleaver by columns from the first column to the eighteenth column filling the complete 32 × 18 matrix. Reverse Traffic Channel repeated code symbols shall be output from the interleaver by rows. For Radio Configuration 1 and 2, the interleaver rows shall be output in the following order:

At 9600 or 14400 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 4800 or 7200 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 2400 or 3600 bps:

1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

At 1200 or 1800 bps:

1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

2.1.3.1.8.2 Bit-Reversal Interleaving

The Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Request Channel, and the Reverse Traffic Channel with Radio Configurations 3, 4, 5, 6, and 8 shall use a bit-reversal interleaver, where the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one and the interleaved symbols are read out in a permuted order with the i-th symbol being read from address A_i, as follows:

$$A_i = 2^m (i \bmod J) + BRO_m(\lfloor i/J \rfloor)$$

where

$i = 0$ to $N - 1$,

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$BRO_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $BRO_3(6) = 3$).

The interleaver parameters m and J are specified in Table 2.1.3.1.8-1.

Table 2.1.3.1.8-1. Interleaver Parameters

Interleaver Block Size	m	J
384	6	6
768	6	12
1,536	6	24
3,072	6	48
6,144	7	48
12,288	7	96
576	5	18
2,304	6	36
4,608	7	36
9,216	7	72
18,432	8	72
36,864	8	144

2.1.3.1.8.3 Interleaving for the Reverse Packet Data Channel

The channel interleaving for the Reverse Packet Data Channel shall consist of symbol separation, subblock interleaving, and symbol grouping.

2.1.3.1.8.3.1 Symbol Separation

All of the encoded symbols shall be demultiplexed into five subblocks denoted by S, P_0, P_1, P'_0, and P'_1. The encoder output symbols shall be sequentially distributed into five subblocks with the first encoder output symbol going to the S subblock, the second to the P_0 subblock, the third to the P_1 subblock, the fourth to the P'_0 subblock, the fifth to the P'_1 subblock, the sixth to the S subblock, etc.

2.1.3.1.8.3.2 Subblock Interleaving

The five subblocks shall be interleaved separately. The sequence of interleaver output symbols for each subblock shall be generated by the procedure described below. The entire subblock of symbols to be interleaved is written into an array at addresses from 0 to the interleaver subblock size (N_{int}) minus one, and the interleaved symbols are read out in a permuted order with the i-th symbol being read from an address, A_i (i = 0 to N_{int} – 1), as follows:

1. Determine the subblock interleaver parameters, m and J from Table 2.1.3.1.8.3.2-1.
2. Initialize i and k to 0.
3. Form a tentative output address T_k according to the formula

$$T_k = 2^m (k \bmod J) + BRO_m (\lfloor k/J \rfloor),$$

where $BRO_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $BRO_3(6) = 3$).

4. If T_k is less than N_{int}, $A_i = T_k$ and increment i and k by 1. Otherwise, increment k by 1 and discard T_k.
5. Repeat steps 3 and 4 until all N_{int} interleaver output addresses are obtained.

The parameters for the subblock interleavers are specified in Table 2.1.3.1.8.3.2-1.

Table 2.1.3.1.8.3.2-1. Subblock Interleaver Parameters

Encoder Packet Size	Subblock Interleaver Parameters		
	N_{int}	m	J
192	192	6	3
408	408	7	4
792	792	8	4
1,560	1,560	9	4
3,096	3,096	10	4
4,632	4,632	11	3
6,168	6,168	11	4
9,240	9,240	12	3
12,312	12,312	12	4
15,384	15,384	13	2
18,456	18,456	13	3

2.1.3.1.8.3.3 Symbol Grouping

The channel interleaver output sequence shall consist of the interleaved S subblock sequence followed by a symbol-by-symbol multiplexed sequence of the interleaved P_0 and P'_0 subblock sequences followed by a symbol-by-symbol multiplexed sequence of the interleaved P_1 and P'_1 subblock sequences. The symbol-by-symbol multiplexed sequence of interleaved P_0 and P'_0 subblock sequences shall consist of the first interleaved P_0 subblock output, the first interleaved P'_0 subblock output, the second interleaved P_0 subblock output, the second interleaved P'_0 subblock output, etc. The symbol-by-symbol multiplexed sequence of interleaved P_1 and P'_1 subblock sequences shall consist of the first interleaved P_1 subblock output, the first interleaved P'_1 subblock output, the second interleaved P_1 subblock output, the second interleaved P'_1 subblock output, etc.

Figure 2.1.3.1.8.3.3-1 shows the subblock symbol grouping.

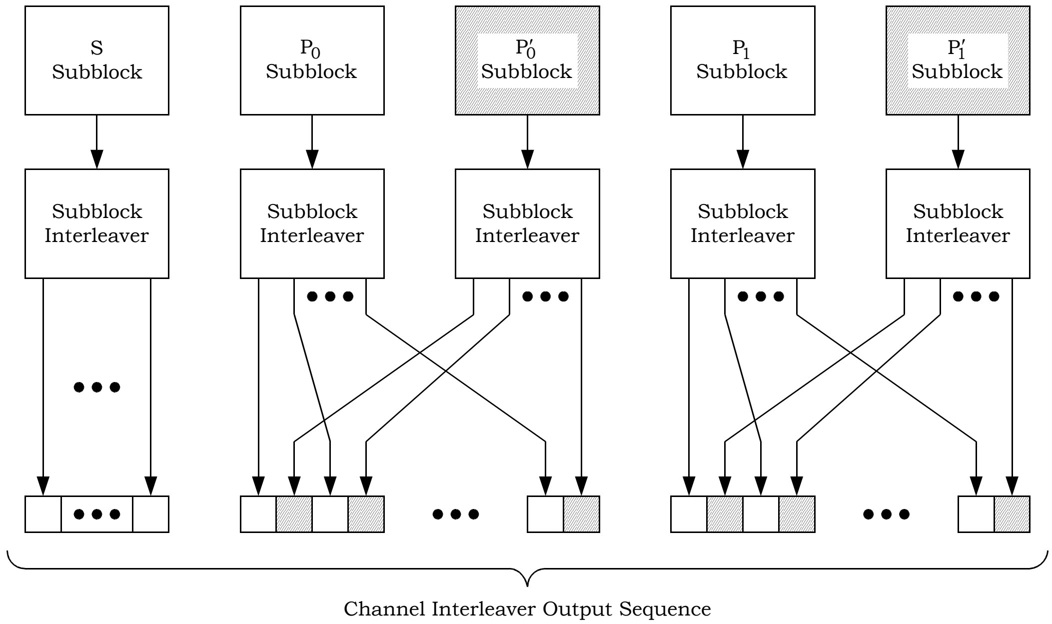

Figure 2.1.3.1.8.3.3-1. Subblock Symbol Grouping

2.1.3.1.9 Sequence Repetition

Sequence repetition applies to the Reverse Packet Data Control Channel. For this channel, the sequence of 64 symbols out of the symbol-by-symbol exclusive OR operation with the Mobile Status Indicator Bit shall be transmitted three times. In each transmission, the entire sequence of 64 symbols shall be transmitted.

2.1.3.1.10 Subpacket Symbol Selection for the Reverse Packet Data Channel

Encoder packets are transmitted as one, two, or three subpackets. Initially, the first subpacket is transmitted. Then, subsequent subpackets are transmitted if the transmitted subpacket is not the last subpacket, and the mobile station does not receive an acknowledgment from the base station. The symbols in a subpacket are formed by selecting a specific sequence of symbols from the interleaved turbo encoder output sequence. The resulting subpacket sequence is a binary sequence of symbols for the modulator.

Let the interleaved and selected symbols be numbered from zero with the 0-th symbol being the first symbol in the sequence. Also, let

k be the subpacket index (k = 0, 1, or 2);

N_{EP} be the number of bits in the encoder packet (N_{EP} = 192, 408, 792, 1560, 3096, 4632, 6168, 9240, 12312, 15384, or 18456);

F_k be the index of the interleaver output symbol selected for the first symbol of the k-th subpacket; and

$L_{N_{EP}}$ be the number of binary code symbols in each subpacket for an encoder packet size of N_{EP}.

Then, the index of the interleaver output symbol to use for the i-th symbol of the k-th subpacket shall be

$S_{k,i} = (F_k + i) \bmod (5\ N_{EP})$

where i = 0 to $L_{N_{EP}} - 1$.

The values for F_k and $L_{N_{EP}}$ are given in Table 2.1.3.1.11.4-1. The values for F_k are in the column labeled “Interleaver Output Sequence Starting Point for the Subpacket”, and the values for $L_{N_{EP}}$ are selected values listed in the column labeled “Number of Binary Code Symbols in the Transmitted Subpackets” for an encoder packet size of N_{EP} and having a subpacket ID of 0 in the column labeled “Transmitted Subpacket ID”.

2.1.3.1.11 Modulation for the Reverse Packet Data Channel

For the Reverse Packet Data Channel operating with Radio Configuration 7, the symbols from the subpacket symbol selection operation are mapped into a sequence of BPSK, QPSK, or 8-PSK modulation symbols. The type of modulation depends on the encoder packet size, as specified in 2.1.3.1.11.4.

2.1.3.1.11.1 BPSK Modulation

For subpackets that use BPSK modulation, each binary symbol out of the subpacket symbol selection operation shall be mapped to a BPSK modulation symbol. The binary symbol ‘0’ shall be mapped to the +1 modulation symbol, and the binary symbol ‘1’ shall be mapped to the –1 modulation symbol.

2.1.3.1.11.2 QPSK Modulation

For subpackets that use QPSK modulation, groups of two successive symbols out of the subpacket symbol selection operation shall be grouped to form QPSK modulation symbols. Each group of two adjacent symbol-selection-operation output symbols, $s_0 = x(2i)$ and $s_1 = x(2i + 1)$, i = 0,…, M – 1, shall be mapped into a complex modulation symbol $(m_I(i), m_Q(i))$ as specified in Table 2.1.3.1.11.2-1. The parameter M is the number of QPSK modulation symbols in the Reverse Packet Data Channel subpacket. Figure 2.1.3.1.11.2-1 shows the signal constellation of the QPSK modulator.

Table 2.1.3.1.11.2-1. QPSK Modulation Table

Symbol-Selection-Operation Output Symbols		Modulation Symbols	
s_1	s_0	$m_I(i)$	$m_Q(i)$
0	0	D	D
0	1	–D	D
1	0	D	–D
1	1	–D	–D

Note: $D = 1/\sqrt{2}$.

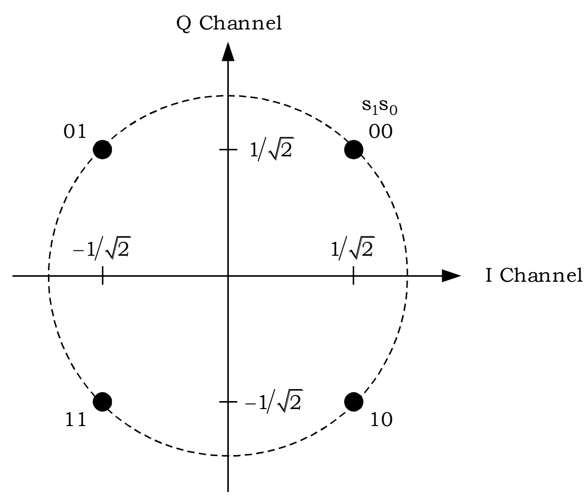

Figure 2.1.3.1.11.2-1. Signal Constellation for QPSK Modulation

2.1.3.1.11.3 8-PSK Modulation

For subpackets that use 8-PSK modulation (modulation order = 3), the symbols out of the subpacket symbol selection operation shall be grouped to form 8-PSK modulation symbols: $s_0 = x(2M + i)$, $s_1 = x(2i)$, and $s_2 = x(2i + 1)$. These groups of three symbol-selection-operation output symbols shall be mapped into complex modulation symbols ($m_I(i)$, $m_Q(i)$), i = 0,..., M – 1, as specified in Table 2.1.3.1.11.3-1. The parameter M is the number of 8-PSK modulation symbols in all the Walsh channels of the Reverse Packet Data Channel subpacket. Figure 2.1.3.1.11.3-1 shows the signal constellation of the 8-PSK modulator.

Table 2.1.3.1.11.3-1. 8-PSK Modulation Table

Symbol-Selection-Operation Output Symbols			Modulation Symbols	
s_2	s_1	s_0	$m_I(i)$	$m_Q(i)$
0	0	0	C	S
0	0	1	S	C
0	1	1	–S	C
0	1	0	–C	S
1	1	0	–C	–S
1	1	1	–S	–C
1	0	1	S	–C
1	0	0	C	–S

Note: $C = \cos(\pi/8) \approx 0.9239$ and $S = \sin(\pi/8) \approx 0.3827$.

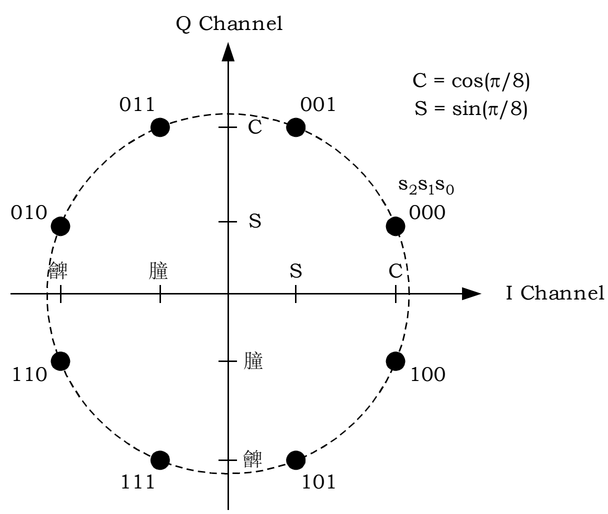

Figure 2.1.3.1.11.3-1. Signal Constellation for 8-PSK Modulation

2.1.3.1.11.4 Modulation Types

The mobile station shall use BPSK modulation for encoder packet sizes of 192, 408, and 792 bits, QPSK modulation for encoder packet sizes of 1560, 3096, 4632, 6168, 9240, 12312, and 15384 bits, and 8-PSK modulation for an encoder packet size of 18456 bits as shown in Table 2.1.3.1.11.4-1. The subpacket data rate is the number of encoder packet bits divided by the subpacket duration. The data rate shown in Table 2.1.3.1.11.4-1 is the number of encoder packet bits divided by the duration of all of the transmitted subpackets of the encoder packet. The effective code rate is defined as the number of bits in the encoder packet divided by the number of binary code symbols in all of the transmitted subpackets of the encoder packet. The "Interleaver Output Sequence Starting Point for the Subpacket" is the first symbol in the interleaver output sequence that the subpacket symbol selection operation selects for each subpacket, as described in 2.1.3.1.10.

Table 2.1.3.1.11.4-1. Parameters for the Reverse Packet Data Channel with Radio Configuration 7

Number of Information Bits per Encoder Packet	Number of Frame Quality Indicator Bits per Encoder Packet	Number of Encoder Tail Allowance Bits per Encoder Packet	Number of Bits per Encoder Packet	Code Rate	Transmitted Subpacket ID	Data Rate (kbps)	Modulation per Walsh Function	Interleaver Output Sequence Starting Point for the Subpacket	Walsh Functions W_n^N	Number of Binary Code Symbols in the Transmitted Subpackets	Effective Code Rate Including Repetition
174	12	6	192	1/5	2	6.4	BPSK on I	384	+ + – –	9,216	0.0208
174	12	6	192	1/5	1	9.6	BPSK on I	192	+ + – –	6,144	0.0313
174	12	6	192	1/5	0	19.2	BPSK on I	0	+ + – –	3,072	0.0625
386	16	6	408	1/5	2	13.6	BPSK on I	24	+ + – –	9,216	0.0443
386	16	6	408	1/5	1	20.4	BPSK on I	1,032	+ + – –	6,144	0.0664
386	16	6	408	1/5	0	40.8	BPSK on I	0	+ + – –	3,072	0.1328
770	16	6	792	1/5	2	26.4	BPSK on I	2,184	+ + – –	9,216	0.0859
770	16	6	792	1/5	1	39.6	BPSK on I	3,072	+ + – –	6,144	0.1289
770	16	6	792	1/5	0	79.2	BPSK on I	0	+ + – –	3,072	0.2578
1,538	16	6	1,560	1/5	2	52.0	QPSK	4,488	+ + – –	18,432	0.0846
1,538	16	6	1,560	1/5	1	78.0	QPSK	6,144	+ + – –	12,288	0.1270
1,538	16	6	1,560	1/5	0	156.0	QPSK	0	+ + – –	6,144	0.2539
3,074	16	6	3,096	1/5	2	103.2	QPSK	9,096	+ –	36,864	0.0840
3,074	16	6	3,096	1/5	1	154.8	QPSK	12,288	+ –	24,576	0.1260
3,074	16	6	3,096	1/5	0	309.6	QPSK	0	+ –	12,288	0.2520
4,610	16	6	4,632	1/5	2	154.4	QPSK	13,704	+ + – – and + –	55,296	0.0838
4,610	16	6	4,632	1/5	1	231.6	QPSK	18,432	+ + – – and + –	36,864	0.1257
4,610	16	6	4,632	1/5	0	463.2	QPSK	0	+ + – – and + –	18,432	0.2513
6,146	16	6	6,168	1/5	2	205.6	QPSK	6,024	+ + – – and + –	55,296	0.1115
6,146	16	6	6,168	1/5	1	308.4	QPSK	18,432	+ + – – and + –	36,864	0.1673
6,146	16	6	6,168	1/5	0	616.8	QPSK	0	+ + – – and + –	18,432	0.3346
9,218	16	6	9,240	1/5	2	308.0	QPSK	36,864	+ + – – and + –	55,296	0.1671
9,218	16	6	9,240	1/5	1	462.0	QPSK	18,432	+ + – – and + –	36,864	0.2507
9,218	16	6	9,240	1/5	0	924.0	QPSK	0	+ + – – and + –	18,432	0.5013
12,290	16	6	12,312	1/5	2	410.4	QPSK	36,864	+ + – – and + –	55,296	0.2227
12,290	16	6	12,312	1/5	1	615.6	QPSK	18,432	+ + – – and + –	36,864	0.3340
12,290	16	6	12,312	1/5	0	1,231.2	QPSK	0	+ + – – and + –	18,432	0.6680
15,362	16	6	15,384	1/5	2	512.8	QPSK	36,864	+ + – – and + –	55,296	0.2782
15,362	16	6	15,384	1/5	1	769.2	QPSK	18,432	+ + – – and + –	36,864	0.4173
15,362	16	6	15,384	1/5	0	1,538.4	QPSK	0	+ + – – and + –	18,432	0.8346
18,434	16	6	18,456	1/5	2	615.2	8-PSK	55,296	+ + – – and + –	82,944	0.2225
18,434	16	6	18,456	1/5	1	922.8	8-PSK	27,648	+ + – – and + –	55,296	0.3338
18,434	16	6	18,456	1/5	0	1,845.6	8-PSK	0	+ + – – and + –	27,648	0.6675

2.1.3.1.12 Sequence Demultiplexing and Walsh Processing for the Reverse Packet Data Channel

For the Reverse Packet Data Channel, the encoder packet sizes of 4632, 6168, 9240, 12312, and 15384 bits shall be QPSK modulated as specified in 2.1.3.1.11.2, while the encoder packet size of 18456 bits shall be 8-PSK modulated as specified in 2.1.3.1.11.3. The modulator outputs shall be demultiplexed into two sequences for covering by two different Walsh covers. The first one third of the modulated symbols of the subpacket shall be demultiplexed to the output for covering by the W_2^4 Walsh function, and the last two thirds of the modulated symbols of the subpacket shall be demultiplexed to the output for covering by the W_1^2 Walsh function. After the Walsh covering, the symbols that have been covered with the W_1^2 Walsh function shall be amplified by a power gain factor of two thirds and the symbols that have been covered by the W_2^4 Walsh function shall be amplified by a power gain factor of one third. The resulting sequences shall be summed to obtain a single sequence.

2.1.3.1.13 Orthogonal Modulation and Spreading

When transmitting on the Access Channel or the Reverse Traffic Channel with Radio Configurations 1 and 2, the mobile station uses orthogonal modulation. When transmitting on the Reverse Pilot Channel and the Reverse Secondary Pilot Channel, the mobile station uses orthogonal spreading. When transmitting on the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, and the Reverse Traffic Channel with Radio Configuration 3, 4, 5, 6, and 8, the mobile station uses BPSK modulation followed by orthogonal spreading. When transmitting on the Reverse Packet Data Channel, the mobile station uses BPSK modulation, QPSK modulation, or 8-PSK modulation followed by orthogonal spreading as specified in 2.1.3.1.11.

2.1.3.1.13.1 Orthogonal Modulation

When transmitting on the Access Channel or the Reverse Traffic Channel in Radio Configuration 1 or 2, modulation for the Reverse CDMA Channel shall be 64-ary orthogonal modulation. One of 64 possible modulation symbols is transmitted for each six repeated code symbols. The modulation symbol shall be one of 64 mutually orthogonal waveforms generated using Walsh functions. These modulation symbols are given in Table 2.1.3.1.13.1-1 and are numbered 0 through 63. The modulation symbols shall be selected according to the following formula:

Modulation symbol index = $c_0 + 2c_1 + 4c_2 + 8c_3 + 16c_4 + 32c_5$,

where c_5 shall represent the last (or most recent) and c_0 the first (or oldest) binary valued (‘0’ and ‘1’) repeated code symbol of each group of six repeated code symbols that form a modulation symbol index.

The 64 by 64 matrix shown in Table 2.1.3.1.13.1-1 can be generated by means of the following recursive procedure:

$$\mathbf{H}_1 = 0, \qquad \mathbf{H}_2 = \begin{matrix} 0 & 0 \\ 0 & 1 \end{matrix}, \qquad \mathbf{H}_4 = \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix}, \qquad \mathbf{H}_{2N} = \begin{matrix} \mathbf{H}_N & \mathbf{H}_N \\ \mathbf{H}_N & \overline{\mathbf{H}_N} \end{matrix};$$

where N is a power of 2 and $\overline{\mathbf{H}_N}$ denotes the binary complement of $\mathbf{H}_N$.

Walsh function time alignment shall be such that the first Walsh chip begins at the first chip of a frame.

The period of time required to transmit a single modulation symbol shall be equal to 1/4800 second (208.333... μs). The period of time associated with one sixty-fourth of the modulation symbol is referred to as a Walsh chip and shall be equal to 1/307200 second (3.255... μs).

Within a modulation symbol, Walsh chips shall be transmitted in the order of 0, 1, 2,..., 63.

Table 2.1.3.1.13.1-1. 64-ary Orthogonal Symbol Set

Walsh Chip within Symbol

MODULATION SYMBOL INDEX	0 1 2 3	4 5 6 7	8 9 10 11	12 13 14 15	16 17 18 19	20 21 22 23	24 25 26 27	28 29 30 31	32 33 34 35	36 37 38 39	40 41 42 43	44 45 46 47	48 49 50 51	52 53 54 55	56 57 58 59	60 61 62 63
0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1
2	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1
3	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0
4	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1
5	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0
6	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0
7	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1
8	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1
9	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0
10	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0
11	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1
12	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0
13	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1
14	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1
15	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0
16	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1
17	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0
18	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0
19	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1
20	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0
21	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1
22	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1
23	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0
24	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0
25	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1
26	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1
27	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0
28	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1
29	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0
30	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0
31	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1
32	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1
33	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0
34	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0
35	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1
36	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0
37	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1
38	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1
39	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0
40	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0
41	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1
42	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1
43	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0
44	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1
45	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0
46	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0
47	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1
48	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
49	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1
50	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1
51	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0
52	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1
53	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0
54	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0
55	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1
56	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1
57	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0
58	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0
59	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1
60	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	1 1 1 1	0 0 0 0	1 1 1 1	1 1 1 1	0 0 0 0
61	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1	0 1 0 1	1 0 1 0	0 1 0 1	1 0 1 0	1 0 1 0	0 1 0 1
62	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1	0 0 1 1	1 1 0 0	0 0 1 1	1 1 0 0	1 1 0 0	0 0 1 1
63	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0	0 1 1 0	1 0 0 1	0 1 1 0	1 0 0 1	1 0 0 1	0 1 1 0

2.1.3.1.13.2 Orthogonal Spreading

When transmitting on the Reverse Pilot Channel, the Reverse Secondary Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, or the Reverse Traffic Channel with Radio Configuration 3, 4, 5, 6, and 8, the mobile station shall use orthogonal spreading. Table 2.1.3.1.13.2-1 specifies the Walsh functions that are applied to the Reverse CDMA Channels.

The Reverse Packet Data Channel with Radio Configuration 7 shall use the W_2^4 Walsh function for encoder packet sizes of 192, 408, 792, and 1560 bits. The Reverse Packet Data Channel shall use the W_1^2 Walsh function for an encoder packet size of 3096 bits. The Reverse Packet Data Channel shall use the W_1^2 and W_2^4 Walsh functions for encoder packet sizes of 4632, 6168, 9240, 12312, 15384, and 18456 bits.

Table 2.1.3.1.13.2-1. Walsh Functions for Reverse CDMA Channels

Channel Type	Walsh Function
Reverse Pilot Channel	W_0^{64}
Reverse Secondary Pilot Channel	W_{32}^{64}
Enhanced Access Channel	W_2^8
Reverse Common Control Channel	W_2^8
Reverse Packet Data Control Channel	W_{48}^{64}
Reverse Request Channel	W_8^{16}
Reverse Dedicated Control Channel	W_8^{16}
Reverse Acknowledgment Channel	W_{16}^{64}
Reverse Acknowledgment Channel 1	W_{16}^{64}
Reverse Acknowledgment Channel 2	W_{12}^{64}
Reverse Acknowledgment Channel 3	W_8^{64}
Reverse Channel Quality Indicator Channel	W_{12}^{16}
Reverse Fundamental Channel	W_4^{16}
Reverse Supplemental Channel 1	W_1^2or W_2^4
Reverse Supplemental Channel 2	W_2^4or W_6^8
Reverse Packet Data Channel	W_1^2, W_2^4, or both

Walsh function W_n^N represents the n-th Walsh function (n = 0 to N – 1) of length N with the binary symbols of the Walsh function mapped to ±1 symbols using the mapping '0' to +1 and '1' to –1. A binary-symbol Walsh function of length N can be serially constructed from the n-th row of an N × N Hadamard matrix with the zeroth row being Walsh function 0, the first row being Walsh function 1, etc. Within Walsh function n, Walsh chips shall be transmitted serially from the n-th row from left to right. Hadamard matrices can be generated by means of the following recursive procedure:

$$\mathbf{H}_1 = 0, \qquad \mathbf{H}_2 = \begin{matrix} 0 & 0 \\ 0 & 1 \end{matrix}, \qquad \mathbf{H}_4 = \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix}, \qquad \mathbf{H}_{2N} = \begin{matrix} \mathbf{H}_N & \mathbf{H}_N \\ \mathbf{H}_N & \overline{\mathbf{H}_N} \end{matrix};$$

where N is a power of 2 and $\overline{\mathbf{H}_N}$ denotes the binary complement of $\mathbf{H}_N$.

A code channel that is spread using Walsh function n from the N-ary orthogonal set ($0 \le n \le N - 1$) shall be assigned to Walsh function W_n^N. Walsh function time alignment shall be such that the first Walsh chip begins at the first chip of a frame. The Walsh function spreading sequence shall repeat with a period of N/1.2288 μs for Spreading Rate 1 and with a period of N/3.6864 μs for Spreading Rate 3.

Table 2.1.3.1.13.2-2 through Table 2.1.3.1.13.2-5 specify the Walsh functions that are applied to the Reverse Supplemental Channels. This Walsh function repetition factor is the number of Walsh function sequence repetitions per interleaver output symbol.

When a mobile station only supports one Reverse Supplemental Channel, it should support Reverse Supplemental Channel 1. Reverse Supplemental Channel 1 should use Walsh Function W_2^4 when possible.

Table 2.1.3.1.13.2-2. Reverse Supplemental Channel Walsh Functions with Spreading Rate 1 when Only One Reverse Supplemental Channel Is Assigned

Reverse Supplemental Channel 1			Reverse Supplemental Channel 2		
Walsh Function	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**	**Walsh Function**	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**
W_1^2 = (+ –)	614.4/M	M = 1, 2, 4, 8, 16, and 32	Not Supported		
W_2^4 = (+ + – –)	307.2/M	M = 1, 2, 4, 8, and 16	Not Supported		
Not Supported			W_2^4 = (+ + – –)	307.2/M	M = 1, 2, 4, 8, and 16
Not Supported			W_6^8 = (+ + – – – – + +)	153.6/M	M = 1, 2, 4, and 8

Table 2.1.3.1.13.2-3. Reverse Supplemental Channel Walsh Functions with Spreading Rate 1 when Two Reverse Supplemental Channels Are Assigned

Reverse Supplemental Channel 1			Reverse Supplemental Channel 2		
Walsh Function	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**	**Walsh Function**	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**
W_1^2 = (+ –)	614.4/M	M = 1, 2, 4, 8, 16, and 32	W_2^4 = (+ + – –)	307.2/M	M = 1, 2, 4, 8, and 16
W_1^2 = (+ –)	614.4/M	M = 1, 2, 4, 8, 16, and 32	W_6^8 = (+ + – – – – + +)	153.6/M	M = 1, 2, 4, and 8
W_2^4 = (+ + – –)	307.2/M	M = 2, 4, 8, and 16	W_6^8 = (+ + – – – – + +)	153.6/M	M = 1, 2, 4, and 8

Table 2.1.3.1.13.2-4. Reverse Supplemental Channel Walsh Functions with Spreading Rate 3 when Only One Reverse Supplemental Channel Is Assigned

Reverse Supplemental Channel 1			Reverse Supplemental Channel 2		
Walsh Function	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**	**Walsh Function**	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**
W_1^2 = (+ –)	1,843.2/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, and 96	Not Supported		
W_2^4 = (+ + – –)	921.6/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48	Not Supported		
Not Supported			W_2^4 = (+ + – –)	921.6/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48
Not Supported			W_6^8 = (+ + – – – – + +)	460.8/M	M = 1, 2, 3, 4, 6, 8, 12, 16, and 24

Table 2.1.3.1.13.2-5. Reverse Supplemental Channel Walsh Functions with Spreading Rate 3 when Two Reverse Supplemental Channels Are Assigned

Reverse Supplemental Channel 1			Reverse Supplemental Channel 2		
Walsh Function	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**	**Walsh Function**	**Interleaver Output Symbol Rate (ksps)**	**Walsh Function Repetition Factor**
W_1^2 = (+ –)	1,843.2/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, and 96	W_2^4 = (+ + – –)	921.6/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48
W_1^2 = (+ –)	1,843.2/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, and 96	W_6^8 = (+ + – – – – + +)	460.8/M	M = 1, 2, 3, 4, 6, 8, 12, 16, and 24
W_2^4 = (+ + – –)	921.6/M	M = 2, 4, 6, 8, 12, 16, 24, 32, and 48	W_6^8 = (+ + – – – – + +)	460.8/M	M = 1, 2, 3, 4, 6, 8, 12, 16, and 24

2.1.3.1.14 Gated Transmission

Several types of gated transmission are used, depending on the mode of operation. These include:

- Variable data rate transmission on the Reverse Fundamental Channel with Radio Configurations 1 and 2.
- PUF operation on the Reverse Traffic Channel with Radio Configurations 1 and 2.
- Gated operation on the Reverse Pilot Channel.
- Gated operation of the Reverse Secondary Pilot Channel.
- Gated operation of the Enhanced Access Channel preamble.
- Gated operation of the Reverse Common Control Channel preamble.
- Gated operation of the Reverse Fundamental Channel and the Reverse Pilot Channel with Radio Configuration 3, 4, 5, and 6.
- Gated operation of the Reverse Pilot Channel when Reverse Fundamental Channel is transmitted at 0 bps with Radio Configuration 8.
- Gated operation of the Reverse Channel Quality Indicator Channel.

2.1.3.1.14.1 Rates and Gating for Radio Configurations 1 and 2

When operating with Radio Configuration 1 or 2, the Reverse Fundamental Channel interleaver output stream is time-gated to allow transmission of certain interleaver output symbols and deletion of others. This process is illustrated in Figure 2.1.3.1.14.1-1. As shown in the figure, the duty cycle of the transmission gate varies with the transmit data rate. When the transmit data rate is 9600 or 14400 bps, the transmission gate allows all interleaver output symbols to be transmitted. When the transmit data rate is 4800 or 7200 bps, the transmission gate allows one-half of the interleaver output symbols to be transmitted, and so forth. The gating process operates by dividing the 20 ms frame into 16 equal length (i.e., 1.25 ms) periods, called power control groups (PCG). Certain power control groups are gated-on (i.e., transmitted), while other groups are gated-off (i.e., not transmitted).

The assignment of gated-on and gated-off groups, referred to as the data burst randomizing function, is specified in 2.1.3.1.14.2. The gated-on power control groups are pseudo randomized in their positions within the frame. The data burst randomizer ensures that every code symbol input to the repetition process is transmitted exactly once. During the gated-off periods, the mobile station shall comply with the requirement in 2.1.2.2.2, thus reducing the interference to other mobile stations operating on the same Reverse CDMA Channel.

The data burst randomizer is not used during a PUF probe (see 2.1.3.1.14.3).

When transmitting on the Access Channel, the code symbols are repeated once (each symbol occurs twice) prior to transmission. The data burst randomizer is not used when the mobile station transmits on the Access Channel. Therefore, both copies of the repeated code symbols are transmitted as shown in Figure 2.1.3.1.14.1-2.

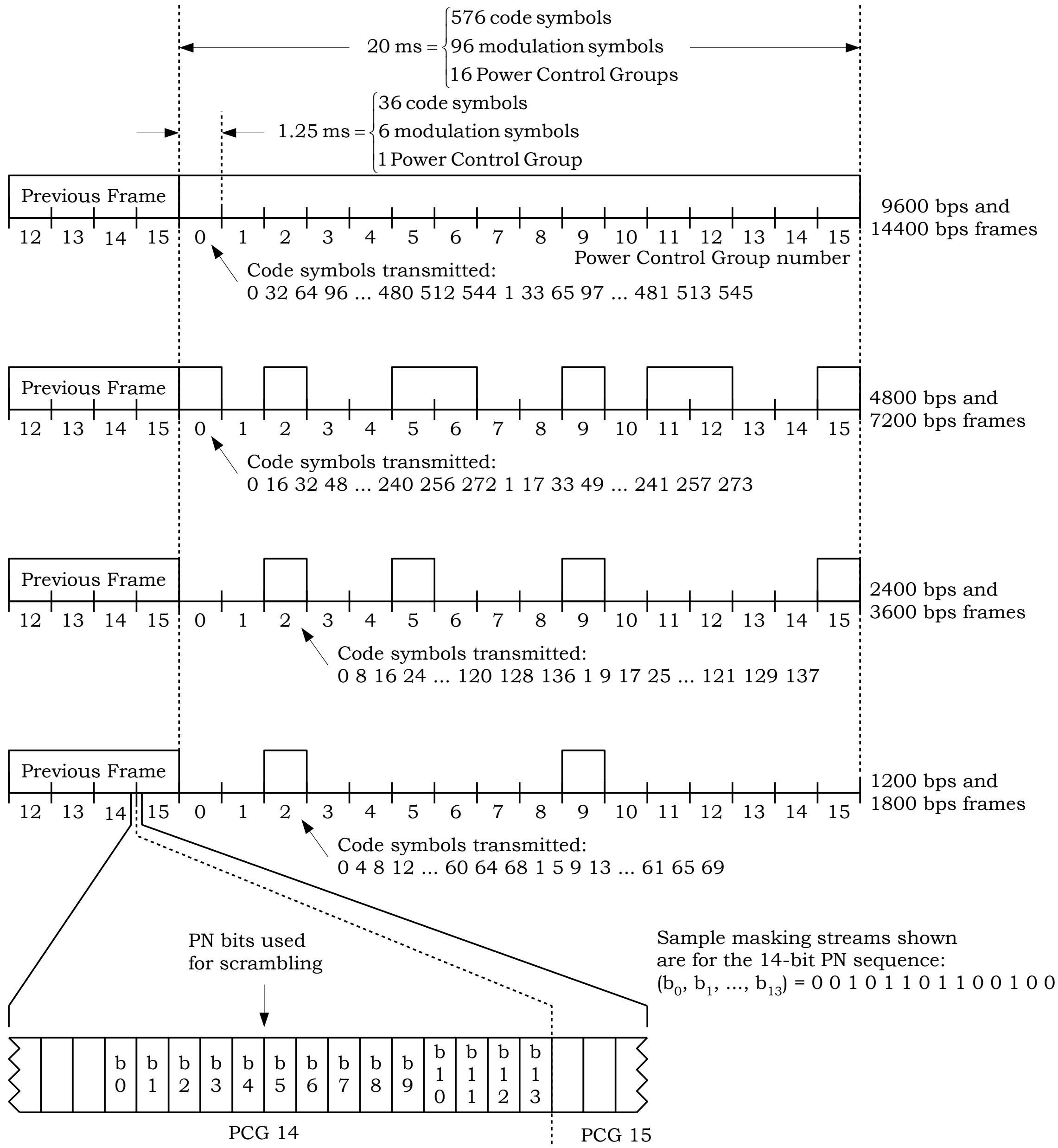

Figure 2.1.3.1.14.1-1. Reverse CDMA Channel Variable Data Rate Transmission for Radio Configurations 1 and 2 Example

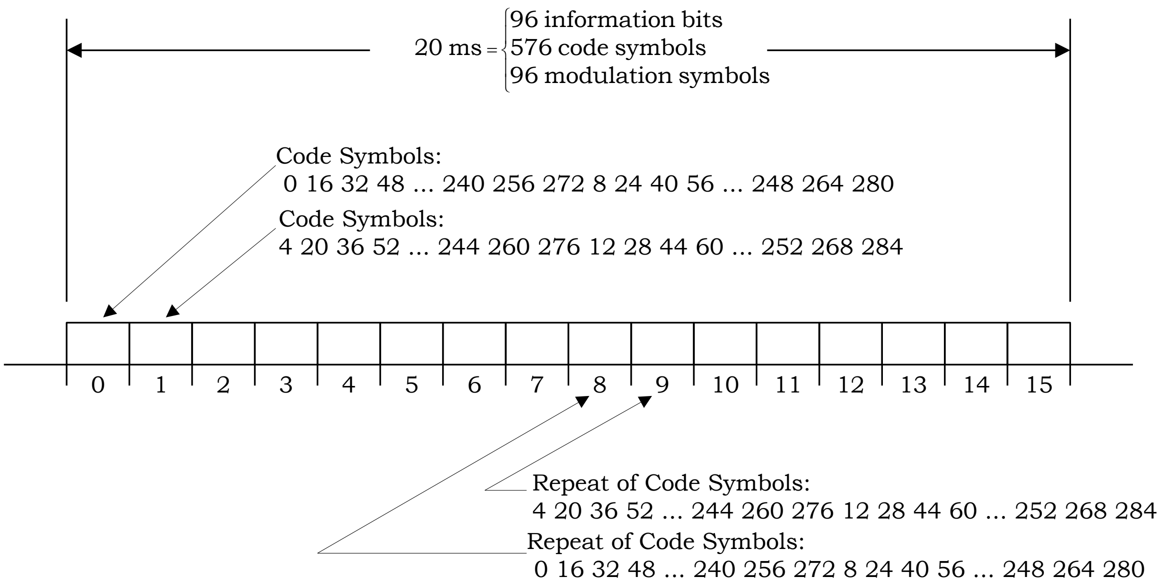

Figure 2.1.3.1.14.1-2. Access Channel Transmission Structure

2.1.3.1.14.2 Data Burst Randomizing Algorithm for Radio Configurations 1 and 2

The data burst randomizer generates a masking pattern of ‘0’s and ‘1’s that randomly masks out the redundant data generated by the code repetition. The masking pattern is determined by the data rate of the frame and by a block of 14 bits taken from the long code. These 14 bits shall be the last 14 bits of the long code used for spreading in the next to last power control group of the previous frame (see Figure 2.1.3.1.14.1-1). In other words, these are the 14 bits that occur exactly one power control group (1.25 ms) before each Reverse Fundamental Channel frame boundary. These 14 bits are denoted by

$$b_0 \; b_1 \; b_2 \; b_3 \; b_4 \; b_5 \; b_6 \; b_7 \; b_8 \; b_9 \; b_{10} \; b_{11} \; b_{12} \; b_{13},$$

where b_0 represents the oldest bit and b_{13} represents the latest bit.[24]

Each 20 ms Reverse Fundamental Channel frame shall be divided into 16 equal length (i.e., 1.25 ms) power control groups numbered from 0 to 15 as shown in Figure 2.1.3.1.14.1-1. The data burst randomizer algorithm shall be as follows:

Data Rate Selected: 9600 or 14400 bps

Transmission shall occur on power control groups numbered

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.

Data Rate Selected: 4800 or 7200 bps

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[24] In order to randomize the position of the data bursts, only 8 bits are strictly necessary. The algorithm described here uses 14 bits to ensure that the slots used for data transmission at the quarter rate are a subset of the slots used at the half rate and that the slots used at the one-eighth rate are a subset of the slots used at the quarter rate.

Transmission shall occur on power control groups numbered

b_0, 2 + b_1, 4 + b_2, 6 + b_3, 8 + b_4, 10 + b_5, 12 + b_6, 14 + b_7.

Data Rate Selected: 2400 or 3600 bps

Transmission shall occur on power control groups numbered

b_0 if b_8 = '0',	or	2 + b_1 if b_8 = '1';
4 + b_2 if b_9 = '0',	or	6 + b_3 if b_9 = '1';
8 + b_4 if b_{10} = '0',	or	10 + b_5 if b_{10} = '1';
12 + b_6 if b_{11} = '0',	or	14 + b_7 if b_{11} = '1'.

Data Rate Selected: 1200 or 1800 bps

Transmission shall occur on power control groups numbered

b_0	if (b_8, b_{12})	=	('0', '0'), or
2 + b_1	if (b_8, b_{12})	=	('1', '0'), or
4 + b_2	if (b_9, b_{12})	=	('0', '1'), or
6 + b_3	if (b_9, b_{12})	=	('1', '1');
8 + b_4	if (b_{10}, b_{13})	=	('0', '0'), or
10 + b_5	if (b_{10}, b_{13})	=	('1', '0'), or
12 + b_6	if (b_{11}, b_{13})	=	('0', '1'), or
14 + b_7	if (b_{11}, b_{13})	=	('1', '1').

2.1.3.1.14.3 Gating During a PUF Probe

While operating in Radio Configuration 1 or 2, the mobile station shall transmit all power control groups as gated-on during the PUF setup and PUF pulse portions of a PUF probe, except when the transmitter is disabled.

If the transmitter is enabled during the PUF recovery portion of a PUF probe, the mobile station shall transmit all power control groups as gated-on; otherwise, the mobile station shall not transmit any power control groups.

2.1.3.1.14.4 Reverse Pilot Channel Gating

When operating in Reverse Radio Configuration 3, 4, 5, or 6, the mobile station may support Reverse Pilot Channel gating when none of the following channels is assigned: the Reverse Fundamental Channel, the Reverse Supplemental Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, the Forward Fundamental Channel, the Forward Supplemental Channel, and the Forward Packet Data Channel. When operating in Reverse Radio Configuration 3, 4, 5, or 6, the mobile station may also support Reverse Pilot Channel gating when the Forward Fundamental Channel with $FCH\_BCMC\_IND_s$ = '1', or the Forward Supplemental Channel with $SCH\_BCMC\_IND_s[i]$ = '1', or both, are assigned but none of the following channels is assigned: the Reverse Fundamental Channel, the Reverse Supplemental Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, the Forward Fundamental Channel with $FCH\_BCMC\_IND_S$ = '0', the Forward Supplemental Channel with $SCH\_BCMC\_IND_S[i]$ = '0', and the Forward Packet Data Channel. If the mobile station supports Reverse Pilot Channel gating, it shall perform the gating as specified in 2.1.3.2.3.

If the Reverse Acknowledgment Channel or the Reverse Channel Quality Indicator Channel is present, these channels and the Reverse Pilot Channel shall be gated off unless directed by a MAC Layer primitive that can be received by the Physical Layer at every 1.25 ms Reverse Channel Quality Indicator Channel or Reverse Acknowledgment Channel frame boundary.

2.1.3.1.14.5 Reverse Secondary Pilot Channel Gating

The mobile station shall perform Reverse Secondary Pilot Channel gating as specified in 2.1.3.3.3.

2.1.3.1.14.6 Enhanced Access Channel Preamble Gating

The mobile station shall perform Enhanced Access Channel preamble gating as specified in 2.1.3.5.2.3.

2.1.3.1.14.7 Reverse Common Control Channel Preamble Gating

The mobile station shall perform Reverse Common Control Channel preamble gating as specified in 2.1.3.6.2.3.

2.1.3.1.14.8 Reverse Channel Quality Indicator Channel Gating

The mobile station may support Reverse Channel Quality Indicator Channel gating when operating in Forward Radio Configuration 10. If the mobile station supports Reverse Channel Quality Indicator Channel gating, the mobile station shall perform gating as instructed by the MAC Layer at every 1.25 ms Reverse Channel Quality Indicator Channel frame boundary.

2.1.3.1.14.9 Reverse Fundamental Channel Gating

The mobile station may support Reverse Fundamental Channel gating when operating in Reverse Radio Configuration 3, 4, 5, or 6. If the mobile station supports Reverse Fundamental Channel gating, the mobile station shall perform gating as specified in 2.1.3.12.7.

2.1.3.1.14.10 Reverse Pilot Channel Gating (Radio Configuration 8)

When operating in Radio Configuration 8, the mobile station shall support Reverse Pilot Channel gating when the Reverse Fundamental Channel is transmitted at 0 bps and no Reverse Supplemental Channel is assigned. When the Reverse Pilot Channel is gated, the mobile station shall only transmit the Reverse Pilot Channel in power control groups 0, 3, 4, 7, 8, 11, 12, and 15 as specified in 2.1.3.2.3.

2.1.3.1.15 Reverse Power Control Subchannel

The reverse power control subchannel applies to Radio Configurations 3 through 8 only. The mobile station shall maintain both the inner power control loop and the outer power control loop for Forward Traffic Channel power control on the Forward Fundamental Channel, the Forward Dedicated Control Channel, and the Forward Supplemental Channel, when assigned. The mobile station does not maintain an inner and outer power control loop for the Forward Packet Data Channel.

The outer power control loop estimates the setpoint value based on E_b/N_t to achieve the target frame error rate (FER) on each assigned Forward Traffic Channel[25], except the Forward Packet Data Channel. These setpoints are communicated to the base station, either implicitly through the inner loop, or explicitly through signaling messages. The differences between setpoints help the base station derive the appropriate transmit levels for the Forward Traffic Channels that do not have inner loops.

The inner power control loop compares the E_b/N_t of the received Forward Traffic Channel and the common power control subchannel (if one is assigned), with the corresponding outer power control loop setpoint, if one is maintained for that channel, to determine the value of the power control bit to be sent to the base station on the reverse power control subchannel. The mobile station shall transmit the Erasure Indicator Bits (EIB) or the Quality Indicator Bits (QIB) on the reverse power control subchannel upon the command of the base station.

If the Forward Packet Data Channel is assigned, and neither the Forward Fundamental Channel nor the Forward Dedicated Control Channel is assigned, the mobile station shall not puncture power control bits on the Reverse Pilot Channel.

2.1.3.1.15.1 Reverse Power Control Subchannel Structure

Each 1.25 ms power control group on the Reverse Pilot Channel contains 1536 × N PN chips, where N is the spreading rate number (N = 1 for Spreading Rate 1 and N = 3 for Spreading Rate 3).

For reverse link Radio Configurations 1 through 7, the mobile station shall transmit the pilot signal in the first 1152 × N PN chips, and transmit the reverse power control subchannel in the following 384 × N PN chips in each power control group on the Reverse Pilot Channel (see Figure 2.1.3.1.15.1-1).

For reverse link Radio Configurations 8, the mobile station shall transmit the reverse power control subchannel in power control groups 1, 3, 5, 7, 9, 11, 13, and 15 on the Reverse Pilot Channel if FPC_MODE_s = '000' or '010' (see Figure 2.1.3.1.15.1-3); the mobile station shall transmit the reverse power control subchannel in power control groups 3, 7, 11, and 15 on the Reverse Pilot Channel if FPC_MODE_s = '001' (see Figure 2.1.3.1.15.1-4). When the reverse power control subchannel is transmitted in a power control group, the mobile

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[25] The Eb/Nt may be estimated on the forward power control subchannel of the forward traffic channel or the common power control subchannel.

station shall transmit the pilot signal in the first 1152 PN chips and transmit the reverse power control subchannel in the following 384 PN chips. When the reverse power control subchannel is not transmitted in a power control group that is gated on[26], the mobile station shall transmit the pilot signal in all 1536 PN chips.

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = ‘000’, ‘001’, and ‘010’, then each of the 384 × N PN chips on the reverse power control subchannel is a repetition of the forward power control bit generated by the mobile station. When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = ‘011’, ‘100’, or ‘101’, then each of the 384 × N PN chips on the reverse power control subchannel is a repetition of the Erasure Indicator Bit (EIB) or the Quality Indicator Bit (QIB) generated by the mobile station (see 2.2.2.2). When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = ‘110’, then each of the 384 × N PN chips on the primary reverse power control subchannel is a repetition of the forward power control bit generated by the mobile station and each of the 384 × N PN chips on the secondary reverse power control subchannel is a repetition of the Erasure Indicator Bit (EIB) generated by the mobile station (see 2.2.2.2).

When the mobile station is operating with reverse link Radio Configuration 8, if FPC_MODE_S = ‘000’, ‘001’, and ‘010’, then each of the 384 × N PN chips on the reverse power control subchannel is a repetition of the forward power control bit generated by the mobile station (N = 1).

All PN chips sent on the Reverse Pilot Channel within a power control group shall be transmitted at the same power level. The structure of the reverse power control subchannel is illustrated in Figure 2.1.3.1.15.1-1.

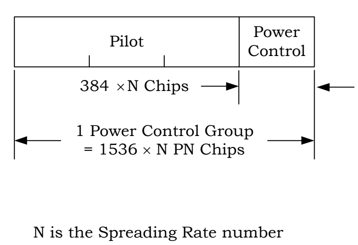

Figure 2.1.3.1.15.1-1. Reverse Power Control Subchannel Structure

For Radio Configuration 3 through 7, the Reverse Pilot Channel can be transmitted with the gated transmission mode enabled or disabled as described in 2.1.3.2.3. If the Forward

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[26] For reverse link Radio Configuration 8, the Reverse Pilot Channel is gated off in power control groups 1, 2, 5, 6, 9, 10, 13, and 14 when the Reverse Fundamental Channel is transmitted at 0 bps.

Packet Data Channel is not assigned and the gated transmission mode is disabled (PILOT_GATING_USE_RATE$_S$ = '0'), the mobile station shall transmit the reverse power control subchannel in every power control group as shown in Figure 2.1.3.1.15.1-2. If the Forward Packet Data Channel is not assigned and the gated transmission mode is enabled (PILOT_GATING_USE_RATE$_S$ = '1'), the mobile station shall transmit the reverse power control subchannel only in the power control groups that are gated on as specified in 2.1.3.2.3. The relative timing of the forward power control subchannel or the common power control subchannel and the reverse power control subchannel transmissions when the gated transmission mode is enabled and disabled is depicted in Figure 2.1.3.1.15.1-5.

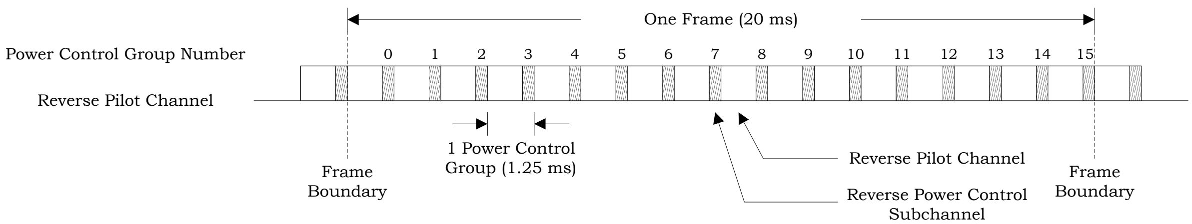


Figure 2.1.3.1.15.1-2. Reverse Power Control Subchannel (Radio Configuration 3 through 7)

For reverse link Radio Configuration 8, the relative timing of the forward power control subchannel and the reverse power control subchannel transmissions is depicted in Figure 2.1.3.1.15.1-6.

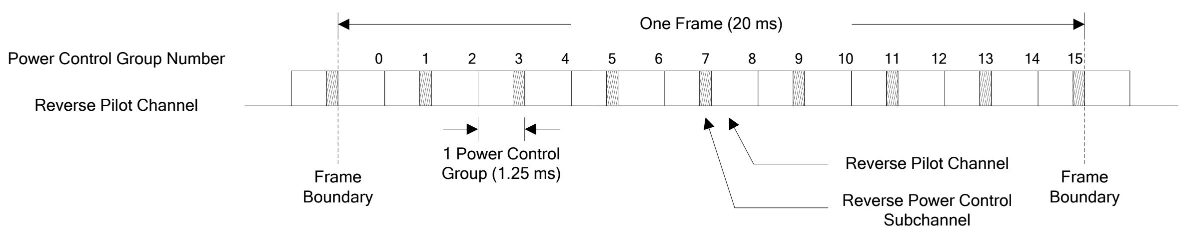


Figure 2.1.3.1.15.1-3. Reverse Power Control Subchannel (Reverse link Radio Configuration 8) if FPC_MODE$_S$ = '000' or '010'

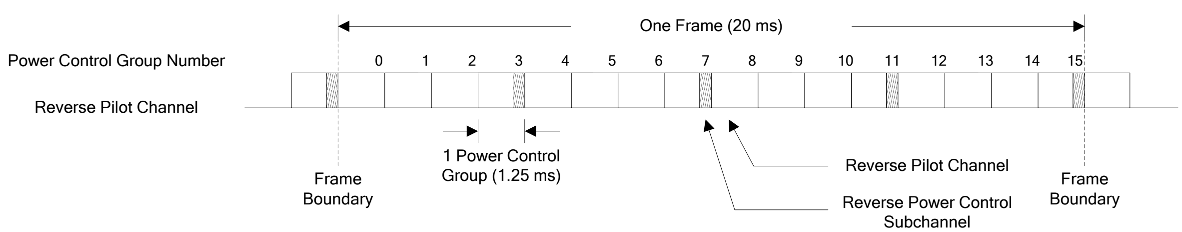


Figure 2.1.3.1.15.1-4. Reverse Power Control Subchannel (Reverse link Radio Configuration 8) if FPC_MODE$_S$ = '001'

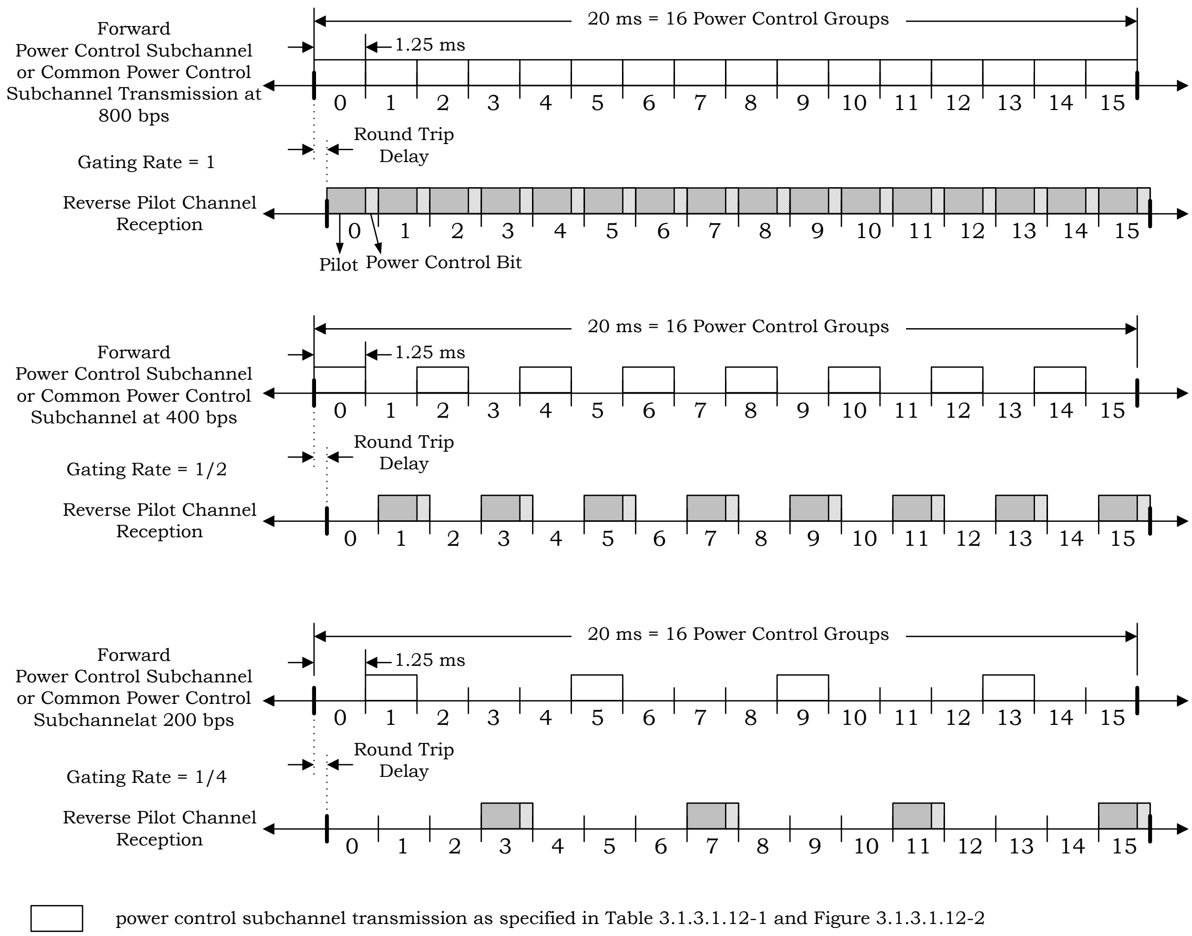


Figure 2.1.3.1.15.1-5. Forward and Reverse Power Control Timing (Radio Configuration 3 through Radio Configuration 7)

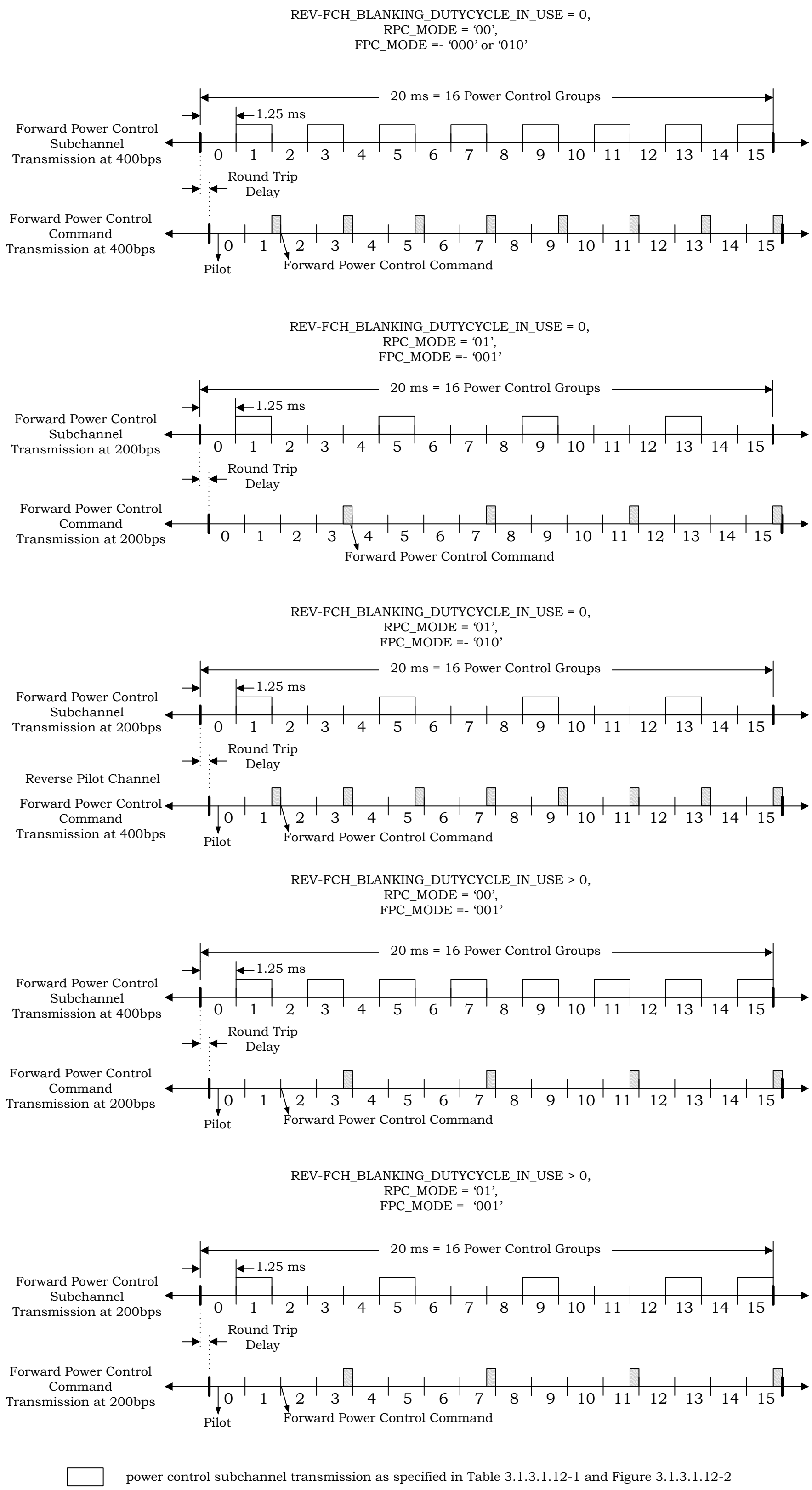


Figure 2.1.3.1.15.1-6. Forward and Reverse Power Control Timing (Radio Configuration 11 or 12 on Forward Link and Radio Configuration 8 on Reverse Link)

When the mobile station is operating with Radio Configurations 3 through 7, if the Reverse Pilot Channel is not gated ($PILOT\_GATING\_USE\_RATE_S$ = '0'), the mobile station shall transmit one reverse power control subchannel when FPC_MODE_S = '000', '011', or '100'. If the mobile station supports the Forward Supplemental Channel and at least one Forward Supplemental Channel is assigned to the mobile station, the mobile station shall transmit two reverse power control subchannels when FPC_MODE_S = '001', '010', '101', or '110'.

When the mobile station is operating with Radio Configurations 3 through 7, if the Reverse Pilot Channel is in gated mode ($PILOT\_GATING\_USE\_RATE_S$ = '1'), the mobile station shall transmit one reverse power control subchannel. Therefore, when the Reverse Pilot Channel is in the gated mode, FPC_MODE_S shall be '000', '011', or '100'. If the mobile station supports the simultaneous operation of the common power control subchannel and the Forward Fundamental Channel with $FCH\_BCMC\_IND_S$ = '1', or simultaneous operation of the common power control subchannel and one or more Forward Supplemental Channels, the mobile station shall transmit two reverse power control subchannels when the FPC_MODE_S = '001', '010', '101', or '110'.

The configurations of the reverse power control subchannel when the Reverse Pilot Channel is not in gated mode are shown in Table 2.1.3.1.15.1-1 and described as follows:

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '000', the mobile station shall transmit the primary reverse power control subchannel (see 2.1.3.1.15.3) at an 800 bps data rate.

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '001', the mobile station shall transmit the primary reverse power control subchannel at a 400 bps data rate, and the secondary reverse power control subchannel (see 2.1.3.1.15.3) at a 400 bps data rate.

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '010', the mobile station shall transmit the primary reverse power control subchannel at a 200 bps data rate, and the secondary reverse power control subchannel (see 2.1.3.1.15.3) at a 600 bps data rate.

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '011', the mobile station shall transmit the Erasure Indicator Bit (EIB) on the reverse power control subchannel. The transmission of the Erasure Indicator Bit shall occur at the second frame (20 ms frame) of the Reverse Traffic Channel following the corresponding Forward Traffic Channel frame in which the Erasure Indicator Bit is determined (see 2.2.2.2 and Figure 2.1.3.1.15.1-7).

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '100', the mobile station shall transmit the Quality Indicator Bit (QIB) on the reverse power control subchannel. The transmission of the Quality Indicator Bit shall occur at the second frame (20 ms frame) of the Reverse Traffic Channel following the corresponding Forward Traffic Channel frame in which the Quality Indicator Bit is determined (see 2.2.2.2 and Figure 2.1.3.1.15.1-7).

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '101', the mobile station shall transmit the following:

1. The Quality Indicator Bit (QIB) on the primary reverse power control subchannel that is derived from the Forward Fundamental Channel ($FPC\_PRI\_CHAN_S$ = '0'), or the Forward Dedicated Control Channel ($FPC\_PRI\_CHAN_S$ = '1').

2. The Erasure Indicator Bit (EIB) on the secondary reverse power control subchannel that is derived from Forward Supplemental Channel 0 ($FPC\_SEC\_CHAN_S$ = '0'), Forward Supplemental Channel 1 ($FPC\_SEC\_CHAN_S$ = '1'), or the Forward Fundamental Channel when the common power control subchannel is assigned and $FPC\_BCMC\_CHAN_S$ = '1'.

The transmission of the Erasure Indicator Bit and the Quality Indicator Bit shall start at the second frame (20 ms frame) of the Reverse Traffic Channel following the corresponding Forward Traffic Channel frame in which the Quality Indicator Bit or Erasure Indicator Bit is determined (see 2.2.2.2, Figure 2.1.3.1.15.1-7, and Figure 2.1.3.1.15.1-8).

When the mobile station is operating with Radio Configurations 3 through 7, if FPC_MODE_S = '110', the mobile station shall transmit the following:

1. The primary reverse power control subchannel at a 400 bps data rate.

2. The Erasure Indicator Bit on the secondary reverse power control subchannel that is derived from Forward Supplemental Channel 0 ($FPC\_SEC\_CHAN_S$ = '0'), Forward Supplemental Channel 1 ($FPC\_SEC\_CHAN_S$ = '1') or the Forward Fundamental Channel when the common power control subchannel is assigned and $FPC\_BCMC\_CHAN_S$ = '1' (see 2.1.3.1.15.3 and Figure 2.1.3.1.15.1-8).

The transmission of the Erasure Indicator Bit shall start at the second frame (20 ms frame) of the Reverse Traffic Channel following the end of the corresponding Forward Supplemental Channel frame or the Forward Fundamental Channel frame in which the Erasure Indicator Bit is determined.

When the mobile station is operating with reverse link Radio Configuration 8, the valid values for FPC_MODE_S depend on the value of REV-FCH_BLANKING_DUTYCYCLE_IN_USE and RPC_MODE_S. If REV-FCH_BLANKING_DUTYCYCLE_IN_USE = 0 and RPC_MODE_S = '00', the only valid values for FPC_MODE_S are '000' and '010'. If REV-FCH_BLANKING_DUTYCYCLE_IN_USE = 0 and RPC_MODE_S = '01', the only valid values for FPC_MODE_S is '001' and '010'. If REV-FCH_BLANKING_DUTYCYCLE_IN_USE > 0, the only valid value for FPC_MODE_S is '001'.

When the mobile station is operating with reverse link Radio Configuration 8, if FPC_MODE_s = '000', the mobile station shall transmit the primary reverse power control subchannel in power control groups 1, 3, 5, 7, 9, 11, 13, and 15 at 400 bps data rate (see Table 2.1.3.1.15.1-2).

When the mobile station is operating with reverse link Radio Configuration 8, if FPC_MODE_s = '001', the mobile station shall transmit the primary reverse power control subchannel in power control groups 3, 7, 11, and 15 at 200 bps data rate (see Table 2.1.3.1.15.1-2).

When the mobile station is operating with reverse link Radio Configuration 8, if the FPC_MODE_s = '010', the mobile station shall transmit the primary reverse power control subchannel in power control groups 3, 7, 11, and 15 at 200 bps data rate and shall transmit the secondary reverse power control subchannel in power control groups 1, 5, 9, and 13 at 200 bps data rate (see Table 2.1.3.1.15.1-2).

Table 2.1.3.1.15.1-1. Reverse Power Control Subchannel Configurations (Radio Configurations 3 through 7)

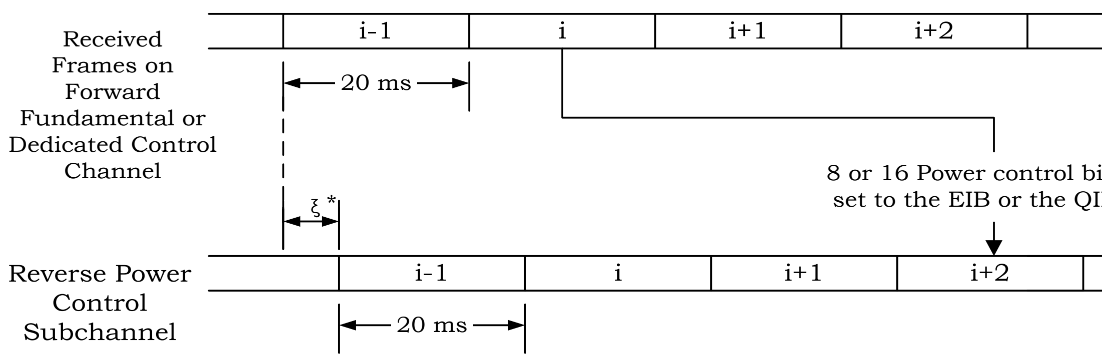
	Reverse Power Control Subchannel Allocations (Power Control Group Numbers 0-15)	
FPC_MODE_S	**Primary Reverse Power Control Subchannel**	**Secondary Reverse Power Control Subchannel**
‘000’	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Not supported
‘001’	0, 2, 4, 6, 8, 10, 12, 14	1, 3, 5, 7, 9, 11, 13, 15
‘010’	1, 5, 9, 13	0, 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15
‘011’	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Not supported
‘100’	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Not supported
‘101’	0, 2, 4, 6, 8, 10, 12, 14	1, 3, 5, 7, 9, 11, 13, 15
‘110’	0, 2, 4, 6, 8, 10, 12, 14	1, 3, 5, 7, 9, 11, 13, 15
All other values	Reserved	Reserved

Notes:

1. When FPC_MODE_S is equal to ‘011’ or ‘100’, the 16 power control bits on the primary reverse power control subchannel are all set to the Erasure Indicator Bit or the Quality Indicator Bit, respectively, so the effective feedback rate is 50 bps.
2. When FPC_MODE_S is equal to ‘101’, the eight power control bits on the primary reverse power control subchannel are all set to the Quality Indicator Bit, so the effective feedback rate is 50 bps.
3. When FPC_MODE_S is equal to ‘101’ or ‘110’, the power control bits on the secondary reverse power control subchannel corresponding to a Forward Supplemental Channel or the Forward Fundamental Channel frame duration are all set to the Erasure Indicator Bit, so the effective feedback rate is 50 bps for 20 ms frames, 25 bps for 40 ms frames, or 12.5 bps for 80 ms frames.

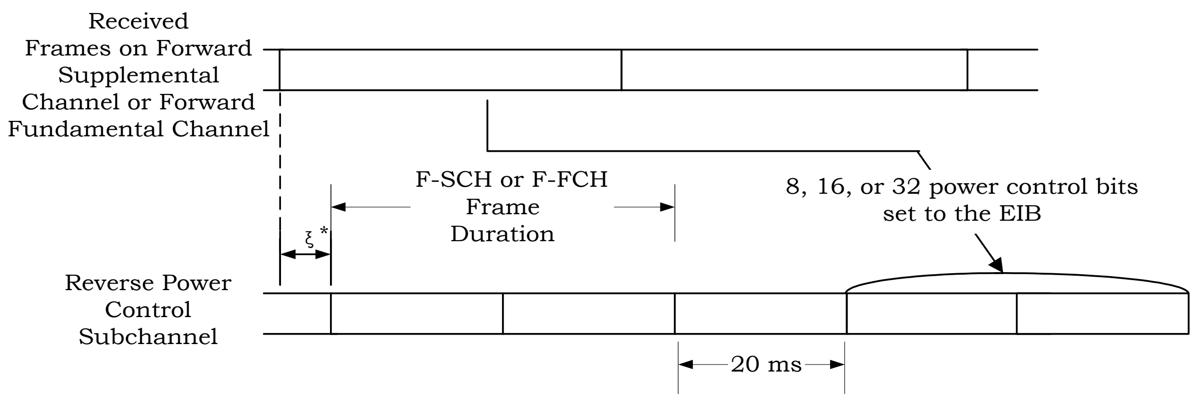
Table 2.1.3.1.15.1-2. Reverse Power Control Subchannel Configurations (Radio Configuration 8)

FPC_MODE_S	Reverse Power Control Subchannel Allocations (Power Control Group Numbers 0-15)	
	Primary Reverse Power Control Subchannel	**Secondary Reverse Power Control Subchannel**
'000'	1, 3, 5, 7, 9, 11, 13, 15	Not supported
'001'	3, 7, 11, 15	Not supported
'010'	3, 7, 11, 15	1, 5, 9, 13
All other values	Reserved	Reserved



Note: ξ = 1.25×FRAME_OFFSET ms when the received frames have been transmitted through the "Shared Traffic Channel", otherwise ξ = 0. The "Shared Traffic Channels" consist of the Forward Dedicated Channel when the common power control subchannel is assigned, the Forward Fundamental Channel with $FCH\_BCMC\_IND_S$ = '1', and the Forward Supplemental Channel with $SCH\_BCMC\_IND_S[i]$ = '1', where i = 1 or 2.

Figure 2.1.3.1.15.1-7. Primary Reverse Power Control Subchannel Transmission Timing for FPC_MODE_S = '011', '100', and '101' (Radio Configurations 3 through 7)



Note: ξ = 1.25×FRAME_OFFSET ms when the received frames have been transmitted through the "Shared Traffic Channel", otherwise ξ = 0. The "Shared Traffic Channels" consist of the Forward Dedicated Channel when the common power control subchannel is assigned, the Forward Fundamental Channel with FCH_BCMC_INDs = '1', and the Forward Supplemental Channel with SCH_BCMC_INDs[i] = '1', where i = 1 or 2.

Figure 2.1.3.1.15.1-8. Secondary Reverse Power Control Subchannel Transmission Timing for FPC_MODE$_S$ = '101' and '110' (Radio Configurations 3 through 7)

2.1.3.1.15.2 Outer Power Control Loop

When using Radio Configurations 3 through 7, for FPC_MODE$_S$ = '000', '001', and '010', the mobile station shall support an outer power control loop on each of the following Forward Traffic Channels assigned to the mobile station: the Forward Dedicated Control Channel, the Forward Fundamental Channel, and the Forward Supplemental Channel.

When using Radio Configurations 3 through 7, for FPC_MODE$_S$ = '110', the mobile station shall support an outer power control loop on each of the following channels assigned to the mobile station: the Forward Dedicated Control Channel and the Forward Fundamental Channel.

When using reverse link Radio Configuration 8, for FPC_MODE$_S$ = '000' and '001' the mobile station shall support an outer power control loop on the Forward Fundamental Channel. When using reverse link Radio Configuration 8, for FPC_MODE$_S$ = '010', the mobile station shall support an outer power control loop on the Forward Fundamental Channel and another outer power control loop on the Forward Supplemental Channels.

If the mobile station is monitoring the Forward Fundamental Channel which is assigned, the mobile station shall adjust FPC_FCH_CURR_SETPT$_S$ (E_b/N_t) to achieve the target FER for the 9600 bps or the 14400 bps data rate on the Forward Fundamental Channel for 20 ms frames. When the value of FPC_FCH_CURR_SETPT$_S$ is greater than FPC_FCH_MAX_SETPT$_S$, the mobile station shall set FPC_FCH_CURR_SETPT$_S$ to FPC_FCH_MAX_SETPT$_S$. When the value of FPC_FCH_CURR_SETPT$_S$ is less than FPC_FCH_MIN_SETPT$_S$, the mobile station shall set FPC_FCH_CURR_SETPT$_S$ to FPC_FCH_MIN_SETPT$_S$.

If the mobile station is monitoring the Forward Dedicated Control Channel, the mobile station shall adjust FPC_DCCH_CURR_SETPT$_s$ (E_b/N_t) to achieve the target FER for the 9600 bps or the 14400 bps data rate on the Forward Dedicated Control Channel for 20 ms frames. When the value of FPC_DCCH_CURR_SETPT$_s$ is greater than FPC_DCCH_MAX_SETPT$_s$, the mobile station shall set FPC_DCCH_CURR_SETPT$_s$ to FPC_DCCH_MAX_SETPT$_s$. When the value of FPC_DCCH_CURR_SETPT$_s$ is less than FPC_DCCH_MIN_SETPT$_s$, the mobile station shall set FPC_DCCH_CURR_SETPT$_s$ to FPC_DCCH_MIN_SETPT$_s$.

If the mobile station is monitoring Forward Supplemental Channel i, the mobile station shall adjust FPC_SCH_CURR_SETPT$_s$[i] (E_b/N_t) to achieve the target FER for the maximum assigned data rate on the Forward Supplemental Channel i. When the value of FPC_SCH_CURR_SETPT$_s$[i] is greater than FPC_SCH_MAX_SETPT$_s$[i], the mobile station shall set FPC_SCH_CURR_SETPT$_s$[i] to FPC_SCH_MAX_SETPT$_s$[i]. When the value of FPC_SCH_CURR_SETPT[i]$_s$ is less than FPC_SCH_MIN_SETPT$_s$[i], the mobile station shall set FPC_SCH_CURR_SETPT$_s$[i] to FPC_SCH_MIN_SETPT$_s$[i].

The mobile station may suspend its current Forward Traffic Channel processing in order to tune to a Candidate Frequency for possible hard handoff, and re-tune to the Serving Frequency. If the mobile station reception is suspended for d ms in a frame of length T ms, and if d is less than T/2, the mobile station may increase its setpoint value by an amount no greater than (1 + 10log(T/(T – d))) dB (rounded to the nearest 0.125 dB) for the remainder of the frame that is received. The mobile station shall resume its original setpoint value at the beginning of the next frame. See Figure 2.1.3.1.15.2-1.

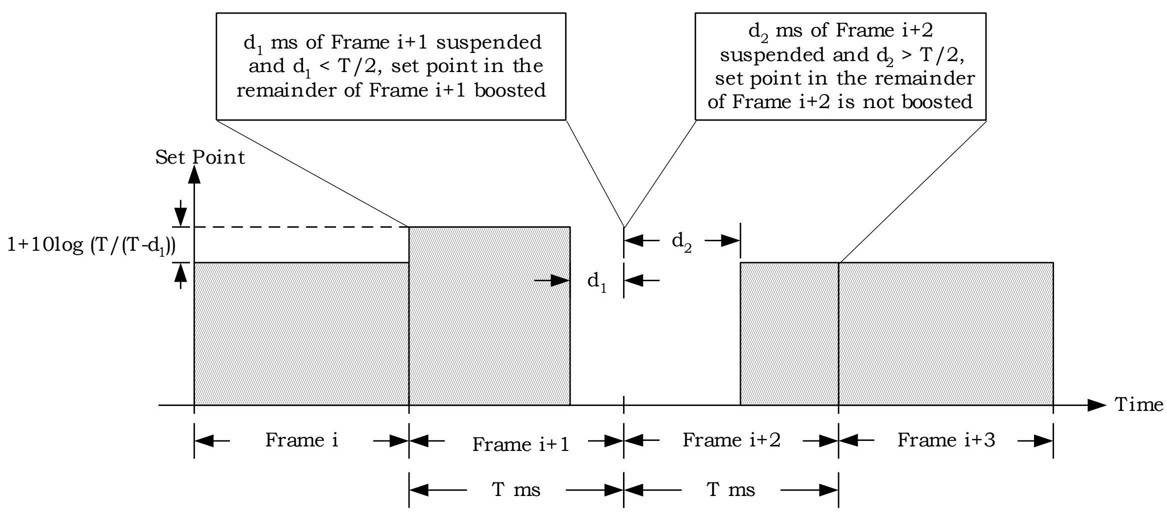


Figure 2.1.3.1.15.2-1. Increased Outer Power Control Loop Set Point for Interfrequency Hard Handoff

2.1.3.1.15.3 Inner Power Control Loop

When operating with Radio Configurations 3 through 7, and if FPC_MODE_s is set to '000', '001', '010', or '110' the mobile station shall support a primary inner power control loop for the received Forward Fundamental Channel ($FPC\_PRI\_CHAN_s$ = '0'), or for the received Forward Dedicated Control Channel ($FPC\_PRI\_CHAN_s$ = '1').If FPC_MODE_s is equal to '001'or '010', the mobile station shall also support the secondary inner power control loop for the Supplemental Channel specified by $FPC\_SEC\_CHAN_s$ or the Forward Fundamental Channel when that channel and the common power control subchannel are both assigned and $FPC\_BCMC\_CHAN_s$ = '1'.

When operating with reverse link Radio Configuration 8, the mobile station shall support a primary inner power control loop for the Forward Fundamental Channel. In addition, if FPC_MODE_s = '010', the mobile station shall also support a secondary inner power control loop for the received Forward Supplemental Channel.

The mobile station receiver shall compare the E_b/N_t (dB) value provided by the inner power control loop with the corresponding outer power control loop setpoint to determine the power control bits ('0' or '1') to be sent on the reverse power control subchannel.

When operating with Radio Configurations 3 through 7, if $FPC\_PRI\_CHAN_s$ = '0' and if FPC_MODE_s is equal to '000', '001', '010', or '110', the mobile station shall compare the E_b/N_t (dB) value provided by the primary inner power control loop with $FPC\_FCH\_CURR\_SETPT_s$ to determine the power control bit sent on the primary reverse power control subchannel. If FPC_MODE_s is equal to '001' or '010', the mobile station shall also compare the E_b/N_t (dB) value provided by the secondary inner power control loop with $FPC\_SCH\_CURR\_SETPT_s[FPC\_SEC\_CHAN_s]$ to determine the power control bit sent on the secondary reverse power control subchannel.

When operating with Radio Configurations 3 through 7, If $FPC\_PRI\_CHAN_s$ = '1' and if FPC_MODE_s is equal to '000', '001', '010', or '110', the mobile station shall compare the E_b/N_t (dB) value provided by the primary inner power control loop with $FPC\_DCCH\_CURR\_SETPT_s$ to determine the power control bit sent on the primary reverse power control subchannel. If FPC_MODE_s is equal to '001' or '010', the mobile station shall also compare the E_b/N_t (dB) value provided by the secondary inner power control loop with $FPC\_SCH\_CURR\_SETPT_s[FPC\_SEC\_CHAN_s]$, or the $FPC\_FCH\_CURR\_SETPT_s$ when the Forward Fundamental Channel is assigned, $FCH\_BCMC\_IND_s$ = '1', and $FPC\_BCMC\_CHAN_s$ = '1' to determine the power control bit sent on the secondary reverse power control subchannel.

When operating with reverse link Radio Configuration 8, if $FPC\_PRI\_CHAN_s$ = '0' and if FPC_MODE_s is equal to '000', '001', or '010', the mobile station shall compare the E_b/N_t (dB) value provided by the primary inner power control loop with $FPC\_FCH\_CURR\_SETPT_s$ to determine the power control bit sent on the primary reverse power control subchannel. If FPC_MODE_s is equal to '010', the mobile station shall also compare the E_b/N_t (dB) value provided by the secondary inner power control loop with $FPC\_SCH\_CURR\_SETPT_s[FPC\_SEC\_CHAN_s]$ to determine the power control bit sent on the secondary reverse power control subchannel.

A power control bit shall be set to '0' when the E_b/N_t (dB) value provided by the inner power control loop is less than the corresponding setpoint value. A power control bit shall be set to '1' when the E_b/N_t (dB) value provided by the inner power control loop is greater than or equal to the corresponding setpoint value.

2.1.3.1.16 Direct Sequence Spreading

Direct sequence spreading using the long code shall be applied to the Access Channel and the Reverse Traffic Channel with Radio Configurations 1 and 2.

For the Access Channel, this spreading operation involves modulo-2 addition of the 64-ary orthogonal modulator output stream and the long code. For the Reverse Traffic Channel with Radio Configurations 1 and 2, this spreading operation involves modulo-2 addition of the data burst randomizer output stream and the long code.

The long code shall be periodic with period $2^{42} – 1$ chips and shall satisfy the linear recursion specified by the following characteristic polynomial:

$$p(x) = x^{42} + x^{35} + x^{33} + x^{31} + x^{27} + x^{26} + x^{25} + x^{22} + x^{21} + x^{19} + x^{18} + x^{17} + x^{16} + x^{10} + x^{7} + x^{6} + x^{5} + x^{3} + x^{2} + x^{1} + 1.$$

Each PN chip of the long code shall be generated by the modulo-2 inner product of a 42-bit mask and the 42-bit state vector of the sequence generator as shown in Figure 2.1.3.1.16-1. The time alignment of the long code generator shall be as shown in Figure 1.3-1.

The mask used for the long code varies depending upon the channel type on which the mobile station is transmitting. See Figure 2.1.3.1.16-2.

When transmitting on the Access Channel, the mask shall be as follows: M_{41} through M_{33} shall be set to '110001111'; M_{32} through M_{28} shall be set to chosen to the Access Channel number (RA); M_{27} through M_{25} shall be set to the code channel number for the associated Paging Channel ($PAGECH_s$); M_{24} through M_9 shall be set to $BASE\_ID_s$ for the current base station; and M_8 through M_0 shall be set to $PILOT\_PN_s$ for the current CDMA Channel (see Figure 2.1.3.1.16-2).

For the public long code mask, bits M_{41} through M_0 shall be specified by PLCM_42 (see 2.3.6 in [5]).

For the private long code mask, bits M_{41} through M_0 shall be specified by PVTLCM_42 (see 2.3.6 in [5]).

When a mobile station is transmitting on the Reverse Fundamental Channel or the Reverse Supplemental Code Channel, the mobile station shall use one of the following two long code masks unique to each channel: a public long code mask or a private long code mask.

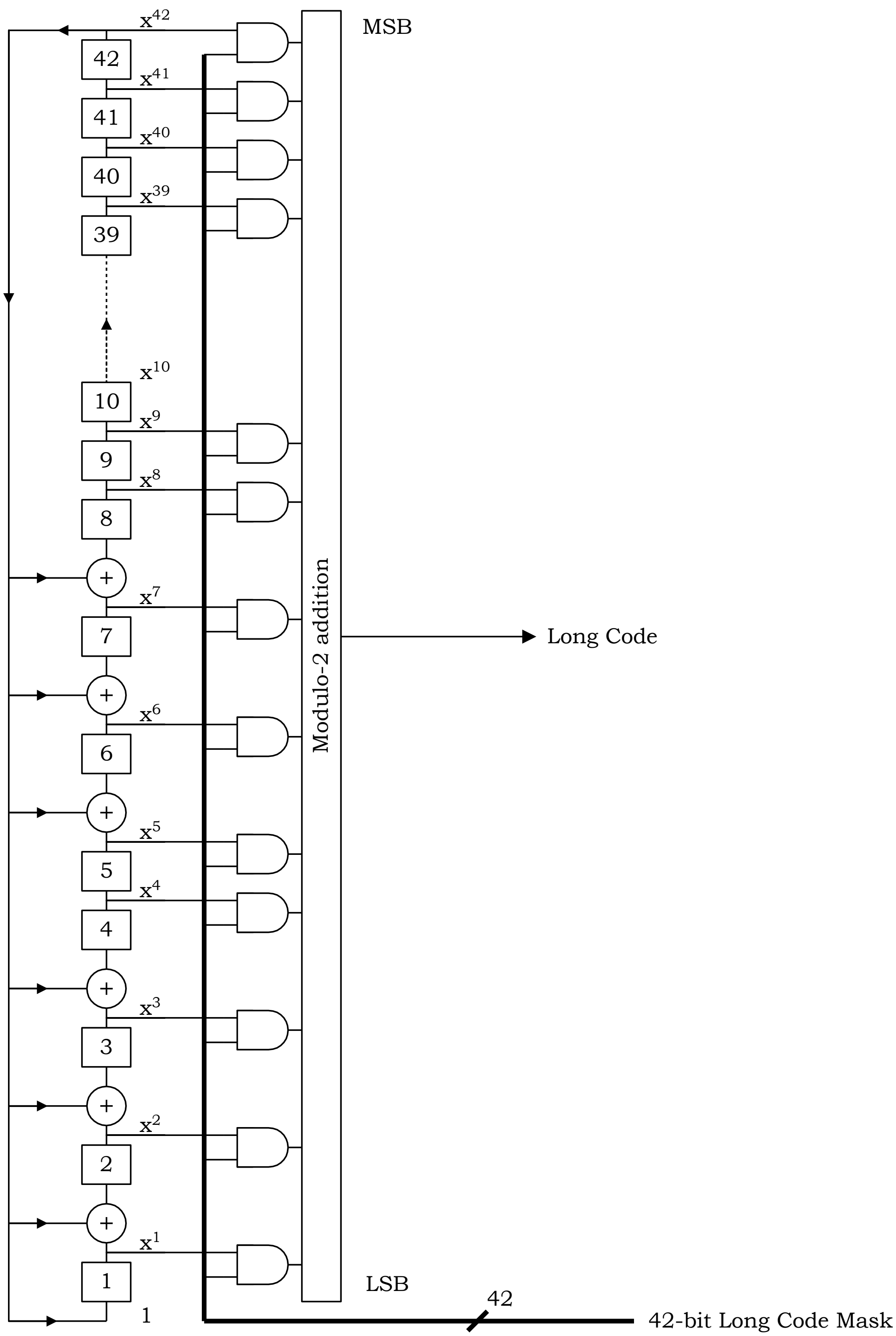


Figure 2.1.3.1.16-1. Long Code Generator

41 … 33	32 … 28	27 … 25	24 … 9	8 … 0
110001111	ACN	PCN	BASE_ID	PILOT_PN

ACN - Access Channel Number
PCN - Paging Channel Number
BASE_ID - Base station identification
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 2.1.3.1.16-2. Access Channel Long Code Mask Format for Direct Sequence Spreading

2.1.3.1.17 Quadrature Spreading

The Access Channel and the Reverse Traffic Channel with Radio Configurations 1 and 2 are spread in quadrature as shown in Figure 2.1.3.1.1.1-3, Figure 2.1.3.1.1.1-13, and Figure 2.1.3.1.1.1-14. The direct sequence spreading output is modulo-2 added to an in-phase and quadrature-phase sequence. The in-phase and quadrature-phase components of this spreading sequence are specified in 2.1.3.1.17.1. These sequences are periodic with a period of 2^{15} chips. After quadrature spreading, the Q-channel data shall be delayed by half a PN chip time (406.901 ns) with respect to the I-channel data.

For the Reverse Pilot Channel, the Reverse Secondary Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, or the Reverse Traffic Channel with Radio Configurations 3 through 7, the I-channel data and Q-channel data shall be multiplied by a complex spreading sequence before baseband filtering as shown in Figure 2.1.3.1.1.1-22 and Figure 2.1.3.1.1.2-7.

The in-phase spreading sequence shall be formed by a modulo-2 addition of the I-channel PN sequence and the I long code sequence. The quadrature-phase spreading sequence shall be formed by the modulo-2 addition of the following three terms: the W_1^2 Walsh function, the modulo-2 addition of the I-channel PN sequence and the I long code sequence, and the decimated-by-2 output of the modulo-2 addition of the Q-channel PN sequence and the Q long code sequence. The decimator shall provide an output that is constant for the two chips corresponding to the two symbols of the W_1^2 Walsh function, and the value of the decimator output for the W_1^2 Walsh function period shall be equal to the first of the two symbols into the decimator in that period. The W_1^2 Walsh function time alignment shall be such that the first Walsh chip begins at the first chip of a frame.

The I long code for Spreading Rate 1 shall be the long code sequence specified in 2.1.3.1.16. The I long code for Spreading Rate 1 shall have a chip rate of 1.2288 MHz. The Q long code for Spreading Rate 1 shall be the I long code delayed by one chip.

The I long code for Spreading Rate 3 shall consist of three multiplexed component sequences, each having a chip rate of 1.2288 Mcps, as shown in Figure 2.1.3.1.17-1. The first component sequence shall be the I long code for Spreading Rate 1. The second component sequence shall be the modulo-2 addition of the I long code for Spreading Rate 1 and the I long code for Spreading Rate 1 delayed by 1/1.2288 μs. The third component sequence shall be the modulo-2 addition of the I long code for Spreading Rate 1 and the I long code for Spreading Rate 1 delayed by 2/1.2288 μs. The three component sequences shall be multiplexed such that the I long code value at the beginning of every 1/1.2288 μs interval, starting from the beginning of the System Time, corresponds to the first component sequence. The I long code for Spreading Rate 3 shall have a chip rate of 3.6864 Mcps. The Q long code for Spreading Rate 3 shall be the I long code delayed by one chip.

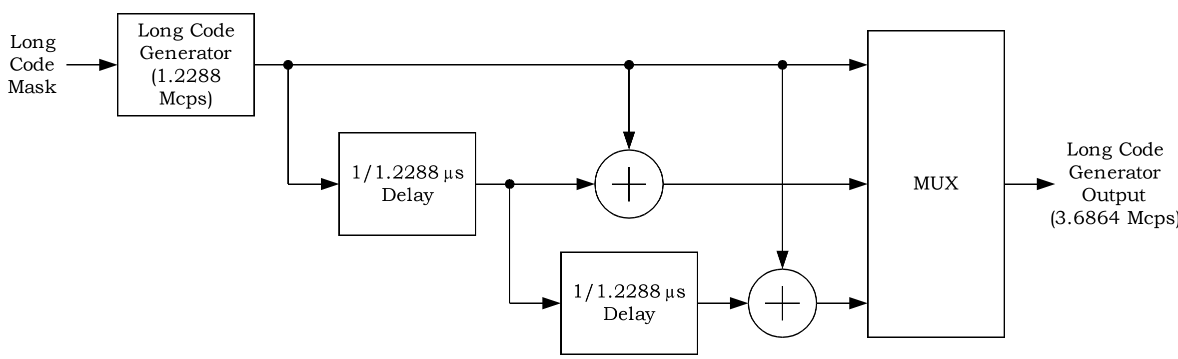


Figure 2.1.3.1.17-1. Long Code Generator for Spreading Rate 3

The mask used for generating the I long code for Spreading Rate 1 (or equivalently, the first component sequence of the I long code for Spreading Rate 3) varies depending on the channel type on which the mobile station is transmitting. See Figure 2.1.3.1.16-2.

When transmitting on the Enhanced Access Channel using the common long code, the mask shall be as follows: bits M_{41} through M_{33} shall be set to '110001110'; bits M_{32} through M_{28} shall be set to the Enhanced Access Channel number; bits M_{27} through M_{25} shall be set to the Forward Common Control Channel number; bits M_{24} through M_9 shall be set to BASE_ID$_s$ for the current base station; and bits M_8 through M_0 shall be set to the time dependent field, SLOT_OFFSET (see Figure 2.1.3.1.17-2).

When transmitting on the Reverse Common Control Channel while in Reservation Access Mode, the mask shall be as follows: bits M_{41} through M_{33} shall be set to '110001101'; bits M_{32} through M_{28} shall be set to the Reverse Common Control Channel number chosen; bits M_{27} through M_{25} shall be set to the code channel number for the associated Forward Common Control Channel (the range is 1 through 7); bits M_{24} through M_9 shall be set to BASE_ID$_s$ for the current base station; and bits M_8 through M_0 shall be set to PILOT_PN$_s$ for the current CDMA Channel (see Figure 2.1.3.1.17-2).

When transmitting on the Reverse Traffic Channel, the Reverse Acknowledgment Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, or the Reverse

Channel Quality Indicator Channel, the mobile station shall use one of the following two long code masks: a public long code mask or a private long code mask.

For the public long code mask, bits M_{41} through M_0 shall be specified by PLCM_42 (see 2.3.6 in [5]).

The private long code mask (see Figure 2.1.3.1.17-2) shall be as follows: M_{41} through M_0 shall be specified by PVTLCM_42 (see 2.3.6 in [5]).

For the Reverse Common Control Channel, the long code mask shall be as follows: bits M_{41} through M_{33} shall be set to '110001101'; bits M_{32} through M_{28} shall be set to the Reverse Common Control Channel number chosen; bits M_{27} through M_{25} shall be set to the code channel number for the associated Forward Common Control Channel (the range is 1 through 7); bits M_{24} through M_9 shall be set to $BASE\_ID_s$ for the current base station; and bits M_8 through M_0 shall be set to $PILOT\_PN_s$ for the current CDMA Channel (see Figure 2.1.3.1.17-2).

41 ... 33	32 ... 28	27 ... 25	24 ... 9	8 ... 0
110001110	EACH_ID	FCCCH_ID	BASE_ID	SLOT_OFFSET

EACH_ID - Enhanced Access Channel Number
FCCCH_ID - Forward Common Control Channel Number
BASE_ID - Base station identification
SLOT_OFFSET - Slot offset associated with the Enhanced Access Channel

a) Enhanced Access Channel Long Code Mask

41 ... 33	32 ... 28	27 ... 25	24 ... 9	8 ... 0
110001101	RCCCH_ID	FCCCH_ID	BASE_ID	PILOT_PN

RCCCH_ID - Reverse Common Control Channel Number
FCCCH_ID - Forward Common Control Channel Number
BASE_ID - Base station identification
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

b) Reverse Common Control Channel Long Code Mask in the Reservation Access Mode

Figure 2.1.3.1.17-2. Long Code Mask Format for Quadrature Spreading of the Enhanced Access Channel and the Reverse Common Control Channel

The I and Q PN sequences used for quadrature spreading shall be as specified in 2.1.3.1.17.1 and 2.1.3.1.17.2. These sequences are periodic with a period of 2^{15} chips for Spreading Rate 1 and with a period of 3×2^{15} chips for Spreading Rate 3.

2.1.3.1.17.1 Spreading Rate 1

The PN sequences shall be based upon the following characteristic polynomials:

$$P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1$$

(for the in-phase (I) sequence)

and

$$P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1$$

(for the quadrature-phase (Q) sequence).

The maximal length linear feedback shift register sequences i(n) and q(n) based upon the above polynomials are of length $2^{15} – 1$ and can be generated by the following linear recursions:

$$i(n) = i(n – 15) \oplus i(n – 10) \oplus i(n – 8) \oplus i(n – 7) \oplus i(n – 6) \oplus i(n – 2)$$

(based upon $P_I(x)$ as the characteristic polynomial)

and

$$q(n) = q(n – 15) \oplus q(n – 12) \oplus q(n – 11) \oplus q(n – 10) \oplus q(n – 9)$$

$$\oplus q(n – 5) \oplus q(n – 4) \oplus q(n – 3)$$

(based upon $P_Q(x)$ as the characteristic polynomial),

where i(n) and q(n) are binary-valued (‘0’ and ‘1’) and the additions are modulo-2. In order to obtain the I and Q PN sequences (of period 2^{15}), a ‘0’ is inserted in i(n) and q(n) after 14 consecutive ‘0’ outputs (this occurs only once in each period); therefore, the PN sequences have one run of 15 consecutive ‘0’ outputs instead of 14.

The mobile station shall align the I and Q PN sequences such that the first chip on every even second mark as referenced to the transmit time reference (see 2.1.5) is the ‘1’ after the 15 consecutive ‘0’s (see Figure 1.3-1).

The chip rate shall be 1.2288 Mcps. The PN sequence period is 32768/1228800 = 26.666… ms, and exactly 75 PN sequence repetitions occur every 2 seconds.

For the Access Channel and the Reverse Traffic Channel with Radio Configurations 1 and 2, the data spread by the Q PN sequence shall be delayed by half a PN chip time (406.901 ns) with respect to the data spread by the I PN sequence.

2.1.3.1.17.2 Spreading Rate 3

The PN sequences shall be truncated sequences of a maximal length linear feedback shift register sequence based upon the following characteristic polynomial:

$$P(x) = x^{20} + x^9 + x^5 + x^3 + 1$$

The maximal length linear feedback shift register sequence based upon the above polynomial is of length $2^{20} – 1$ and can be generated by the following recursion:

$$b(n) = b(n – 20) \oplus b(n – 17) \oplus b(n – 15) \oplus b(n – 11)$$

where b(n) is binary-valued (‘0’ and ‘1’) and the additions are modulo-2. The I and Q PN sequences are both formed from this maximal length sequence of length $2^{20} - 1$ using different starting positions and truncating the sequences after 3×2^{15} chips. The starting position of the I PN sequence is such that the first 20 chips are ‘1000 0000 0001 0001 0100’. The starting position of the Q PN sequence is the starting position of the I PN sequence delayed by 2^{19} chips in the untruncated maximal length sequence of length $2^{20} - 1$. The mobile station shall align the I and Q PN sequences such that the first 20 chips of the I and Q PN sequences on every even second mark as referenced to the transmit time reference (see 2.1.5) are ‘1000 0000 0001 0001 0100’ and ‘1001 0000 0010 0100 0101’ (see Figure 1.3-1).

The chip rate shall be 3.6864 Mcps. The PN sequence period is $3 \times 32768/3686400$ = 26.666… ms, and exactly 75 pilot PN sequence repetitions occur every 2 seconds.

2.1.3.1.18 Baseband Filtering

2.1.3.1.18.1 Spreading Rate 1

Following the spreading operation when operating in Spreading Rate 1, the I and Q impulses are applied to the inputs of the I and Q baseband filters as described in 2.1.3.1.1.1. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 2.1.3.1.18.1-1. Specifically, the normalized frequency response of the filter shall be contained within $\pm\delta_1$ in the passband $0 \le f \le f_p$, and shall be less than or equal to $-\delta_2$ in the stopband $f \ge f_s$. The numerical values for the parameters are δ_1 = 1.5 dB, δ_2 = 40 dB, f_p = 590 kHz, and f_s = 740 kHz.

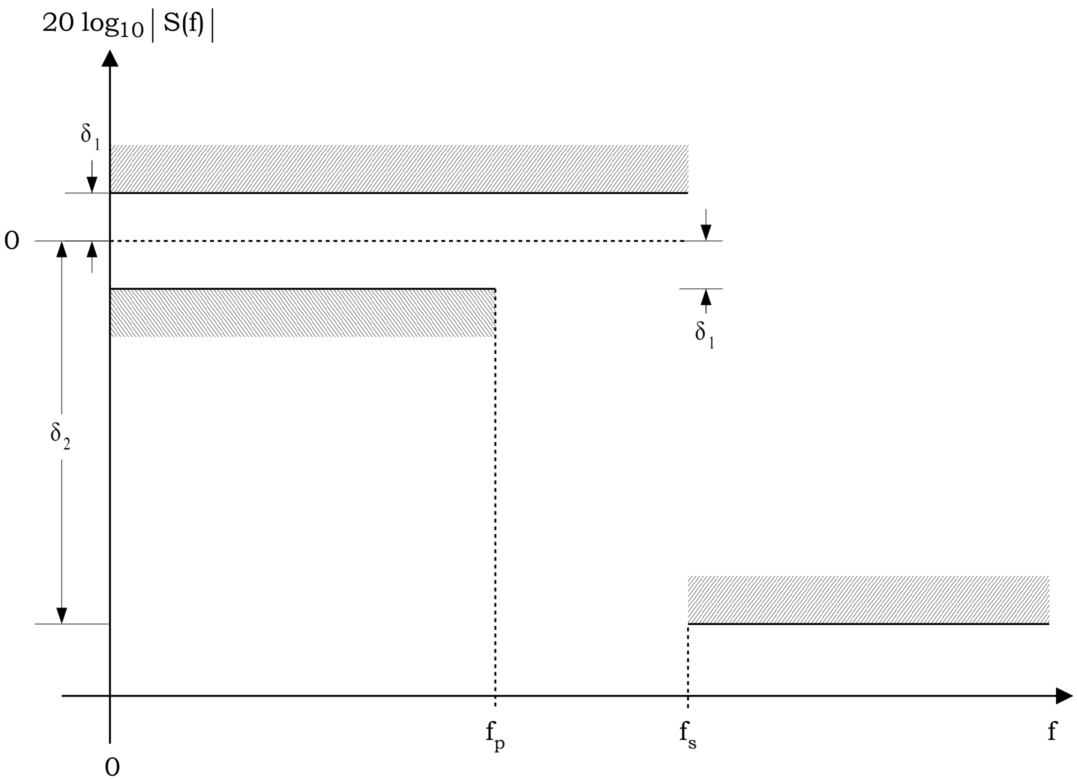


Figure 2.1.3.1.18.1-1. Baseband Filters Frequency Response Limits

Let s(t) be the impulse response of the baseband filter. Then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty}\left[\alpha s\left(kT_S - \tau\right) - h\left(k\right)\right]^2 \leq 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_S is equal to 203.451... ns. T_S equals one quarter of the duration of a PN chip. The values of the coefficients h(k), for k < 48, are given in Figure 2.1.3.1.18.1-1; h(k) = 0 for k ≥ 48. Note that h(k) equals h(47 – k).

Table 2.1.3.1.18.1-1. Coefficients of h(k) for Spreading Rate 1

k	h(k)
0, 47	–0.025288315
1, 46	–0.034167931
2, 45	–0.035752323
3, 44	–0.016733702
4, 43	0.021602514
5, 42	0.064938487
6, 41	0.091002137
7, 40	0.081894974
8, 39	0.037071157
9, 38	–0.021998074
10, 37	–0.060716277
11, 36	–0.051178658
12, 35	0.007874526
13, 34	0.084368728
14, 33	0.126869306
15, 32	0.094528345
16, 31	–0.012839661
17, 30	–0.143477028
18, 29	–0.211829088
19, 28	–0.140513128
20, 27	0.094601918
21, 26	0.441387140
22, 25	0.785875640
23, 24	1.0

2.1.3.1.18.2 Spreading Rate 3

Following the spreading operation when operating in Spreading Rate 3, the I and Q impulses are applied to the inputs of the I and Q baseband filters as described in 2.1.3.1.1.2. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 2.1.3.1.18.1-1. Specifically, the normalized frequency response of the filter shall be contained within $\pm\delta_1$ in the passband $0 \le f \le f_p$, and shall be less than or equal to $-\delta_2$ in the stopband $f \ge f_s$. The numerical values for the parameters are δ_1 = 1.5 dB, δ_2 = 40 dB, f_p = 1.7164 MHz, and f_s = 1.97 MHz.

Let s(t) be the impulse response of the baseband filter. Then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty}\left[\alpha s\left(kT_s - \tau\right) - h(k)\right]^2 \le 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_s is equal to 67.81684027... ns. T_s equals one quarter of a PN chip. The values of the coefficients h(k), for k < 108, are given in Table 2.1.3.1.18.2-1; h(k) = 0 for k ≥ 108. Note that h(k) equals h(107 – k).

Table 2.1.3.1.18.2-1. Coefficients of h(k) for Spreading Rate 3

k	h(k)	k	h(k)
0, 107	0.005907324	27, 80	0.036864993
1, 106	0.021114345	28, 79	0.032225981
2, 105	0.017930022	29, 78	0.007370446
3, 104	0.019703955	30, 77	–0.025081919
4, 103	0.011747086	31, 76	–0.046339352
5, 102	0.001239201	32, 75	–0.042011421
6, 101	–0.008925787	33, 74	–0.011379513
7, 100	–0.013339137	34, 73	0.030401507
8, 99	–0.009868192	35, 72	0.059332552
9, 98	–0.000190463	36, 71	0.055879297
10, 97	0.010347710	37, 70	0.017393708
11, 96	0.015531711	38, 69	–0.037885556
12, 95	0.011756251	39, 68	–0.078639005
13, 94	0.000409244	40, 67	–0.077310571
14, 93	–0.012439542	41, 66	–0.027229017
15, 92	–0.019169850	42, 65	0.049780118
16, 91	–0.015006530	43, 64	0.111330557
17, 90	–0.001245650	44, 63	0.115580285
18, 89	0.014862732	45, 62	0.046037444
19, 88	0.023810108	46, 61	–0.073329573
20, 87	0.019342903	47, 60	–0.182125302
21, 86	0.002612151	48, 59	–0.207349170
22, 85	–0.017662720	49, 58	–0.097600349
23, 84	–0.029588008	50, 57	0.148424686
24, 83	–0.024933958	51, 56	0.473501031
25, 82	–0.004575322	52, 55	0.779445702
26, 81	0.020992966	53, 54	0.964512513

2.1.3.1.19 Carrier Phase Offset for Radio Configurations 1 and 2

When operating in Radio Configuration 1 or 2, the phase offset ϕ_i represents the angular offset between the i^{th} Supplemental Code Channel and the Reverse Fundamental Channel as shown in Figure 2.1.3.1.1.1-13 and Figure 2.1.3.1.1.1-14. The phase offset ϕ_i of the i-th Reverse Supplemental Code Channel shall take on the values given in Table 2.1.3.1.19-1.

Table 2.1.3.1.19-1. Reverse Supplemental Code Channel Carrier Phase Offsets for Radio Configurations 1 and 2

Reverse Supplemental Code Channel (i)	Carrier Phase Offset ϕ_i (radians)
1	$\pi/2$
2	$\pi/4$
3	$3\pi/4$
4	0
5	$\pi/2$
6	$\pi/4$
7	$3\pi/4$

2.1.3.2 Reverse Pilot Channel

The Reverse Pilot Channel is an unmodulated spread spectrum signal used to assist the base station in detecting a mobile station transmission. When the reverse power control subchannel is not inserted, the Reverse Pilot Channel is continuous. When the reverse power control subchannel is inserted, the Reverse Pilot Channel is as shown in Figure 2.1.3.1.15.1-1.

The Reverse Pilot Channel shall be transmitted when the Enhanced Access Channel, Reverse Common Control Channel, or the Reverse Traffic Channel with Radio Configurations 3 through 8 is enabled. The Reverse Pilot Channel shall also be transmitted during the Enhanced Access Channel preamble, the Reverse Common Control Channel preamble, and the Reverse Traffic Channel preamble.

2.1.3.2.1 Reverse Power Control Subchannel

The mobile station shall insert a reverse power control subchannel on the Reverse Pilot Channel as specified in 2.1.3.1.15 when transmitting the Traffic Channel Preamble, and when operating on the Reverse Traffic Channel with Radio Configurations 3 through 8, except for the case where the Forward Packet Data Channel is assigned, and neither the Forward Fundamental Channel nor the Forward Dedicated Control Channel is assigned.

When neither the Forward Fundamental Channel nor the Forward Dedicated Control Channel is assigned, the mobile station shall transmit a continuous Reverse Pilot Channel.

2.1.3.2.2 Reverse Pilot Channel Spreading

The Reverse Pilot Channel data shall be spread with W_0^{64} as specified in 2.1.3.1.13.

2.1.3.2.3 Reverse Pilot Channel Gating

When transmitting on the Reverse Pilot Channel in gated mode ($PILOT\_GATING\_USE\_RATE_s$ = '1'), the mobile station shall periodically gate off certain power control groups of the Reverse Pilot Channel at a rate specified by $PILOT\_GATING\_RATE_s$, which may be continuous ($PILOT\_GATING\_RATE_s$ = '00'), 1/2 rate ($PILOT\_GATING\_RATE_s$ = '01'), or 1/4 rate ($PILOT\_GATING\_RATE_s$ = '10'). Reverse Pilot Channel gating may be used when none of the following channels is assigned: the Forward Fundamental Channel, the Forward Supplemental Channel, the Forward Packet Data Control Channel, the Forward Packet Data Channel, the Reverse Fundamental Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, and the Reverse Supplemental Channel. Reverse Pilot Channel gating may also be used when the Forward Fundamental Channel with $FCH\_BCMC\_IND_s$ = '1', or the Forward Supplemental Channel with $SCH\_BCMC\_IND_s[i]$ = '1', or both, are assigned, but none of the following channels is assigned: the Forward Fundamental Channel with $FCH\_BCMC\_IND_s$ = '0', the Forward Supplemental Channel with $SCH\_BCMC\_IND_s[i]$ = '0', the Forward Packet Data Control Channel, the Forward Packet Data Channel, the Reverse Fundamental Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, and the Reverse Supplemental Channel. The power control groups within a 20 ms frame are numbered from 0 to 15. When 1/2 rate gating is used, only the odd numbered power control groups shall be transmitted. When 1/4 rate gating is used, only power control groups 3, 7, 11, and 15 shall be transmitted. The gated-on and gated-off periods are arranged so that the gated-on period always comes immediately before the 5 ms frame boundary.

For reverse link Radio Configuration 8, the Reverse Pilot Channel shall be gated as shown in Figure 2.1.3.2.3-2 when the Reverse Fundamental Channel is transmitted at 0 bps. For reverse link Radio Configuration 8, the Reverse Pilot Channel shall not be gated when the Reverse Fundamental Channel is transmitted at 1800, 3000, 5000, or 9600 bps.Gating patterns for the Reverse Pilot Channel with gating rates of 1, 1/2, and 1/4 are shown in Figure 2.1.3.2.3-1. When there is transmission on the Reverse Dedicated Control Channel, the Reverse Pilot Channel shall be gated on for the duration of the active frame as shown in Figure 2.1.3.2.3-3 and Figure 2.1.3.2.3-4.

If the Forward Packet Data Channel is not assigned and the Reverse Fundamental Channel with Radio Configuration 3, 4, 5, or 6 is operated in the gated mode (see 2.1.3.12.7) at a data rate of 1500 bps for Radio Configurations 3 and 5, or 1800 bps for Radio Configurations 4 and 6, the Reverse Pilot Channel shall have a transmission duty cycle of 50%. The Reverse Pilot Channel shall be transmitted in power control groups 2, 3, 6, 7, 10, 11, 14, and 15, and shall not be transmitted in power control groups 0, 1, 4, 5, 8, 9, 12, and 13, as shown in Figure 2.1.3.12.7-1. The mobile station transmits the Reverse Pilot

Channel in the gated-off period if it is concurrently transmitting on a channel other than the Reverse Fundamental Channel (see 2.1.3.2.7).

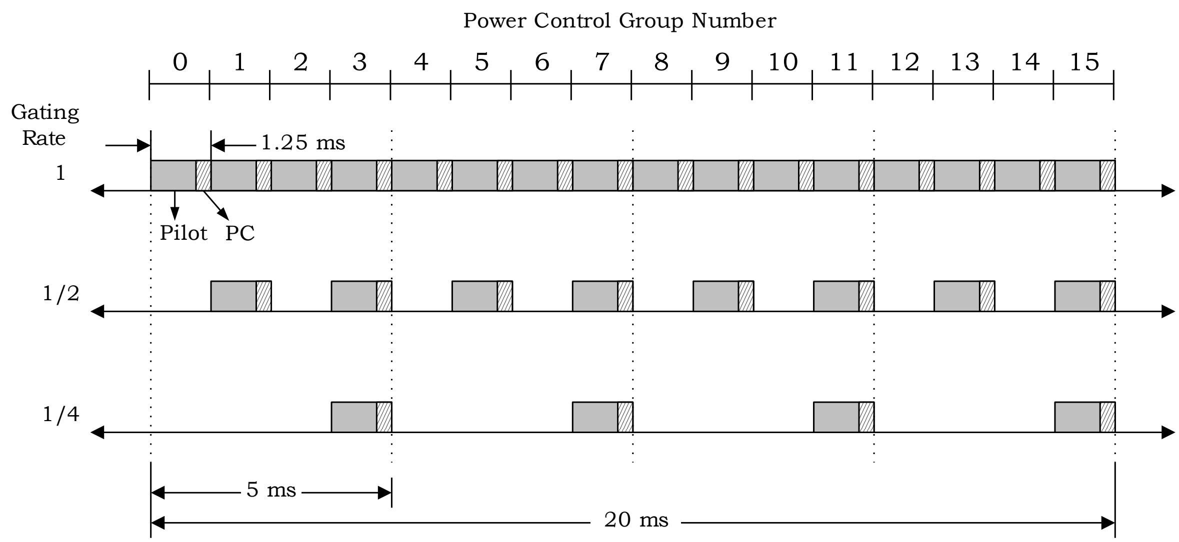


Figure 2.1.3.2.3-1. Reverse Pilot Channel Gating (Radio Configurations 3 through 7)

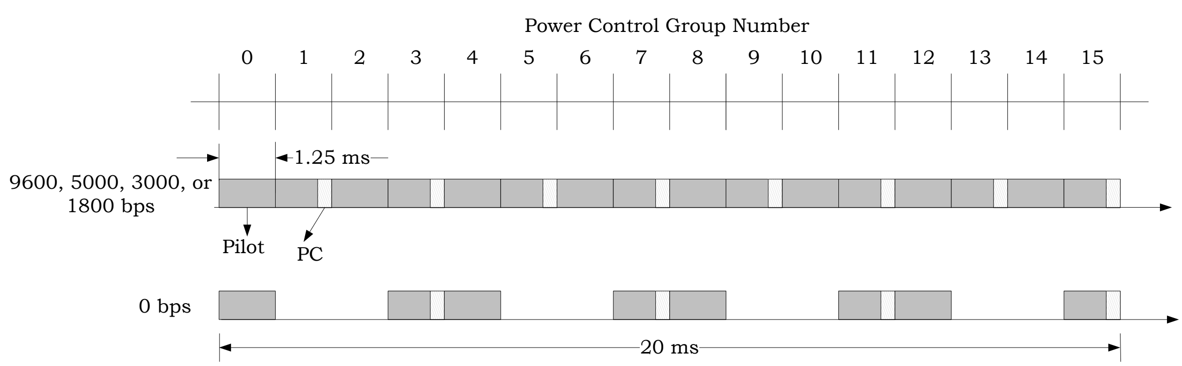


Figure 2.1.3.2.3-2. Reverse Pilot Channel Gating (Radio Configurations 8)

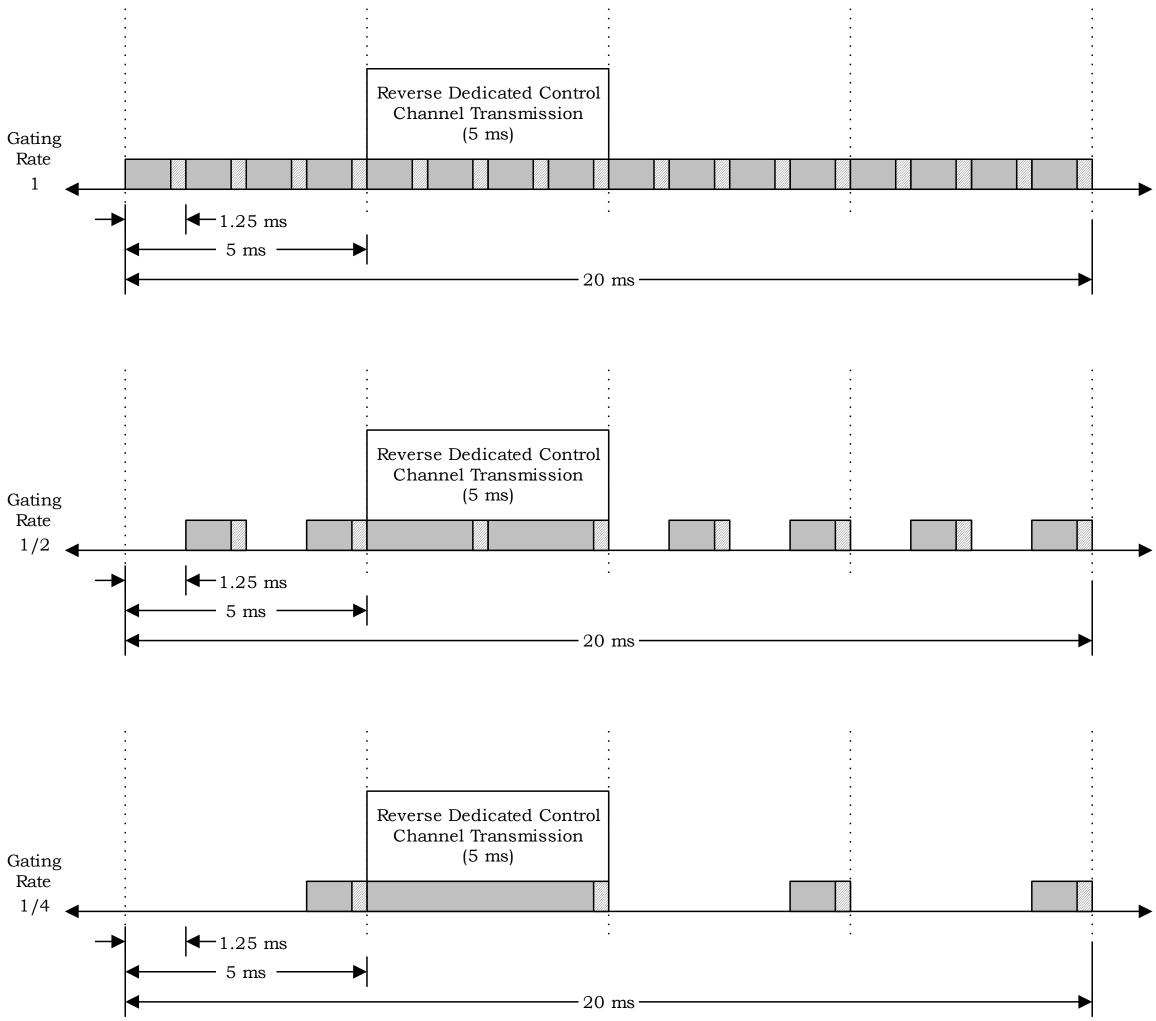


Figure 2.1.3.2.3-3. Reverse Pilot Channel Gating during Reverse Dedicated Control Channel Transmission with 5 ms Frame Duration

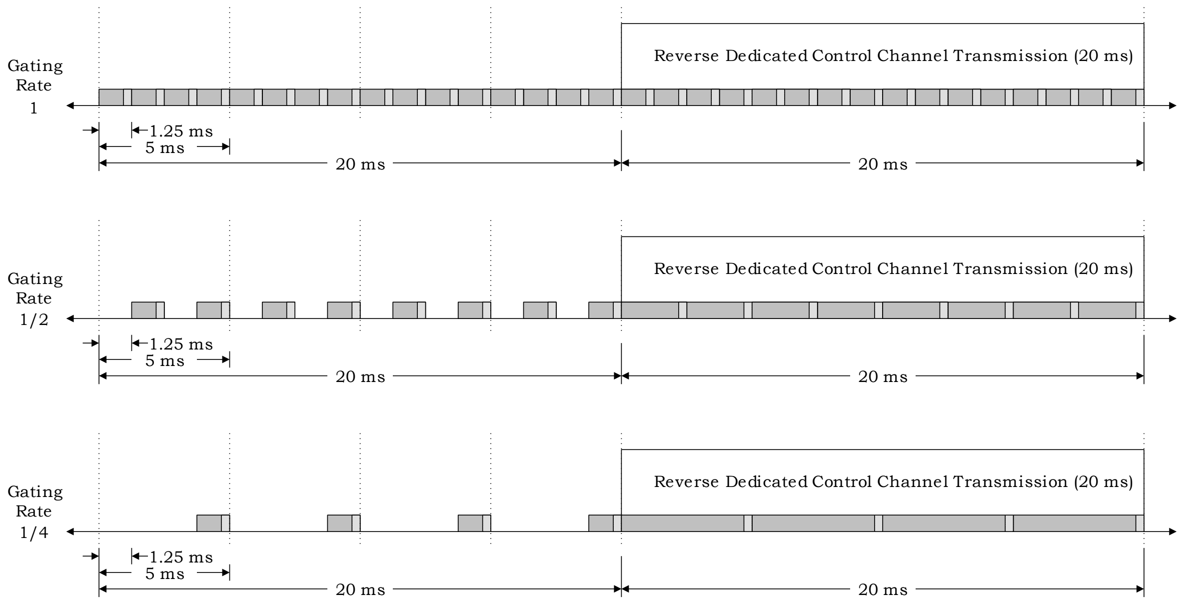


Figure 2.1.3.2.3-4. Reverse Pilot Channel Gating during Reverse Dedicated Control Channel Transmission with 20 ms Frame Duration

2.1.3.2.4 Reverse Pilot Channel Operation during Reverse Traffic Channel Preamble

The Reverse Traffic Channel preamble consists of transmissions only on the Reverse Pilot Channel before transmitting on the Reverse Dedicated Control Channel or the Reverse Fundamental Channel with Radio Configurations 3, 4, 5, 6, and 8. The Reverse Pilot Channel shall not be gated during transmission of the preamble and shall contain a power control subchannel unless neither the Forward Fundamental Channel nor the Forward Dedicated Control Channel is assigned (see 2.1.3.2.1).

When performing a hard handoff, the mobile station shall begin the transmission of the Reverse Traffic Channel preamble NUM_PREAMBLE_s power control groups before the start of the earliest available Traffic Channel frame boundary as shown in Figure 2.1.3.2.4-1. The mobile station shall enable transmission on the appropriate code channels at the beginning of the first eligible Traffic Channel frame as is shown in Figure 2.1.3.2.4-1.

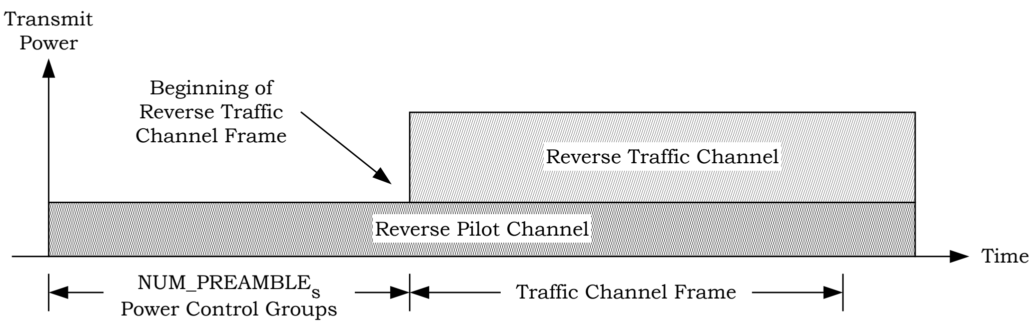


Figure 2.1.3.2.4-1. Reverse Traffic Channel Preamble during Hard Handoff for the Reverse Traffic Channel with Radio Configurations 3 through 8

2.1.3.2.5 Reverse Pilot Channel Quadrature Spreading

The Reverse Pilot Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.2.6 Reverse Pilot Channel Baseband Filtering

The Reverse Pilot Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.2.7 Reverse Pilot Channel Transmission Processing

If the mobile station is transmitting only on the Reverse Channel Quality Indicator Channel or only on the Reverse Acknowledgment Channel and the Reverse Channel Quality Indicator Channel, the mobile station shall not transmit the Reverse Pilot Channel unless the Physical Layer receives a PHY-RPICH.Request() from the MAC Layer.

On reception of the PHY-RPICH.Request() from the MAC Layer, the mobile station shall perform the following:

- Transmit the Reverse Pilot Channel for 1.25 ms.

2.1.3.3 Reverse Secondary Pilot Channel

The Reverse Secondary Pilot Channel is an unmodulated spread spectrum signal used to assist the base station in channel estimation and in detecting a mobile station transmission on the Reverse Packet Data Channel. The MAC Layer indicates when to transmit the Reverse Secondary Pilot Channel.

2.1.3.3.1 Reverse Secondary Pilot Channel Time Alignment

The MAC Layer instructs the Physical Layer when to transmit on the Reverse Secondary Pilot Channel. When the mobile station receives a PHY-RSPICH.Request() primitive from the MAC Layer, the mobile station transmits on the Reverse Secondary Pilot Channel for 10 ms.

Transmission on the Reverse Secondary Pilot Channel begins only when System Time is an integral multiple of 10 ms (see Figure 1.3-1). The Reverse Secondary Pilot Channel is aligned with the transmission of data on the Reverse Packet Data Channel.

2.1.3.3.2 Reverse Secondary Pilot Channel Orthogonal Spreading

The Reverse Secondary Pilot Channel data shall be orthogonally spread as specified in 2.1.3.1.13.

2.1.3.3.3 Reverse Secondary Pilot Channel Gating

The Reverse Secondary Pilot Channel shall be gated off unless it is being transmitted in conjunction with the Reverse Packet Data Channel and when instructed by the MAC Layer.

2.1.3.3.4 Reverse Secondary Pilot Channel Quadrature Spreading

The Reverse Secondary Pilot Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.3.5 Reverse Secondary Pilot Channel Baseband Filtering

The Reverse Secondary Pilot Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.3.6 Reverse Secondary Pilot Channel Transmission Processing

When the Physical Layer receives a PHY-RSPICH.Request(SYS_TIME) from the MAC Layer, the mobile station shall perform the following:

- Transmit the Reverse Secondary Pilot Channel for 10 ms starting at System Time equal to SYS_TIME.

2.1.3.4 Access Channel

The Access Channel is used by the mobile station to initiate communication with the base station and to respond to Paging Channel messages. An Access Channel transmission is a coded, interleaved, and modulated spread-spectrum signal. The Access Channel uses a random-access protocol. Access Channels are uniquely identified by their long codes (see 2.1.3.1.16).

An Access probe shall consist of an Access preamble, followed by a series of Access Channel frames, with each carrying an SDU.

2.1.3.4.1 Access Channel Time Alignment and Modulation Rate

The mobile station shall transmit information on the Access Channel at a fixed data rate of 4800 bps. An Access Channel frame shall be 20 ms in duration. An Access Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1).

The mobile station shall delay the transmit timing of the probe by RN PN chips, where the value of RN is supplied by the Common Channel multiplex sublayer. This transmit timing adjustment includes delay of the direct sequence spreading long code and of the quadrature spreading I and Q pilot PN sequences, so it effectively increases the apparent range from the mobile station to the base station.[27]

The Reverse CDMA Channel may contain up to 32 Access Channels numbered 0 through 31 per supported Paging Channel. At least one Access Channel exists on the Reverse CDMA Channel for each Paging Channel on the corresponding Forward CDMA Channel. Each Access Channel is associated with a single Paging Channel.

2.1.3.4.2 Access Channel Frame Structure

Each Access Channel frame contains 96 bits (20 ms frame at 4800 bps). Each Access Channel frame shall consist of 88 information bits and eight Encoder Tail Bits (see Figure 2.1.3.4.2-1).

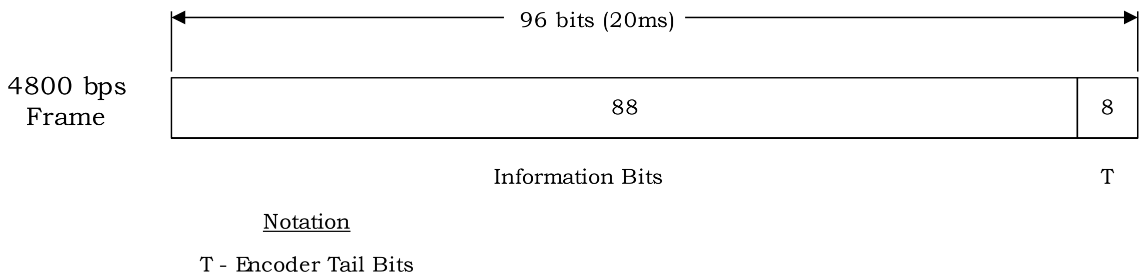


Figure 2.1.3.4.2-1. Access Channel Frame Structure

2.1.3.4.2.1 Access Channel Preamble

The Access Channel preamble shall consist of frames of 96 zeros that are transmitted at the 4800 bps rate. The Access Channel preamble is transmitted to aid the base station in acquiring an Access Channel transmission.

2.1.3.4.3 Access Channel Convolutional Encoding

The Access Channel data shall be convolutionally encoded as specified in 2.1.3.1.5.

When generating Access Channel data, the encoder shall be initialized to the all-zero state at the end of each 20 ms frame.

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[27] This increases the probability that the base station will be able to separately demodulate transmissions from multiple mobile stations in the same Access Channel slot, especially when many mobile stations are at a similar range from the base station. Use of a non-random algorithm for PN randomization permits the base station to separate the PN randomization from the actual propagation delay from the mobile station, so it can accurately estimate the timing of Reverse Traffic Channel transmissions from the mobile station.

2.1.3.4.4 Access Channel Code Symbol Repetition

Each code symbol output from the convolutional encoder on the Access Channel shall be repeated once (each code symbol occurs two consecutive times) as specified in 2.1.3.1.6.

2.1.3.4.5 Access Channel Interleaving

The repeated code symbols on the Access Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.4.6 Access Channel Modulation

The Access Channel data shall be modulated as specified in 2.1.3.1.13.

2.1.3.4.7 Access Channel Gating

The mobile station shall transmit all power control groups while transmitting on the Access Channel as specified in 2.1.3.1.14.1.

2.1.3.4.8 Access Channel Direct Sequence Spreading

The Access Channel shall be spread by the long code as specified in 2.1.3.1.16.

2.1.3.4.9 Access Channel Quadrature Spreading

The Access Channel shall be quadrature spread by the pilot PN sequences as specified in 2.1.3.1.17.

2.1.3.4.10 Access Channel Baseband Filtering

The Access Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.4.11 Access Channel Transmission Processing

When the Physical Layer receives a PHY-ACHPreamble.Request(RA, PWR_LVL, RN, NUM_PREAMBLE_FRAMES) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments RA, PWR_LVL, RN, and NUM_PREAMBLE_FRAMES.
- Transmit NUM_PREAMBLE_FRAMES Access Channel preamble frames.

When the Physical Layer receives a PHY-ACH.Request(RA, PWR_LVL, RN, SDU) from the MAC Layer, the mobile station shall:

- Store the arguments RA, PWR_LVL, RN, and SDU.
- Set the information bits (see Figure 2.1.3.4.2-1) to SDU.
- Transmit an Access Channel frame.

2.1.3.5 Enhanced Access Channel

The Enhanced Access Channel is used by the mobile station to initiate communication with the base station or to respond to a mobile station directed message. The Enhanced Access Channel can be used in two possible modes: Basic Access Mode and Reservation Access

Mode. When operating in the Basic Access Mode, the mobile station shall not transmit the Enhanced Access header on the Enhanced Access Channel. In Basic Access Mode, the Enhanced Access probe shall consist of an Enhanced Access Channel preamble followed by Enhanced Access data.

When operating in the Reservation Access Mode, the Enhanced Access probe shall consist of an Enhanced Access Channel preamble followed by an Enhanced Access header. Enhanced Access data is sent on the Reverse Common Control Channel upon receiving permission from the base station.

The Enhanced Access Channel uses a random-access protocol. Enhanced Access Channels are uniquely identified by their long code masks (see 2.1.3.1.17). The Enhanced Access probe structure is shown in Figure 2.1.3.5-1.

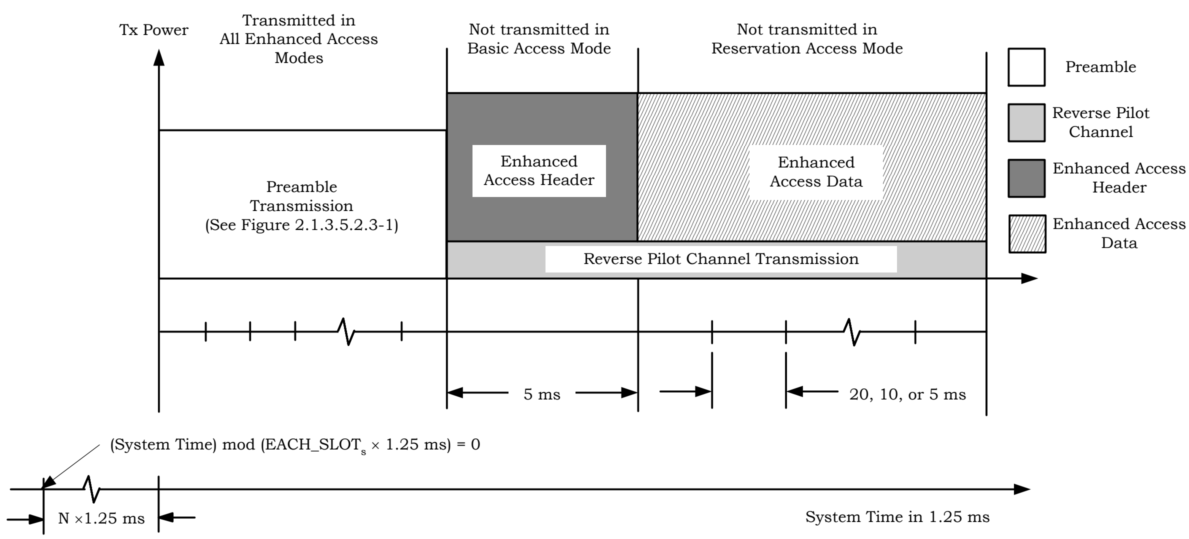


Figure 2.1.3.5-1. Enhanced Access Channel Probe Structure

2.1.3.5.1 Enhanced Access Channel Time Alignment and Modulation Rate

The mobile station shall transmit the Enhanced Access header on the Enhanced Access Channel at a fixed data rate of 9600 bps. The mobile station shall transmit the Enhanced Access data on the Enhanced Access Channel at a fixed data rate of 9600, 19200, or 38400 bps.

The frame duration for the Enhanced Access header on the Enhanced Access Channel shall be 5 ms. The frame duration for the Enhanced Access data on the Enhanced Access Channel shall be 20, 10, or 5 ms. The timing of Enhanced Access Channel transmissions shall start on 1.25 ms increments of System Time (see Figure 1.3-1).

The Reverse CDMA Channel may contain up to 32 Enhanced Access Channels per supported Forward Common Control Channel, numbered 0 through 31. There is a Forward Common Assignment Channel associated with every Enhanced Access Channel operating in the Reservation Access Mode.

The total number of slots associated with an Enhanced Access Channel shall be 512. The Enhanced Access Channel slot duration shall be $\text{EACH\_SLOT}_s \times 1.25$ ms. An Enhanced Access Channel slot shall begin only when System Time is $N \times 1.25$ ms after an integer multiple of $\text{EACH\_SLOT}_s \times 1.25$ ms, where N equals $[(\text{EACH\_ID} \times \text{EACH\_SLOT\_OFFSET2}_s) + \text{EACH\_SLOT\_OFFSET1}_s] \bmod \text{EACH\_SLOT}_s$, and EACH_ID is the identity of the Enhanced Access Channel to be used, which is passed by the primitives from the MAC Layer (see 2.1.3.5.9 and Figure 2.1.3.5-1). The mobile station shall initiate transmission of an Enhanced Access probe on an Enhanced Access Channel slot boundary.

For each Enhanced Access probe, the mobile station shall use a long code mask associated with the first slot of the transmission and shall use this mask until transmission of the Enhanced Access probe is complete. Depending on the slot in which the mobile station starts transmission (SLOT_OFFSET), a maximum of 512 unique long code masks are possible. The mobile procedure for generating the long code mask is specified in 2.1.3.1.17.

2.1.3.5.2 Enhanced Access Channel Frame Structure

Table 2.1.3.5.2-1 summarizes the Enhanced Access Channel bit allocations. The order of the bits is shown in Figure 2.1.3.5.2-1.

Table 2.1.3.5.2-1. Enhanced Access Channel Frame Structure Summary

Frame Length (ms)	Frame Type	Transmission Rate (bps)	Number of Bits per Frame			
			Total	Information	Frame Quality Indicator	Encoder Tail
5	Header	9600	48	32	8	8
20	Data	9600	192	172	12	8
20	Data	19200	384	360	16	8
20	Data	38400	768	744	16	8
10	Data	19200	192	172	12	8
10	Data	38400	384	360	16	8
5	Data	38400	192	172	12	8

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.5.2-1. Enhanced Access Channel Frame Structure

2.1.3.5.2.1 Enhanced Access Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits.

When transmitting the Enhanced Access header, the Enhanced Access Channel shall use an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4.

When transmitting Enhanced Access data, the 20 ms Enhanced Access Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 for the 9600 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 for the 38400 bps and 19200 bps frames. When transmitting Enhanced Access data, the 10 ms Enhanced Access Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 for the 19200 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 for the 38400 bps frame. When transmitting Enhanced Access data, the 5 ms Enhanced Access Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.5.2.2 Enhanced Access Channel Encoder Tail Bits

The last eight bits of each Enhanced Access Channel frame are called the Encoder Tail Bits. These eight bits shall be set to '0'.

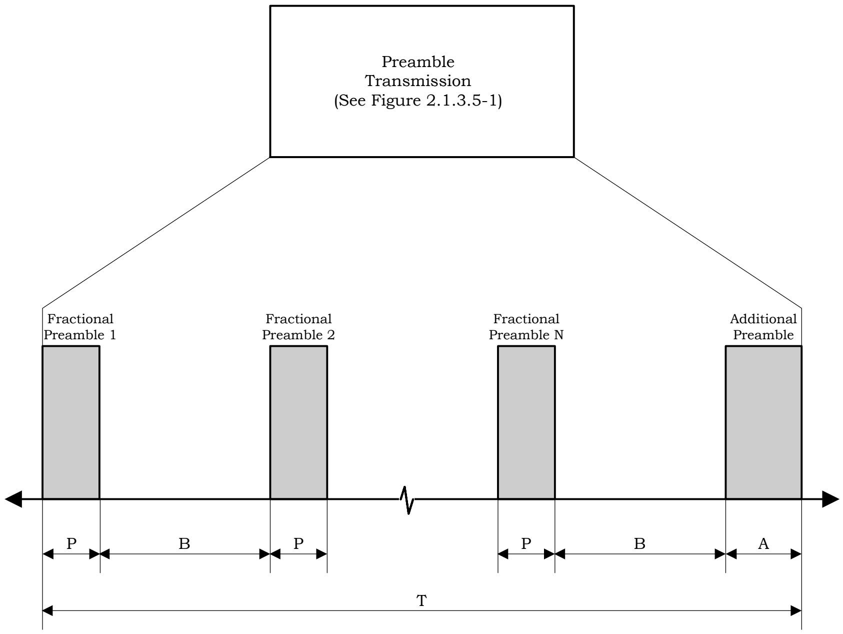
2.1.3.5.2.3 Enhanced Access Channel Preamble

The Enhanced Access Channel preamble is transmitted to aid the base station in acquiring an Enhanced Access Channel transmission.

The Enhanced Access Channel preamble is shown in Figure 2.1.3.5.2.3-1. The Enhanced Access Channel preamble is a transmission of only the non-data-bearing Reverse Pilot Channel at an increased power level. The Reverse Pilot Channel associated with the Enhanced Access Channel does not have a reverse power control subchannel. The total preamble length shall be an integer multiple of 1.25 ms. No preamble shall be transmitted when $\text{EACH\_PREAMBLE\_ENABLED}_S$ = '0'. If the Enhanced Access Channel preamble is not of length zero, the Enhanced Access Channel preamble shall consist of a sequence of fractional preambles and one additional preamble.

The sequence of fractional preambles shall include $\text{EACH\_PREAMBLE\_NUM\_FRAC}_S + 1$ fractional preambles, each with a duration of $(\text{EACH\_PREAMBLE\_FRAC\_DURATION}_S + 1) \times$ 1.25 ms. The transmission of the Enhanced Access Channel preamble shall be gated-off for a period of $\text{EACH\_PREAMBLE\_OFF\_DURATION}_S \times 1.25$ ms after the transmission of each fractional preamble.

When operating in Basic Access Mode, the additional preamble with a length of $\text{EACH\_PREAMBLE\_ADD\_DURATION}_S \times 1.25$ ms shall be transmitted just prior to the Enhanced Access Channel data. When operating in the Reservation Access Mode, the additional preamble with a length of $\text{EACH\_PREAMBLE\_ADD\_DURATION}_S \times 1.25$ ms shall be transmitted just prior to the Enhanced Access Channel header. The additional preamble assists the base station in channel estimation.



N = EACH_PREAMBLE_NUM_FRAC$_s$ + 1

P = (EACH_PREAMBLE_FRAC_DURATION$_s$ + 1) × 1.25 ms

B = EACH_PREAMBLE_OFF_DURATION$_s$ × 1.25 ms

A = EACH_PREAMBLE_ADD_DURATION$_s$ × 1.25 ms

$T = N (P + B) + A$

Figure 2.1.3.5.2.3-1. Preamble for the Enhanced Access Channel

2.1.3.5.3 Enhanced Access Channel Convolutional Encoding

The Enhanced Access Channel data shall be convolutionally encoded as specified in 2.1.3.1.5.

When generating Enhanced Access Channel data, the encoder shall be initialized to the all-zero state at the end of each 20, 10, or 5 ms frame.

2.1.3.5.4 Enhanced Access Channel Code Symbol Repetition

Each code symbol output from the convolutional encoder on the Enhanced Access Channel shall be repeated as specified in 2.1.3.1.6.

2.1.3.5.5 Enhanced Access Channel Interleaving

The repeated code symbols on the Enhanced Access Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.5.6 Enhanced Access Channel Modulation and Orthogonal Spreading

The Enhanced Access Channel header and data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.5.7 Enhanced Access Channel Quadrature Spreading

The Enhanced Access Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.5.8 Enhanced Access Channel Baseband Filtering

The Enhanced Access Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.5.9 Enhanced Access Channel Transmission Processing

When the Physical Layer receives a PHY-EACHPreamble.Request(PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, and SLOT_OFFSET.
- Set the Enhanced Access Channel Long Code Mask using FCCCH_ID, EACH_ID, BASE_ID, and SLOT_OFFSET (see Figure 2.1.3.1.17-2).
- Transmit Enhanced Access Channel preamble frames.

When the Physical Layer receives a PHY-EACHHeader.Request(PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, SDU) from the MAC Layer, the mobile station shall:

- Store the arguments PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, and SDU.
- Set the Enhanced Access Channel Long Code Mask using FCCCH_ID, EACH_ID, BASE_ID, and SLOT_OFFSET (see Figure 2.1.3.1.17-2).
- Set the information bits (see Figure 2.1.3.5.2-1) to SDU.
- Transmit an Enhanced Access Channel Header.

When the Physical Layer receives a PHY-EACH.Request(PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall:

- Store the arguments PWR_LVL, FCCCH_ID, EACH_ID, BASE_ID, SLOT_OFFSET, FRAME_DURATION, NUM_BITS, and SDU.
- Set the Enhanced Access Channel Long Code Mask using FCCCH_ID, EACH_ID, BASE_ID and SLOT_OFFSET (see Figure 2.1.3.1.17-2).
- Set the information bits (see Figure 2.1.3.5.2-1) to SDU.
- Transmit an Enhanced Access Channel frame of duration FRAME_DURATION (5 ms, 10 ms, or 20 ms) at a data rate that corresponds to NUM_BITS and FRAME_DURATION as specified in Table 2.1.3.5.2-1.

2.1.3.6 Reverse Common Control Channel

The Reverse Common Control Channel is used for the transmission of user and signaling information to the base station when Reverse Traffic Channels are not in use. The Reverse Common Control Channel is used in the Reservation Access Mode.

A Reverse Common Control Channel transmission is a coded, interleaved, and modulated spread-spectrum signal. The mobile station transmits during intervals specified by the base station. Reverse Common Control Channels are uniquely identified by their long codes (see 2.1.3.1.17). The Reverse Common Control Channel preamble and data transmission structure is shown in Figure 2.1.3.6-1.

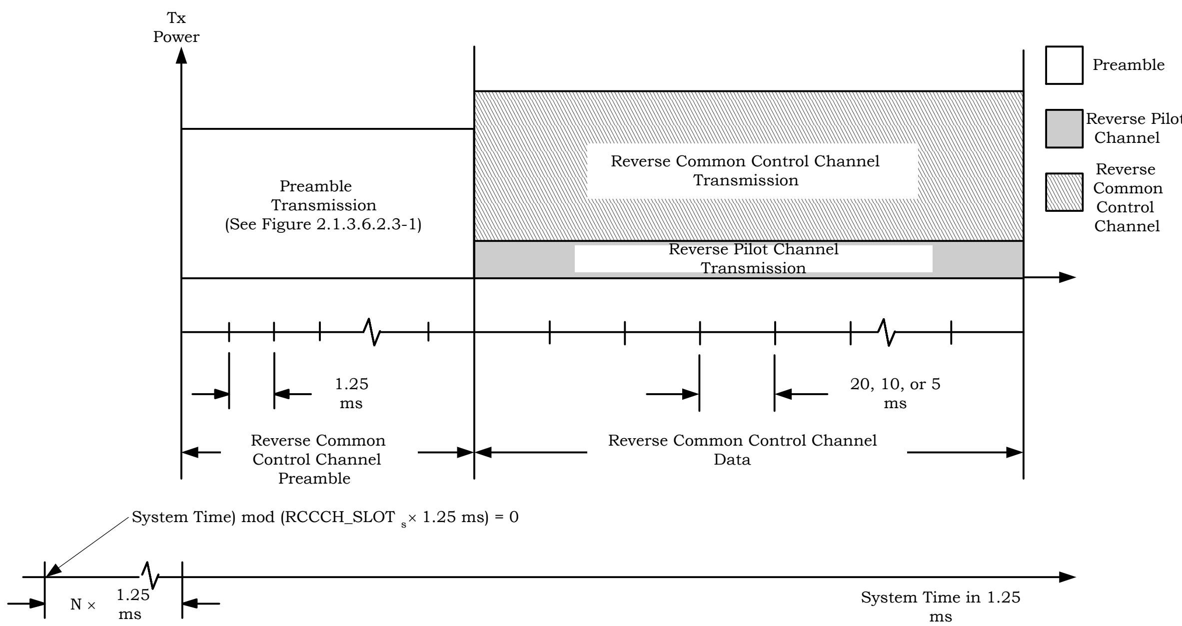


Figure 2.1.3.6-1. Preamble and Data Transmission for the Reverse Common Control Channel

2.1.3.6.1 Reverse Common Control Channel Time Alignment and Modulation Rate

The mobile station shall transmit information on the Reverse Common Control Channel at variable data rates of 9600, 19200, and 38400 bps. A Reverse Common Control Channel frame shall be 20, 10, or 5 ms in duration. The timing of Reverse Common Control Channel transmissions shall start on 1.25 ms increments of System Time (see Figure 1.3-1).

The Reverse CDMA Channel may contain up to 32 Reverse Common Control Channels numbered 0 through 31 per supported Forward Common Control Channel and up to 32 Reverse Common Control Channels numbered 0 through 31 per supported Common Assignment Channel. At least one Reverse Common Control Channel exists on the Reverse CDMA Channel for each Forward Common Control Channel on the corresponding Forward CDMA Channel. Each Reverse Common Control Channel is associated with a single Forward Common Control Channel.

The Reverse Common Control Channel slot shall begin only when System Time is N × 1.25 ms after an integer multiple of $RCCCH\_SLOT_S$ × 1.25 ms, where N equals [($RCCCH\_ID$ × $RCCCH\_SLOT\_OFFSET2_S$) + $RCCCH\_SLOT\_OFFSET1_S$] mod $RCCCH\_SLOT_S$, and RCCCH_ID is the identity of the Reverse Common Control Channel to be used, which is passed by the primitives from the MAC Layer (see 2.1.3.6.9 and Figure 2.1.3.6-1). The mobile station shall initiate transmission of a Reverse Common Control Channel frame on a Reverse Common Control Channel slot boundary.

2.1.3.6.2 Reverse Common Control Channel Frame Structure

Table 2.1.3.6.2-1 summarizes the Reverse Common Control Channel bit allocations. The order of the bits is shown in Figure 2.1.3.6.2-1.

All frames shall consist of the information bits, followed by a frame quality indicator (CRC) and eight Encoder Tail Bits.

Table 2.1.3.6.2-1. Reverse Common Control Channel Frame Structure Summary

Frame Length (ms)	Transmission Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Encoder Tail
20	9600	192	172	12	8
20	19200	384	360	16	8
20	38400	768	744	16	8
10	19200	192	172	12	8
10	38400	384	360	16	8
5	38400	192	172	12	8

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.6.2-1. Reverse Common Control Channel Frame Structure

2.1.3.6.2.1 Reverse Common Control Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The 20 ms Reverse Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 for the 9600 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 for the 38400 bps and 19200 bps frames. The 10 ms Reverse Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 for the 19200 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 for the 38400 bps frame. The 5 ms Reverse Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.6.2.2 Reverse Common Control Channel Encoder Tail Bits

The last eight bits of each Reverse Common Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

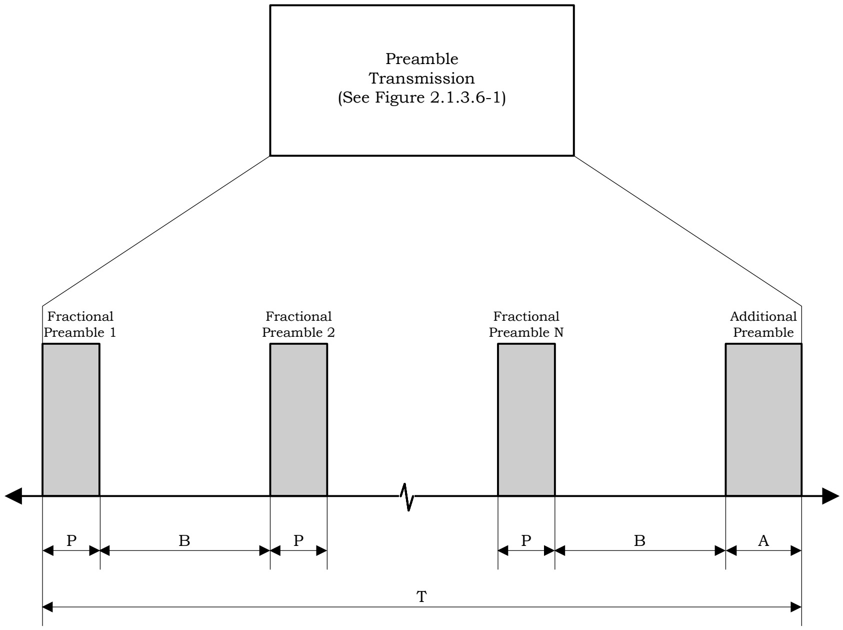
2.1.3.6.2.3 Reverse Common Control Channel Preamble

The Reverse Common Control Channel preamble is transmitted to aid the base station in acquiring a Reverse Common Control Channel transmission.

The Reverse Common Control Channel preamble is shown in Figure 2.1.3.6.2.3-1. The Reverse Common Control Channel preamble is a transmission of only the non-data-bearing Reverse Pilot Channel at an increased power level. The Reverse Pilot Channel associated with the Reverse Common Control Channel does not have a reverse power control subchannel. The total preamble duration shall be an integer multiple of 1.25 ms. No preamble shall be transmitted when operating in the Reservation Access Mode and $\text{RCCCH\_PREAMBLE\_ENABLED}_S$ = ‘0’. If the Reverse Common Control Channel preamble is not of zero length, the Reverse Common Control Channel preamble shall consist of a sequence of fractional preambles and one additional preamble.

When operating in the Reservation Access Mode, the sequence of fractional preambles shall include $\text{RCCCH\_PREAMBLE\_NUM\_FRAC}_S + 1$ fractional preambles, each with a duration of $(\text{RCCCH\_PREAMBLE\_FRAC\_DURATION}_S + 1) \times 1.25$ ms. The transmission of the Reverse Common Control Channel preamble shall be gated off for a duration of $\text{RCCCH\_PREAMBLE\_OFF\_DURATION}_S \times 1.25$ ms after the transmission of each fractional preamble. The additional preamble with a length of $\text{RCCCH\_PREAMBLE\_ADD\_DURATION}_S \times 1.25$ ms shall be transmitted just prior to the Reverse Common Control Channel data.

The additional preamble assists the base station in channel estimation.



For Reservation Access Mode

N = RCCCH_PREAMBLE_NUM_FRAC$_s$ + 1

P = (RCCCH_PREAMBLE_FRAC_DURATION$_s$ + 1) × 1.25 ms

B = RCCCH_PREAMBLE_OFF_DURATION$_s$ × 1.25 ms

A = RCCCH_PREAMBLE_ADD_DURATION$_s$ × 1.25 ms

T = N (P + B) + A

Figure 2.1.3.6.2.3-1. Preamble for the Reverse Common Control Channel

2.1.3.6.2.4 Reverse Common Control Channel Data

When operating in the Reservation Access Mode, the Reverse Common Control Channel data shall consist of Enhanced Access data.

2.1.3.6.3 Reverse Common Control Channel Convolutional Encoding

The Reverse Common Control Channel data shall be convolutionally encoded as specified in 2.1.3.1.5.

When generating Reverse Common Control Channel data, the encoder shall be initialized to the all-zero state at the end of each 20, 10, or 5 ms frame.

2.1.3.6.4 Reverse Common Control Channel Code Symbol Repetition

Each code symbol output from the convolutional encoder on the Reverse Common Control Channel shall be repeated as specified in 2.1.3.1.6

2.1.3.6.5 Reverse Common Control Channel Interleaving

The encoded code symbols on the Reverse Common Control Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.6.6 Reverse Common Control Channel Modulation and Orthogonal Spreading

The Reverse Common Control Channel data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.6.7 Reverse Common Control Channel Quadrature Spreading

The Reverse Common Control Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.6.8 Reverse Common Control Channel Baseband Filtering

The Reverse Common Control Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.6.9 Reverse Common Control Channel Transmission Processing

When the Physical Layer receives a PHY-RCCCHPreamble.Request(FCCCH_ID, RCCCH_ID, BASE_ID) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments FCCCH_ID, RCCCH_ID, and BASE_ID.
- Set the Reverse Common Control Channel Long Code Mask using FCCCH_ID, RCCCH_ID, and BASE_ID (see Figure 2.1.3.1.17-2).
- Transmit a Reverse Common Control Channel preamble.

When the Physical Layer receives a PHY-RCCCH.Request(FCCCH_ID, RCCCH_ID, BASE_ID, SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments FCCCH_ID, RCCCH_ID, BASE_ID, SDU, FRAME_DURATION, and NUM_BITS.
- Set the Reverse Common Control Channel Long Code Mask using FCCCH_ID, RCCCH_ID, and BASE_ID (see Figure 2.1.3.1.17-2).
- Set the information bits (see Figure 2.1.3.6.2-1) to SDU.
- Transmit a Reverse Common Control Channel frame of duration FRAME_DURATION (5 ms, 10 ms, or 20 ms) at a data rate that corresponds to NUM_BITS and FRAME_DURATION as specified in Table 2.1.3.6.2-1.

2.1.3.7 Reverse Packet Data Control Channel

The Reverse Packet Data Control Channel is used by the mobile station for transmitting control information for the associated Reverse Packet Data Channel and the Mobile Status Indicator Bit.

2.1.3.7.1 Reverse Packet Data Control Channel Time Alignment and Modulation Rates

The mobile station shall transmit information on the Reverse Packet Data Control Channel at a fixed data rate of 700 bps. For each frame, the MAC Layer instructs the Physical Layer whether to transmit on the Reverse Packet Data Control Channel. When the mobile station receives a PHY-RPDCCH.Request primitive from the MAC Layer, the mobile station shall transmit one Reverse Packet Data Control Channel frame.

A Reverse Packet Data Control Channel frame shall be 10 ms in duration. A Reverse Packet Data Control Channel frame begins only when System Time is an integral multiple of 10 ms (see Figure 1.3-1). Transmission on the Reverse Packet Data Control Channel is aligned with the transmission of data on the Reverse Packet Data Channel.

2.1.3.7.2 Reverse Packet Data Control Channel Structure

The Reverse Packet Data Control Channel shall consist of six information bits and a Mobile Status Indicator Bit as shown in Figure 2.1.3.1.1.1-6.

2.1.3.7.3 Reverse Packet Data Control Channel Encoding

The Reverse Packet Data Control Channel data shall be encoded as specified in 2.1.3.1.5.3.2.

2.1.3.7.4 Reverse Packet Data Control Channel Sequence Repetition

The Reverse Packet Data Control Channel encoded sequence shall be repeated as specified in 2.1.3.1.9.

2.1.3.7.5 Reverse Packet Data Control Channel Modulation and Orthogonal Spreading

The Reverse Packet Data Control Channel shall be modulated and orthogonally spread as specified in 2.1.3.1.13.2.

2.1.3.7.6 Reverse Packet Data Control Channel Quadrature Spreading

The Reverse Packet Data Control Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.7.7 Reverse Packet Data Control Channel Baseband Filtering

The Reverse Packet Data Control Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.7.8 Reverse Packet Data Control Channel Transmission Processing

When the Physical Layer receives a PHY-RPDCCH.Request(SDU, BOOST, EP_SIZE, MSIB, SYS_TIME) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, BOOST, EP_SIZE, MSIB, and SYS_TIME.
- Set the information bits to SDU.
- Set the Mobile Status Indicator Bit to MSIB.

- Transmit the information bits and the Mobile Status Indicator Bit in a Reverse Packet Data Control Channel frame using the appropriate row of Table 2.1.2.3.3.3-1 or Table 2.1.2.3.3.3-2 (depending on the value of BOOST and EP_SIZE) starting at SYS_TIME as specified in Figure 2.1.3.1.1.1-6.

2.1.3.8 Reverse Request Channel

The Reverse Request Channel is used by the mobile station to indicate its ability to the base station to transmit above the autonomous data rate on the Reverse Packet Data Channel. The Reverse Request Channel is also used by the mobile station to update the base station with the amount of data in the buffer, the QoS requirements, and the available headroom (see [3] for more details).

2.1.3.8.1 Reverse Request Channel Time Alignment and Modulation Rates.

The mobile station shall transmit information on the Reverse Request Channel at a fixed data rate of 3200 bps. For each frame, the MAC Layer instructs the Physical Layer whether to transmit on the Reverse Request Channel. When the mobile station receives a PHY-RREQCH.Request primitive from the MAC Layer, the mobile station shall transmit one Reverse Request Channel frame.

A Reverse Request Channel frame shall be 10 ms in duration. A Reverse Request Channel frame begins only when System Time is an integral multiple of 10 ms (see Figure 1.3-1), and may be offset from the frames of the Reverse Traffic Channels operating with Radio Configurations 3 and 4 as specified in [3].

2.1.3.8.2 Reverse Request Channel Frame Structure

The frame structure of the Reverse Request Channel is shown in Figure 2.1.3.8.2-1.

All frames shall consist of 12 information bits, followed by a 12-bit frame quality indicator (CRC) and eight Encoder Tail Bits.

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.8.2-1. Reverse Request Channel Frame Structure

2.1.3.8.2.1 Reverse Request Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The Reverse Request Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.8.2.2 Reverse Request Channel Encoder Tail Bits

The last eight bits of each Reverse Request Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to '0'.

2.1.3.8.3 Reverse Request Channel Convolutional Encoding

The Reverse Request Channel data shall be encoded as specified in 2.1.3.1.5.

When generating Reverse Request Channel data, the encoder shall be initialized to the all-zero state at the end of each 10 ms frame.

2.1.3.8.4 Reverse Request Channel Code Symbol Repetition

Each code symbol output from the convolutional encoder on the Reverse Request Channel shall be repeated as specified in 2.1.3.1.6.

2.1.3.8.5 Reverse Request Channel Interleaving

The modulation symbols on the Reverse Request Channel shall be interleaved as specified in 2.1.3.1.8. The interleaver block shall align with the Reverse Request Channel frame.

2.1.3.8.6 Reverse Request Channel Modulation and Orthogonal Spreading

The Reverse Request Channel data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.8.7 Reverse Request Channel Quadrature Spreading

The Reverse Request Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.8.8 Reverse Request Channel Baseband Filtering

The Reverse Request Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.8.9 Reverse Request Channel Transmission Processing

When the Physical Layer receives a PHY-RREQCH.Request(SDU, SYS_TIME) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU and SYS_TIME.
- Set the information bits to SDU.
- Transmit the information bits, a computed 12-bit frame quality indicator, and eight Encoder Tail Bits on the Reverse Request Channel frame starting at SYS_TIME.

2.1.3.9 Reverse Dedicated Control Channel

The Reverse Dedicated Control Channel is used for the transmission of user and signaling information to the base station during a call. The Reverse Traffic Channel may contain up to one Reverse Dedicated Control Channel.

2.1.3.9.1 Reverse Dedicated Control Channel Time Alignment and Modulation Rates

The mobile station shall transmit information on the Reverse Dedicated Control Channel at a fixed data rate of 9600 bps or 14400 bps using 20 ms frames, or 9600 bps using 5 ms frames. The mobile station may support flexible data rates. If the mobile station supports flexible data rates, other fixed data rates from 1050 bps to 9600 bps or 14400 bps using 20 ms frames can also be used.

The Reverse Dedicated Control Channel frame shall be 5 ms or 20 ms in duration.

The mobile station shall transmit information on the Reverse Dedicated Control Channel at a data rate of 9600 bps for Radio Configurations 3 and 5. If the mobile station supports flexible data rates, other fixed data rates from 1050 bps to 9600 bps using 20 ms frames can also be used for the Reverse Dedicated Control Channel in Radio Configurations 3 and 5.

The mobile station shall transmit information on the Reverse Dedicated Control Channel at a data rate of 14400 bps for 20 ms frames and 9600 bps for 5 ms frames for Radio Configurations 4 and 6. If the mobile station supports flexible data rates, other fixed data rates from 1050 bps to 14400 bps using 20 ms frames can also be used for the Reverse Dedicated Control Channel in Radio Configurations 4 and 6.

The mobile station shall support discontinuous transmission on the Reverse Dedicated Control Channel. The decision to enable or disable the Reverse Dedicated Control Channel shall be made on a frame-by-frame (i.e., 5 or 20 ms) basis.

The mobile station shall support Reverse Dedicated Control Channel frames that are time offset by multiples of 1.25 ms. The amount of the time offset is specified by FRAME_OFFSET_S. A zero-offset 20 ms Reverse Dedicated Control Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 5 ms Reverse Dedicated Control Channel frame shall begin only when System Time is an integral multiple of 5 ms. An offset 20 ms Reverse Dedicated Control Channel frame shall begin $1.25 \times \text{FRAME\_OFFSET}_S$ ms later than the zero-offset 20 ms Reverse Dedicated Control Channel frame. An offset 5 ms Reverse Dedicated Control Channel frame shall begin $1.25 \times (\text{FRAME\_OFFSET}_S \bmod 4)$ ms later than the zero-offset 5 ms Reverse Dedicated Control Channel frame. The interleaver block for the Reverse Dedicated Control Channel shall be aligned with the Reverse Dedicated Control Channel frame.

2.1.3.9.2 Reverse Dedicated Control Channel Frame Structure

Table 2.1.3.9.2-1 summarizes the Reverse Dedicated Control Channel bit allocations for non-flexible data rates. Table 2.1.3.9.2-2 summarizes the Reverse Dedicated Control Channel bit allocations for flexible data rates. The order of the bits is shown in Figure 2.1.3.9.2-1.

All 20 ms frames in Radio Configuration 3 and 5 and all 5 ms frames shall consist of the information bits, followed by a frame quality indicator (CRC) and eight Encoder Tail Bits.

All 20 ms frames in Radio Configuration 4 and 6 and all 5 ms frames shall consist of the information bits, followed by the frame quality indicator (CRC), and eight Encoder Tail Bits, except when 267 information bits are used together with 12 frame quality indicator bits, where one reserved bit will precede the information bits.

Table 2.1.3.9.2-1. Reverse Dedicated Control Channel Frame Structure Summary for Non-flexible Data Rates

Radio Config.	Frame Length (ms)	Data Rate (bps)	Number of Bits per Frame				
			Total	Reserved	Information	Frame Quality Indicator	Encoder Tail
3 and 5	20	9600	192	0	172	12	8
4 and 6	20	14400	288	1	267	12	8
3, 4, 5, and 6	5	9600	48	0	24	16	8

Table 2.1.3.9.2-2. Reverse Dedicated Control Channel Frame Structure Summary for Flexible Data Rates

Radio Config.	Frame Length (ms)	Data Rate (bps)	Number of Bits per Frame			
			Total	Information	Frame Quality Indicator	Encoder Tail
3 and 5	20	1250 to 9600	25 to 192	1 to 168	16	8
	20	1050 to 9550	21 to 191	1 to 171	12	8
4 and 6	20	1250 to 14400	25 to 288	1 to 264	16	8
	20	1050 to 14300, 14400	21 to 286, 288	1 to 266, 268	12	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.9.2-1. Reverse Dedicated Control Channel Frame Structure

2.1.3.9.2.1 Reverse Dedicated Control Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The 20 ms Reverse Dedicated Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 for non-flexible data rates. If flexible data rates are supported, either a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 or a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 shall be used. The 5 ms Reverse Dedicated Control Channel shall use a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.9.2.2 Reverse Dedicated Control Channel Encoder Tail Bits

The last eight bits of each Reverse Dedicated Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

2.1.3.9.2.3 Reverse Traffic Channel Preamble

The Reverse Traffic Channel preamble is transmitted on the Reverse Pilot Channel as specified in 2.1.3.2.4.

2.1.3.9.3 Reverse Dedicated Control Channel Convolutional Encoding

The Reverse Dedicated Control Channel shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Reverse Dedicated Control Channel data, the encoder shall be initialized to the all-zero state at the end of each 20 ms or 5 ms frame.

2.1.3.9.4 Reverse Dedicated Control Channel Code Symbol Repetition

Reverse Dedicated Control Channel code symbol repetition shall be as specified in 2.1.3.1.6.

2.1.3.9.5 Reverse Dedicated Control Channel Code Symbol Puncturing

Reverse Dedicated Control Channel code symbol puncturing shall be as specified in 2.1.3.1.7.

2.1.3.9.6 Reverse Dedicated Control Channel Interleaving

The modulation symbols shall be interleaved as specified in 2.1.3.1.8.

2.1.3.9.7 Reverse Dedicated Control Channel Modulation and Orthogonal Spreading

The Reverse Dedicated Control Channel data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.9.8 Reverse Dedicated Control Channel Quadrature Spreading

The Reverse Dedicated Control Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.9.9 Reverse Dedicated Control Channel Baseband Filtering

The Reverse Dedicated Control Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.9.10 Reverse Dedicated Control Channel Transmission Processing

When the Physical Layer receives a PHY-DCCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Reverse Dedicated Control Channel frame of duration FRAME_DURATION (5 ms or 20 ms). If a PHY-DCCH.Request primitive for a 5 ms frame is received coincident with a PHY-DCCH.Request primitive for a 20 ms frame or during transmission of a 20 ms frame, then the mobile station may preempt transmission of the 20 ms frame and transmit a 5 ms frame. Transmission of the 20 ms frame may start or resume after completion of the 5 ms frame. If transmission of the 20 ms frame is resumed after an interruption in transmission, then the relative power level of the Reverse Dedicated Control Channel modulation symbols shall be equal to that of the modulation symbols sent prior to the preemption.

2.1.3.10 Reverse Acknowledgment Channel

The Reverse Acknowledgment Channel provides feedback for the Forward Packet Data Channel of Radio Configuration 10. The Reverse Acknowledgment Channel 1 provides feedback for the Forward Fundamental Channel of Radio Configuration 11 and 12 The Reverse Acknowledgment Channel 2 provides feedback for the Forward Supplemental Channel 1 of Radio Configuration 11 and 12 while the Reverse Acknowledgment Channel 3 provides feedback for the Forward Supplemental Channel 2 of Radio Configuration 11 and 12.

The mobile station transmits ACK or NAK responses to Forward Packet Data Control Channel messages. See [3] for a description of the protocol that is used on the Reverse Acknowledgment Channel.

For reverse link Radio Configuration 8, the Reverse Acknowledgment Channel provides feedback for the Forward Fundamental Channel or Forward Supplemental Channel of forward link Radio Configuration 11 and 12.

When acknowledging successful reception of a Forward Fundamental Channel frame, the Reverse Acknowledgment Channel shall use OOK (ON-OFF keying) modulation, with a 1 (ON) representing positive acknowledgment (ACK) and a 0 (OFF) representing negative acknowledgment (NAK). When acknowledging successful reception of a Forward Supplemental Channel frame, the Acknowledgment Channel shall use BPSK modulation, with a 1 representing positive acknowledgment (ACK) and a –1 representing negative acknowledgment (NAK). The mobile station shall transmit an ACK or NAK for the Forward Fundamental Channel and each of the Forward Supplemental Channels only in power control groups where the Acknowledgment mask for the respective channel is equal to '1'.

For forward link Radio Configuration 11 and 12, the mobile station shall attempt decode of the Forward Fundamental Channel frames prior to the end of the nominal duration (20 ms) of the frame as specified by the Acknowledgment mask for the Forward Fundamental Channel. For example, if the FCH_ACK_MASK equals '0000000110011000' the mobile station shall indicate whether or not it successfully received the frame in power control groups 7, 8, 11, and 12.

If the mobile station successfully receives a frame on the Forward Fundamental Channel, it shall transmit an acknowledgment on the Reverse Acknowledgment Channel 1 (see Figure 2.1.3.1.1.1-23) as specified by the Acknowledgment mask for the Forward Fundamental Channel.

If F_SCH_EARLY_TERM_SUPPORTED = '1' as specified in [5], and the mobile station successfully receives a frame on the Forward Supplemental Channel 1, then it shall transmit an acknowledgment on the Reverse Acknowledgment Channel 2 (see Figure 2.1.3.1.1.1-23), as specified by the Acknowledgment mask for the Forward Supplemental Channel.

If F_SCH_EARLY_TERM_SUPPORTED = '1' as specified in [5], and the mobile station successfully receives a frame on the Forward Supplemental Channel 2, then it shall transmit an acknowledgment on the Reverse Acknowledgment Channel 3 (see Figure 2.1.3.1.1.1-23), as specified by the Acknowledgment mask for the Forward Supplemental Channel.

A Forward Fundamental Channel, Forward Supplemental Channel 1, or Forward Supplemental Channel 2 frame is considered successfully received if the CRC checks.

The Reverse Acknowledgment Channels for the Forward Fundamental Channel and Forward Supplemental Channels are code multiplexed and transmitted in power control groups permitted by their respective Acknowledgment masks. An Acknowledgment mask is specified for each of the Forward Fundamental Channel and the Forward Supplemental Channels.

If the base station receives an acknowledgment it shall not transmit the corresponding Forward Fundamental Channel or the corresponding Forward Supplemental Channel for the remainder of the frame duration.

The Acknowledgment mask for the Forward Fundamental Channel is specified by F-FCH_ACK_MASK and that for the Forward Supplemental Channels is specified by F_SCH_ACK_MASK.

Figure 2.1.3.9.2.3-1 shows an example of frame early termination of a Forward Fundamental Channel for Radio Configuration 11 and 12. The Acknowledgment mask of '0000000110011000' indicates that the base station may receive an Acknowledgment only in power control groups 7, 8, 11, or 12. In the example shown the mobile station attempts decode after power control group 6 and fails to decode the packet. The mobile station therefore attempts decode after power control group 7 and is able to successfully receive the frame and transmits an acknowledgment on the Reverse Acknowledgment Channel in power control group 8. The base station receives the Forward Acknowledgment Channel in power control group 8 and stops transmissions on the Forward Fundamental Channel for the remainder of the power control groups in the frame.

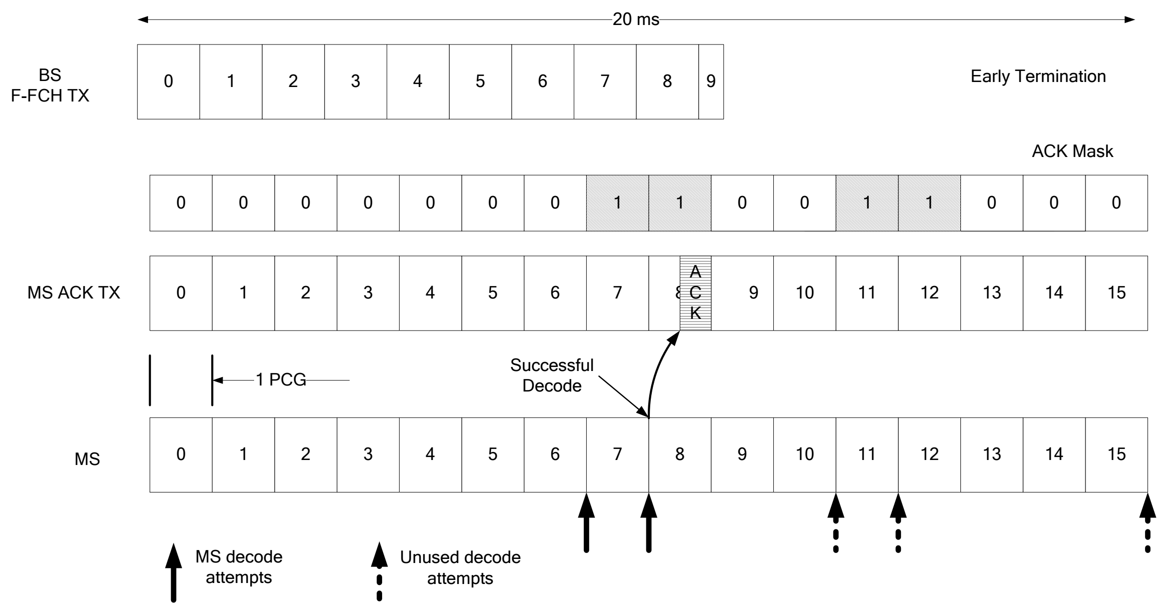


Figure 2.1.3.9.2.3-1. Forward Link Radio Configuration 11 and 12 Frame Early Termination Example

2.1.3.10.1 Reverse Acknowledgment Channel Structure and Time Alignment

For Reverse Radio Configurations 3 through 7, when the Reverse Acknowledgment Channel is transmitted, it shall transmit an ACK_OR_NAK response as specified by the MAC Layer as a parameter in the PHY-RACKCH.Request primitive, where ACK_OR_NAK is set to ACK or NAK. Otherwise, (if no PHY-RACKCH.Request primitive is received from the MAC Layer), the Reverse Acknowledgment Channel shall be gated off. See [3] for more details.

A '0' bit shall be transmitted for an ACK response and a '1' bit shall be transmitted for a NAK response.

A Reverse Acknowledgment Channel frame shall begin only when System Time is an integral multiple of 1.25 ms (see Figure 1.3-1).

For Reverse Link Radio Configuration 8, when the Reverse Acknowledgment Channel 1 is transmitted for the Forward Fundamental Channel or the Reverse Acknowledgment Channel 2 or Reverse Acknowledgment Channel 3 for the Forward Supplemental Channels, the mobile station shall transmit an ACK_OR_NAK as specified by the MAC Layer as a parameter in the PHY-RACKCH.Request primitive, where ACK_OR_NAK is set to ACK or NAK, if the Acknowledgment mask is equal to 1. Otherwise, (if no PHY-RACKCH.Request primitive is received from the MAC Layer or Acknowledgment mask is equal to '0'), the Reverse Acknowledgment Channel shall be gated off. See [3] for more details.

For Reverse Link Radio Configuration 8, when the Reverse Acknowledgment Channel 1 transmits an ACK for the Forward Fundamental Channel, the corresponding Walsh code is transmitted at the specified gain relative to the Reverse Pilot Channel. Otherwise, the Reverse Acknowledgment Channel 1 shall be gated off.

For Reverse Link Radio Configuration 8, when the Reverse Acknowledgment Channel 2 or Reverse Acknowledgment Channel 3 transmit an ACK or NAK corresponding to Forward Supplemental Channel 1 or Forward Supplemental Channel 2, a '1' bit is transmitted for an ACK response and a '0' bit is transmitted for the NAK response. Otherwise, the Reverse Acknowledgment Channel 2 or Reverse Acknowledgment Channel 3 shall be gated off.

In the power control groups where a Reverse Acknowledgment Channel is transmitted it is transmitted during the second half of the power control group.

2.1.3.10.2 Reverse Acknowledgment Channel Modulation

The Reverse Acknowledgment Channel, Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3 shall be modulated as specified in 2.1.3.1.13.

2.1.3.10.3 Reverse Acknowledgment Channel Quadrature Spreading

The Reverse Acknowledgment Channel, Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3 shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.10.4 Reverse Acknowledgment Channel Baseband Filtering

The Reverse Acknowledgment Channel, Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3 shall be filtered as specified in 2.1.3.1.18.

2.1.3.10.5 Reverse Acknowledgment Channel Transmission Processing

When the Physical Layer receives a PHY-RACKCH.Request(ACK_OR_NAK) from the MAC Layer, the mobile station shall perform the following:

- Store the argument ACK_OR_NAK.

- If ACK_OR_NAK is equal to ACK, transmit an ACK on the Reverse Acknowledgment Channel, Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3; otherwise, transmit a NAK on the Reverse Acknowledgment Channel, Reverse Acknowledgment Channel 1, Reverse Acknowledgment Channel 2, and Reverse Acknowledgment Channel 3.

2.1.3.11 Reverse Channel Quality Indicator Channel

The mobile station uses the Reverse Channel Quality Indicator Channel to indicate the channel quality measurements of the member of the packet data channel active set (see [5]) from which the mobile station has selected to receive Forward Packet Data Channel transmissions. This information can be used by the base station to determine the transmission power levels and data transmission rates (i.e., encoder packet sizes and subpacket slot durations) on the Forward Packet Data Channel and the power level and duration of the Forward Packet Data Control Channel. It can also be used by the base station in the decision of when to schedule a particular mobile station on the Forward Packet Data Channel.

When the Forward Packet Data Channel is assigned to a mobile station, the mobile station sends the channel quality feedback information on the Reverse Channel Quality Indicator Channel every 1.25 ms. When the mobile station is not indicating a cell switch, each transmission on the Reverse Channel Quality Indicator Channel carries either a full channel quality indicator value (i.e., a value that is an estimate of the signal-to-noise ratio of the base station's pilot) or a differential channel quality indicator value.

A distinct Walsh cover on the Reverse Channel Quality Indicator Channel transmission indicates the member of the packet data channel active set selected by the mobile station for Forward Packet Data Channel transmissions. When the mobile station selects a new member of the packet data channel active set from which the mobile station will receive Forward Packet Data Channel transmissions, the mobile station invokes a switching procedure. To initiate the switch, the mobile station transmits a distinctive switching pattern on the Reverse Channel Quality Indicator Channel for some number of 20 ms periods. During the switching period, the Reverse Channel Quality Indicator Channel transmissions are modified to use the Walsh cover of the target base station in certain 1.25 ms frames.

There are two modes of operation of the Reverse Channel Quality Indicator Channel: full C/I feedback mode and differential C/I feedback mode. In the full C/I feedback mode, only full C/I reports are sent. In the differential C/I feedback mode, a pattern of full and differential C/I reports is sent. The base station can indicate that the mobile station is to alter the pattern of full and differential C/I reports to repeat the full C/I reports a total of two or four times.

The Reverse Channel Quality Indicator Channel pattern of full and differential C/I reports is also modified by the current reverse link pilot gating rate. When the Reverse Pilot Channel gating is enabled, the mobile station does not transmit on the Reverse Channel Quality Indicator Channel during the 1.25 ms slots in which the Reverse Pilot Channel is gated.

Further details of the timing and operating procedures for the Reverse Channel Quality Indicator Channel can be found in [3].

2.1.3.11.1 Reverse Channel Quality Indicator Channel Structure

The Reverse Channel Quality Indicator Channel structure is shown in Figure 2.1.3.1.1.1-12. The MAC Layer instructs the Physical Layer what to transmit on the Reverse Channel Quality Indicator Channel for each frame. When the mobile station receives a PHY-RCQICH.Request primitive from the MAC Layer with CQI_VALUE set to a 4-bit value, the mobile station shall map these 4 bits into 12 symbols using a (12, 4) block code according to 2.1.3.1.5.3.1.

When the mobile station receives a PHY-RCQICH.Request primitive from the MAC Layer with CQI_VALUE set to 'UP' or 'DOWN', the mobile station shall map it into a Channel Quality Indicator Channel bit (a_0), and it shall be repeated 12 times to form 12 symbols according to Figure 2.1.3.1.1.1-12. If the CQI_VALUE is 'UP', the mobile station shall set a_0 to '1'. If the CQI_VALUE is 'DOWN', the mobile station shall set a_0 to '0'. See [3] for more details.

An 8-ary Walsh function specified by the WALSH_COVER parameter of the PHY-RCQICH.Request primitive shall be used to spread the Reverse Channel Quality Indicator Channel transmission to indicate the base station identity. The Reverse Channel Quality Indicator Channel shall be covered with the Walsh function as specified in Table 2.1.3.11.1-1.

Table 2.1.3.11.1-1. Walsh Function Selection for the Channel Quality Indicator Channel

WALSH_COVER	8-ary Walsh Function for Reverse Channel Quality Indicator Channel Transmission
'000'	'00000000'
'001'	'01010101'
'010'	'00110011'
'011'	'01100110'
'100'	'00001111'
'101'	'01011010'
'110'	'00111100'
'111'	'01101001'

A Reverse Channel Quality Indicator Channel frame shall begin only when System Time is an integral multiple of 1.25 ms (see Figure 1.3-1). It may be offset from the Reverse Traffic Channel frames as specified in [3].

2.1.3.11.2 Reverse Channel Quality Indicator Channel Modulation and Orthogonal Spreading

The Reverse Channel Quality Indicator Channel shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.11.3 Reverse Channel Quality Indicator Channel Gating

The Reverse Channel Quality Indicator Channel shall be gated off unless specified otherwise by the MAC Layer at every Reverse Channel Quality Indicator Channel frame boundary.

2.1.3.11.4 Reverse Channel Quality Indicator Channel Quadrature Spreading

The Reverse Channel Quality Indicator Channel shall be quadrature spread as specified in 2.1.3.1.17. If the Reverse Fundamental Channel is assigned, the Reverse Channel Quality Indicator Channel shall be transmitted on the I-channel. Otherwise, the Reverse Channel Quality Indicator Channel shall be transmitted on the Q-channel.

2.1.3.11.5 Reverse Channel Quality Indicator Channel Baseband Filtering

The Reverse Channel Quality Indicator Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.11.6 Reverse Channel Quality Indicator Channel Transmission Processing

When the Physical Layer receives a PHY-RCQICH.Request(WALSH_COVER, CQI_VALUE, CQI_GAIN) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments WALSH_COVER, CQI_VALUE, and CQI_GAIN.
- Transmit the channel quality indicator value, CQI_VALUE, on the Reverse Channel Quality Indicator Channel using the Walsh cover WALSH_COVER with the relative gain specified by CQI_GAIN (see Table 2.1.2.3.3.6-1).

2.1.3.12 Reverse Fundamental Channel

The Reverse Fundamental Channel is used for the transmission of user and signaling information to the base station during a call. The Reverse Traffic Channel may contain up to one Reverse Fundamental Channel.

2.1.3.12.1 Reverse Fundamental Channel Time Alignment and Modulation Rates

When operating with Radio Configuration 1, the mobile station shall transmit information on the Reverse Fundamental Channel at variable data rates of 9600, 4800, 2400, and 1200 bps.

When operating with Radio Configuration 2, the mobile station shall transmit information on the Reverse Fundamental Channel at variable data rates of 14400, 7200, 3600, and 1800 bps.

When operating with Radio Configurations 3 and 5, the mobile station shall transmit information on the Reverse Fundamental Channel at variable data rates of 9600, 4800, 2700, and 1500 bps during 20 ms frames or at 9600 bps during 5 ms frames. The mobile station may support flexible data rates. If flexible data rates are supported, the mobile station should support variable data rates corresponding to 1 to 171 information bits per 20 ms frame on the Reverse Fundamental Channel. The minimum number of flexible data rates used in variable rate operation is not specified.

When operating with Radio Configurations 4 and 6, the mobile station shall transmit information on the Reverse Fundamental Channel at variable data rates of 14400, 7200, 3600, and 1800 bps during 20 ms frames or at 9600 bps during 5 ms frames. If flexible data rates are supported, the mobile station should support variable rates corresponding to 1 to 268 information bits per 20 ms frame on the Reverse Fundamental Channel. The minimum number of flexible data rates used in variable rate operation is not specified.

When operating with reverse link Radio Configuration 8, the mobile station shall transmit information on the Reverse Fundamental Channel at variable data rates of 9600, 5000, 3000, 1800, or 0 bps during 20 ms frames.

Reverse Fundamental Channel frames with Radio Configurations 1, 2, and 8 shall be 20 ms in duration. Reverse Fundamental Channel frames with Radio Configurations 3 through 6 shall be 5 or 20 ms in duration. The data rate and frame duration on a Reverse Fundamental Channel within a radio configuration shall be selected on a frame-by-frame basis. Although the data rate may vary on a frame-by-frame basis, the modulation symbol rate is kept constant by code repetition. A mobile station operating with Radio Configurations 3 through 6 may discontinue transmission of the Reverse Fundamental Channel for up to three 5 ms frames in a 20 ms frame. A mobile station operating with reverse link Radio Configuration 8 shall discontinue transmission of the Reverse Fundamental Channel before the end of a 20 ms frame if it receives an acknowledgment from the base station.

The mobile station shall support Reverse Fundamental Channel frames that are time offset by multiples of 1.25 ms. The amount of the time offset is specified by FRAME_OFFSET_S. A zero-offset 20 ms Reverse Fundamental Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 5 ms Reverse Fundamental Channel frame shall begin only when System Time is an integral multiple of 5 ms. An offset 20 ms Reverse Fundamental Channel frame shall begin $1.25 \times \text{FRAME\_OFFSET}_S$ ms later than the zero-offset 20 ms Reverse Fundamental Channel frame. An offset 5 ms Reverse Fundamental Channel frame shall begin $1.25 \times (\text{FRAME\_OFFSET}_S \bmod 4)$ ms later than the zero-offset 5 ms Reverse Fundamental Channel frame. The interleaver block for the Reverse Fundamental Channel shall be aligned with the Reverse Fundamental Channel frame.

For reverse link Radio Configuration 8, the mobile station shall transmit a frame at 9600, 5000, 3000, or 1800 bps on the Reverse Fundamental Channel when $(\text{FRAME\_NUMBER} + \text{FRAME\_OFFSET}_S) \bmod M = 0$, where M = 1, 4, or 8 for REV-FCH_BLANKING_DUTYCYCLE_IN_USE = 0, 1, or 2, respectively. The mobile station shall transmit the Null Traffic Data on the Reverse Fundamental Channel if no other traffic data is available in a frame when a non-zero data rate frame is required to be transmitted.Reverse Fundamental Channel Frame Structure

Table 2.1.3.12.1-1 summarizes the Reverse Fundamental Channel bit allocations for non-flexible data rates. Table 2.1.3.12.1-2 summarizes the Reverse Fundamental Channel bit allocations for flexible data rates. The order of the bits is shown in Figure 2.1.3.12.1-1.

The 2400 and 1200 bps frames with Radio Configuration 1 shall consist of the information bits followed by eight Encoder Tail Bits. All 5 ms frames, all frames with Radio Configurations 3, 5, and 8, and the 9600 and 4800 bps frames with Radio Configuration 1 shall consist of the information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits. All 20 ms frames with Radio Configurations 2, 4, and 6 shall consist of zero or one Reserved/Erasure Indicator Bits, followed by the information bits, frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.12.1-1. Reverse Fundamental Channel Frame Structure Summary for Non-flexible Data Rates

Radio Config.	Transmission Rate (bps)	Number of Bits per Frame				
		Total	Reserved/ Erasure Indicator	Information	Frame Quality Indicator	Encoder Tail
1	9600	192	0	172	12	8
	4800	96	0	80	8	8
	2400	48	0	40	0	8
	1200	24	0	16	0	8
2	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
3 and 5	9600 (5 ms)	48	0	24	16	8
	9600 (20 ms)	192	0	172	12	8
	4800	96	0	80	8	8
	2700	54	0	40	6	8
	1500	30	0	16	6	8
4 and 6	9600 (5 ms)	48	0	24	16	8
	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
8	9600	192	0	172	12	8
	5000	100	0	80	12	8
	3000	60	0	40	12	8
	1800	36	0	16	12	8
	0	0	0	0	0	0

Table 2.1.3.12.1-2. Reverse Fundamental Channel Frame Structure Summary for Flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Encoder Tail
3 and 5	4850 to 9600	97 to 192	73 to 168	16	8
	4850 to 9550	97 to 191	77 to 171	12	8
	2750 to 4800	55 to 96	31 to 72	16	8
	2750 to 4800	55 to 96	35 to 76	12	8
	2750 to 4750	55 to 95	39 to 79	8	8
	1550 to 2700	31 to 54	7 to 30	16	8
	1550 to 2700	31 to 54	11 to 34	12	8
	1550 to 2700	31 to 54	15 to 38	8	8
	1550 to 2650	31 to 53	17 to 39	6	8
	1250 to 1500	25 to 30	1 to 6	16	8
	1050 to 1500	21 to 30	1 to 10	12	8
	850 to 1500	17 to 30	1 to 14	8	8
	750 to 1450	15 to 29	1 to 15	6	8
4 and 6	7250 to 14400	145 to 288	121 to 264	16	8
	7250 to 14300, 14400	145 to 286, 288	125 to 266, 268	12	8
	3650 to 7200	73 to 144	49 to 120	16	8
	3650 to 7200	73 to 144	53 to 124	12	8
	3650 to 7100, 7200	73 to 142, 144	55 to 124, 126	10	8
	1850 to 3600	37 to 72	13 to 48	16	8
	1850 to 3600	37 to 72	17 to 52	12	8
	1850 to 3600	37 to 72	19 to 54	10	8
	1850 to 3500, 3600	37 to 70, 72	21 to 54, 56	8	8
	1250 to 1800	25 to 36	1 to 12	16	8
	1050 to 1800	21 to 36	1 to 16	12	8
	950 to 1800	19 to 36	1 to 18	10	8
	850 to 1800	17 to 36	1 to 20	8	8
	750 to 1700, 1800	15 to 34, 36	1 to 20, 22	6	8

R/E	Information Bits	F	T

Notation

R/E - Reserved/Erasure Indicator Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.12.1-1. Reverse Fundamental Channel Frame Structure

2.1.3.12.1.1 Reverse Fundamental Channel Frame Quality Indicator

Each frame with Radio Configurations 2, 3, 4, 5, 6, 8, and the 9600 and 4800 bps frames of Radio Configuration 1 shall include a frame quality indicator. This frame quality indicator is a CRC.[28] No frame quality indicator is used for the 2400 and 1200 bps data rates of Radio Configuration 1.

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits.

The 5 ms frames shall use a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1.

The 9600 bps transmissions with Radio Configuration 1 and the 14400 bps transmissions with Radio Configuration 2 shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The 7200 bps transmissions with Radio Configuration 2 shall use a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3.

The 4800 bps transmissions with Radio Configuration 1 and the 3600 bps transmissions with Radio Configuration 2 shall use an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4.

The 1800 bps transmissions with Radio Configuration 2 shall use a 6-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.6.

The 20 ms frames in Radio Configurations 3 and 5 with more than 96 total bits and in Radio Configurations 4 and 6 with more than 144 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 may be used if flexible data rates are supported.

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[28]The frame quality indicator supports two functions at the receiver: The first function is to determine whether the frame is in error. The second function is to assist in the determination of the data rate of the received frame. Other parameters may be needed for rate determination in addition to the frame quality indicator, such as symbol error rate evaluated at the four data rates of the Reverse Fundamental Channel.

The 20 ms frames in Radio Configurations 4 and 6 with 73 to 144 total bits shall use a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 3 and 5 with 55 to 96 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 4 and 6 with 37 to 72 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2, or a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 3 and 5 with 54 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2, or an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 4 and 6 with 36 or fewer total bits shall use a 6-bit frame quality indicator. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2, a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3, or an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configuration 8 with 192, 100, 60, and 36 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.12.1.2 Reverse Fundamental Channel Encoder Tail Bits

The last eight bits of each Reverse Fundamental Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

2.1.3.12.1.3 Reverse Traffic Channel Preambles

The Reverse Traffic Channel preamble is transmitted on the Reverse Pilot Channel or Reverse Fundamental Channel to aid the base station in acquiring the Reverse Fundamental Channel transmissions.

2.1.3.12.1.3.1 Radio Configurations 1 and 2

The Reverse Traffic Channel preamble shall consist of a frame of all zeros that is transmitted with a 100% transmission duty cycle. The Reverse Traffic Channel preamble shall not include the frame quality indicator. For Radio Configuration 1, the Reverse Traffic Channel preamble shall consist of 192 zeros that are transmitted at the 9600 bps rate. For Radio Configuration 2, the Reverse Traffic Channel preamble shall consist of 288 zeros that are transmitted at the 14400 bps rate.

When performing a hard handoff, the mobile station shall transmit the Reverse Traffic Channel preamble for NUM_PREAMBLE_s frames.

2.1.3.12.1.3.2 Radio Configurations 3, 4, 5, 6, and8

2.1.3.12.2 The Reverse Traffic Channel preamble is transmitted on the Reverse Pilot Channel as specified in 2.1.3.2.4.Reverse Fundamental Channel Convolutional Encoding

The Reverse Fundamental Channel shall be convolutionally encoded as specified in 2.1.3.1.5.

When generating Reverse Fundamental Channel data, the encoder shall be initialized to the all-zero state at the end of each 5 or 20 ms frame.

2.1.3.12.3 Reverse Fundamental Channel Code Symbol Repetition

Reverse Fundamental Channel code symbol repetition shall be as specified in 2.1.3.1.6.

2.1.3.12.4 Reverse Fundamental Channel Code Symbol Puncturing

Reverse Fundamental Channel code symbol puncturing shall be as specified in 2.1.3.1.7.

2.1.3.12.5 Reverse Fundamental Channel Interleaving

The Reverse Fundamental Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.12.6 Reverse Fundamental Channel Modulation and Orthogonal Spreading

When using Radio Configurations 1 and 2, the Reverse Fundamental Channel data shall be modulated as specified in 2.1.3.1.13.1. When using Radio Configurations 3, 4, 5, 6, and 8, the Reverse Fundamental Channel data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.2.

2.1.3.12.7 Reverse Fundamental Channel Gating

The mobile station shall perform the data burst randomizing function as specified in 2.1.3.1.14 while transmitting on the Reverse Fundamental Channel with Radio Configuration 1 or 2.

The transmission of the Reverse Fundamental Channel with Radio Configuration 3, 4, 5, or 6 may be gated when no other Reverse Traffic Channel is assigned, FPC_MODE_s is not ‘010’, and the data rate is 1500 bps for Radio Configuration 3 and 5, or 1800 bps for Radio Configuration 4 and 6. The mobile station shall operate in the Reverse Fundamental Channel gating mode if and only if $\text{REV\_FCH\_GATING\_MODE}_s$ is equal to ‘1’.

When the Reverse Fundamental Channel with Radio Configuration 3, 4, 5, or 6 is operated in the gated mode at a data rate of 1500 bps for Radio Configurations 3 and 5, or 1800 bps for Radio Configurations 4 and 6 (i.e., when $REV\_FCH\_GATING\_MODE_s = 1$), the Reverse Fundamental Channel shall have a transmission duty cycle of 50%. The Reverse Fundamental Channel shall be transmitted in power control groups 2, 3, 6, 7, 10, 11, 14, and 15, and shall not be transmitted in power control groups 0, 1, 4, 5, 8, 9, 12, and 13, as shown in Figure 2.1.3.12.7-1.

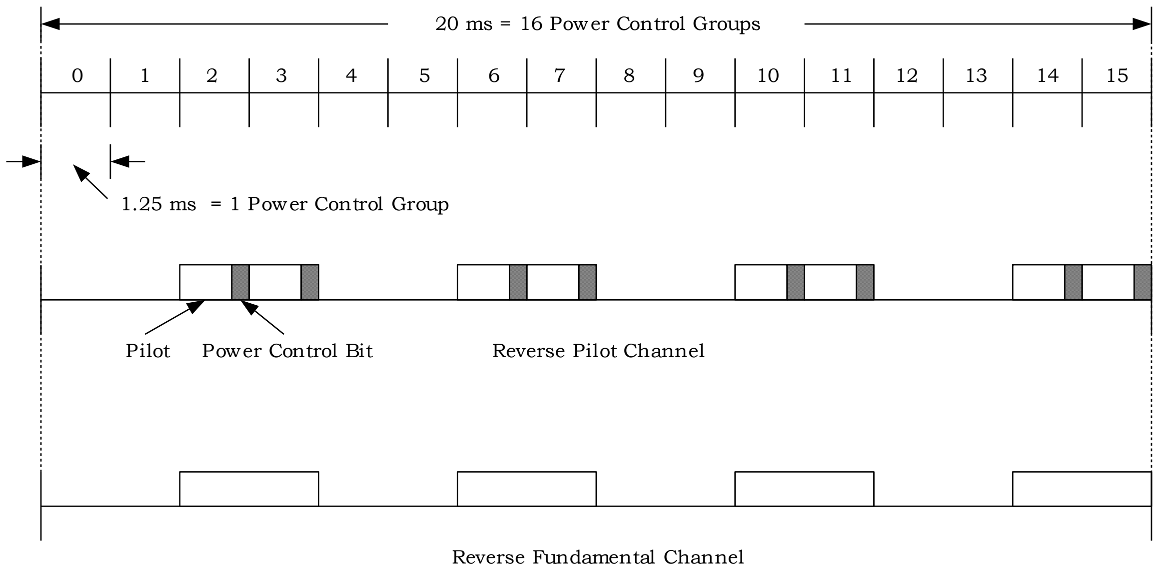


Figure 2.1.3.12.7-1. Gating Operation When the Reverse Fundamental Channel Data Rate is 1500 bps for Radio Configuration 3 and 5 or 1800 bps for Radio Configuration 4 and 6

2.1.3.12.8 Reverse Fundamental Channel Direct Sequence Spreading

When operating in Radio Configuration 1 or 2, the Reverse Fundamental Channel shall be spread by the long code as specified in 2.1.3.1.16.

2.1.3.12.9 Reverse Fundamental Channel Quadrature Spreading

The Reverse Fundamental Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.12.10 Reverse Fundamental Channel Baseband Filtering

The Reverse Fundamental Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.12.11 Reverse Fundamental Channel Transmission Processing

When the Physical Layer receives a PHY-FCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.

- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU on a Reverse Fundamental Channel frame of duration FRAME_DURATION (5 ms or 20 ms). If a PHY-FCH.Request primitive for a 5 ms frame is received coincident with a PHY-FCH.Request primitive for a 20 ms frame or during transmission of a 20 ms frame, then the mobile station may preempt transmission of the 20 ms frame and transmit a 5 ms frame. Transmission of the 20 ms frame may start or resume after completion of the 5 ms frame. If transmission of the 20 ms frame is resumed after an interruption in transmission, then the relative power level of the Reverse Fundamental Channel modulation symbols shall be equal to that of the modulation symbols sent prior to the preemption.

2.1.3.13 Reverse Supplemental Channel

The Reverse Supplemental Channel applies to Radio Configurations 3, 4, 5, 6, and 8 only.

The Reverse Supplemental Channel is used for the transmission of higher-level data to the base station during a call. The Reverse Traffic Channel contains up to two Reverse Supplemental Channels.

2.1.3.13.1 Reverse Supplemental Channel Time Alignment and Modulation Rates

When transmitting on the Reverse Supplemental Channel with a single assigned data rate in Radio Configuration 3, the mobile station shall transmit information at fixed data rates of 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.The mobile station may support flexible data rates. If flexible data rates are supported,

- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 3, the mobile station should transmit information at a fixed data rate corresponding to 15 to 6143 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 16 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 3, the mobile station should transmit information at a fixed data rate corresponding to 31 to 6143 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 40 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 3, the mobile station should transmit information at a fixed data rate corresponding to 55 to 6143 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 80 information bits per frame.

When transmitting on the Reverse Supplemental Channel with a single assigned data rate in Radio Configuration 4, the mobile station shall transmit information at fixed data rates of 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

If flexible data rates are supported,

- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 4, the mobile station should transmit information at a fixed data rate corresponding to 15 to 4607 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 22 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 4, the mobile station should transmit information at a fixed data rate corresponding to 37 to 4607 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 56 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 4, the mobile station should transmit information at a fixed data rate corresponding to 73 to 4607 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 126 information bits per frame.

When transmitting on the Reverse Supplemental Channel with a single assigned data rate in Radio Configuration 5, the mobile station shall transmit information at a fixed data rate of 614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.

If flexible data rates are supported,

- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 5, the mobile station should transmit information at a fixed data rate corresponding to 15 to 12287 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 16 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 5, the mobile station should transmit information at a fixed data rate corresponding to 31 to 12287 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 40 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 5, the mobile station should transmit information at a fixed data rate corresponding to 55 to 12287 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 80 information bits per frame.

When transmitting on the Reverse Supplemental Channel with a single assigned data rate in Radio Configuration 6, the mobile station shall transmit information at a fixed data rate of 1036800, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

If flexible data rates are supported,

- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 6, the mobile station should transmit information at a fixed data rate corresponding to 15 to 20735 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 22 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 6, the mobile station should transmit information at a fixed data rate corresponding to 37 to 20735 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 56 information bits per frame.
- When transmitting on the Reverse Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 6, the mobile station should transmit information at a fixed data rate corresponding to 73 to 20735 total bits per frame in 1 bit increments. The mobile station need not support flexible rates with less than 126 information bits per frame.

When transmitting on the Reverse Supplemental Channel with a single assigned data rate in Radio Configuration 8, the mobile station shall transmit information at fixed data rates of 307200, 153600, 76800, 38400, 19200, or 9600 bps.

If the mobile station is operating with Radio Configuration 8 and is assigned a Reverse Supplemental Channel, it shall set REV-FCH_BLANKING_DUTYCYCLE_IN_USE to '0'.

When using variable-rate transmission on the Reverse Supplemental Channel with multiple assigned data rates in Radio Configurations 3, 4, 5, and 6, the mobile station shall

- Transmit information at the maximal assigned data rate, or
- Transmit information at the other assigned data rates with the same modulation symbol rate as that of the maximal assigned data rate. To achieve a higher modulation symbol rate, repetition or puncturing is applied to the specified data rate.

If the mobile station supports the Reverse Supplemental Channel, the mobile station shall support Reverse Supplemental Channel frames that are 20 ms in duration. The mobile station may support Reverse Supplemental Channel frames that are 40 or 80 ms in duration. The mobile station may support discontinuous transmission of Reverse Supplemental Channel frames.

The mobile station shall support Reverse Supplemental Channel frames that are time offset by multiples of 1.25 ms as specified by FRAME_OFFSET_S. The mobile station may support 40 or 80 ms Reverse Supplemental Channel frames that are time offset by multiples of 20 ms as specified by $\text{REV\_SCH\_FRAME\_OFFSET}_S$[i], where i = 1 and 2 for Reverse Supplemental Channel 1 and Reverse Supplemental Channel 2, respectively.

The amount of the time offset is specified by FRAME_OFFSET_S and $\text{REV\_SCH\_FRAME\_OFFSET}_S$[i], where i = 1 or 2. A zero-offset 20 ms Reverse Supplemental Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 40 ms Reverse Supplemental Channel frame shall begin only when System Time is an integral multiple of 40 ms. A zero-offset 80 ms Reverse Supplemental Channel frame shall begin only when System Time is an integral multiple of 80 ms. An offset 20 ms Reverse Supplemental Channel frame shall begin $1.25 \times \text{FRAME\_OFFSET}_s$ ms later than the zero-offset 20 ms Reverse Supplemental Channel frame. An offset 40 ms Reverse Supplemental Channel frame shall begin $(1.25 \times \text{FRAME\_OFFSET}_s + 20 \times \text{REV\_SCH\_FRAME\_OFFSET}_s[i])$ ms later than the zero-offset 40 ms Reverse Supplemental Channel frame. An offset 80 ms Reverse Supplemental Channel frame shall begin $(1.25 \times \text{FRAME\_OFFSET}_s + 20 \times \text{REV\_SCH\_FRAME\_OFFSET}_s[i])$ ms later than the zero-offset 80 ms Reverse Supplemental Channel frame. The interleaver block for the Reverse Supplemental Channels shall be aligned with the Reverse Supplemental Channel frame.

2.1.3.13.2 Reverse Supplemental Channel Frame Structure

Table 2.1.3.13.2-1 through Table 2.1.3.13.2-3 summarize the Reverse Supplemental Channel bit allocations for non-flexible data rates. Table 2.1.3.13.2-4 through Table 2.1.3.13.2-8 summarize the Reverse Supplemental Channel bit allocations for flexible data rates. All frames shall consist of zero or one Reserved Bits followed by the information bits, a frame quality indicator (CRC), and eight Encoder Tail Bits, as shown in Figure 2.1.3.13.2-1.

All frames with Radio Configurations 3 and 5 and the frames with Radio Configurations 4 and 6 with data rates above 14400 bps shall consist of the information bits, followed by the frame quality indicator (CRC) and eight Encoder Tail Bits. All frames with Radio Configurations 4 and 6 with data rates equal to or less than 14400 bps shall consist of zero or one Reserved Bits, followed by the information bits, frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.13.2-1. Reverse Supplemental Channel Frame Structure Summary for 20 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail
3 and 5	614400	12288	0	12264	16	8
	307200	6144	0	6120	16	8
	153600	3072	0	3048	16	8
	76800	1536	0	1512	16	8
	38400	768	0	744	16	8
	19200	384	0	360	16	8
	9600	192	0	172	12	8
	4800	96	0	80	8	8
	2700	54	0	40	6	8
	1500	30	0	16	6	8
4 and 6	1036800	20736	0	20712	16	8
	460800	9216	0	9192	16	8
	230400	4608	0	4584	16	8
	115200	2304	0	2280	16	8
	57600	1152	0	1128	16	8
	28800	576	0	552	16	8
	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
8	307200	6144	0	6120	16	8
	153600	3072	0	3048	16	8
	76800	1536	0	1512	16	8
	38400	768	0	744	16	8
	19200	384	0	360	16	8
	9600	192	0	172	12	8

Note: The 614400 bps data rate applies to Radio Configuration 5. The 1036800 bps and 460800 bps data rates apply to Radio Configuration 6 only.

Table 2.1.3.13.2-2. Reverse Supplemental Channel Frame Structure Summary for 40 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail
3 and 5	307200	12288	0	12264	16	8
	153600	6144	0	6120	16	8
	76800	3072	0	3048	16	8
	38400	1536	0	1512	16	8
	19200	768	0	744	16	8
	9600	384	0	360	16	8
	4800	192	0	172	12	8
	2400	96	0	80	8	8
	1350	54	0	40	6	8
4 and 6	518400	20736	0	20712	16	8
	230400	9216	0	9192	16	8
	115200	4608	0	4584	16	8
	57600	2304	0	2280	16	8
	28800	1152	0	1128	16	8
	14400	576	0	552	16	8
	7200	288	1	267	12	8
	3600	144	1	125	10	8
	1800	72	1	55	8	8

Note: The 307200 bps data rate applies to Radio Configuration 5. The 518400 bps and 230400 bps data rates apply to Radio Configuration 6 only.

Table 2.1.3.13.2-3. Reverse Supplemental Channel Frame Structure Summary for 80 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Reserved/ Encoder Tail
3 and 5	153600	12288	0	12264	16	8
	76800	6144	0	6120	16	8
	38400	3072	0	3048	16	8
	19200	1536	0	1512	16	8
	9600	768	0	744	16	8
	4800	384	0	360	16	8
	2400	192	0	172	12	8
	1200	96	0	80	8	8
4 and 6	259200	20736	0	20712	16	8
	115200	9216	0	9192	16	8
	57600	4608	0	4584	16	8
	28800	2304	0	2280	16	8
	14400	1152	0	1128	16	8
	7200	576	0	552	16	8
	3600	288	1	267	12	8
	1800	144	1	125	10	8

Note: The 153600 bps data rate applies to Radio Configuration 5. The 259200 bps and 115200 bps data rates apply to Radio Configuration 6 only.

Table 2.1.3.13.2-4. Reverse Supplemental Channel Frame Structure Summary for 20 ms Frames for Flexible Data Rates (Part 1 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
5	307250 to 614350	6145 to 12287	6121 to 12263	16	8
3 and 5	153650 to 307150	3073 to 6143	3049 to 6119	16	8
	76850 to 153550	1537 to 3071	1513 to 3047	16	8
	38450 to 76750	769 to 1535	745 to 1511	16	8
	19250 to 38350	385 to 767	361 to 743	16	8
	9650 to 19150	193 to 383	169 to 359	16	8
	4850 to 9600	97 to 192	73 to 168	16	8
	4850 to 9550	97 to 191	77 to 171	12	8
	2750 to 4800	55 to 96	31 to 72	16	8
	2750 to 4800	55 to 96	35 to 76	12	8
	2750 to 4750	55 to 95	39 to 79	8	8
	1550 to 2700	31 to 54	7 to 30	16	8
	1550 to 2700	31 to 54	11 to 34	12	8
	1550 to 2700	31 to 54	15 to 38	8	8
	1550 to 2650	31 to 53	17 to 39	6	8
	1250 to 1500	25 to 30	1 to 6	16	8
	1050 to 1500	21 to 30	1 to 10	12	8
	850 to 1500	17 to 30	1 to 14	8	8
	750 to 1450	15 to 29	1 to 15	6	8

Table 2.1.3.13.2-5. Reverse Supplemental Channel Frame Structure Summary for 20 ms Frames for Flexible Data Rates (Part 2 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
6	460850 to 1036750	9217 to 20735	9193 to 20711	16	8
	230450 to 460750	4609 to 9215	4585 to 9191	16	8
4 and 6	115250 to 230350	2305 to 4607	2281 to 4583	16	8
	57650 to 115150	1153 to 2303	1129 to 2279	16	8
	28850 to 57550	577 to 1151	553 to 1127	16	8
	14450 to 28750	289 to 575	265 to 551	16	8
	7250 to 14400	145 to 288	121 to 264	16	8
	7250 to 14300, 14400	145 to 286, 288	125 to 266, 268	12	8
	3650 to 7200	73 to 144	49 to 120	16	8
	3650 to 7200	73 to 144	53 to 124	12	8
	3650 to 7100, 7200	73 to 142, 144	55 to 124, 126	10	8
	1850 to 3600	37 to 72	13 to 48	16	8
	1850 to 3600	37 to 72	17 to 52	12	8
	1850 to 3600	37 to 72	19 to 54	10	8
	1850 to 3500, 3600	37 to 70, 72	21 to 54, 56	8	8
	1250 to 1800	25 to 36	1 to 12	16	8
	1050 to 1800	21 to 36	1 to 16	12	8
	950 to 1800	19 to 36	1 to 18	10	8
	850 to 1800	17 to 36	1 to 20	8	8
	750 to 1700, 1800	15 to 34, 36	1 to 20, 22	6	8

Table 2.1.3.13.2-6. Reverse Supplemental Channel Frame Structure Summary for 40 ms Frames for Flexible Data Rates (Part 1 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
5	153625 to 307175	6145 to 12287	6121 to 12263	16	8
3 and 5	76825 to 153575	3073 to 6143	3049 to 6119	16	8
	38425 to 76775	1537 to 3071	1513 to 3047	16	8
	19225 to 38375	769 to 1535	745 to 1511	16	8
	9625 to 19175	385 to 767	361 to 743	16	8
	4825 to 9575	193 to 383	169 to 359	16	8
	2425 to 4800	97 to 192	73 to 168	16	8
	2425 to 4775	97 to 191	77 to 171	12	8
	1375 to 2400	55 to 96	31 to 72	16	8
	1375 to 2400	55 to 96	35 to 76	12	8
	1375 to 2375	55 to 95	39 to 79	8	8
	775 to 1350	31 to 54	7 to 30	16	8
	775 to 1350	31 to 54	11 to 34	12	8
	775 to 1350	31 to 54	15 to 38	8	8
	775 to 1325	31 to 53	17 to 39	6	8

Table 2.1.3.13.2-7. Reverse Supplemental Channel Frame Structure Summary for 40 ms Frames for Flexible Data Rates (Part 2 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
6	230425 to 518375	9217 to 20735	9193 to 20711	16	8
	115225 to 230375	4609 to 9215	4585 to 9191	16	8
4 and 6	57625 to 115175	2305 to 4607	2281 to 4583	16	8
	28825 to 57575	1153 to 2303	1129 to 2279	16	8
	14425 to 28775	577 to 1151	553 to 1127	16	8
	7225 to 14375	289 to 575	265 to 551	16	8
	3625 to 7200	145 to 288	121 to 264	16	8
	3625 to 7150, 7200	145 to 286, 288	125 to 266, 268	12	8
	1825 to 3600	73 to 144	49 to 120	16	8
	1825 to 3600	73 to 144	53 to 124	12	8
	1825 to 3550, 3600	73 to 142, 144	55 to 124, 126	10	8
	925 to 1800	37 to 72	13 to 48	16	8
	925 to 1800	37 to 72	17 to 52	12	8
	925 to 1800	37 to 72	19 to 54	10	8
	925 to 1750, 1800	37 to 70, 72	21 to 54, 56	8	8

Table 2.1.3.13.2-8. Reverse Supplemental Channel Frame Structure Summary for 80 ms Frames for Flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame: Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
5	76812.5 to 153587.5	6145 to 12287	6121 to 12263	16	8
3 and 5	38412.5 to 76787.5	3073 to 6143	3049 to 6119	16	8
	19212.5 to 38387.5	1537 to 3071	1513 to 3047	16	8
	9612.5 to 19187.5	769 to 1535	745 to 1511	16	8
	4812.5 to 9587.5	385 to 767	361 to 743	16	8
	2412.5 to 4787.5	193 to 383	169 to 359	16	8
	1212.5 to 2400	97 to 192	73 to 168	16	8
	1212.5 to 2387.5	97 to 191	77 to 171	12	8
	687.5 to 1200	55 to 96	31 to 72	16	8
	687.5 to 1200	55 to 96	35 to 76	12	8
	687.5 to 1187.5	55 to 95	39 to 79	8	8
6	115212.5 to 259187.5	9217 to 20735	9193 to 20711	16	8
	57612.5 to 115187.5	4609 to 9215	4585 to 9191	16	8
4 and 6	28812.5 to 57587.5	2305 to 4607	2281 to 4583	16	8
	14412.5 to 28787.5	1153 to 2303	1129 to 2279	16	8
	7212.5 to 14387.5	577 to 1151	553 to 1127	16	8
	3612.5 to 7187.5	289 to 575	265 to 551	16	8
	1812.5 to 3600	145 to 288	121 to 264	16	8
	1812.5 to 3575, 3600	145 to 286, 288	125 to 266, 268	12	8
	912.5 to 1800	73 to 144	49 to 120	16	8
	912.5 to 1800	73 to 144	53 to 124	12	8
	912.5 to 1775, 1800	73 to 142, 144	55 to 124, 126	10	8

R	Information Bits	F	R/T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
R/T - Reserved/Encoder Tail Bits

Figure 2.1.3.13.2-1. Reverse Supplemental Channel Frame Structure

2.1.3.13.2.1 Reverse Supplemental Channel Frame Quality Indicator

Each frame shall include a frame quality indicator. This frame quality indicator is a CRC.

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Reserved/Encoder Tail Bits.

Frames in Radio Configurations 3 and 5 with more than 192 total bits and in Radio Configurations 4 and 6 with more than 288 total bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1.

Frames in Radio Configurations 3 and 5 with 97 to 192 total bits and in Radio Configurations 4 and 6 with 145 to 288 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 may be used if flexible data rates are supported.

Frames in Radio Configurations 4 and 6 with 73 to 144 total bits shall use a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 may be used if flexible data rates are supported.

Frames in Radio Configurations 3 and 5 with 55 to 96 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2 may be used if flexible data rates are supported.

Frames in Radio Configurations 4 and 6 with 37 to 72 total bits shall use an 8-bit frame quality indicator. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality Indicator with the generator polynomial specified in 2.1.3.1.4.1.2, or a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3 may be used if flexible data rates are supported.

Frames in Radio Configurations 3 and 5 with 54 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2, or an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4 may be used if flexible data rates are supported.

Frames in Radio Configurations 4 and 6 with 36 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2, a 10-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.3, or an 8-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.4 may be used if flexible data rates are supported.

Frames in Radio Configurations 8 with more than 192 total bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1.

Frames in Radio Configurations 8 with 192 or fewer total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.13.2.2 Reverse Supplemental Channel Encoder Tail Bits

The last eight bits of each Reverse Supplemental Channel frame are called the Reserved/Encoder Tail Bits. For the convolutional encoder, these eight bits shall each be set to ‘0’. For the turbo encoder, the first two of the eight bits shall each be set to ‘0’, and the turbo encoder will calculate and append the remaining six tail bits.

2.1.3.13.3 Reverse Supplemental Channel Forward Error Correction Encoding

The Reverse Supplemental Channel shall be convolutionally or turbo encoded as specified in 2.1.3.1.5.

When generating Reverse Supplemental Channel data, the encoder shall be initialized to the all-zero state at the end of each frame.

2.1.3.13.4 Reverse Supplemental Channel Code Symbol Repetition

Reverse Supplemental Channel code symbol repetition shall be as specified in 2.1.3.1.6.

2.1.3.13.5 Reverse Supplemental Channel Code Symbol Puncturing

Reverse Supplemental Channel code symbol puncturing shall be as specified in 2.1.3.1.7.

2.1.3.13.6 Reverse Supplemental Channel Interleaving

The Reverse Supplemental Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.13.7 Reverse Supplemental Channel Modulation and Orthogonal Spreading

The Reverse Supplemental Channel data shall be modulated and orthogonally spread as specified in 2.1.3.1.13.

2.1.3.13.8 Reverse Supplemental Channel Quadrature Spreading

The Reverse Supplemental Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.13.9 Reverse Supplemental Channel Baseband Filtering

The Reverse Supplemental Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.13.10 Reverse Supplemental Channel Transmission Processing

When the Physical Layer receives a PHY-SCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Reverse Supplemental Channel frame of duration FRAME_DURATION (20, 40, or 80 ms).

2.1.3.14 Reverse Supplemental Code Channel

The Reverse Supplemental Code Channel applies to Radio Configurations 1 and 2 only.

The Reverse Supplemental Code Channel is used for the transmission of higher-level data to the base station during a call. The Reverse Traffic Channel contains up to seven Reverse Supplemental Code Channels.

2.1.3.14.1 Reverse Supplemental Code Channel Time Alignment and Modulation Rates

When transmitting on Reverse Supplemental Code Channels with Radio Configuration 1, the mobile station shall transmit information at 9600 bps. When transmitting on Reverse Supplemental Code Channels with Radio Configuration 2, the mobile station shall transmit information at 14400 bps.

The Reverse Supplemental Code Channel frame shall be 20 ms in duration.

The mobile station shall transmit Reverse Supplemental Code Channels within 3/8 of a PN chip (305.1758 ns) of the Reverse Fundamental Channel.

The mobile station shall support Reverse Supplemental Code Channel frames that are time offset by multiples of 1.25 ms. The amount of the time offset is specified by FRAME_OFFSET_S. A zero-offset Reverse Supplemental Code Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). An offset Reverse Supplemental Code Channel frame shall begin $1.25 \times \text{FRAME\_OFFSET}_S$ ms later than the zero-offset Reverse Supplemental Code Channel frame. The mobile station shall transmit frames on the Reverse Supplemental Code Channels in time alignment with the Reverse Fundamental Channel. The interleaver block for the Reverse Supplemental Code Channels shall be aligned with the Reverse Supplemental Code Channel frame.

2.1.3.14.2 Reverse Supplemental Code Channel Frame Structure

Table 2.1.3.14.2-1 summarizes the Reverse Supplemental Code Channel bit allocations. The order of the bits is shown in Figure 2.1.3.14.2-1.

Radio Configuration 1 frames shall consist of the information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits. Radio Configuration 2 frames shall consist of a Reserved Bit, followed by the information bits, a frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.14.2-1. Reverse Supplemental Code Channel Frame Structure Summary

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Encoder Tail
1	9600	192	0	172	12	8
2	14400	288	1	267	12	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.14.2-1. Reverse Supplemental Code Channel Frame Structure

2.1.3.14.2.1 Reverse Supplemental Code Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. Each frame with Radio Configuration 1 and 2 shall include a 12-bit frame quality indicator with the generator polynomial as specified in 2.1.3.1.4.1.2. This frame quality indicator is a CRC.

The frame quality indicator shall be computed as specified in 2.1.3.1.4.

2.1.3.14.2.2 Reverse Supplemental Code Channel Encoder Tail Bits

The last eight bits of each Reverse Supplemental Code Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

2.1.3.14.2.3 Reverse Supplemental Code Channel Preambles

The Reverse Supplemental Code Channel preamble is transmitted on the Reverse Supplemental Code Channel to aid the base station in acquiring the Reverse Supplemental Code Channel transmissions.

2.1.3.14.2.3.1 Reverse Supplemental Code Channel Preamble

The Reverse Supplemental Code Channel preamble shall consist of $NUM\_PREAMBLE\_FRAMES_S$ frames of all zeros that are transmitted with a 100%

transmission duty cycle. The Reverse Supplemental Code Channel preamble shall not include the frame quality indicator. For Radio Configuration 1, each frame of the Reverse Supplemental Code Channel preamble shall consist of 192 zeros that are transmitted at the 9600 bps rate. For Radio Configuration 2, each frame of the Reverse Supplemental Code Channel preamble shall consist of 288 zeros that are transmitted at the 14400 bps rate.

2.1.3.14.2.3.2 Reverse Supplemental Code Channel Discontinuous Transmission Preamble

When discontinuous transmission is permitted on the Reverse Supplemental Code Channel, the mobile station may resume transmission following a break in the Reverse Supplemental Code Channel transmission. When transmission on a Reverse Supplemental Code Channel is resumed, the mobile station shall transmit a preamble, consisting of $\mathrm{RESUME\_PREAMBLE}_s$ frames of all zeros that are transmitted with a 100% transmission duty cycle. The preamble frames shall not include the frame quality indicator.

For Radio Configuration 1, each frame of the Reverse Supplemental Code Channel preamble shall consist of 192 zeros that are transmitted at the 9600 bps rate. For Radio Configuration 2, each frame of the Reverse Supplemental Code Channel Discontinuous Transmission preamble shall consist of 288 zeros that are transmitted at the 14400 bps rate.

2.1.3.14.3 Reverse Supplemental Code Channel Convolutional Encoding

The Reverse Supplemental Channel shall be convolutionally encoded as specified in 2.1.3.1.5.

When generating Reverse Supplemental Code Channel data, the encoder shall be initialized to the all-zero state at the end of each 20 ms frame.

2.1.3.14.4 Reverse Supplemental Code Channel Code Symbol Repetition

Reverse Supplemental Code Channel code symbol repetition shall be as specified in 2.1.3.1.6.

2.1.3.14.5 Reverse Supplemental Code Channel Interleaving

The Reverse Supplemental Code Channel shall be interleaved as specified in 2.1.3.1.8.

2.1.3.14.6 Reverse Supplemental Code Channel Modulation

The Reverse Supplemental Code Channel data shall be modulated as specified in 2.1.3.1.13.

2.1.3.14.7 Reverse Supplemental Code Channel Direct Sequence Spreading

The Reverse Supplemental Code Channel shall be spread by the long code as specified in 2.1.3.1.16.

2.1.3.14.8 Reverse Supplemental Code Channel Quadrature Spreading

The Reverse Supplemental Code Channel shall be quadrature spread by the pilot PN sequences as specified in 2.1.3.1.17.

2.1.3.14.9 Reverse Supplemental Code Channel Baseband Filtering

The Reverse Supplemental Code Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.14.10 Reverse Supplemental Code Channel Transmission Processing

When the Physical Layer receives a PHY-SCCHPreamble.Request(NUM_PREAMBLE_FRAMES) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments NUM_PREAMBLE_FRAMES.
- Transmit NUM_PREAMBLE_FRAMES Reverse Supplemental Code Channel preamble frames.

When the Physical Layer receives a PHY-SCCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Reverse Supplemental Code Channel frame.

2.1.3.15 Reverse Packet Data Channel

The Reverse Packet Data Channel is used for the transmission of higher-level data to the base stations by the mobile stations operating with Spreading Rate 1.

2.1.3.15.1 Reverse Packet Data Channel Structure, Time Alignment, and Modulation Rates

The Reverse Packet Data Channel shall transmit 174, 386, 770, 1538, 3074, 4610, 6146, 9218, 12290, 15362, or 18434 information bits. Frame quality indicator and encoder tail bits shall be appended to the information bits as specified in 2.1.3.15.2 to form encoder packets. The encoder packets shall be encoded with a rate 1/5 turbo encoder and interleaved. The symbols from the interleaved sequence shall then be selected for transmission as a subpacket as specified in 2.1.3.1.10. The selected subpacket symbols shall be modulated into BPSK, QPSK, or 8-PSK symbols. For encoder packet sizes of 192, 408, 792, or 1560 bits, the modulated symbols shall be spread with a 4-chip Walsh function. For an encoder packet size of 3096 bits, the modulated symbols shall be spread with a 2-chip Walsh function. For encoder packet sizes of 4632, 6168, 9240, 12312, 15384, or 18456 bits, the modulated symbols shall be sequence demultiplexed and Walsh processed as specified in 2.1.3.1.12.

If the mobile station supports the Reverse Packet Data Channel with Radio Configuration 7, the mobile station shall support encoder packet sizes of 192, 408, 792, 1560, 3096, 4632, 6168, 9240, and 12312 bits. If the mobile station supports the Reverse Packet Data Channel with Radio Configuration 7, the mobile station may support encoder packet sizes of 15384 or 18456 bits. If the mobile station supports an encoder packet size of 18456 bits, the mobile station shall support an encoder packet size of 15384 bits.

An encoder packet shall be transmitted using from one to three 10-ms subpackets. A Reverse Packet Data Channel frame starts only when System Time is an integral multiple of

10 ms (see Figure 1.3-1), and may be offset from the frames of the Reverse Traffic Channels operating with Radio Configuration 3 and 4 as specified in [3]. The selected symbols for each subpacket of the encoder packet will be different, but the modulation and Walsh spreading shall be the same for all of the subpackets of an encoder packet.

The subpacket data rates shall be from 19.2 kbps to 1.8456 Mbps, as given in Table 2.1.3.1.3-1.

2.1.3.15.2 Reverse Packet Data Channel Encoder Packet Structure

Encoder packets shall consist of the information bits followed by the frame quality indicator bits followed by 6 turbo encoder tail allowance bits. The order of the bits is shown in Figure 2.1.3.15.2-1.

Information Bits 174, 386, 770, 1538, 3074, 4610, 6146, 9218, 12290, 15362, or 18434 Bits	Frame Quality Indicator (12 or 16 Bits)	Turbo Encoder Tail Allowance (6 Bits)

Figure 2.1.3.15.2-1. Reverse Packet Data Channel Encoder Packet Structure

2.1.3.15.2.1 Reverse Packet Data Channel Encoder Packet Frame Quality Indicator

Each encoder packet shall include a frame quality indicator. The frame quality indicator shall be calculated on all the bits within the encoder packet except the Frame Quality Indicator itself and the Encoder Tail Bit Allowance. Encoder packets with 192 bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.2. Encoder packets with 408, 792, 1560, 3096, 4632, 6168, 9240, 12312, 15384, or 18456 bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 2.1.3.1.4.1.1.

The frame quality indicators shall be computed as specified in 2.1.3.1.4.

2.1.3.15.2.2 Reverse Packet Data Channel Encoder Tail Allowance

Encoder packets include a 6-bit turbo encoder tail allowance, as described in 2.1.3.15.2. The turbo encoder discards the turbo encoder tail allowance bits and appends turbo encoder output tail bits such that the number of bits out of the rate-1/5 turbo encoder is five times the number of bits in an encoder packet.

2.1.3.15.3 Reverse Packet Data Channel Turbo Encoding

Encoder packets shall be turbo coded with a code rate of 1/5 as specified in 2.1.3.1.5.

2.1.3.15.4 Reverse Packet Data Channel Interleaving

The turbo encoder output sequence shall be interleaved as specified in 2.1.3.1.8.3.

2.1.3.15.5 Reverse Packet Data Channel Subpacket Symbol Selection

Subpacket symbols are selected from the interleaver output sequence as specified in 2.1.3.1.10.

2.1.3.15.6 Reverse Packet Data Channel Modulation and Orthogonal Spreading

The symbols from the subpacket symbol selection process shall be modulated as specified in 2.1.3.1.11 orthogonally spread as specified in 2.1.3.1.13.2.

2.1.3.15.7 Reverse Packet Data Channel Quadrature Spreading

The Reverse Packet Data Channel shall be quadrature spread as specified in 2.1.3.1.17.

2.1.3.15.8 Reverse Packet Data Channel Baseband Filtering

The Reverse Packet Data Channel shall be filtered as specified in 2.1.3.1.18.

2.1.3.15.9 Reverse Packet Data Channel Encoding Processing

When the Physical Layer receives a PHY-EncodeRPDCH.Request(SDU, NUM_BITS, SYS_TIME) from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, NUM_BITS, and SYS_TIME.
- Set the information bits to SDU.
- Set the number of information bits to NUM_BITS.

Encode the information bits to form an encoded packet as specified in 2.1.3.15.2, and send a PHY-EncodeRPDCH.Indication(RETURNED_EP, SYS_TIME) after the mobile station performs the following actions:

- Set the RETURNED_EP to the symbols of the encoded packet.
- Set SYS_TIME to the value of SYS_TIME received in PHY-EncodeRPDCH.Request(SDU, NUM_BITS, SYS_TIME).

2.1.3.15.10 Reverse Packet Data Channel Transmission Processing

When the Physical Layer receives a PHY-RPDCH.Request(EP, SPID, BOOST, SYS_TIME) from the MAC Layer, the mobile station shall:

- Store the arguments EP, SPID, BOOST, and SYS_TIME.
- The Physical Layer shall set EP_SIZE to the size of the encoded packet that formed the EP and form a subpacket using the EP, EP_SIZE, and SPID as specified in Table 2.1.3.1.11.4-1.
- Transmit the subpacket on the Reverse Packet Data Channel with the power level as indicated by EP_SIZE, SPID, and BOOST (see Table 2.1.2.3.3.8-1 through Table 2.1.2.3.3.8-4) at SYS_TIME.

2.1.4 Limitations on Emissions

2.1.4.1 Conducted Spurious Emissions

The mobile station shall meet the requirements in Section 4.5.1 of the current version of [11].

2.1.4.2 Radiated Spurious Emissions

The mobile station shall meet the requirements in Section 4.5.2 of the current version of [11].

2.1.5 Synchronization and Timing

Figure 1.3-1 illustrates the nominal relationship between the mobile station and base station transmit and receive time references. The mobile station shall establish a time reference that is utilized to derive timing for the transmitted chips, symbols, frame slots, and system timing. Under steady state conditions, the mobile station time reference shall be within ±1 μs of the time of occurrence of the earliest multipath component being used for demodulation as measured at the mobile station antenna connector. If another multipath component belonging to the same pilot channel or to a different pilot channel becomes the earliest arriving multipath component to be used, the mobile station time reference shall track to the new component. A valid pilot channel may be a Forward Pilot Channel, Transmit Diversity Pilot Channel, Auxiliary Pilot Channel, or Auxiliary Transmit Diversity Pilot Channel. If the difference between the mobile station time reference and the time of occurrence of the earliest arriving multipath component being used for demodulation, as measured at the mobile station antenna connector, is less than ±1 μs, the mobile station may track its time reference to the earliest arriving multipath component being used for demodulation.

When receiving the Forward Traffic Channel, the mobile station time reference shall be used as the transmit time of the Reverse Traffic Channel. If a mobile station time reference correction is needed, it shall be corrected no faster than 203 ns in any 200 ms period and no slower than 305 ns per second when using Radio Configuration 1 or 2 and no slower than 460 ns per second when using Radio Configuration 3, 4, 5, 6, 7, 8, 9, 11 and 12.

When receiving the Paging Channel, the mobile station time reference shall be used as the transmit time of the Access Channel. If a mobile station time reference correction is needed before transmitting an Access probe, the mobile station shall correct the time reference before it sends the Access probe; there is no limitation on the speed of the correction. If a mobile station time reference correction is needed while transmitting an Access probe, it shall be corrected no faster than 203 ns in any 200 ms period and no slower than 305 ns per second.

When receiving the Forward Common Control Channel, the mobile station time reference shall be used as the transmit time of the Enhanced Access Channel and the Reverse Common Control Channel. If a mobile station time reference correction is needed before transmitting on the Enhanced Access Channel or the Reverse Common Control Channel, the mobile station shall correct the time reference before it transmits; there is no limitation on the speed of the correction. If a mobile station time reference correction is needed while transmitting, it shall be corrected no faster than 203 ns in any 200 ms period and no slower than 460 ns per second.

2.1.5.1 Pilot to Walsh Cover Time Tolerance

When transmitting on the Enhanced Access Channel, the Reverse Common Control Channel, or the Reverse Traffic Channel, the mobile station shall meet the requirements in the current version of [11].

2.1.5.2 Pilot to Walsh Cover Phase Tolerance

When transmitting on the Enhanced Access Channel, the Reverse Common Control Channel, or the Reverse Traffic Channel, the mobile station shall meet the requirements in the current version of [11].

2.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in the current version of [11].

2.2 Receiver

2.2.1 Channel Spacing and Designation

Channel spacing and designation for the mobile station reception shall be as specified in 2.1.1.1. Valid channels for CDMA operations shall be as specified in 2.1.1.1.

2.2.2 Demodulation Characteristics

2.2.2.1 Processing

The mobile station demodulation process shall perform complementary operations to the base station modulation process on the Forward CDMA Channel (see 3.1.3).

Table 2.2.2.1-1 lists the maximum number of channel types that a mobile station may monitor for Spreading Rate 1.

Table 2.2.2.1-1. Maximum Number of Forward CDMA Channels to be Monitored by the Mobile Station for Spreading Rate 1

Channel Type	Maximum Number
Forward Pilot Channel	1
Transmit Diversity Pilot Channel	1
Auxiliary Pilot Channel	1
Auxiliary Transmit Diversity Pilot Channel	1
Sync Channel	1
Paging Channel	1
Broadcast Control Channel	1
Quick Paging Channel	1
Common Power Control Channel	1
Common Assignment Channel	1
Forward Packet Data Control Channel	2
Forward Common Acknowledgment Channel (RC 11 and RC 12)	1
Forward Common Control Channel	1
Forward Rate Control Channel	1
Forward Grant Channel	2
Forward Acknowledgment Channel	1
Forward Dedicated Control Channel	1
Forward Fundamental Channel	1
Forward Supplemental Code Channel (RC 1 and 2 only)	7
Forward Supplemental Channel (RC 3, 4, 5, 11, and 12 only)	2
Forward Packet Data Channel (RC 10 only)	1

Table 2.2.2.1-2 lists the maximum number of channel types that a mobile station may monitor for Spreading Rate 3.

Table 2.2.2.1-2. Maximum Number of Forward CDMA Channels to be Monitored by the Mobile Station for Spreading Rate 3

Channel Type	Maximum Number
Forward Pilot Channel	1
Auxiliary Pilot Channel	1
Sync Channel	1
Broadcast Control Channel	1
Quick Paging Channel	1
Common Power Control Channel	1
Common Assignment Channel	1
Forward Common Control Channel	1
Forward Dedicated Control Channel	1
Forward Fundamental Channel	1
Forward Supplemental Channel	2

The mobile station shall support Walsh and quasi-orthogonal functions (see 3.1.3.1.18).

When the mobile station receives a Radio Configuration 2 frame with the Reserved/Flag Bit in the Forward Fundamental Channel set to '1' in frame i, the mobile station need not process the Forward Supplemental Code Channels in frame i + 2 (see 3.1.3.15.2.3). Otherwise, the mobile station shall process the assigned Forward Supplemental Code Channels.

The mobile station receiver shall provide a minimum of four processing elements that can be independently controlled. At least three elements shall be capable of tracking and demodulating multipath components of the Forward CDMA Channel. At least one element shall be a "searcher" element capable of scanning and estimating the signal strength at each pilot PN sequence offset.

When the mobile station begins monitoring its assigned slot of the Paging Channel, the mobile station should initialize the convolutional code decoder to minimize the message error rate of the first message that is received at the beginning of the mobile station's assigned Paging Channel slot.[29]

If the mobile station supports flexible data rates on the Forward Supplemental Channel with Radio Configuration 3, 4, 6, or 7, the mobile station need not support flexible rates with less than 16 information bits per 20 ms frame, less than 40 information bits per 40 ms frame, and less than 80 information bits per 80 ms frame. If the mobile station

[29] This allows the mobile station to take advantage of the four padding bits sent prior to the beginning of the slot. This can be achieved by assigning the greatest likelihood to 16 possible states and the least likelihood to the remaining states.

supports flexible data rates on the Forward Supplemental Channel with Radio Configuration 5, 8, or 9, the mobile station need not support flexible rates with less than 22 information bits per 20 ms frame, less than 56 information bits per 40 ms frame, and less than 126 information bits per 80 ms frame.

If the mobile station supports the Forward Packet Data Channel with Radio Configuration 10, the mobile station shall support two Forward Packet Data Control Channels and one Forward Packet Data Channel with from one to 28 32-chip Walsh channels. If the mobile station supports the Reverse Packet Data Channel with Radio Configuration 7, then it shall support the Forward Packet Data Channel with Radio Configuration 10, the Forward Grant Channel, the Forward Indicator Control Channel, and the Forward Acknowledgment Channel.

2.2.2.2 Erasure Indicator Bit and Quality Indicator Bit

If Radio Configuration 2 is used on the Reverse Traffic Channel, then during continuous operation on the Forward Fundamental Channel and Reverse Fundamental Channel the mobile station shall set the Reserved/Erasure Indicator Bit as follows:

- The mobile station shall set the Reserved/Erasure Indicator Bit (see Figure 2.1.3.1.15.1-7) to '1' in the second transmitted frame following the reception of a bad frame on the Forward Fundamental Channel as shown in Figure 2.2.2.2-1.
- The mobile station shall set the Reserved/Erasure Indicator Bit (see Figure 2.1.3.1.15.1-8 to '0' in the second transmitted frame following the reception of a good frame on the Forward Fundamental Channel of the Forward Traffic Channel as shown in Figure 2.2.2.2-1.

If Radio Configuration 3, 4, 5, 6, or 7 is used on the Reverse Traffic Channel with FPC_MODE_S = '011', the mobile station shall set all the power control bits on the reverse power control subchannel during a 20 ms period to the Erasure Indicator Bit (EIB) which is defined as follows:

- The mobile station shall set the Erasure Indicator Bit to '0' in the second transmitted frame following the detection[30] of a good 20 ms frame on the Forward Fundamental Channel or the Forward Dedicated Control Channel as shown in Figure 2.2.2.2-1.
- The mobile station shall set the Erasure Indicator Bit to '0' in the second transmitted frame following the detection of at least one good 5 ms frame without detection of any bad 5 ms frames.
- Otherwise, the mobile station shall set the Erasure Indicator Bit to '1' in the second transmitted frame.

If Radio Configuration 3, 4, 5, 6, or 7 is used on the Reverse Traffic Channel with FPC_MODE_S = '100' and the channel configuration contains the Forward Fundamental

[30] A frame is considered to be detected if the mobile station determines that the base station transmitted a frame containing data.

Channel, the mobile station shall set all the power control bits on the reverse power control subchannel during a 20 ms period to the Quality Indicator Bit (QIB). The Quality Indicator Bit shall be set the same as the Erasure Indicator Bit as when FPC_MODE$_S$ = '011'.

If Radio Configuration 3, 4, 5, 6, or 7 is used on the Reverse Traffic Channel with FPC_MODE$_S$ = '100' and if the channel configuration does not contain the Forward Fundamental Channel, the mobile station shall set all the power control bits on the reverse power control subchannel during a 20 ms period to the Quality Indicator Bit (QIB) which is defined as follows:

- The mobile station shall set the Quality Indicator Bit to '1' in the second transmitted frame following the reception of a 20 ms period with insufficient signal quality (e.g., bad frame) on the Forward Dedicated Control Channel as shown in Figure 2.2.2.2-1.
- The mobile station shall set the Quality Indicator Bit to '0' in the second transmitted frame following the reception of a 20 ms period with sufficient signal quality (e.g., good frame) on the Forward Dedicated Control Channel as shown in Figure 2.2.2.2-1.

If Radio Configuration 3, 4, 5, 6, or 7 is used on the Reverse Traffic Channel with FPC_MODE$_S$ = '101', the mobile station shall set all the power control bits on the primary reverse power control subchannel during a 20 ms period to the Quality Indicator Bit (QIB). The Quality Indicator Bit shall be set the same as when FPC_MODE$_S$ = '100'.

If Radio Configuration 3, 4, 5, 6, or 7 is used on the Reverse Traffic Channel with FPC_MODE$_S$ = '101' or '110', the mobile station shall set all the power control bits on the secondary reverse power control subchannel equal to the Erasure Indicator Bit (EIB) for a period equal to the frame duration of the Forward Supplemental Channel 0 (FPC_SEC_CHAN$_S$ = '0'), the Forward Supplemental Channel 1 (FPC_SEC_CHAN$_S$ = '1'), or the Forward Fundamental Channel when the Forward Fundamental Channel is assigned with FCH_BCMC_IND$_S$ = '1' and FPC_BCMC_CHAN$_S$ = '1' and the common power control subchannel is assigned. This Erasure Indicator Bit is derived from the Forward Supplemental Channel 0 (FPC_SEC_CHAN$_S$ = '0'), the Forward Supplemental Channel 1 (FPC_SEC_CHAN$_S$ = '1'), or the Forward Fundamental Channel when the Forward Fundamental Channel is assigned with FCH_BCMC_IND$_S$ = '1' and FPC_BCMC_CHAN$_S$ = '1' and the common power control subchannel is assigned. The Erasure Indicator Bit is defined as follows:

- If the Forward Fundamental Channel is assigned with FCH_BCMC_INDs = '1' and FPC_BCMC_CHANs = '1' and the common power control subchannel is assigned, the mobile station shall set the Erasure Indicator Bit to '0' for a period equal to the frame duration of the corresponding Forward Fundamental Channel , starting at 20 ms after a detected good frame on that Forward Fundamental Channel as shown in Figure 2.2.2.2-2. If the Forward Supplemental Channel is assigned with FPC_BCMC_CHANs = '0', the mobile station shall set the Erasure Indicator Bit to '0' for a period equal to the frame duration of the corresponding Forward Supplemental Channel, starting at 20 ms after a detected good frame on that Forward Supplemental Channel as shown in Figure 2.2.2.2-2.

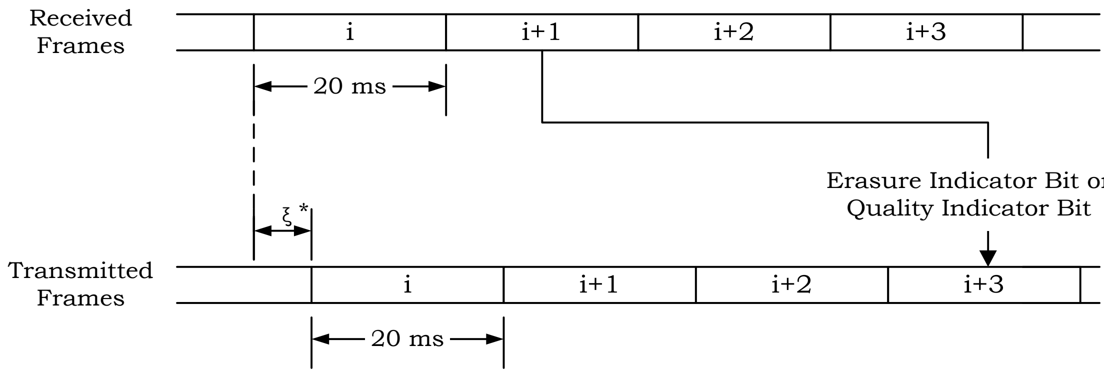
- If the Forward Fundamental Channel is assigned with FCH_BCMC_INDs = ‘1’ and FPC_BCMC_CHANs = ‘1’ and the common power control subchannel is assigned, the mobile station shall set the Erasure Indicator Bit to ‘1’ for a period equal to the frame duration of the corresponding Forward Fundamental Channel, starting at 20 ms after a detected bad frame on that Forward Fundamental Channel as shown in Figure 2.2.2.2-2. If the Forward Supplemental Channel is assigned with FPC_BCMC_CHANs = ‘0’, the mobile station shall set the Erasure Indicator Bit to ‘1’ for a period equal to the frame duration of the corresponding Forward Supplemental Channel, starting at 20 ms after a detected bad frame on that Forward Supplemental Channel as shown in Figure 2.2.2.2-2.

When the mobile station temporarily suspends reception of the Forward Traffic Channel in order to tune to another frequency (such as during a PUF probe, a hard handoff with return on failure, or a Candidate Frequency search), the mobile station shall set the Reserved/Erasure Indicator/Quality Indicator Bit as follows:

- In the first two frames after the mobile station re-enables its transmitter, the mobile station shall send Reserved/Erasure Indicator/Quality Indicator Bits corresponding to the two most recently received frames. One or both of these Reserved/Erasure Indicator/Quality Indicator Bits could be for frames that were received before the mobile station tuned to the other frequency, and were stored by the mobile station before the visit.

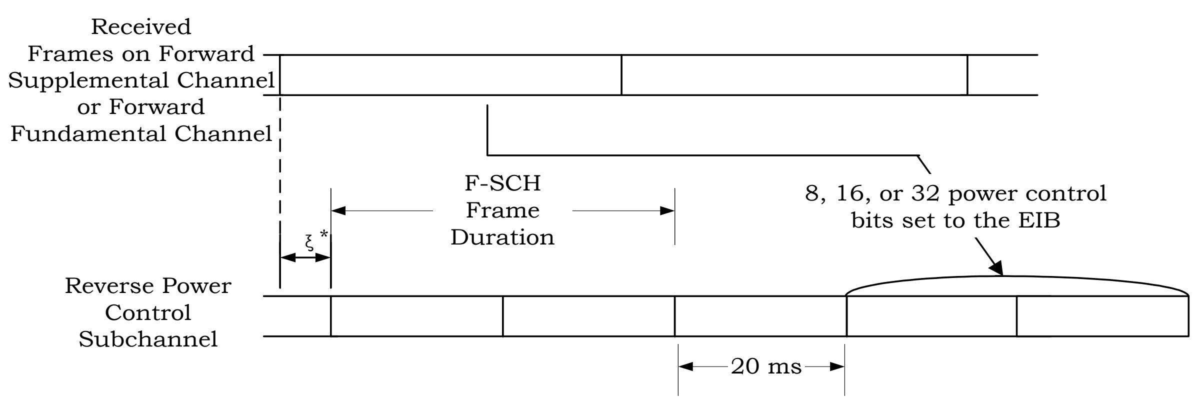
- After transmitting the first two frames, if the number of frames missed on the Reverse Traffic Channel (due to the mobile station’s visit away from the Serving Frequency) is less than that on the Forward Traffic Channel, the mobile station shall set the Reserved/Erasure Indicator/Quality Indicator Bit to ‘0’, until it receives two frames on the Forward Traffic Channel.

- The mobile station shall then set subsequent Reserved/Erasure Indicator/Quality Indicator Bits as described above for continuous operation.



Note: ξ = 1.25×FRAME_OFFSET ms when the received frames have been transmitted through the "Shared Traffic Channel", otherwise ξ = 0. The "Shared Traffic Channels" consist of the Forward Dedicated Channel when the common power control subchannel is assigned, the Forward Fundamental Channel with FCH_BCMC_INDs = '1', and the Forward Supplemental Channel with SCH_BCMC_INDs[i] = '1', where i = 1 or 2.

Figure 2.2.2.2-1. Erasure Indicator Bit/Quality Indicator Bit Timing



Note: ξ = 1.25×FRAME_OFFSET ms when the received frames have been transmitted through the "Shared Traffic Channel", otherwise ξ = 0. The "Shared Traffic Channels" consist of the Forward Dedicated Channel when the common power control subchannel is assigned, the Forward Fundamental Channel with FCH_BCMC_INDs = '1', and the Forward Supplemental Channel with SCH_BCMC_INDs[i] = '1', where i = 1 or 2.

Figure 2.2.2.2-2. Erasure Indicator Bit Timing for the Forward Supplemental Channel or the Forward Fundamental Channel when the Forward Fundamental Channel is assigned with FCH_BCMC_INDs = '1' and FPC_BCMC_CHANs = '1' and the common power control subchannel is assigned

2.2.2.3 Forward Traffic Channel Time Alignment

The Forward Traffic Channel frame time alignment is specified in 3.1.3.14.1, 3.1.3.15.1, 3.1.3.16.1 and 3.1.3.17.1. The mobile station shall support offset Forward Traffic Channel frames.

2.2.2.4 Interface to the MAC Layer

This section specifies the passing of the received physical layer frames.

2.2.2.4.1 Forward Pilot Channel Reception Processing

Not Specified.

2.2.2.4.2 Sync Channel Reception Processing

When the mobile station receives a Sync Channel frame, the Physical Layer shall send a PHY-SYNCH.Indication(SDU) to the MAC Layer after the mobile station performs the following action:

- Set the SDU to the received information bits.

2.2.2.4.3 Paging Channel Reception Processing

When the mobile station receives a Paging Channel frame, the Physical Layer shall send a PHY-PCH.Indication(SDU) to the MAC Layer after the mobile station performs the following action:

- Set the SDU to the received information bits.

2.2.2.4.4 Broadcast Control Channel Reception Processing

When the mobile station receives a Broadcast Control Channel frame, the Physical Layer shall send a PHY-BCCH.Indication(SDU, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set SDU to the received information bits.
- Set NUM_BITS to the number of bits of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.5 Quick Paging Channel Reception Processing

Not specified.

2.2.2.4.6 Common Power Control Channel Reception Processing

While operating in the Reservation Access Mode, the mobile station shall use the power control information transmitted on the assigned common power control subchannel to adjust the transmit power of the Reverse Common Control Channel. When the Forward Traffic Channel is assigned simultaneously with the common power control subchannel, the mobile station shall use the power control information transmitted on the common power control subchannel to adjust the transmit power of Reverse Composite Code Channel being transmitted by the mobile station.

2.2.2.4.7 Forward Common Acknowledgment Channel Reception Processing

While operating with reverse link Radio Configuration 8, the mobile station shall terminate transmission of the Reverse Supplemental Channel frame prior to the nominal termination of the frame if a positive acknowledgment is received on the Forward Common Acknowledgment Channel. Forward Rate Control Channel Reception Processing

When the mobile station receives a PHY-DecodeFRCCH.Request(SYS_TIME) from the MAC Layer the mobile station shall perform the following actions:

- Store the argument SYS_TIME.
- Monitor the Forward Rate Control Channel for a frame, with the first power control group of the frame starting at SYS_TIME (in 1.25 ms units).

When the mobile station receives a Forward Rate Control Channel frame starting at SYS_TIME on the Forward CDMA Channel, the Physical Layer shall send a PHY-DecodeFRCCH.Indication(RC_VEC, SYS_TIME) to the MAC Layer after the mobile station performs the following actions:

- Set RC_VEC[i] to UP if an UP was received on the Forward Rate Control Channel corresponding to the (i+1)-th pilot in the Reverse Packet Data Channel Active Set, or to DOWN if a DOWN was received on the Forward Rate Control Channel corresponding to the (i+1)-th pilot in the Reverse Packet Data Channel Active Set, otherwise to HOLD.
- Set SYS_TIME to the value of SYS_TIME in the received PHY-DecodeFRCCH.Request(SYS_TIME) primitive.

2.2.2.4.8 Common Assignment Channel Reception Processing

When the mobile station receives a Common Assignment Channel frame, the Physical Layer shall send a PHY-CACH.Indication(SDU, FRAME_QUALITY) to the MAC Layer, after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.9 Forward Common Control Channel Reception Processing

When the mobile station receives a Forward Common Control Channel frame, the Physical Layer shall send a PHY-FCCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of bits of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.10 Forward Grant Channel Reception Processing

When the mobile station receives a PHY-DecodeFGCH.Request(PILOT_PN, WALSH_INDEX, SYS_TIME) from the MAC Layer the mobile station shall perform the following actions:

- Store the arguments PILOT_PN, WALSH_INDEX, and SYS_TIME.
- Monitor the Forward Grant Channel corresponding to the Walsh index WALSH_INDEX and the pilot PN offset PILOT_PN for a frame with the first power control group of the frame starting at SYS_TIME (in 1.25 ms units).

When the mobile station receives a Forward Grant Channel at SYS_TIME, the Physical Layer shall send a PHY-DecodeFGCH.Indication(WALSH_INDEX, SDU, SYS_TIME) to the MAC Layer after the mobile station performs the following actions:

- Set WALSH_INDEX to the Forward Grant Channel Walsh Index from which the SDU is decoded.
- Set SDU to the received information bits if the received frame has sufficient frame quality; otherwise, set SDU to NULL.
- Set SYS_TIME to the value of SYS_TIME received in the PHY-DecodeFGCH.Request(PILOT_PN, WALSH_INDEX, SYS_TIME) primitive.

2.2.2.4.11 Forward Acknowledgment Channel Reception Processing

When the mobile station receives a PHY-DecodeFACKCH.Request(SYS_TIME) from the MAC Layer the mobile station shall perform the following actions:

- Store the argument SYS_TIME.
- Monitor the Forward Acknowledgment Channel for a frame with the first power control group of the frame starting at SYS_TIME (in 1.25 ms units).

When the mobile station receives a Forward Acknowledgment Channel at SYS_TIME, the Physical Layer shall send a PHY-DecodeFACKCH.Indication(ACK_OR_NAK, SYS_TIME) to the MAC Layer after the mobile station performs the following actions:

- Set ACK_OR_NAK to ACK if an ACK was received on the Forward Acknowledgment Channel; otherwise, set ACK_OR_NAK to NAK.
- Set SYS_TIME to the value of SYS_TIME received in the PHY-DecodeACKCH.Request(SYS_TIME) primitive.

2.2.2.4.12 Forward Packet Data Control Channel Reception Processing

When the mobile station receives a PHY-DecodeFPDCCH.Request(PDCCH_ID, PILOT_PN, WALSH_INDEX, SYS_TIME, NUM_SLOTS) from the MAC Layer the mobile station shall perform the following actions:

- Store the arguments PDCCH_ID, PILOT_PN, SYS_TIME, NUM_SLOTS.

- If SYS_TIME and NUM_SLOTS are both equal to NULL, the mobile station shall continuously monitor the Forward Packet Data Control Channel corresponding to the channel identifier PDCCH_ID, the Walsh code WALSH_INDEX, and the pilot PN offset PILOT_PN for all possible frame durations (i.e., 1, 2, or 4 slots).
- If neither NUM_SLOTS, nor SYS_TIME is equal to NULL, the mobile station shall monitor the Forward Packet Data Control Channel corresponding to the channel identifier PDCCH_ID and the pilot PN offset PILOT_PN for a frame duration equal to NUM_SLOTS starting at SYS_TIME.

When the mobile station receives a Forward Packet Data Control Channel, with sufficient frame quality, corresponding to channel identifier PDCCH_ID, the Physical Layer shall send a PHY-DecodeFPDCCH.Indication(PDCCH_ID, SDU, SYS_TIME, NUM_SLOTS) to the MAC Layer after the mobile station performs the following actions:

- Set PDCCH_ID to the channel identifier of the Forward Packet Data Control Channel.
- Compute an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.7 on the first 13 information bits as specified in 2.1.3.1.4.1. The first information bit shall be input to the generator of the frame quality indicator first and the 13-th information bit shall be input last.
- Perform bit-by-bit modulo-2 addition of the 8-bit frame quality indicator and the last 8 bits of the information bits to form SDU[0…7]. SDU[0] shall be the addition of the first output bit of the frame quality indicator and the 14-th information bit and SDU[7] shall be the addition of the last output bit of the frame quality indicator and the 21-st information bit.
- Set SYS_TIME to the system time (in 1.25 ms units) at which the first slot of the Forward Packet Data Control Channel frame was received.
- Descramble the first 13 bits of the information bits by bit-by-bit modulo-2 adding a 13-bit scrambler sequence. The scrambler sequence shall be equal to the 13 least significant bits of (SYS_TIME + NUM_SLOTS). The bit-by-bit modulo 2 additions shall be such that the first bit among these 13 information bits is added with the most significant bit of the scrambler sequence and the last bit with the least significant bit of the scrambler sequence.
- Set SDU[8…20] to the descrambled 13 information bits, where SDU[8] shall be the first descrambled information bit and SDU[20] shall be the last descrambled information bit.
- Set NUM_SLOTS to the number of 1.25 ms slots in the decoded Forward Packet Data Control Channel frame.

2.2.2.4.13 Forward Dedicated Control Channel Reception Processing

When the mobile station receives a Forward Dedicated Control Channel frame, the Physical Layer shall send a PHY-DCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of information bits in the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

If the mobile station does not receive a Forward Dedicated Control Channel frame at the end of a 20 ms frame boundary, the Physical Layer shall send a PHY-DCCH.Indication(SDU) to the MAC Layer, after the mobile station performs the following action:

- Set the SDU to NULL.

2.2.2.4.14 Forward Fundamental Channel Reception Processing

When the mobile station receives a Forward Fundamental Channel frame, the Physical Layer shall send a PHY-FCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of information bits in the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.15 Forward Supplemental Channel Reception Processing

When the mobile station receives a Forward Supplemental Channel frame, the Physical Layer shall send a PHY-SCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of information bits of the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.16 Forward Supplemental Channel Outer Code Reception Processing

When the mobile station receives a Forward Supplemental Channel outer coding buffer, the Physical Layer shall send a PHY-SCHOuterCode.Indication (SDU[0…NUM_FRAMES – 1], NUM_BITS, NUM_FRAMES, FRAME_QUALITY[0,…,NUM_FRAMES – 1], SYS_TIME) to the MAC Layer, after the mobile station performs the following actions:

- Set the SDU[0…NUM_FRAMES – 1] to the output of the outer decoder.
- Set NUM_BITS to the number of information bits of the SDU.

- Set NUM_FRAMES to the received number of inner code frames.
- For the i-th received inner code frame, set FRAME_QUALITY[i – 1] to “sufficient” if the received inner code frame has sufficient frame quality; otherwise, set FRAME_QUALITY[i – 1] to “insufficient”.
- Set SYS_TIME to the value of SYS_TIME in the received PHY-SCHOuterCode.Request (SDU, NUM_BITS, SYS_TIME) primitive.

2.2.2.4.17 Forward Supplemental Code Channel Reception Processing

When the mobile station receives a Forward Supplemental Code Channel frame, the Physical Layer shall send a PHY-SCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of information bits of the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

2.2.2.4.18 Forward Packet Data Channel Reception Processing

When the mobile station receives a PHY-DecodeFPDCH.Request(PILOT_PN, ACID, SPID, EP_SIZE, WCI_SET, EP_NEW, SYS_TIME, NUM_SLOTS) from the MAC Layer the mobile station shall perform the following actions:

- Store the arguments PILOT_PN, ACID, SPID, EP_SIZE, WCI_SET, EP_NEW, SYS_TIME, and NUM_SLOTS.
- Decode the Forward Packet Data Channel frame with duration NUM_SLOTS that begins at SYS_TIME, using the following information:
    - The pilot PN offset corresponding to PILOT_PN.
    - The Walsh codes corresponding to the Walsh code indices as specified in WCI_SET.
    - EP_SIZE, the size of the encoder packet.
    - ACID, the ARQ Channel Identifier for the encoder packet.
    - SPID, the Subpacket Identifier.
- Send a PHY-DecodeFPDCH.Response(ACID, EP, SYS_TIME, NUM_SLOTS) to the MAC Layer after the mobile station performs the following actions:
    - Set ACID to the ARQ Channel Identifier for the decoded encoder packet.
    - Set EP to the received information bits if the encoder packet is successfully decoded, or to NULL if the encoder packet is not successfully decoded.
    - Set SYS_TIME to the system time (in 1.25 ms units) for the first slot of the successfully or unsuccessfully decoded encoder packet.

- Set NUM_SLOTS to the number of 1.25 ms slots of the successfully or unsuccessfully decoded encoder packet in the Forward Packet Data Channel frame.

2.2.3 Limitations on Emissions

The mobile station shall meet the requirements in Section 3.6 of the current version of [11].

2.2.4 Receiver Performance Requirements

System performance is predicated on receivers meeting the requirements set forth in Section 3 of the current version of [11].

2.3 Malfunction Detection

2.3.1 Malfunction Timer

The mobile station shall have a malfunction timer that is separate from and independent of all other functions and that runs continuously whenever power is applied to the transmitter of the mobile station. Sufficient reset commands shall be interspersed throughout the mobile station logic program to ensure that the timer never expires as long as the proper sequence of operations is taking place. If the timer expires, a malfunction shall be assumed and the mobile station shall be inhibited from transmitting. The maximum time allowed for expiration of the timer is two seconds.

2.3.2 False Transmission

A protection circuit shall be provided to minimize the possibility of false transmitter operation caused by component failure within the mobile station.

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3 REQUIREMENTS FOR BASE STATION CDMA OPERATION

This section defines requirements specific to CDMA base station equipment and operation.

3.1 Transmitter

3.1.1 Frequency Parameters

3.1.1.1 Channel Spacing and Designation

See [12] for a description of the band classes that a base station may support.

3.1.1.2 Frequency Tolerance

The base station transmit carrier frequency shall be maintained within $\pm 5 \times 10^{-8}$ of the CDMA frequency assignment.

3.1.2 Power Output Characteristics

The base station shall meet the requirements in the current version of [10].

3.1.3 Modulation Characteristics

3.1.3.1 Forward CDMA Channel Signals

Signals transmitted on the Forward Traffic Channel (i.e., the Forward Dedicated Control Channel, Forward Fundamental Channel, Forward Supplemental Channel, Forward Supplemental Code Channel, or Forward Packet Data Channel sent to mobile stations) are specified by radio configurations. There are twelve radio configurations for the Forward Traffic Channel (see Table 3.1.3.1-1).

A base station shall support operation in Radio Configuration 1, 3, 7, or 11. A base station may support operation in Radio Configurations 2, 4, 5, 6, 8, 9, 10, or 12. A base station supporting operation in Radio Configuration 2 shall support Radio Configuration 1. A base station supporting operation in Radio Configuration 4 or 5 shall support Radio Configuration 3. A base station supporting operation in Radio Configuration 6, 8, or 9 shall support Radio Configuration 7.

A base station shall not use Radio Configuration 1 or 2 simultaneously with Radio Configuration 3, 4, 5, 10, 11 or 12 on a Forward Traffic Channel. A base station shall not use Radio Configuration 11 or Radio Configuration 12 simultaneously with Radio Configuration 1 through 10 on a Forward Traffic Channel.

If the base station supports the Reverse Fundamental Channel with Radio Configuration 1, then it shall support the Forward Fundamental Channel with Radio Configuration 1. If the base station supports the Reverse Fundamental Channel with Radio Configuration 2, then it shall support the Forward Fundamental Channel with Radio Configuration 2. If the base station supports the Reverse Fundamental Channel with Radio Configuration 3, then it shall support the Forward Fundamental Channel with Radio Configuration 3, 4, 6, or 7. If the base station supports the Reverse Fundamental Channel with Radio Configuration 4, then it shall support the Forward Fundamental Channel with Radio Configuration 5, 8, or

9. If the base station supports the Reverse Fundamental Channel with Radio Configuration 5, then it shall support the Forward Fundamental Channel with Radio Configuration 6 or 7. If the base station supports the Reverse Fundamental Channel with Radio Configuration 6, then it shall support the Forward Fundamental Channel with Radio Configuration 8 or 9. If the base station supports the Reverse Fundamental Channel with Radio Configuration 8, then it shall support the Forward Fundamental Channel with Radio Configuration 11.

If the base station supports the Reverse Dedicated Control Channel with Radio Configuration 3, then it shall support the Forward Dedicated Control Channel with Radio Configuration 3, 4, 6, or 7. If the base station supports the Reverse Dedicated Control Channel with Radio Configuration 4, then it shall support the Forward Dedicated Control Channel with Radio Configuration 5, 8, or 9. If the base station supports the Reverse Dedicated Control Channel with Radio Configuration 5, then it shall support the Forward Dedicated Control Channel with Radio Configuration 6 or 7. If the base station supports the Reverse Dedicated Control Channel with Radio Configuration 6, then it shall support the Forward Dedicated Control Channel with Radio Configuration 8 or 9.

If the base station supports the Forward Packet Data Channel with Radio Configuration 10, then it shall support the Forward Packet Data Control Channel.

If the base station supports the Reverse Packet Data Channel with Radio Configuration 7, then it shall support the Forward Packet Data Channel with Radio Configuration 10, and may support the Common Power Control Channel, the Forward Acknowledgment Channel, the Forward Grant Channel, and the Forward Rate Control Channel. The base station should support the Forward Indicator Control Channel, the Forward Grant Channel, or both.

If the base station supports the Reverse Fundamental Channel with Radio Configuration 8, then it shall support the Forward Acknowledgment Subchannel. If the base station supports the Reverse Supplemental Channel with Radio Configuration 8, then it should support the Forward Common Acknowledgment Channel.

Table 3.1.3.1-1 shows the general characteristics of the radio configurations.

Table 3.1.3.1-1. Radio Configuration Characteristics for the Forward Traffic Channel

Radio Configuration	Associated Spreading Rate	Data Rates, Forward Error Correction, and General Characteristics
1	1	1200, 2400, 4800, and 9600 bps data rates with R = 1/2, BPSK pre-spreading symbols
2	1	1800, 3600, 7200, and 14400 bps data rates with R = 1/2, BPSK pre-spreading symbols
3	1	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, and 153600 bps data rates with R = 1/4, QPSK pre-spreading symbols, TD allowed
4	1	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/2, QPSK pre-spreading symbols, TD and CCSH allowed
5	1	1800, 3600, 7200, 14400, 28800, 57600, 115200, and 230400 bps data rates with R = 1/4, QPSK pre-spreading symbols, TD and CCSH allowed
6	3	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/6, QPSK pre-spreading symbols
7	3	1200, 1350, 1500, 2400, 2700, 4800, 9600, 19200, 38400, 76800, 153600, 307200, and 614400 bps data rates with R = 1/3, QPSK pre-spreading symbols
8	3	1800, 3600, 7200, 14400, 28800, 57600, 115200, 230400, and 460800 bps data rates with R = 1/4 (20 ms) or 1/3 (5 ms), QPSK pre-spreading symbols
9	3	1800, 3600, 7200, 14400, 28800, 57600, 115200, 230400, 259200, 460800, 518400, and 1036800 bps data rates with R = 1/2 (20 ms) or 1/3 (5 ms), QPSK pre-spreading symbols
10	1	43200, 81600, 86400, 158400, 163200, 172800, 312000, 316800, 326400, 465600, 619200, 624000, 633600, 772800, 931200, 1238400, 1248000, 1545600, 1862400 2476800, and 3091200 bps subpacket data rates with R = 1/5, QPSK, 8-PSK, or 16-QAM pre-spreading symbols (see Table 3.1.3.1.15.4-1)
11	1	0, 1800, 3000, 5000, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/2, QPSK pre-spreading symbols

Radio Configuration	Associated Spreading Rate	Data Rates, Forward Error Correction, and General Characteristics
12	1	0, 1800, 3000, 5000, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/2, QPSK pre-spreading symbols, CCSH allowed

Notes:

1. For Radio Configurations 3 through 9, the Forward Dedicated Control Channel and the Forward Fundamental Channel also allow a 9600 bps, 5 ms format.
2. The Forward Supplemental Channel also supports outer block coding in Radio Configuration 5 at the data rate of 115200 bps. The outer code rates are 11/16, 12/16, 13/16, and 14/16.

For Spreading Rate 1, except the Forward Traffic Channel with Radio Configuration 11 or Radio Configuration 12 and the Forward Common Acknowledgment Channel, the base station may support orthogonal transmit diversity (OTD) or space time spreading (STS) on the Forward Dedicated Control Channel, the Forward Fundamental Channel, the Forward Supplemental Channel, the Broadcast Control Channel, the Quick Paging Channel, the Common Power Control Channel, the Common Assignment Channel, and the Forward Common Control Channel. For Spreading Rate 3, the base station may support transmit diversity by transmitting carriers on separate antennas. The base station shall transmit the Forward Dedicated Control Channel, the Forward Fundamental Channel, and the Forward Supplemental Channel assigned to a mobile station using one of the following schemes: no transmit diversity, OTD, or STS. The base station shall transmit the Forward Fundamental Channel and the Forward Supplemental Channel with Radio Configuration 11 and Radio Configuration 12 without using transmit diversity. The base station shall transmit the Forward Common Acknowledgment Channel without using transmit diversity.

The base station shall transmit the Forward Packet Data Channel, the Forward Packet Data Control Channel, the Forward Acknowledgment Channel, the Forward Grant Channel, the common power control subchannel (used to control the Reverse Fundamental Channel, the Reverse Dedicated Control Channel, the Reverse Packet Data Channel and the Reverse Supplemental Channel) transmitted on the Common Power Control Channel and the rate control subchannel (used to control the Reverse Packet Data Channel) transmitted on the Forward Rate Control Channel, not using transmit diversity. The base station may simultaneously transmit to a mobile station the Forward Dedicated Control Channel, the Forward Fundamental Channel, and the Forward Supplemental Channel assigned to the mobile station using no transmit diversity, OTD, or STS, and the Forward Packet Data Channel, the Forward Grant Channel, the Forward Acknowledgment Channel, the Common Power Control Channel, the Forward Rate Control Channel and the Forward Packet Data Control Channel not using transmit diversity.

The base station shall transmit the Broadcast Control Channel, the common power control subchannel (used to control the Reverse Common Control Channel) on the Forward Indicator Control Channel, the Common Assignment Channel, and the Forward Common

Control Channel on a Forward CDMA Channel using one of the following schemes: no transmit diversity, OTD, or STS.

3.1.3.1.1 Channel Structures

The structure of the code channels transmitted by a base station is shown in Figure 3.1.3.1.1-1.

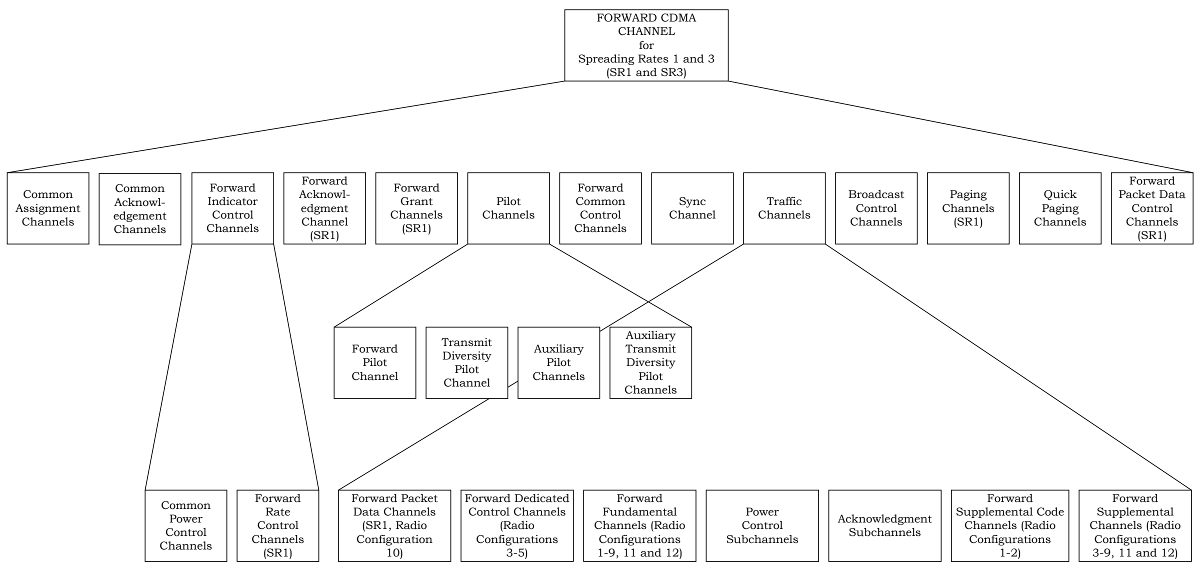


Figure 3.1.3.1.1-1. Forward CDMA Channel Transmitted by a Base Station

3.1.3.1.1.1 Spreading Rate 1

The Forward CDMA Channel consists of the channels specified in Table 3.1.3.1.1.1-1. Table 3.1.3.1.1.1-1 states the range of valid channels for each channel type.

Table 3.1.3.1.1.1-1. Channel Types on the Forward CDMA Channel for Spreading Rate 1

Channel Type	Maximum Number
Forward Pilot Channel	1
Transmit Diversity Pilot Channel	1
Auxiliary Pilot Channel	Not specified
Auxiliary Transmit Diversity Pilot Channel	Not specified
Sync Channel	1
Paging Channel	7
Broadcast Control Channel	7
Quick Paging Channel	3
Common Power Control Channel	Not specified
Common Assignment Channel	7
Forward Packet Data Control Channel	2
Forward Common Control Channel	7
Forward Common Acknowledgment Channel	2
Forward Rate Control Channel	Not specified
Forward Grant Channel	Not specified
Forward Acknowledgment Channel	1
Forward Dedicated Control Channel	Not specified
Forward Fundamental Channel	Not specified
Forward Supplemental Code Channel (RC 1 and 2 only)	Not specified
Forward Supplemental Channel (RC 3, 4, 5, 11 and 12 only)	Not specified
Forward Packet Data Channel (RC 10 only)	2

Each of these code channels is spread by the appropriate Walsh or quasi-orthogonal function. Each code channel is then spread by a quadrature pair of PN sequences at a fixed chip rate of 1.2288 Mcps. Multiple Forward CDMA Channels may be used within a base station in a frequency division multiplexed manner.

If a base station transmits the Forward Common Control Channel on a Forward CDMA Channel, then the base station shall also transmit the Broadcast Control Channel on that Forward CDMA Channel.

The structures of the Forward Pilot Channel, Transmit Diversity Pilot Channel, Auxiliary Pilot Channels, Auxiliary Transmit Diversity Pilot Channels, Sync Channel, and Paging

Channels for the Forward CDMA Channel for Spreading Rate 1 are shown in Figure 3.1.3.1.1.1-1. The structure of the Broadcast Control Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-2 and Figure 3.1.3.1.1.1-3. The structure of the Quick Paging Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-4. The structure of the Common Assignment Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-5 and Figure 3.1.3.1.1.1-6. The structure of the Forward Common Control Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-7 and Figure 3.1.3.1.1.1-8. The structure of the Forward Indicator Control Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-9. The structure of the Forward Common Acknowledgment Channel is shown in Figure 3.1.3.1.1.1-10. The structure of the Forward Grant Channel is shown in Figure 3.1.3.1.1.1-11. The structure of the Forward Acknowledgment Channel is shown in Figure 3.1.3.1.1.1-12. The structure of the Forward Packet Data Control Channel is shown in Figure 3.1.3.1.1.1-13. The structure of the Forward Dedicated Control Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-14 through Figure 3.1.3.1.1.1-16.

The Forward Fundamental Channel and Forward Supplemental Code Channel for Radio Configuration 1 have the overall structure shown in Figure 3.1.3.1.1.1-17. The Forward Fundamental Channel and Forward Supplemental Code Channel for Radio Configuration 2 have the overall structure shown in Figure 3.1.3.1.1.1-18. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 3 have the overall structure shown in Figure 3.1.3.1.1.1-19. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 4 have the overall structure shown in Figure 3.1.3.1.1.1-20. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 5 have the overall structure shown in Figure 3.1.3.1.1.1-21 and Figure 3.1.3.1.1.1-22. The Forward Packet Data Channel for Radio Configuration 10 has the overall structure shown in Figure 3.1.3.1.1.1-23. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 11 and Radio Configuration 12 have the overall structure shown in Figure 3.1.3.1.1.1-24.

For the Forward Traffic Channel with Radio Configurations 3 through 5, long code scrambling, power control puncturing, and symbol point mapping is shown in Figure 3.1.3.1.1.1-25.

For the Forward Traffic Channel with Radio Configuration 11 and Radio Configuration 12, long code scrambling, power control puncturing, and symbol point mapping is shown in Figure 3.1.3.1.1.1-26.

The symbol demultiplexing and I and Q mappings are shown in Figure 3.1.3.1.1.1-27, Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30.

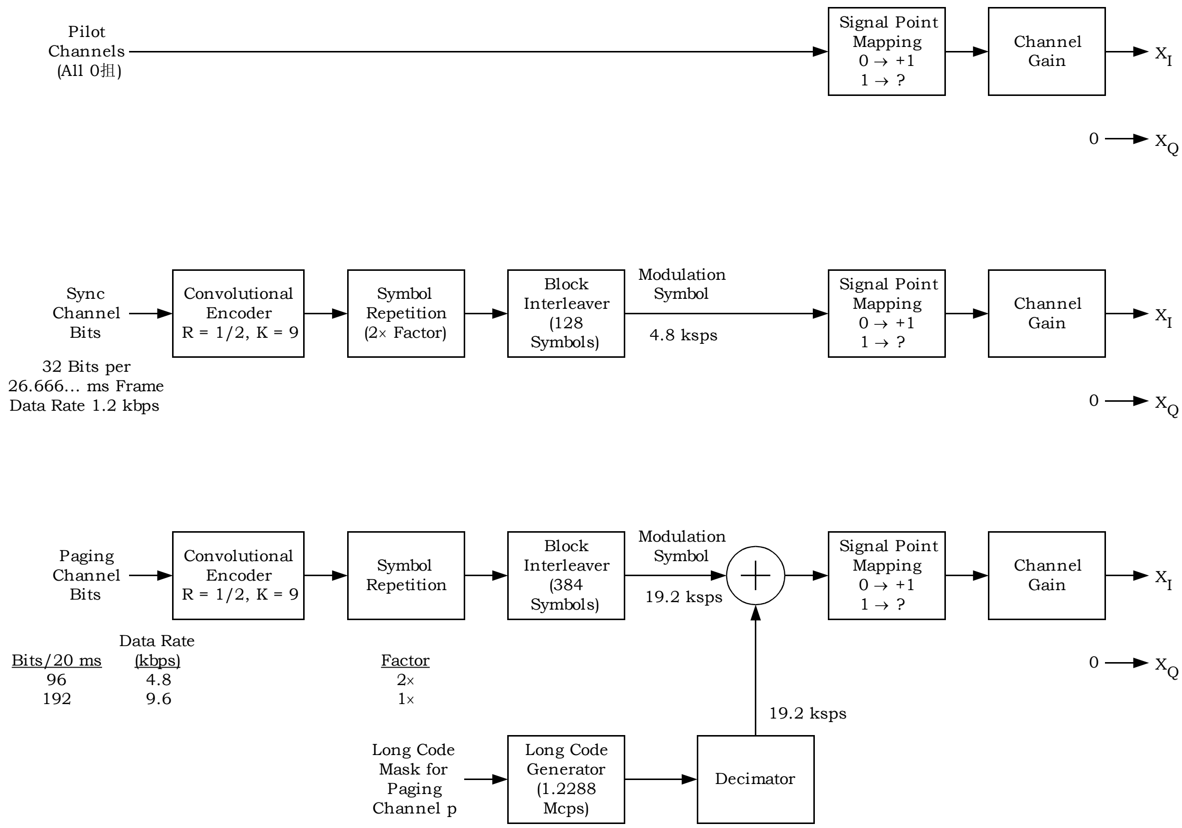


Figure 3.1.3.1.1.1-1. Pilot Channels, Sync Channel, and Paging Channels for Spreading Rate 1

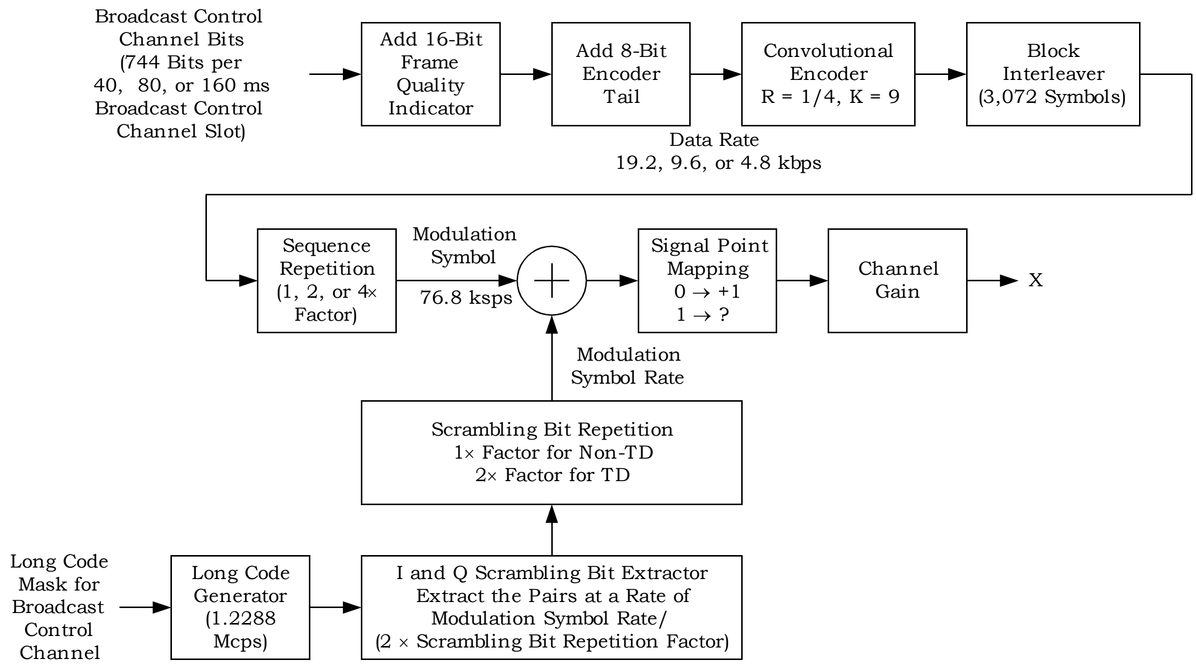


Figure 3.1.3.1.1.1-2. Broadcast Control Channel Structure for Spreading Rate 1 with R = 1/4 Mode

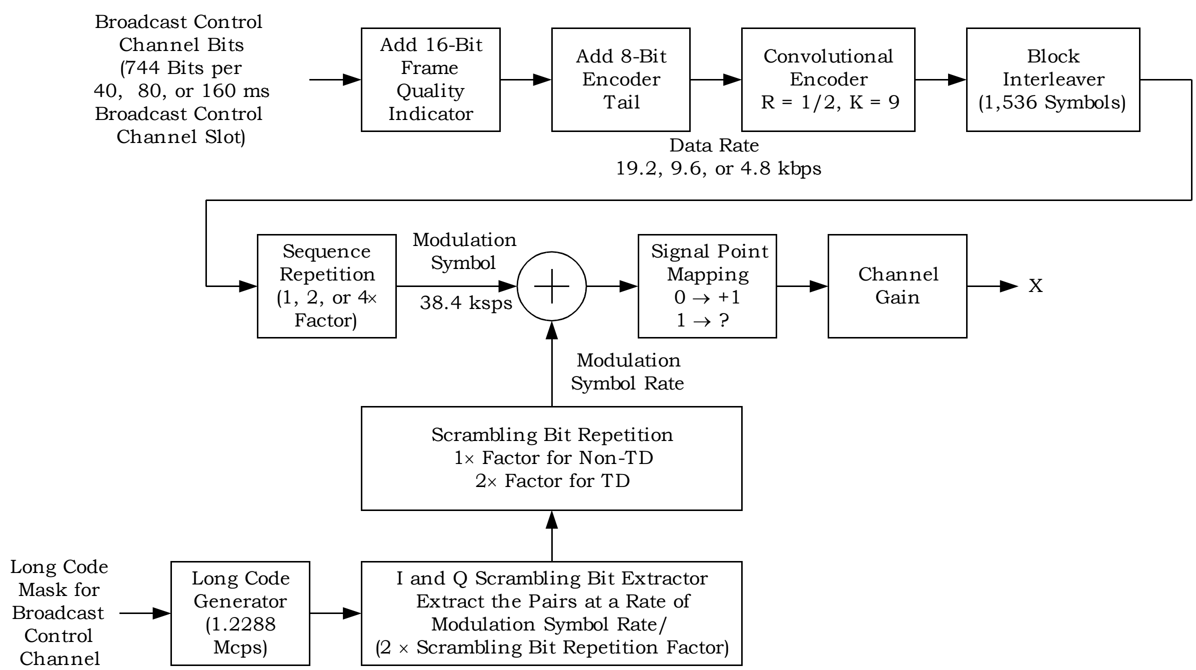


Figure 3.1.3.1.1.1-3. Broadcast Control Channel Structure for Spreading Rate 1 with R = 1/2 Mode

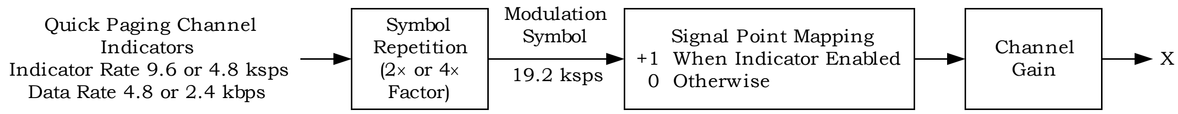


Figure 3.1.3.1.1.1-4. Quick Paging Channel Structure for Spreading Rate 1

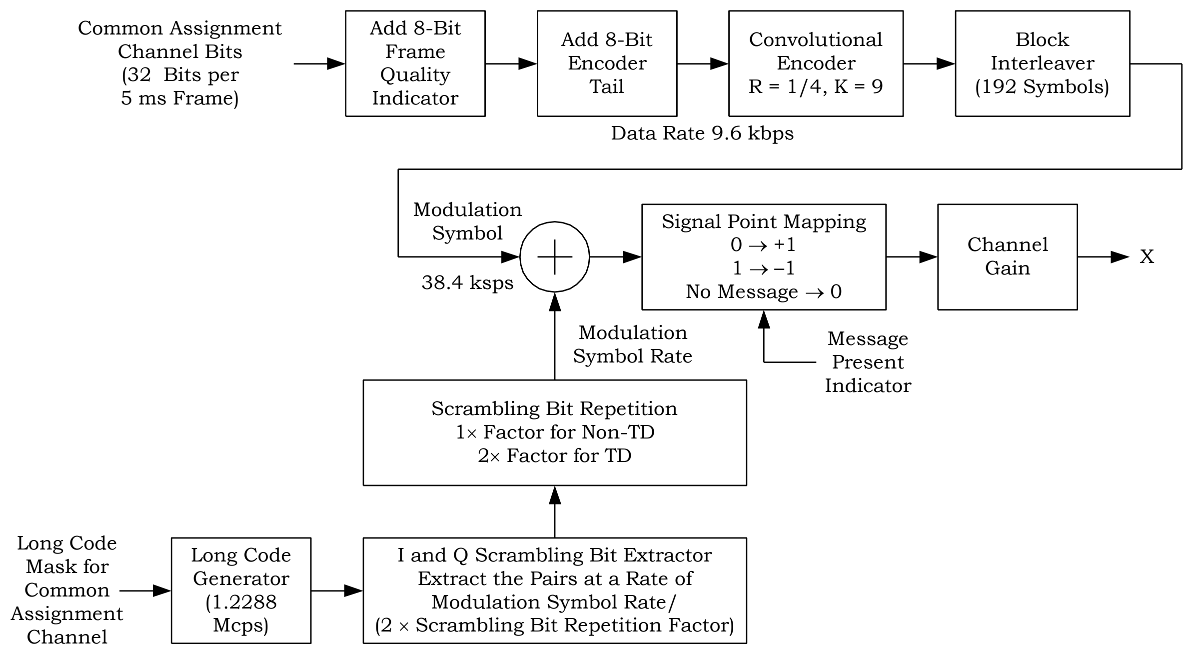


Figure 3.1.3.1.1.1-5. Common Assignment Channel Structure for Spreading Rate 1 with R = 1/4 Mode

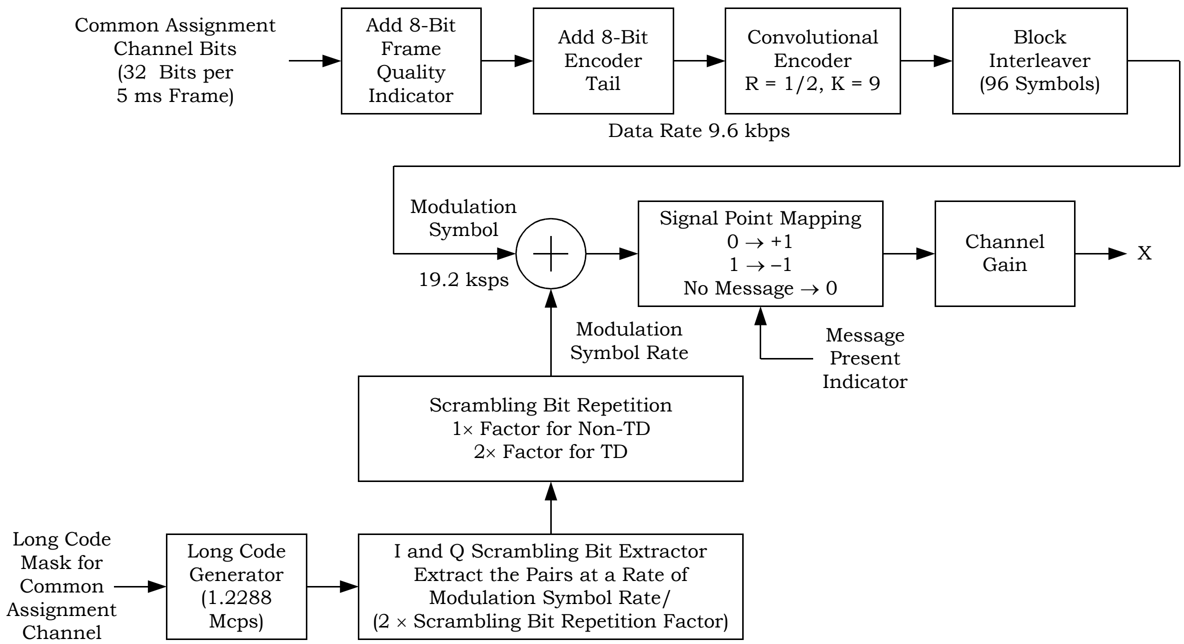


Figure 3.1.3.1.1.1-6. Common Assignment Channel Structure for Spreading Rate 1 with R = 1/2 Mode

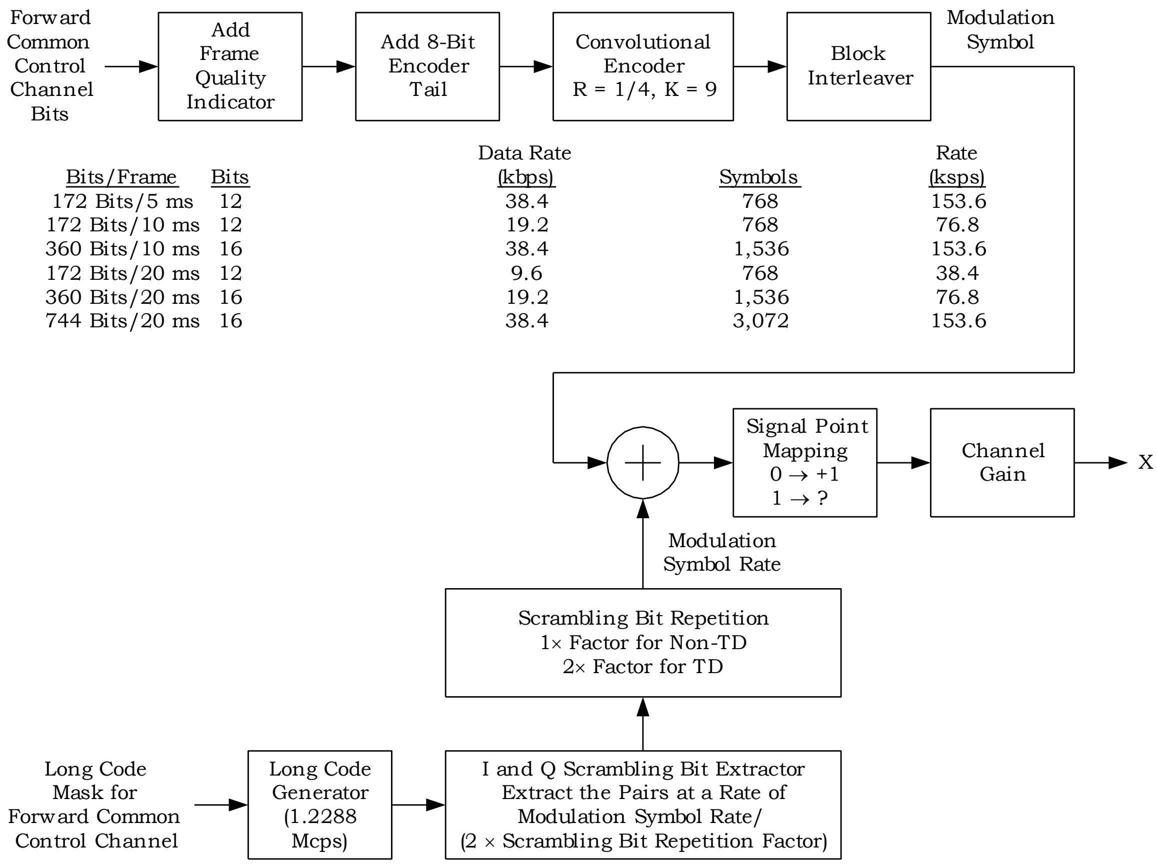


Figure 3.1.3.1.1.1-7. Forward Common Control Channel Structure for Spreading Rate 1 with R = 1/4 Mode

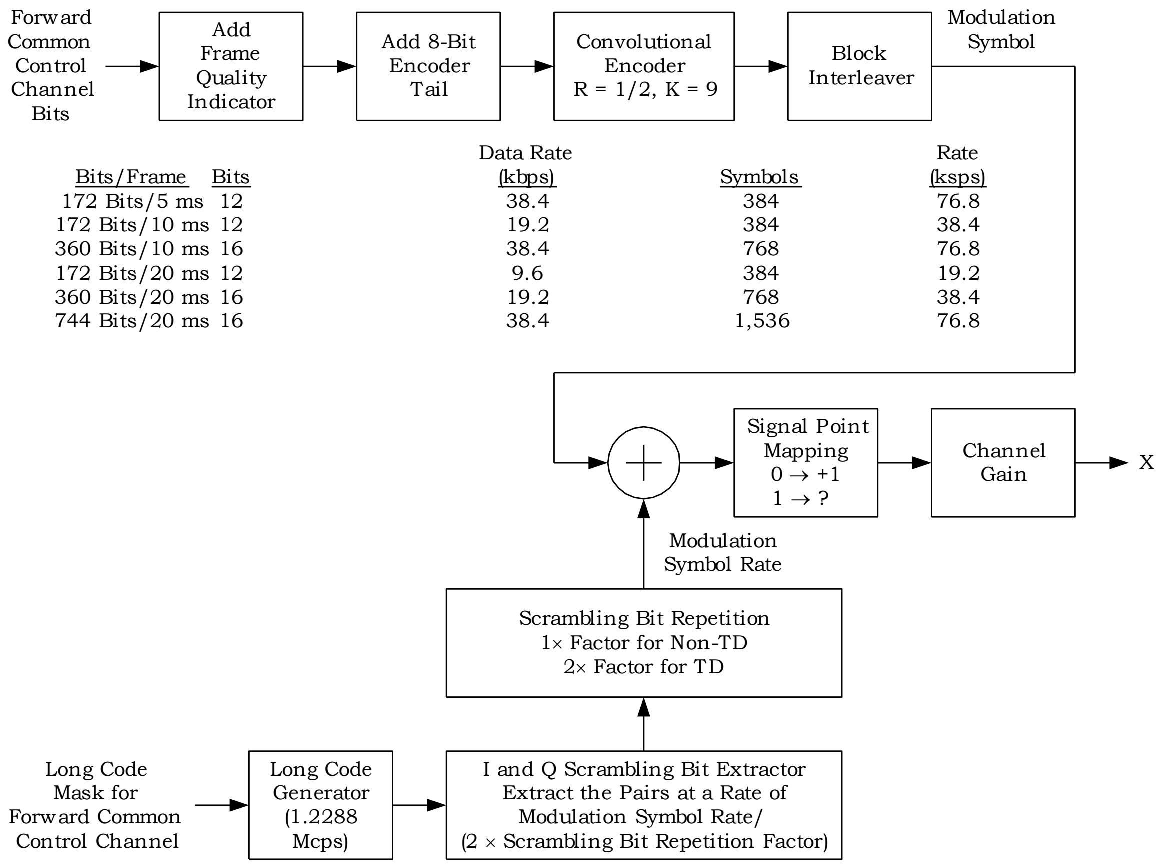


Figure 3.1.3.1.1.1-8. Forward Common Control Channel Structure for Spreading Rate 1 with R = 1/2 Mode

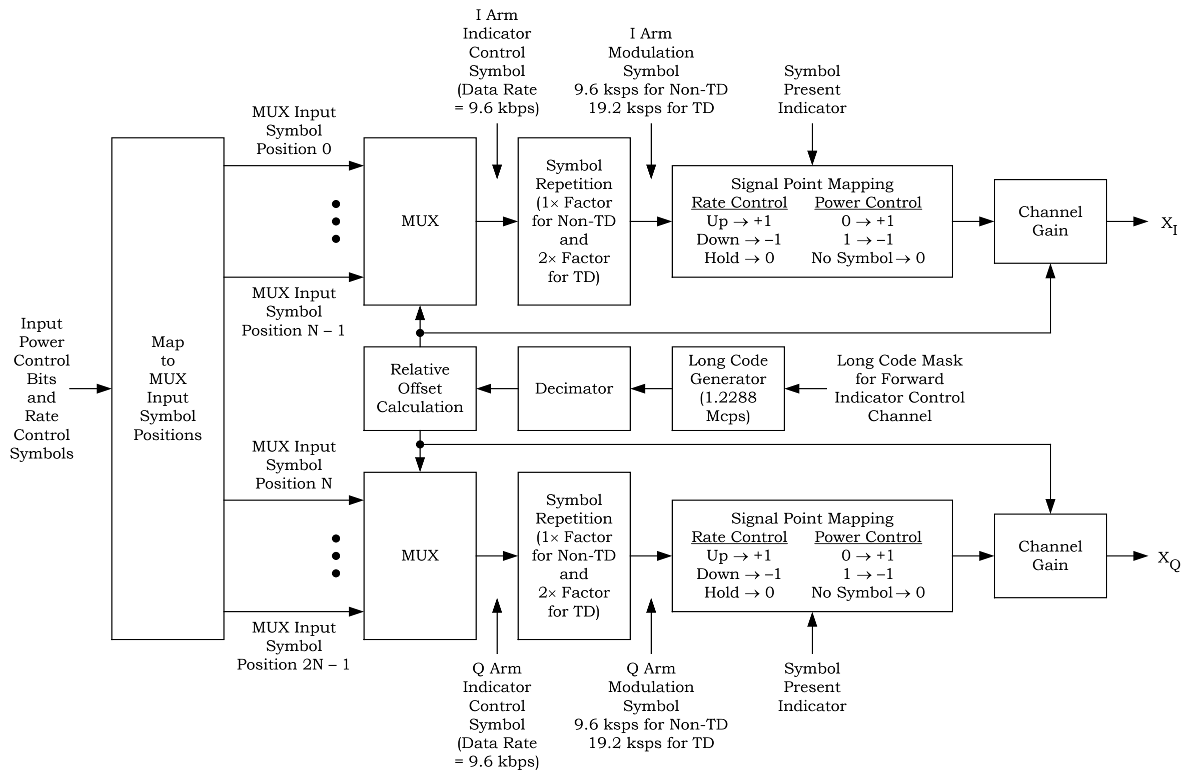


Figure 3.1.3.1.1.1-9. Forward Indicator Control Channel Structure for Spreading Rate 1

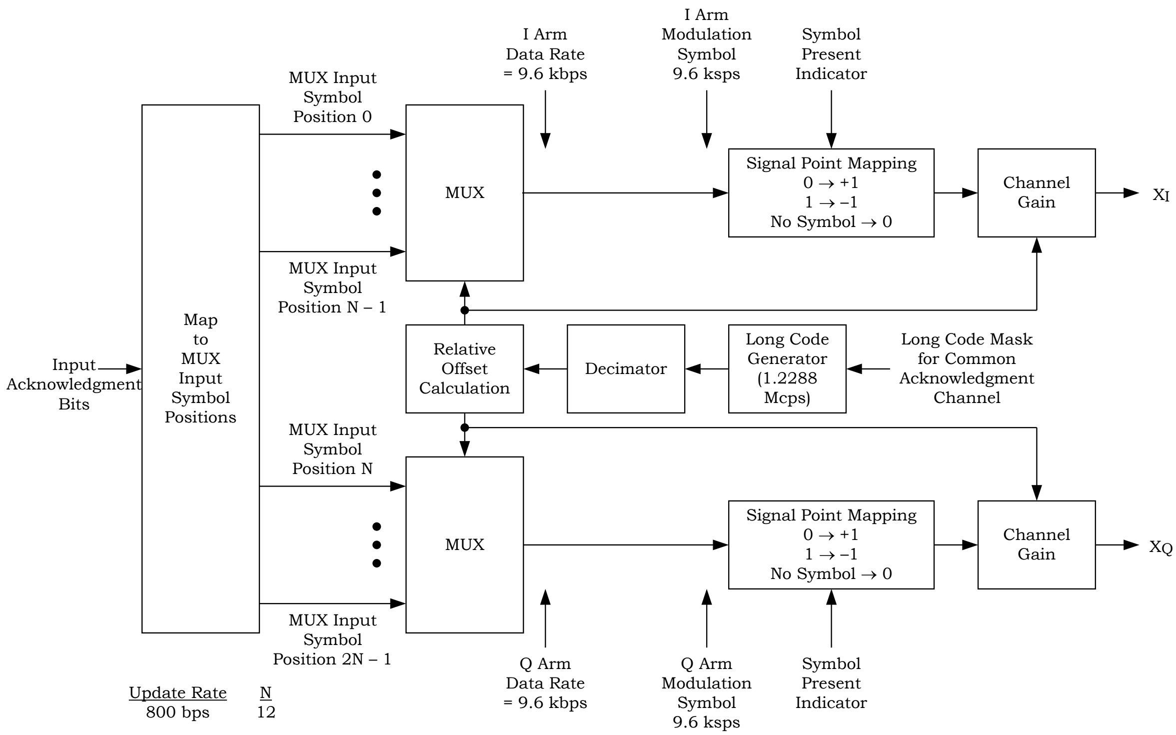


Figure 3.1.3.1.1.1-10. Forward Common Acknowledgment Channel Structure

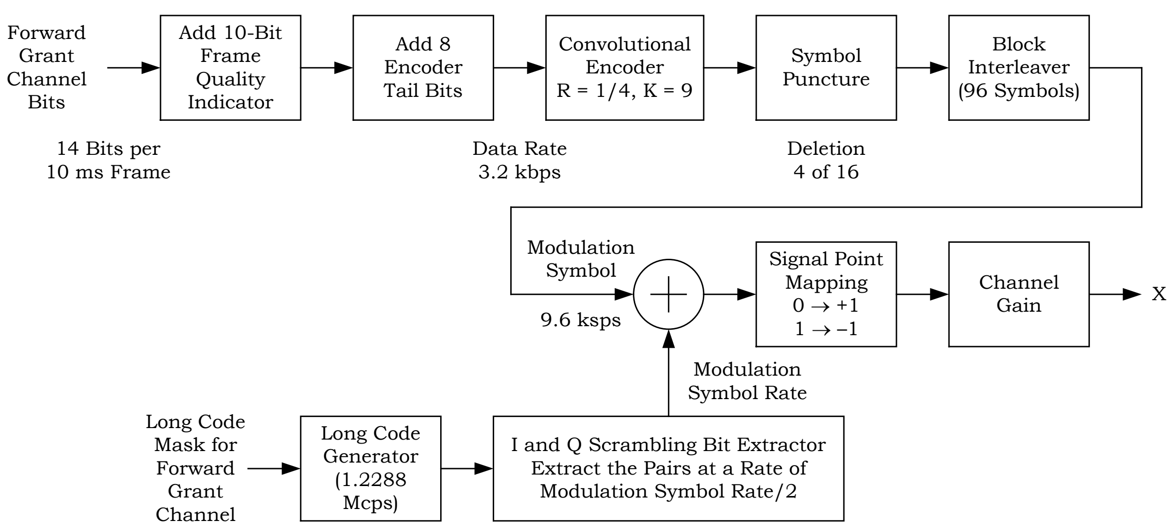


Figure 3.1.3.1.1.1-11. Forward Grant Channel Structure

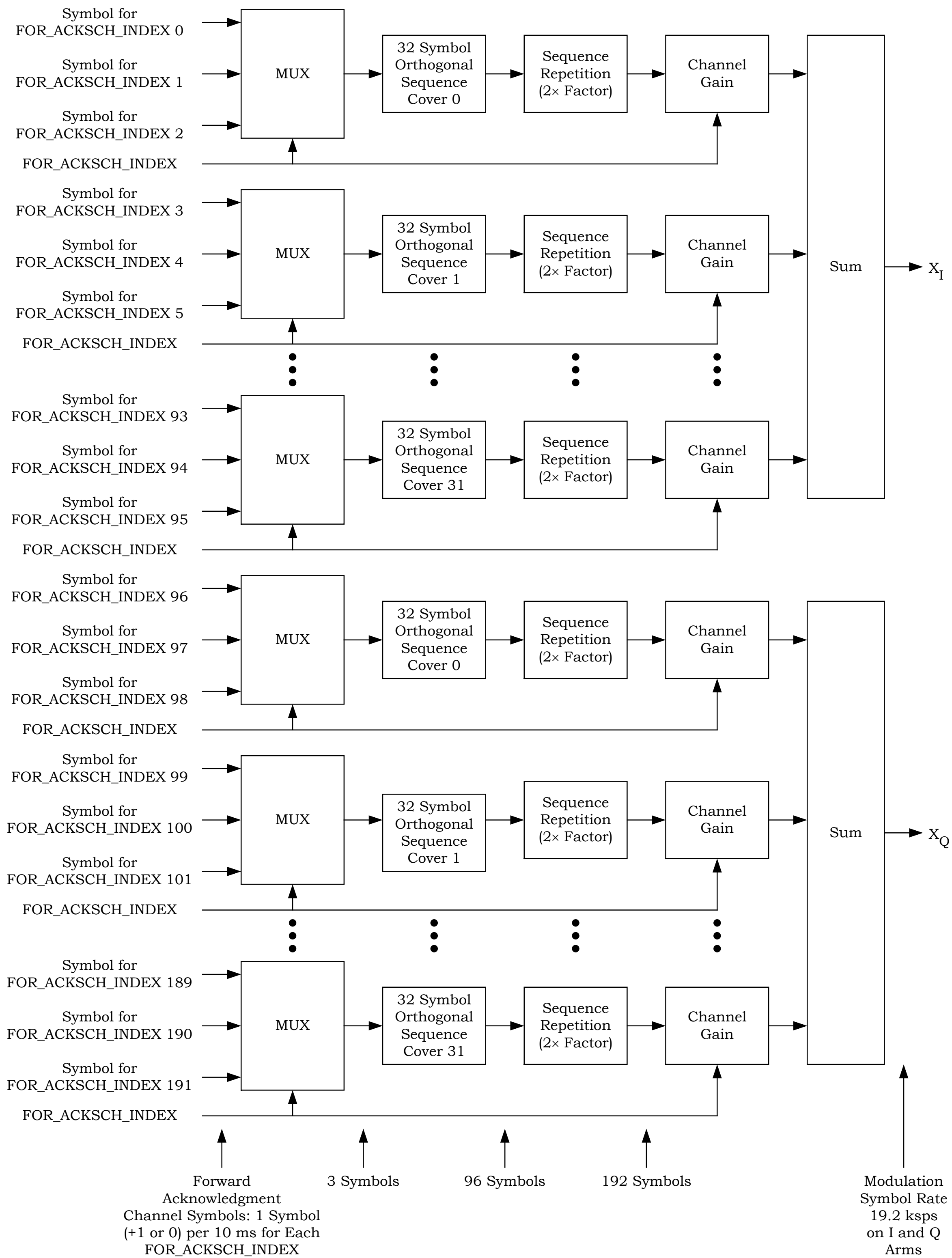


Figure 3.1.3.1.1.1-12. Forward Acknowledgment Channel Structure

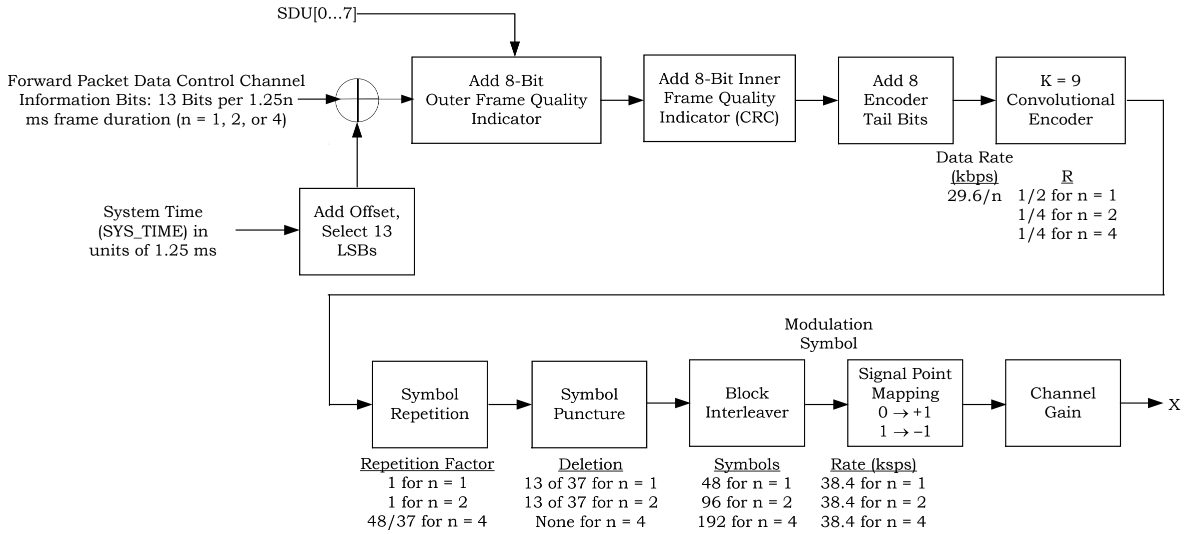


Figure 3.1.3.1.1.1-13. Forward Packet Data Control Channel Structure

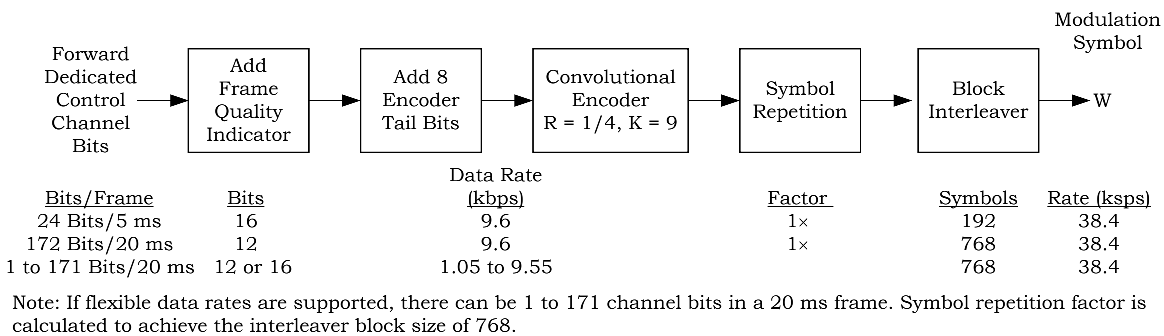


Figure 3.1.3.1.1.1-14. Forward Dedicated Control Channel Structure for Radio Configuration 3

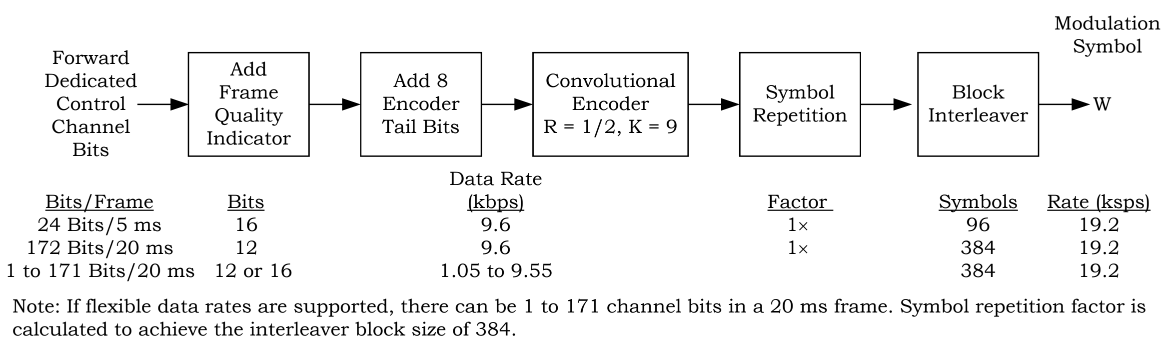
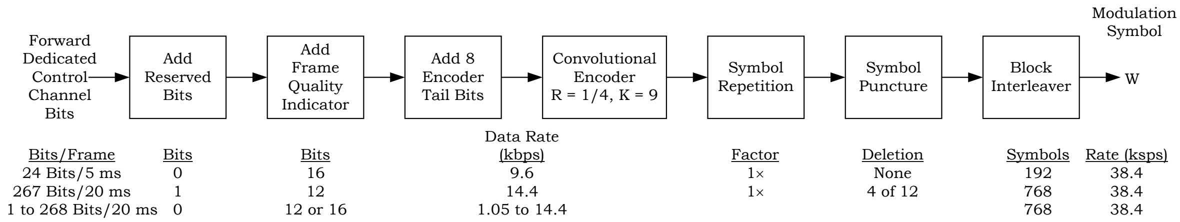
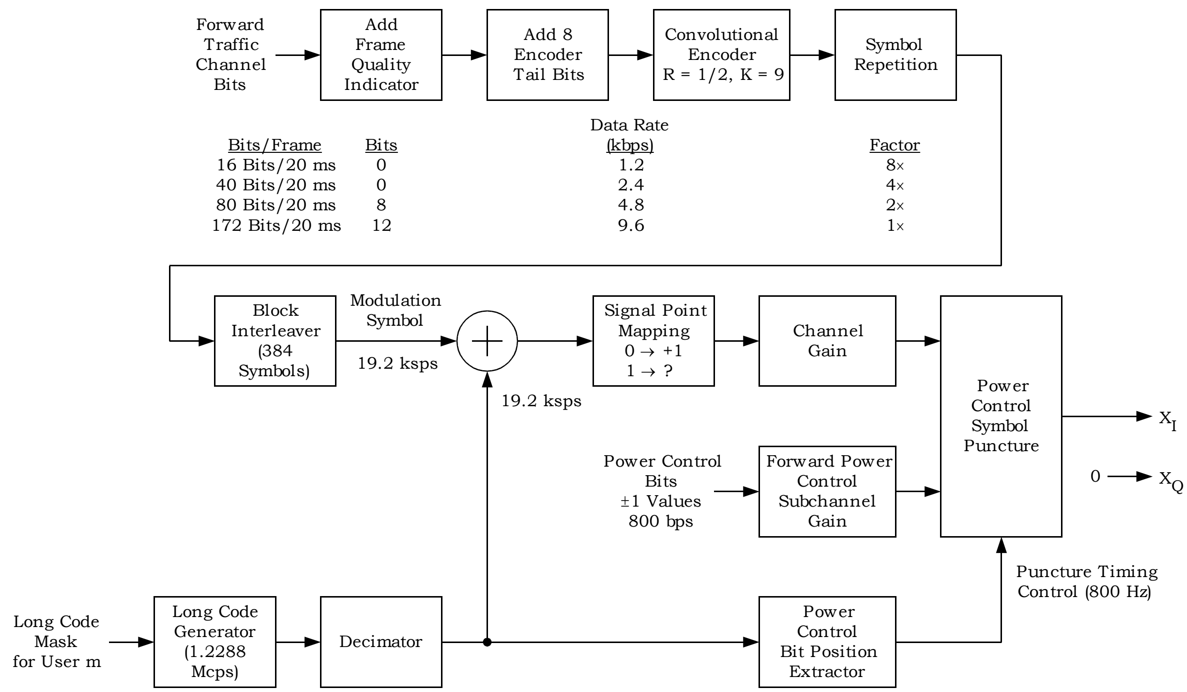


Figure 3.1.3.1.1.1-15. Forward Dedicated Control Channel Structure for Radio Configuration 4



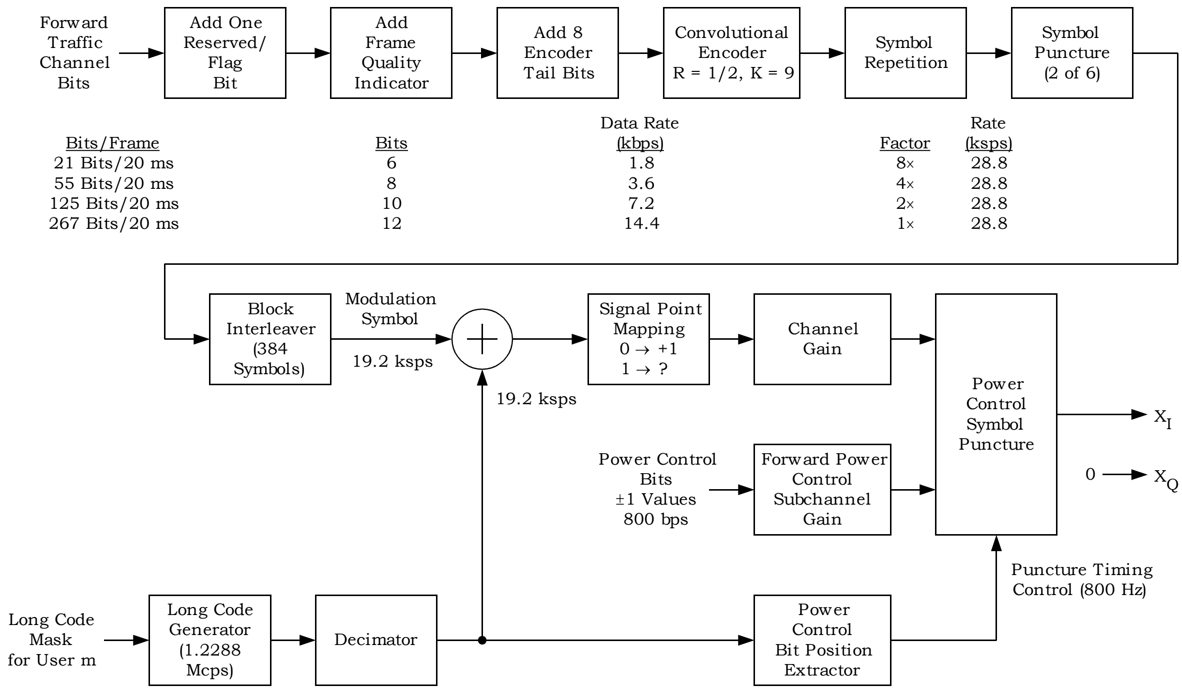
Notes: If flexible data rates are supported, there can be 1 to 268 channel bits in a 20 ms frame. Symbol repetition factor and puncturing are calculated to achieve the interleaver block size of 768.

Figure 3.1.3.1.1.1-16. Forward Dedicated Control Channel Structure for Radio Configuration 5



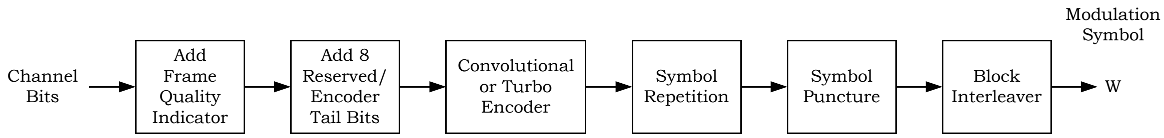
Power control bits are not punctured in for Forward Supplemental Code Channels of the Forward Traffic Channels.

Figure 3.1.3.1.1.1-17. Forward Traffic Channel Structure for Radio Configuration 1



Power control bits are not punctured in for Forward Supplemental Code Channels of the Forward Traffic Channels.

Figure 3.1.3.1.1.1-18. Forward Traffic Channel Structure for Radio Configuration 2

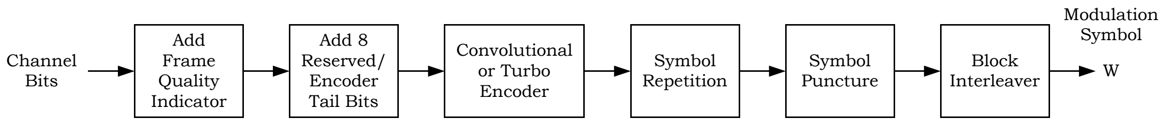


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/4	1×	None	192	38.4
16 Bits/20 ms	6	1.5	1/4	8×	1 of 5	768	38.4
40 Bits/20n ms	6	2.7/n	1/4	4×	1 of 9	768	38.4/n
80 Bits/20n ms	8	4.8/n	1/4	2×	None	768	38.4/n
172 Bits/20n ms	12	9.6/n	1/4	1×	None	768	38.4/n
360 Bits/20n ms	16	19.2/n	1/4	1×	None	1,536	76.8/n
744 Bits/20n ms	16	38.4/n	1/4	1×	None	3,072	153.6/n
1,512 Bits/20n ms	16	76.8/n	1/4	1×	None	6,144	307.2/n
3,048 Bits/20n ms	16	153.6/n	1/4	1×	None	12,288	614.4/n
1 to 3,047 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 192 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
   - The code rate is 1/4. If the number of encoder input bits per frame is less than 384, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 3.1.3.1.1.1-19. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 3

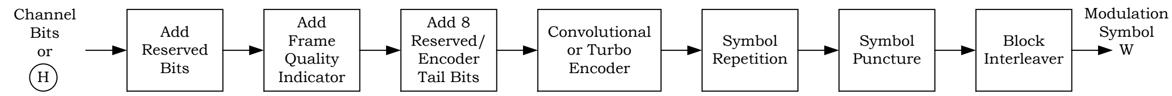


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/2	1×	None	96	19.2
16 Bits/20 ms	6	1.5	1/2	8×	1 of 5	384	19.2
40 Bits/20n ms	6	2.7/n	1/2	4×	1 of 9	384	19.2/n
80 Bits/20n ms	8	4.8/n	1/2	2×	None	384	19.2/n
172 Bits/20n ms	12	9.6/n	1/2	1×	None	384	19.2/n
360 Bits/20n ms	16	19.2/n	1/2	1×	None	768	38.4/n
744 Bits/20n ms	16	38.4/n	1/2	1×	None	1,536	76.8/n
1,512 Bits/20n ms	16	76.8/n	1/2	1×	None	3,072	153.6/n
3,048 Bits/20n ms	16	153.6/n	1/2	1×	None	6,144	307.2/n
6,120 Bits/20n ms	16	307.2/n	1/2	1×	None	12,288	614.4/n
1 to 6,119 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 192 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
   - If the number of encoder input bits per frame is less than 384, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.
   - If ERAM is disabled, the code rate is 1/2. If ERAM is enabled, the code rate of the turbo encoder shall be selected as follows: $R = 1/2$, if $N/I = 2$; $R = 1/3$, if $2 < N/I \le 3$; $R = 1/4$, if $3 < N/I \le 4$; $R = 1/5$, if $N/I > 4$ where I denotes the number of encoder input bits per frame, and N denotes the interleaver block size.

Figure 3.1.3.1.1.1-20. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 4

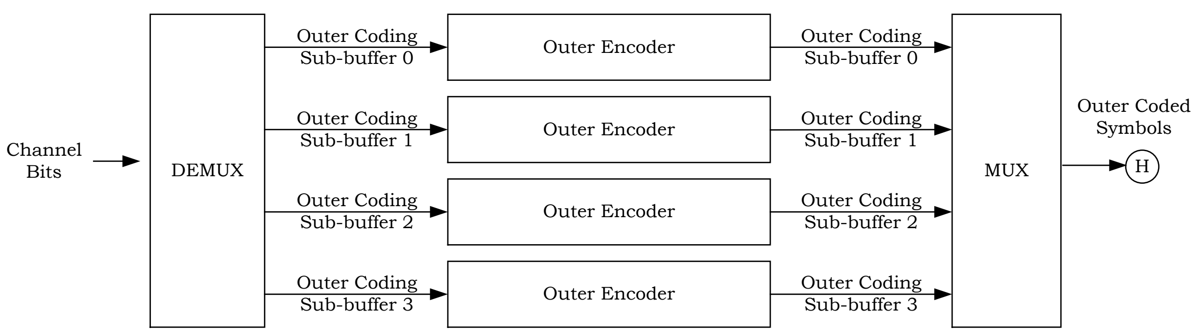


Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/4	1×	None	192	38.4
21 Bits/20 ms	1	6	1.8	1/4	8×	4 of 12	768	38.4
55 Bits/20n ms	1	8	3.6/n	1/4	4×	4 of 12	768	38.4/n
125 Bits/20n ms	1	10	7.2/n	1/4	2×	4 of 12	768	38.4/n
267 Bits/20n ms	1	12	14.4/n	1/4	1×	4 of 12	768	38.4/n
552 Bits/20n ms	0	16	28.8/n	1/4	1×	4 of 12	1,536	76.8/n
1,128 Bits/20n ms	0	16	57.6/n	1/4	1×	4 of 12	3,072	153.6/n
2,280 Bits/20n ms	0	16	115.2/n	1/4	1×	4 of 12	6,144	307.2/n
4,584 Bits/20n ms	0	16	230.4/n	1/4	1×	4 of 12	12,288	614.4/n
1 to 4,583 Bits/20n ms								

Notes:

1. n is the length of the frame in multiples of 20 ms. For 37 to 72 encoder input bits per frame, n = 1 or 2. For more than 72 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 288 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 576 or more encoder input bits per frame; turbo code shall be used when outer coding is used; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - When the number of channel bits per frame is 21, 55, 125, or 267 and the corresponding frame quality indicator length is 6, 8, 10, and 12, an initial reserved bit is used; otherwise, no initial reserved bits are used.
   - The frame quality indicator length is 16 for more than 288 encoder input bits per frame; 12 or 16 for 145 to 288 encoder input bits per frame; 10, 12, or 16 for 73 to 144 encoder input bits per frame; 8, 10, 12, or 16 for 37 to 72 encoder input bits per frame; and 6, 8, 10, 12, or 16 otherwise.
   - If the number of encoder input bits per frame is less than 576, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.
   - If ERAM is disabled, the code rate is 1/4. If ERAM is enabled, the code rate of the turbo encoder shall be selected as follows:
     R = 1/3, if $8/3 < N/I \leq 3$; R = 1/4, if $3 < N/I \leq 4$ or $N/I = 8/3$; R = 1/5, if $N/I > 4$
     where I denotes the number of encoder input bits per frame, and N denotes the interleaver block size.

Figure 3.1.3.1.1.1-21. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 5



Bits/Outer Coding Buffer	Bits/Outer Coding Sub-buffer	Symbols/Outer Coding Sub-buffer	Symbols/Frame
100,320 Bits/1.28 seconds	25,080 Bits/1.28 seconds	36,480 Bits/1.28 seconds	2,280 Bits/20 ms
109,440 Bits/1.28 seconds	27,360 Bits/1.28 seconds	36,480 Bits/1.28 seconds	2,280 Bits/20 ms
118,560 Bits/1.28 seconds	29,640 Bits/1.28 seconds	36,480 Bits/1.28 seconds	2,280 Bits/20 ms
127,680 Bits/1.28 seconds	31,920 Bits/1.28 seconds	36,480 Bits/1.28 seconds	2,280 Bits/20 ms

Figure 3.1.3.1.1.1-22. Forward Supplemental Channel Outer Coding for Radio Configuration 5

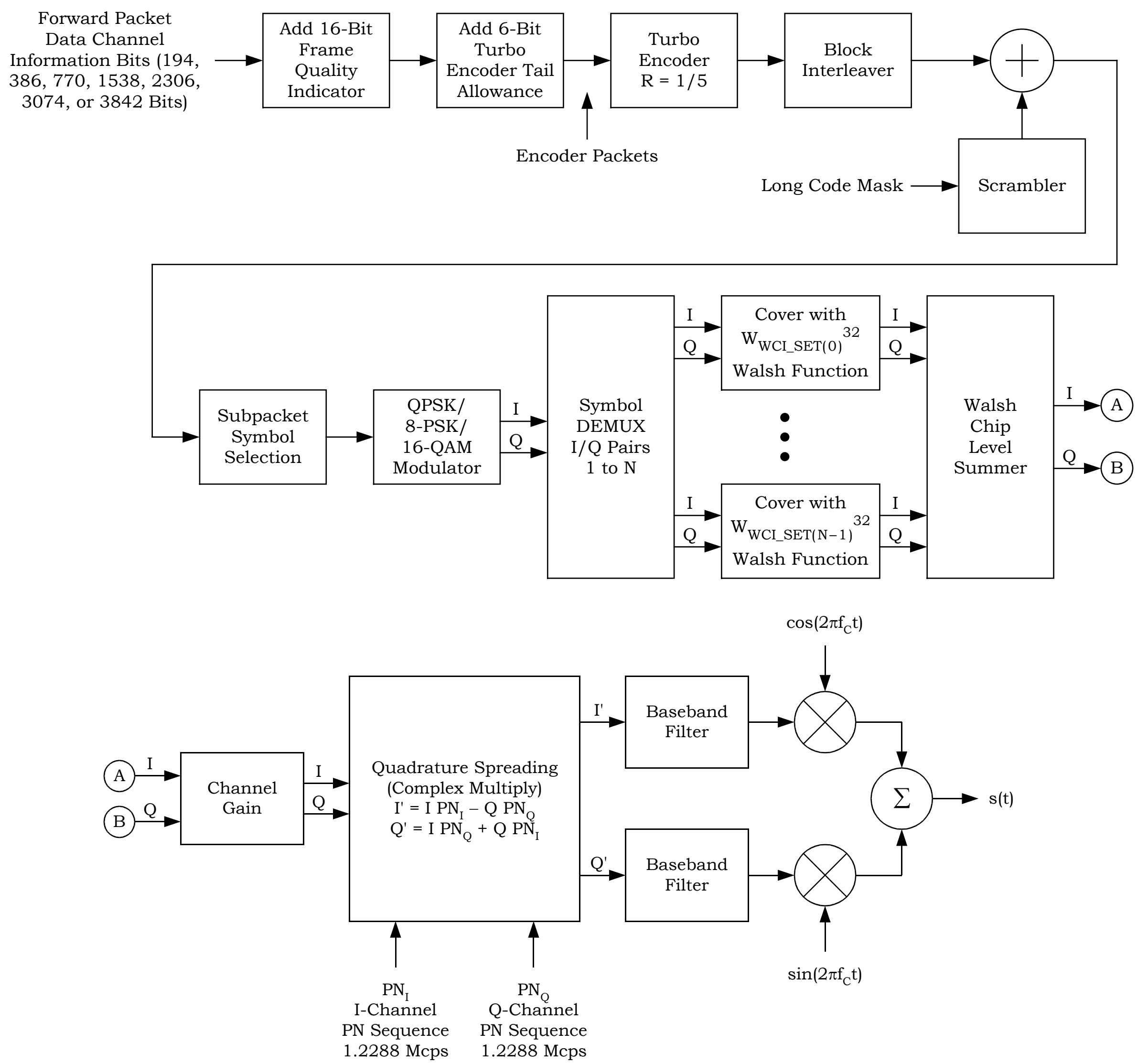
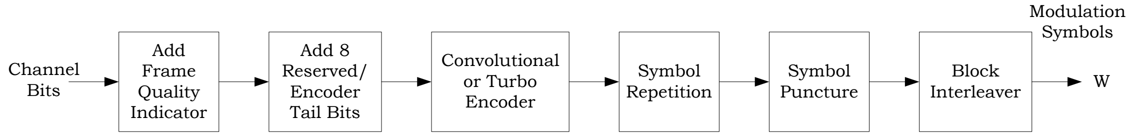


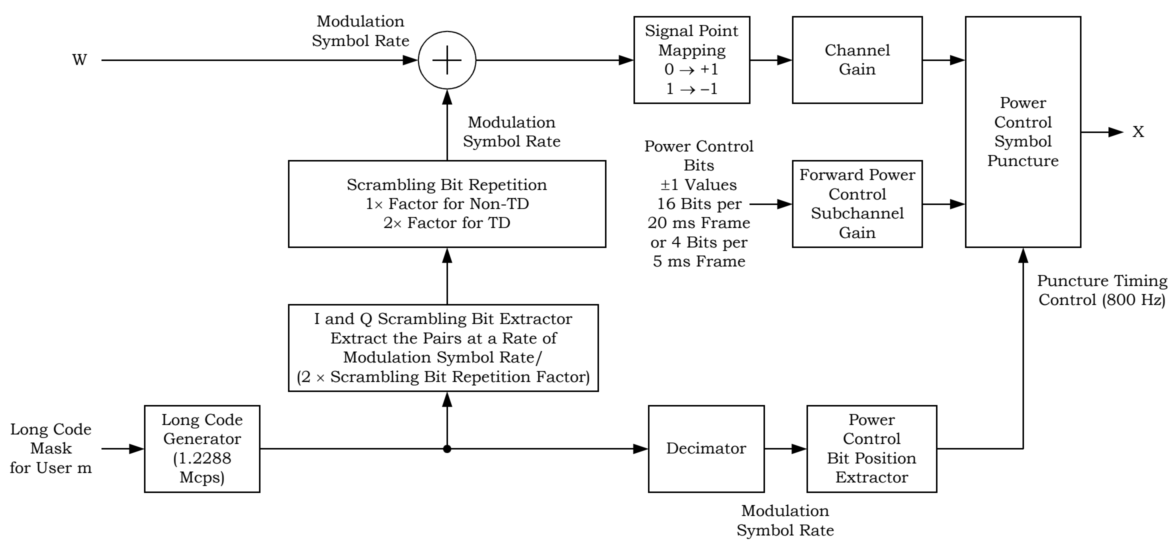
Figure 3.1.3.1.1.1-23. Forward Packet Data Channel Structure for Radio Configuration 10



Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
16 Bits/20 ms	12	1.8	1/2	8x	4 of 12	384	19.2
40 Bits/20 ms	12	3.0	1/2	4x	1 of 5	384	19.2
80 Bits/20 ms	12	5.0	1/2	2x	1 of 25	384	19.2
172 Bits/20 ms	12	9.6	1/2	1x	None	384	19.2
360 Bits/20 ms	16	19.2	1/2	1x	None	768	38.4
744 Bits/20 ms	16	38.4	1/2	1x	None	1,536	76.8
1,512 Bits/20 ms	16	76.8	1/2	1x	None	3,072	153.6
3,048 Bits/20 ms	16	153.6	1/2	1x	None	6,144	307.2
6,120 Bits/20 ms	16	307.2	1/2	1x	None	12,288	614.4

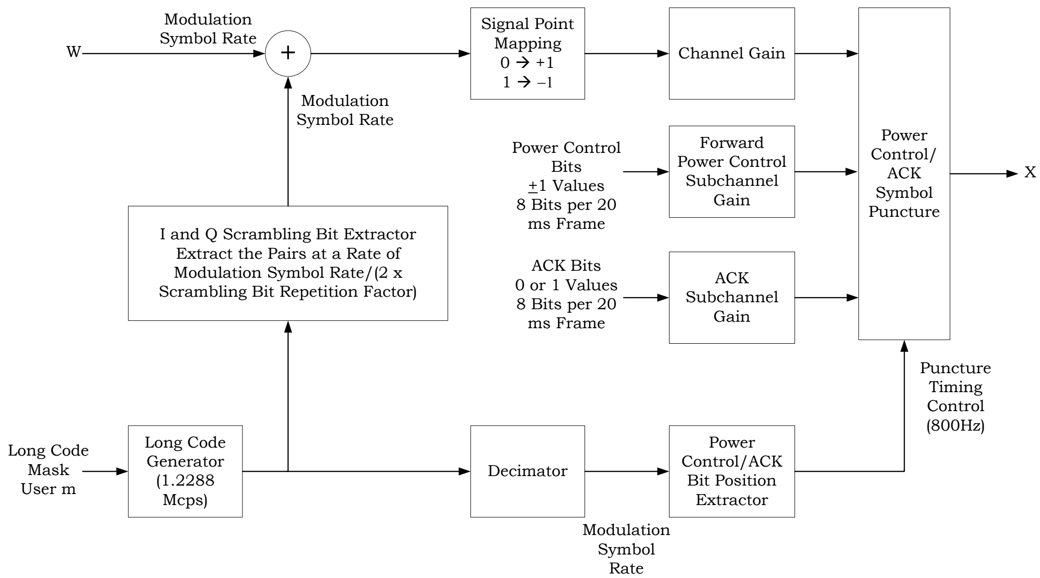
Notes:
1. The Forward Fundamental Channel only uses 0, 36, 60, 100, or 192 encoder input bits per frame.
2. The Forward Supplemental Channel only uses 192, 384, 768, 1536, 3072, or 6144 encoder input bits per frame.
3. Turbo coding is used for the Forward Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.

Figure 3.1.3.1.1.1-24. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 11 and Radio Configuration 12



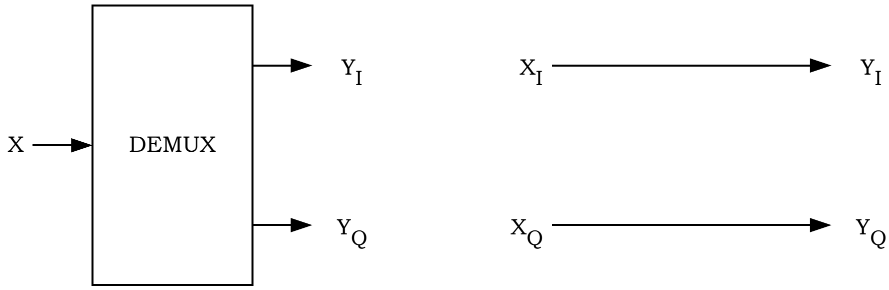
Power control symbol puncturing is on the Forward Fundamental Channels and Forward Dedicated Control Channels only.

Figure 3.1.3.1.1.1-25. Long Code Scrambling, Power Control, and Signal Point Mapping for Forward Traffic Channels with Radio Configurations 3, 4, and 5

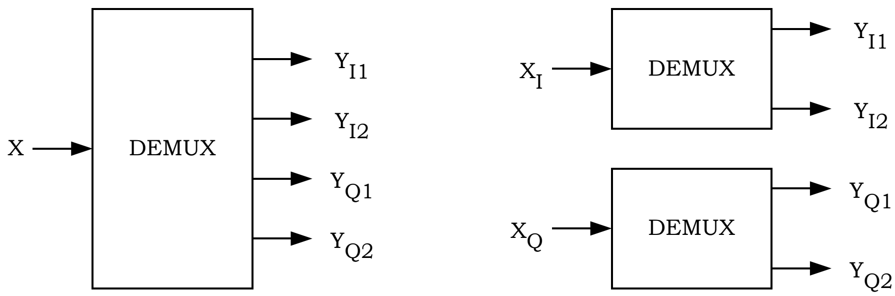


Power Control symbol puncturing is on the Forward Fundamental Channels

Figure 3.1.3.1.1.1-26. Long Code Scrambling, Power Control, Acknowledgment, and Signal Point Mapping for Forward Traffic Channels with Radio Configuration 11 and Radio Configuration 12



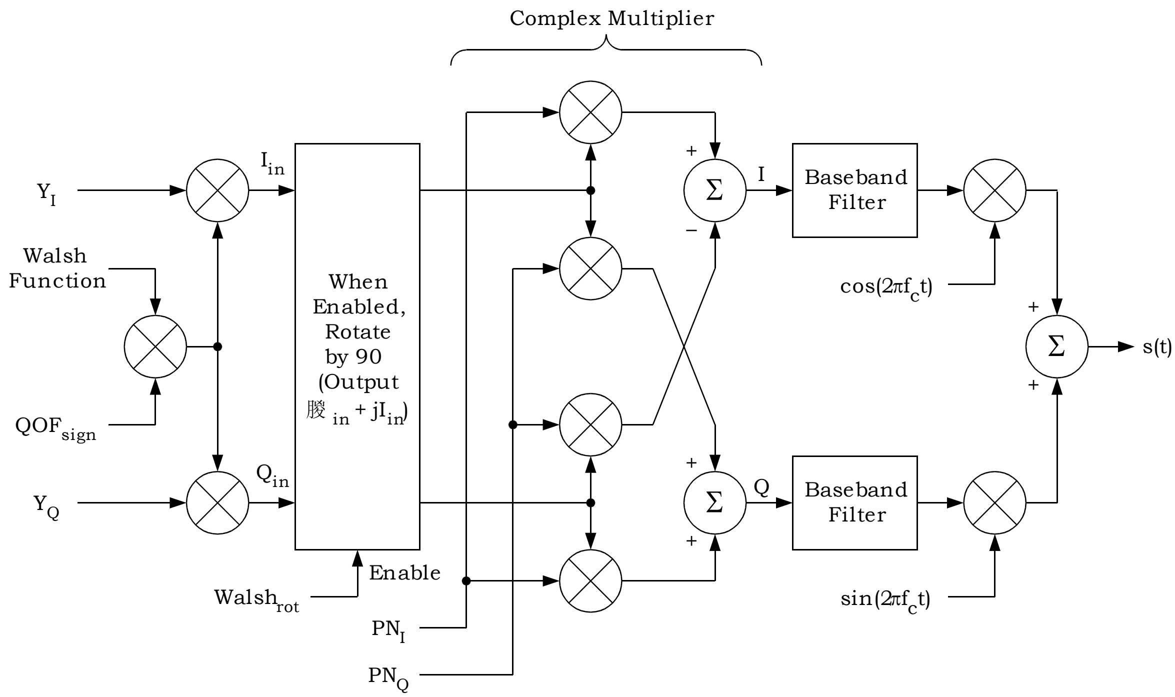
a) Non-TD Mode



b) TD Mode

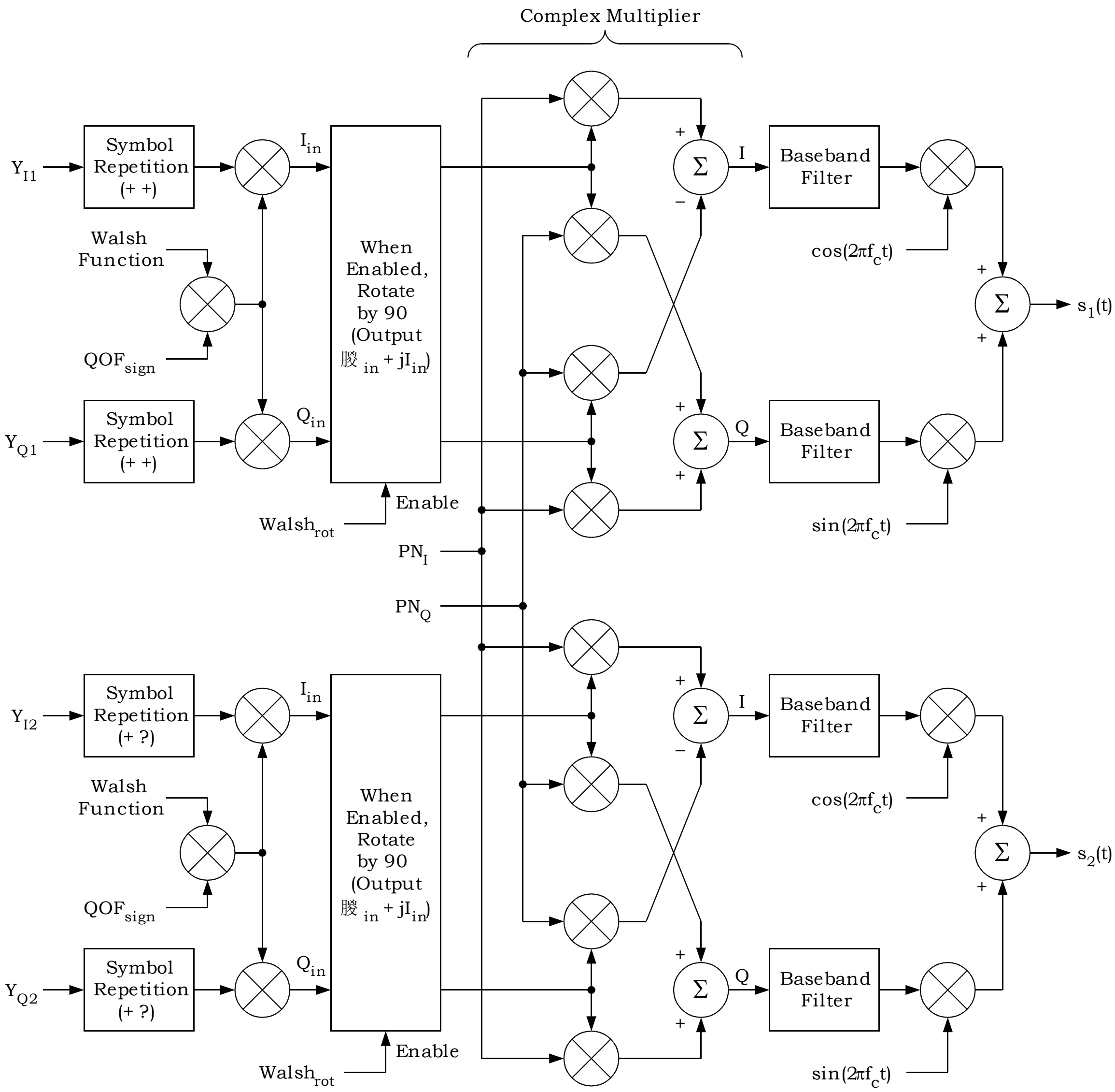
The DEMUX functions distribute input symbols sequentially from the top to the bottom output paths.

Figure 3.1.3.1.1.1-27. Demultiplexer Structure for Spreading Rate 1



Walsh function =±1 (mapping: ??→ +1, ?? → ?)
QOF_{sign} = ±1 sign multiplier QOF mask(mapping: ??→ +1, ?? → ?)
$Walsh_{rot}$ = ??or ??90?rotation-enable Walsh function
$Walsh_{rot}$ = ??means no rotation
$Walsh_{rot}$ = ??means rotate by 90
The null QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = ??
PN_I and PN_Q = ±1 I-channel and Q-channel PN sequences
The null QOF is used for Radio Configurations 1 and 2

Figure 3.1.3.1.1.1-28. I and Q Mapping (Non-TD Mode) for Spreading Rate 1



Walsh function =±1 (mapping: ??→ +1, ?? → ?)
QOF_{sign} = ±1 sign multiplier QOF mask(mapping: ??→ +1, ?? → ?)
$Walsh_{rot}$ = ??or ??90?rotation-enable Walsh function
$Walsh_{rot}$ = ??means no rotation
$Walsh_{rot}$ = ??means rotate by 90
The null QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = ??
PN_I and PN_Q = ? I-channel and Q-channel PN sequences
$s_1(t)$ is associated with the Pilot Channel on W_0^{64}
$s_2(t)$ is associated with the Transmit Diversity Pilot Channel on W_{16}^{128}

Figure 3.1.3.1.1.1-29. I and Q Mapping (OTD Mode) for Spreading Rate 1

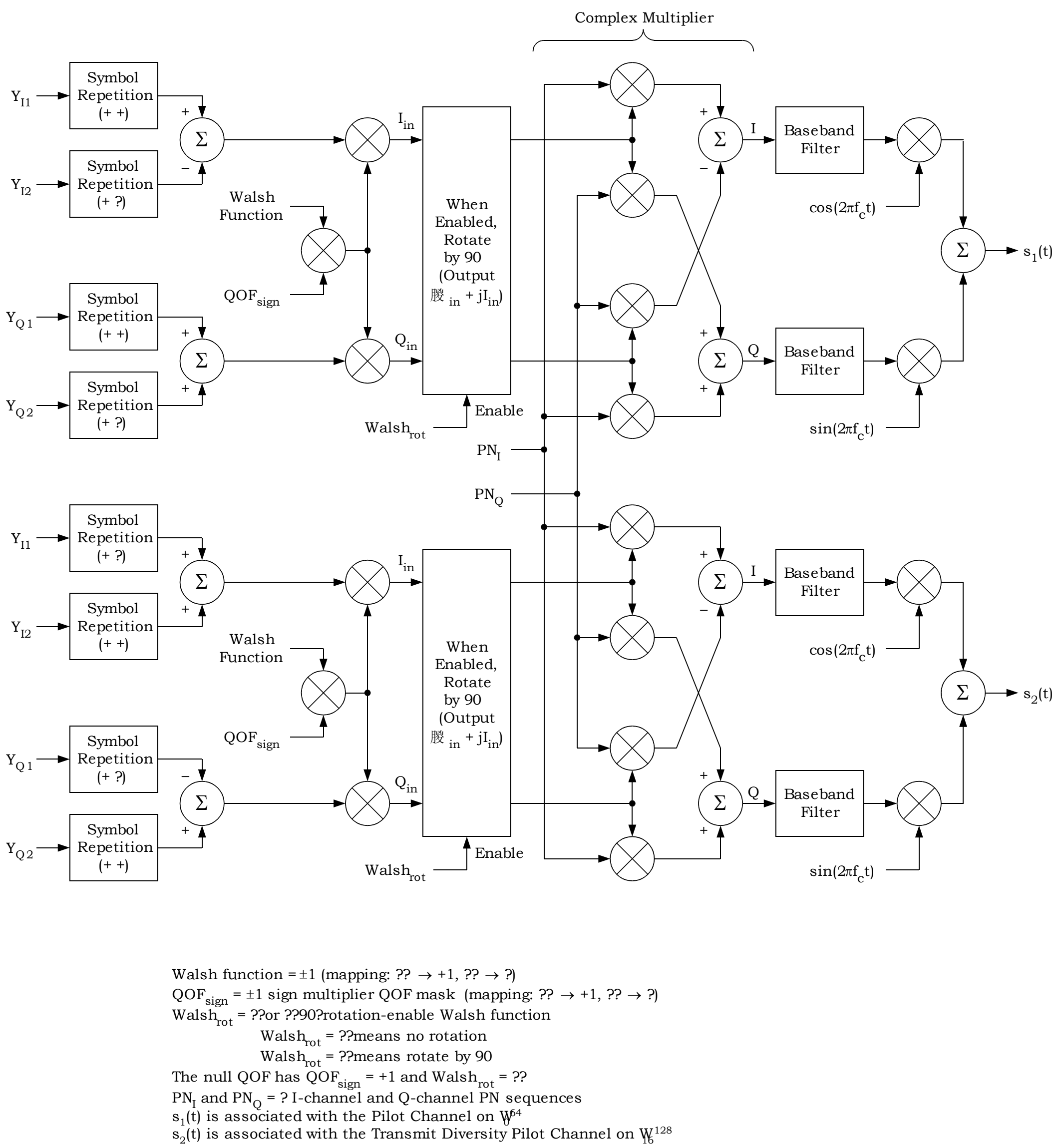


Figure 3.1.3.1.1.1-30. I and Q Mapping (STS Mode) for Spreading Rate 1

3.1.3.1.1.2 Spreading Rate 3

The Forward CDMA Channel consists of the channels specified in Table 3.1.3.1.1.2-1. Table 3.1.3.1.1.2-1 states the range of valid channels for each channel type.

Table 3.1.3.1.1.2-1. Channel Types for the Forward CDMA Channel for Spreading Rate 3

Channel Type	Maximum Number
Forward Pilot Channel	1
Auxiliary Pilot Channel	Not specified
Sync Channel	1
Broadcast Control Channel	7
Quick Paging Channel	3
Forward Indicator Control Channel	4
Common Assignment Channel	7
Forward Common Control Channel	7
Forward Dedicated Control Channel	Not specified
Forward Fundamental Channel	Not specified
Forward Supplemental Channel	Not specified

Each of these code channels is spread by the appropriate Walsh function or quasi-orthogonal function. Each code channel is then spread by a quadrature pair of PN sequences at a fixed chip rate of 1.2288 Mcps. Multiple Forward CDMA Channels may be used within a base station in a frequency division multiplexed manner.

If a base station transmits the Forward Common Control Channel on a Forward CDMA Channel, then the base station shall also transmit the Broadcast Control Channel on that Forward CDMA Channel.

The structures of the Forward Pilot Channel, Auxiliary Pilot Channels, and Sync Channel for Spreading Rate 3 are shown in Figure 3.1.3.1.1.2-1. The structure of the Broadcast Control Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-2. The structure of the Quick Paging Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-3. The structure of the Forward Indicator Control Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-4. The structure of the Common Assignment Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-5. The structure of the Forward Common Control Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-6. The structure of the Forward Dedicated Control Channel for Spreading Rate 3 is shown in Figure 3.1.3.1.1.2-7 through Figure 3.1.3.1.1.2-10.

The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 6 have the overall structure shown in Figure 3.1.3.1.1.2-11. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 7 have the overall structure shown in Figure 3.1.3.1.1.2-12. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 8 have the overall structure shown in Figure 3.1.3.1.1.2-13. The Forward Fundamental Channel and Forward

Supplemental Channel for Radio Configuration 9 have the overall structure shown in Figure 3.1.3.1.1.2-14.

Long code scrambling, power control, and signal point mapping for Forward Traffic Channels with Radio Configurations 6 though 9 are shown in Figure 3.1.3.1.1.2-15.

The symbol demultiplexing and I and Q mappings are shown in Figure 3.1.3.1.1.2-16 and Figure 3.1.3.1.1.2-17.

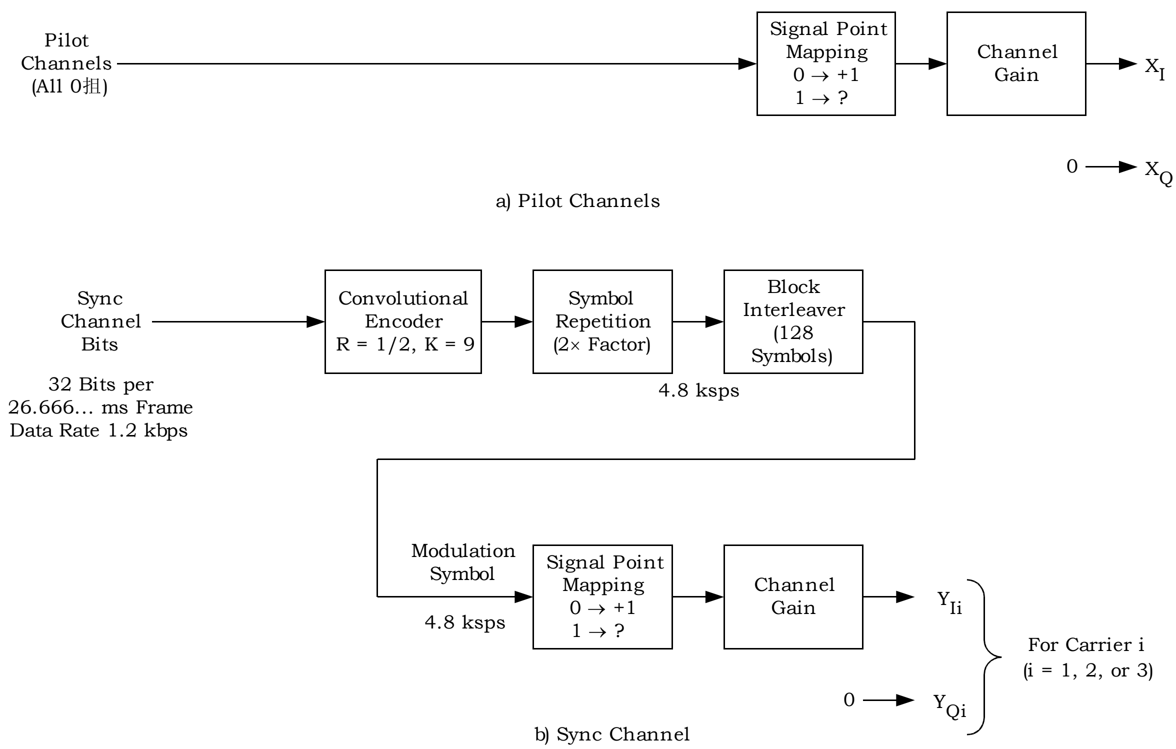


Figure 3.1.3.1.1.2-1. Forward Pilot Channel, Auxiliary Pilot Channels, and Sync Channel for Spreading Rate 3

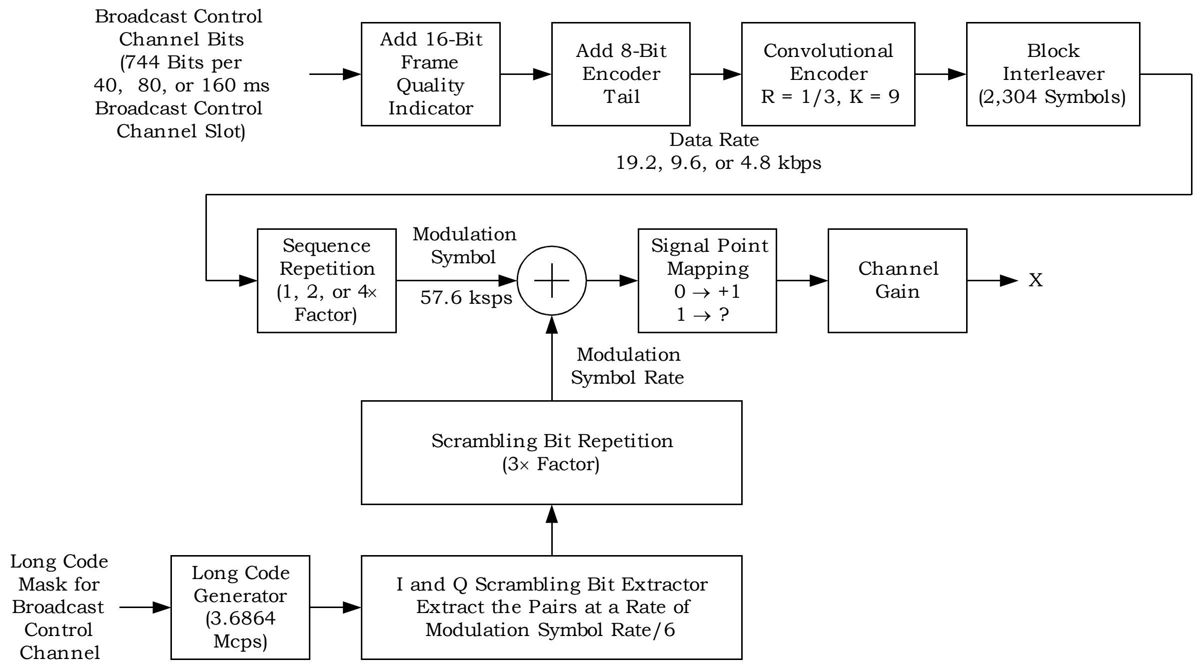


Figure 3.1.3.1.1.2-2. Broadcast Control Channel Structure for Spreading Rate 3

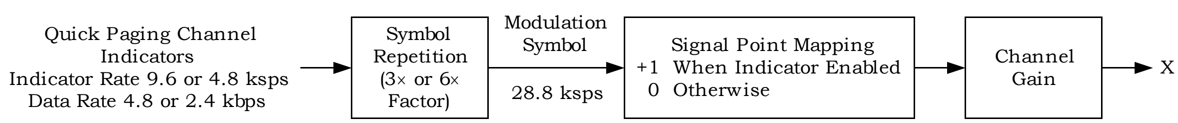


Figure 3.1.3.1.1.2-3. Quick Paging Channel Structure for Spreading Rate 3

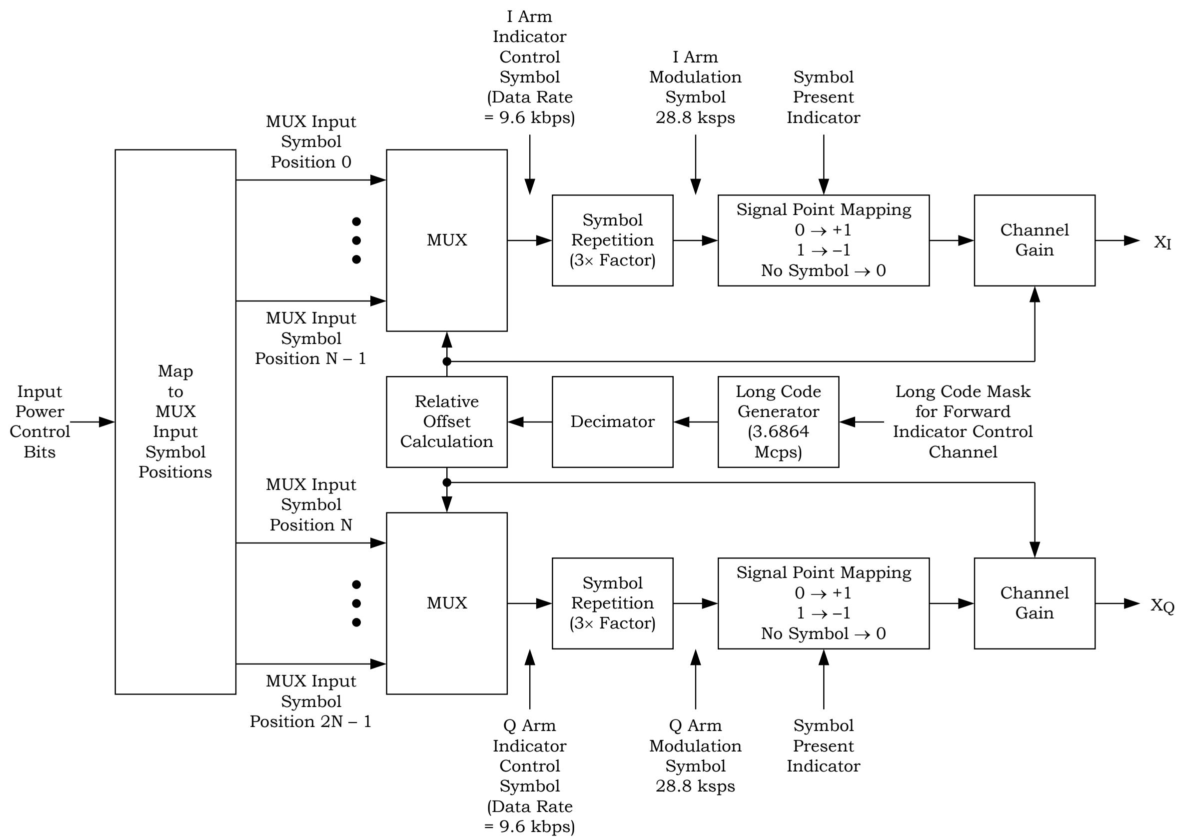


Figure 3.1.3.1.1.2-4. Forward Indicator Control Channel Structure for Spreading Rate 3

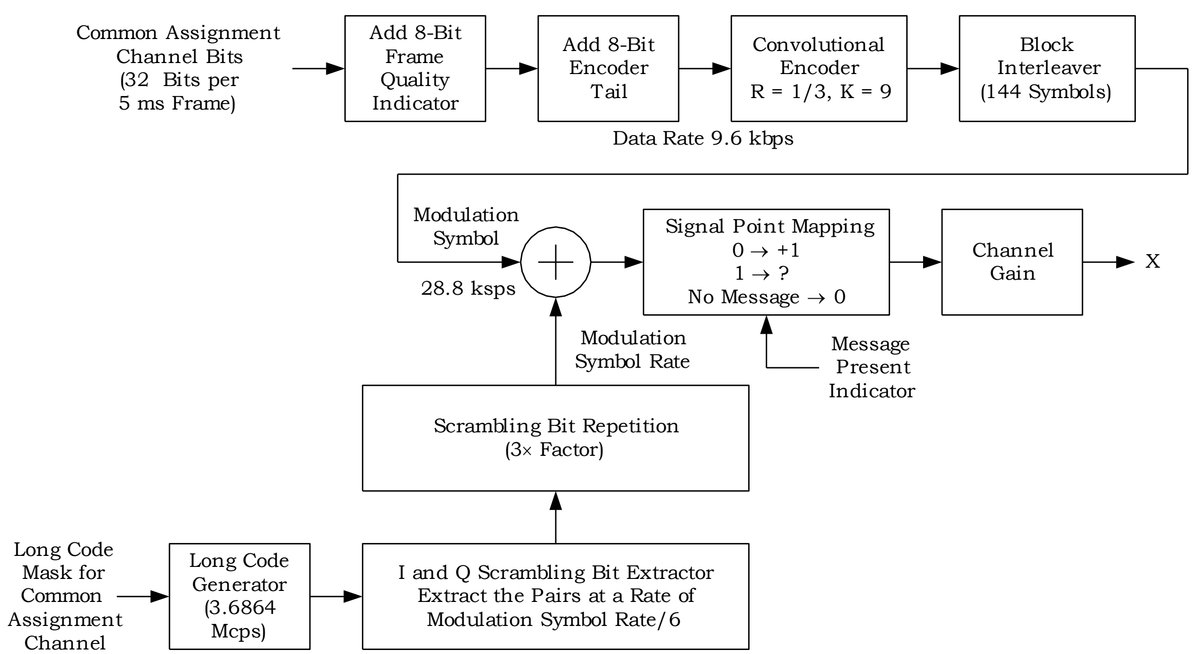
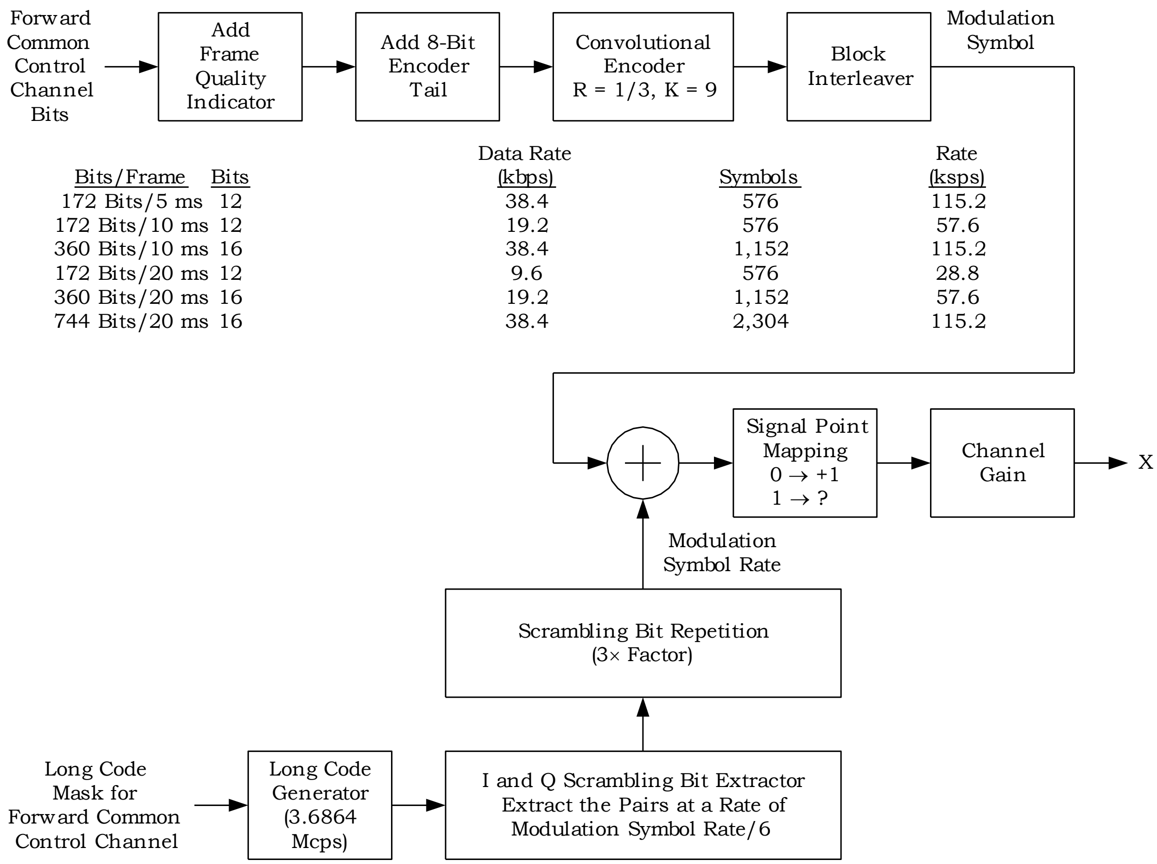
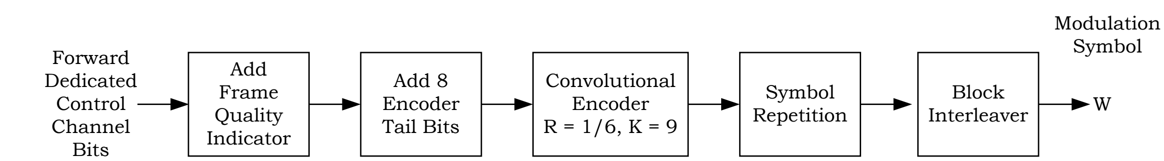


Figure 3.1.3.1.1.2-5. Common Assignment Channel Structure for Spreading Rate 3



Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
172 Bits/5 ms	12	38.4	576	115.2
172 Bits/10 ms	12	19.2	576	57.6
360 Bits/10 ms	16	38.4	1,152	115.2
172 Bits/20 ms	12	9.6	576	28.8
360 Bits/20 ms	16	19.2	1,152	57.6
744 Bits/20 ms	16	38.4	2,304	115.2

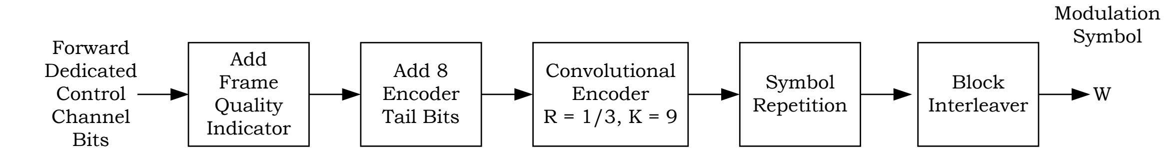
Figure 3.1.3.1.1.2-6. Forward Common Control Channel Structure for Spreading Rate 3



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1×	288	57.6
172 Bits/20 ms	12	9.6	1×	1,152	57.6
1 to 171 Bits/20 ms	12 or 16	1.05 to 9.55		1,152	57.6

Note: If flexible data rates are supported, there can be 1 to 171 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 1,152.

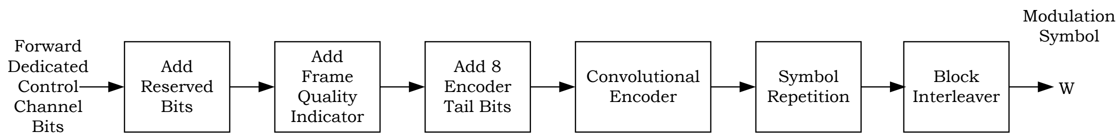
Figure 3.1.3.1.1.2-7. Forward Dedicated Control Channel Structure for Radio Configuration 6



Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1×	144	28.8
172 Bits/20 ms	12	9.6	1×	576	28.8
1 to 171 Bits/20 ms	12 or 16	1.05 to 9.55		576	28.8

Note: If flexible data rates are supported, there can be 1 to 171 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 576.

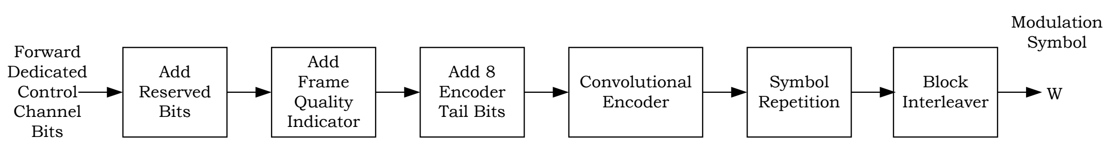
Figure 3.1.3.1.1.2-8. Forward Dedicated Control Channel Structure for Radio Configuration 7



Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	2×	288	57.6
267 Bits/20 ms	1	12	14.4	1/4	1×	1,152	57.6
1 to 268 Bits/20 ms	0	12 or 16	1.05 to 14.4	1/4		1,152	57.6

Notes: If flexible data rates are supported, there can be 1 to 268 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 1,152.

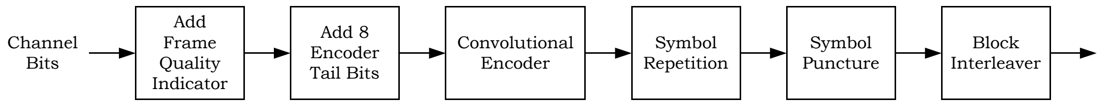
Figure 3.1.3.1.1.2-9. Forward Dedicated Control Channel Structure for Radio Configuration 8



Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	1×	144	28.8
267 Bits/20 ms	1	12	14.4	1/2	1×	576	28.8
1 to 268 Bits/20 ms	0	12 or 16	1.05 to 14.4	1/2		576	28.8

Notes: If flexible data rates are supported, there can be 1 to 268 channel bits in a 20 ms frame. Symbol repetition factor is calculated to achieve the interleaver block size of 576.

Figure 3.1.3.1.1.2-10. Forward Dedicated Control Channel Structure for Radio Configuration 9

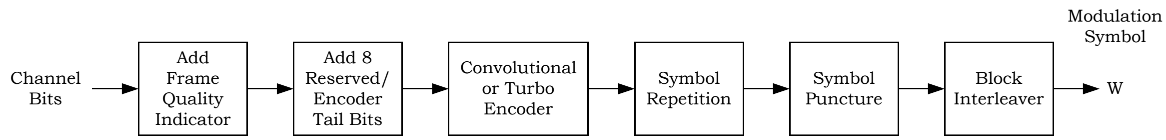


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/6	1×	None	288	57.6
16 Bits/20 ms	6	1.5	1/6	8×	1 of 5	1,152	57.6
40 Bits/20n ms	6	2.7/n	1/6	4×	1 of 9	1,152	57.6/n
80 Bits/20n ms	8	4.8/n	1/6	2×	None	1,152	57.6/n
172 Bits/20n ms	12	9.6/n	1/6	1×	None	1,152	57.6/n
360 Bits/20n ms	16	19.2/n	1/6	1×	None	2,304	115.2/n
744 Bits/20n ms	16	38.4/n	1/6	1×	None	4,608	230.4/n
1,512 Bits/20n ms	16	76.8/n	1/6	1×	None	9,216	460.8/n
3,048 Bits/20n ms	16	153.6/n	1/6	1×	None	18,432	921.6/n
6,120 Bits/20n ms	16	307.2/n	1/6	1×	None	36,864	1,843.2/n
1 to 6,119 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 192 encoder input bits per frame with n = 1.
3. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
    - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
    - The code rate is 1/6.
    - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
    - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 3.1.3.1.1.2-11. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 6

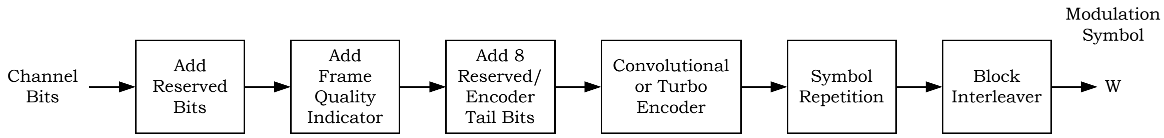


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/3	1×	None	144	28.8
16 Bits/20 ms	6	1.5	1/3	8×	1 of 5	576	28.8
40 Bits/20n ms	6	2.7/n	1/3	4×	1 of 9	576	28.8/n
80 Bits/20n ms	8	4.8/n	1/3	2×	None	576	28.8/n
172 Bits/20n ms	12	9.6/n	1/3	1×	None	576	28.8/n
360 Bits/20n ms	16	19.2/n	1/3	1×	None	1,152	57.6/n
744 Bits/20n ms	16	38.4/n	1/3	1×	None	2,304	115.2/n
1,512 Bits/20n ms	16	76.8/n	1/3	1×	None	4,608	230.4/n
3,048 Bits/20n ms	16	153.6/n	1/3	1×	None	9,216	460.8/n
6,120 Bits/20n ms	16	307.2/n	1/3	1×	None	18,432	921.6/n
12,264 Bits/20n ms	16	614.4/n	1/3	1×	None	36,864	1,843.2/n
1 to 12,263 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 31 to 54 encoder input bits per frame, n = 1 or 2. For more than 54 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 192 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 384 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - The frame quality indicator length is 16 for more than 192 encoder input bits per frame; 12 or 16 for 97 to 192 encoder input bits per frame; 8, 12, or 16 for 55 to 96 encoder input bits per frame; and 6, 8, 12, or 16 otherwise.
   - The code rate is 1/3. If the number of encoder input bits per frame is less than 384, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 3.1.3.1.1.2-12. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 7

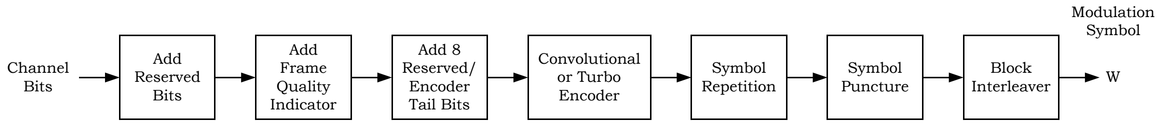


Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	2×	288	57.6
21 Bits/20 ms	1	6	1.8	1/4	8×	1,152	57.6
55 Bits/20n ms	1	8	3.6/n	1/4	4×	1,152	57.6/n
125 Bits/20n ms	1	10	7.2/n	1/4	2×	1,152	57.6/n
267 Bits/20n ms	1	12	14.4/n	1/4	1×	1,152	57.6/n
552 Bits/20n ms	0	16	28.8/n	1/4	1×	2,304	115.2/n
1,128 Bits/20n ms	0	16	57.6/n	1/4	1×	4,608	230.4/n
2,280 Bits/20n ms	0	16	115.2/n	1/4	1×	9,216	460.8/n
4,584 Bits/20n ms	0	16	230.4/n	1/4	1×	18,432	921.6/n
9,192 Bits/20n ms	0	16	460.8/n	1/4	1×	36,864	1,843.2/n
1 to 9,191 Bits/20n ms							

Notes:

1. n is the length of the frame in multiples of 20 ms. For 37 to 72 encoder iput bits per frame, n = 1 or 2. For more than 72 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 288 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 576 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - When the number of channel bits per frame is 21, 55, 125, or 267 and the corresponding frame quality indicator length is 6, 8, 10, and 12, an initial reserved bit is used; otherwise, no initial reserved bits are used.
   - The frame quality indicator length is 16 for more than 288 encoder input bits per frame; 12 or 16 for 145 to 288 encoder input bits per frame; 10, 12, or 16 for 73 to 144 encoder input bits per frame; 8, 10, 12, or 16 for 37 to 72 encoder input bits per frame; and 6, 8, 10, 12, or 16 otherwise.
   - The code rate is 1/4. If the number of encoder input bits per frame is less than 576, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 3.1.3.1.1.2-13. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 8

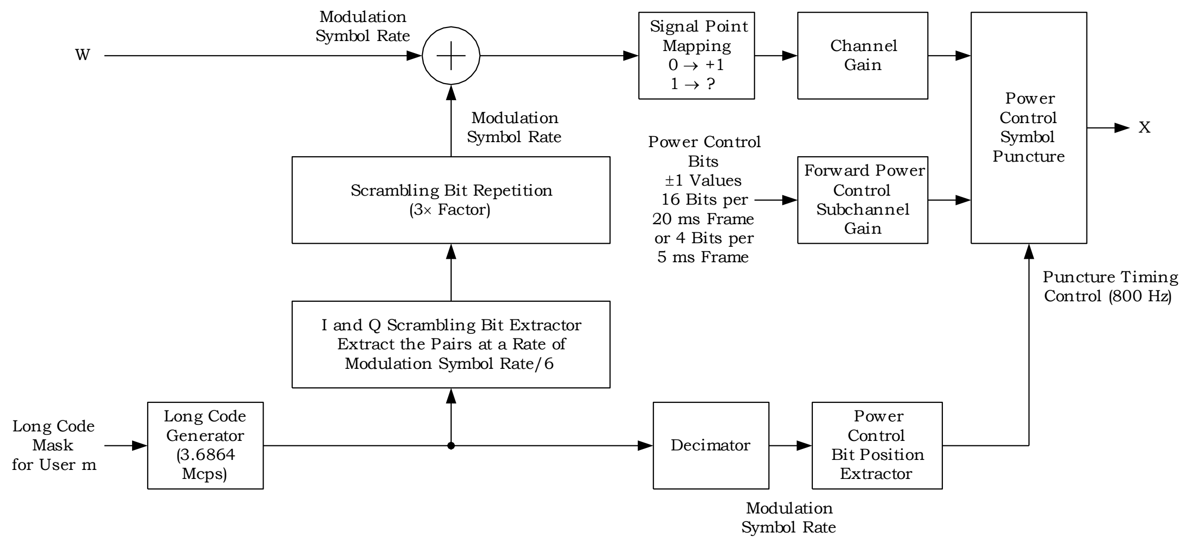


Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	1×	None	144	28.8
21 Bits/20 ms	1	6	1.8	1/2	8×	None	576	28.8
55 Bits/20n ms	1	8	3.6/n	1/2	4×	None	576	28.8/n
125 Bits/20n ms	1	10	7.2/n	1/2	2×	None	576	28.8/n
267 Bits/20n ms	1	12	14.4/n	1/2	1×	None	576	28.8/n
552 Bits/20n ms	0	16	28.8/n	1/2	1×	None	1,152	57.6/n
1,128 Bits/20n ms	0	16	57.6/n	1/2	1×	None	2,304	115.2/n
2,280 Bits/20n ms	0	16	115.2/n	1/2	1×	None	4,608	230.4/n
4,584 Bits/20n ms	0	16	230.4/n	1/2	1×	None	9,216	460.8/n
9,192 Bits/20n ms	0	16	460.8/n	1/2	1×	None	18,432	921.6/n
20,712 Bits/20n ms	0	16	1,036.8/n	1/2	1×	2 of 18	36,864	1,843.2/n
1 to 20,711 Bits/20n ms								

Notes:

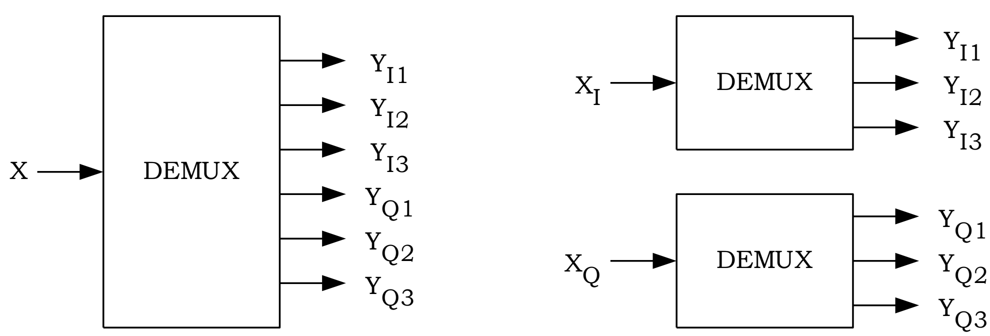
1. n is the length of the frame in multiples of 20 ms. For 37 to 72 encoder input bits per frame, n = 1 or 2. For more than 72 encoder input bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 15 to 288 encoder input bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 576 or more encoder input bits per frame; otherwise, K = 9 convolutional coding is used.
4. With convolutional coding, the Reserved/Encoder Tail bits provide an encoder tail. With turbo coding, the first two of these bits are reserved bits that are encoded and the last six bits are replaced by an internally generated tail.
5. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
   - When the number of channel bits per frame is 21, 55, 125, or 267 and the corresponding frame quality indicator length is 6, 8, 10, and 12, an initial reserved bit is used; otherwise, no initial reserved bits are used.
   - The frame quality indicator length is 16 for more than 288 encoder input bits per frame; 12 or 16 for 145 to 288 encoder input bits per frame; 10, 12, or 16 for 73 to 144 encoder input bits per frame; 8, 10, 12, or 16 for 37 to 72 encoder input bits per frame; and 6, 8, 10, 12, or 16 otherwise.
   - The code rate is 1/2. If the number of encoder input bits per frame is less than 576, the type of encoding is convolutional; otherwise, it is the same as that of the maximum assigned data rate for the channel.
   - If the specified number of channel bits per frame is equal to the maximum assigned number of channel bits per frame and that number and the specified frame quality indicator length match one of the listed cases, the symbol repetition factor and symbol puncturing from that listed case are used. Otherwise, the symbol repetition factor and puncturing are calculated to achieve the same interleaver block size as for the maximum assigned data rate for the channel.
   - If the maximum assigned data rate matches one of the data rates listed in the figure, the interleaver block size for that listed data rate is used. Otherwise, the interleaver block size of the next higher listed data rate is used.

Figure 3.1.3.1.1.2-14. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 9



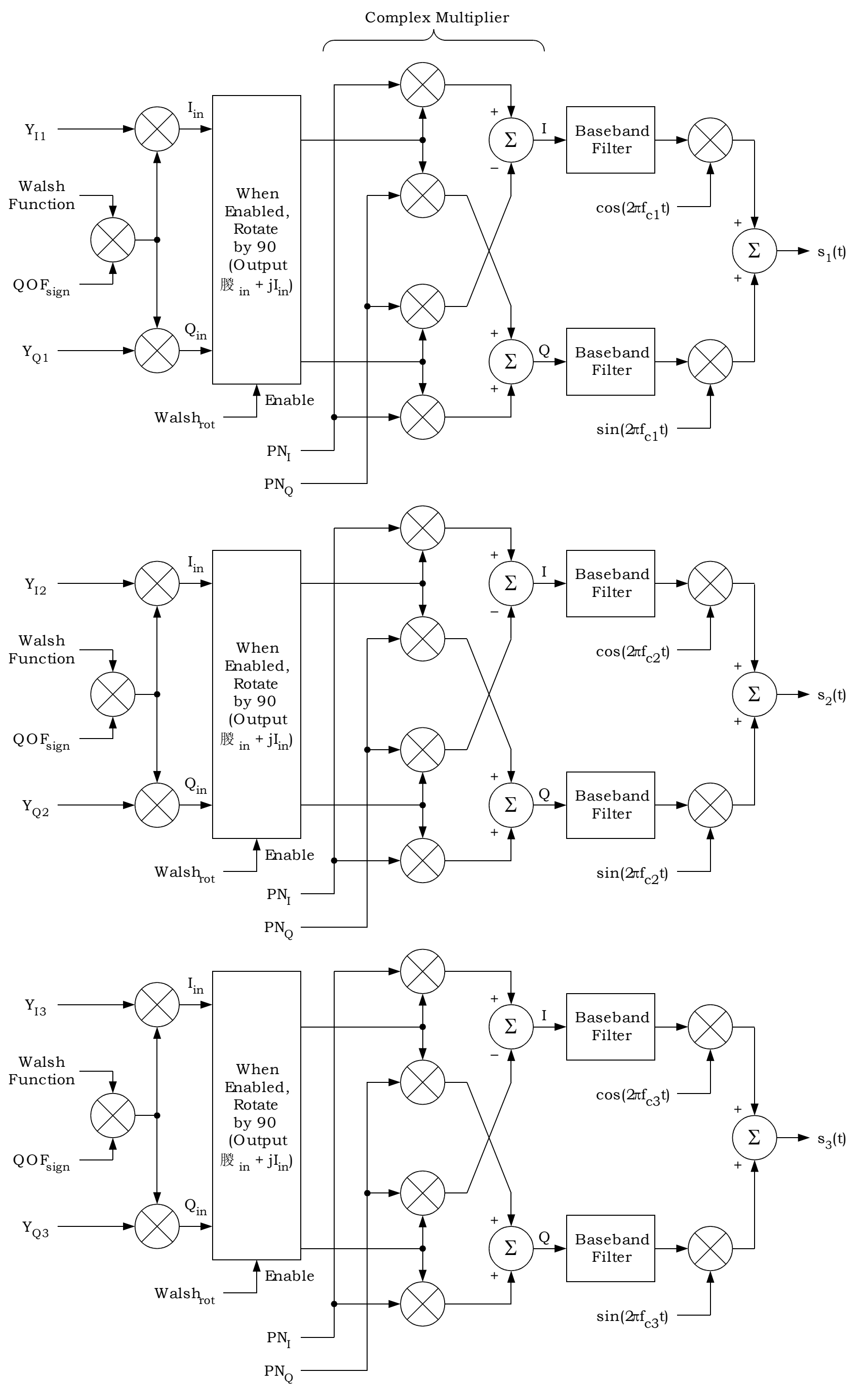
Power control symbol puncturing is on the Forward Fundamental Channels and Forward Dedicated Control Channels only.

Figure 3.1.3.1.1.2-15. Long Code Scrambling, Power Control, and Signal Point Mapping for Forward Traffic Channels with Radio Configurations 6 through 9



The DEMUX functions distribute input symbols sequentially from the top to the bottom output paths.

Figure 3.1.3.1.1.2-16. Demultiplexer Structure for Spreading Rate 3



Walsh function =±1 (mapping: ??→ +1, ??→ ?)
QOF_{sign} = ±1 sign multiplier QOF mask(mapping: ??→ +1, ??→ ?)
$Walsh_{rot}$ = ??or ??90?rotation-enable Walsh function
$Walsh_{rot}$ = ??means no rotation
$Walsh_{rot}$ = ??means rotate by 90
The null QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = ??
PN_I and PN_Q = ? I-channel and Q-channel PN sequences
$f_{c1} < f_{c2} < f_{c3}$

Figure 3.1.3.1.1.2-17. I and Q Mapping for Spreading Rate 3

3.1.3.1.2 Modulation Parameters

3.1.3.1.2.1 Spreading Rate 1

The modulation parameters for the Forward CDMA Channel operating in Spreading Rate 1 are shown in Table 3.1.3.1.2.1-1 through Table 3.1.3.1.2.1-30, and Table 3.1.3.1.15.4-1.

Table 3.1.3.1.2.1-1. Sync Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)	
Parameter	**1,200**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/2	bits/code symbol
Code Symbol Repetition	2	modulation symbols/code symbol
Modulation Symbol Rate	4,800	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4	Walsh functions/modulation symbol
Processing Gain	1,024	PN chips/bit

Table 3.1.3.1.2.1-2. Paging Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)		
Parameter	**9,600**	**4,800**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	modulation symbols/code symbol
Modulation Symbol Rate	19,200	19,200	sps
Walsh Length	64	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	Walsh functions/ modulation symbol
Processing Gain	128	256	PN chips/bit

Table 3.1.3.1.2.1-3. Broadcast Control Channel Modulation Parameters for Spreading Rate 1 with R = 1/4

	Data Rate (bps)			
Parameter	**19,200**	**9,600**	**4,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Sequence Repetition	1	2	4	modulation symbols/ code symbol
Modulation Symbol Rate	76,800	76,800	76,800	sps
QPSK Symbol Rate	38,400	38,400	38,400	sps
Walsh Length	32	32	32	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	64	128	256	PN chips/bit

Table 3.1.3.1.2.1-4. Broadcast Control Channel Modulation Parameters for Spreading Rate 1 with R = 1/2

	Data Rate (bps)			
Parameter	**19,200**	**9,600**	**4,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	bits/code symbol
Code Sequence Repetition	1	2	4	modulation symbols/ code symbol
Modulation Symbol Rate	38,400	38,400	38,400	sps
QPSK Symbol Rate	19,200	19,200	19,200	sps
Walsh Length	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	64	128	256	PN chips/bit

Table 3.1.3.1.2.1-5. Quick Paging Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)		
Parameter	**4,800**	**2,400**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps
Number of Indicators/80 ms Quick Paging Channel Slot	768	384	indicators/slot
Number of Indicators/Slot/ Mobile Station	2	2	indicators/mobile station
Indicator Rate	9,600	4,800	bps
Indicator Repetition Factor	2	4	modulation symbols/ indicator
Modulation Symbol Rate	19,200	19,200	sps
QPSK Symbol Rate	9,600	9,600	sps
Walsh Length	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	Walsh functions/QPSK symbol
Processing Gain	256	512	PN chips/mobile station

Table 3.1.3.1.2.1-6. Forward Common Acknowledgment Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)	
Parameter	**19,200**	**Units**
PN Chip Rate	1.2288	Mcps
PC Bit Repetition Factor	1	modulation symbols /bit
Modulation Symbol Rate	9,600	sps on I and Q
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per I or Q Arm Modulation Symbol	1	Walsh functions/I or Q arm modulation symbol
Processing Gain	64	PN chips/bit

Note: I and Q arms are considered as separate BPSK channels.

Table 3.1.3.1.2.1-6. Common Assignment Channel Modulation Parameters for Spreading Rate 1 with R = 1/4

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	38,400	sps
QPSK Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	128	PN chips/bit

Table 3.1.3.1.2.1-7. Common Assignment Channel Modulation Parameters for Spreading Rate 1 with R = 1/2

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/2	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	19,200	sps
QPSK Symbol Rate	9,600	sps
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	128	PN chips/bit

Table 3.1.3.1.2.1-8. Forward Common Control Channel Modulation Parameters for Spreading Rate 1 with R = 1/4

	Data Rate (bps)			
Parameter	**38,400**	**19,200**	**9,600**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	1	modulation symbols/code symbol
Modulation Symbol Rate	153,600	76,800	38,400	sps
QPSK Symbol Rate	76,800	38,400	19,200	sps
Walsh Length	16	32	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	32	64	128	PN chips/bit

Table 3.1.3.1.2.1-9. Forward Common Control Channel Modulation Parameters for Spreading Rate 1 with R = 1/2

	Data Rate (bps)			
Parameter	**38,400**	**19,200**	**9,600**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	1	1	modulation symbols/ code symbol
Modulation Symbol Rate	76,800	38,400	19,200	sps
QPSK Symbol Rate	38,400	19,200	9600	sps
Walsh Length	32	64	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	32	64	128	PN chips/bit

Table 3.1.3.1.2.1-10. Forward Indicator Control Channel Modulation Parameters for Spreading Rate 1

	Data Rate (bps)	
Parameter	**19,200**	**Units**
Frame Duration	10	ms
PN Chip Rate	1.2288	Mcps
Number of Indicator Control Symbols per Power Control Bit or Rate Control Symbol	1	indicator control symbols/power control bit
	2, 4, or 8	indicator control symbols/ rate control symbol
Repetition Factor of Indicator Control Symbols	1 (non-TD) 2 (TD)	modulation symbols/ indicator control symbol
Modulation Symbol Rate	9,600 (non-TD) 19,200 (TD)	sps on I and Q
Walsh Length	128 (non-TD) 64 (TD)	PN chips
Number of Walsh Function Repetitions per I or Q Arm Modulation Symbol	1	Walsh functions/ modulation symbol
Processing Gain	64 for power control bits and 128, 256, or 512 for rate control symbols	PN chips/ power control bit or rate control symbol

Note: I and Q arms are considered as separate BPSK or tri-state on-off keying channels.

Table 3.1.3.1.2.1-11. Forward Grant Channel Parameters

	Data Rate (bps)	
Parameter	**3,200**	**Units**
Frame Duration	10	ms
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition Rate	1	repeated code symbols/ code symbol
Puncturing Rate	12/16	Modulation Symbols/ repeated code symbol
Modulation Symbol Rate	9,600	sps
QPSK Symbol Rate	4,800	sps
Walsh Length	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	384	PN chips/bit

Table 3.1.3.1.2.1-12. Forward Acknowledgment Channel Parameters (Radio Configuration 10)

	Data Rate (bps)	
Parameter	**19,200**	**Units**
Frame Duration	10	ms
PN Chip Rate	1.2288	Mcps
Code Rate	1/1	bits/code symbol
Code Symbol Repetition Rate	2	repeated code symbols/ code symbol
Modulation Symbol Rate	38,400	sps
QPSK Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	4,096	PN chips/bit

Table 3.1.3.1.2.1-13. Forward Packet Data Control Channel Parameters

	Data Rate (bps)			
Parameter	**29,600**	**14,800**	**7,400**	**Units**
Frame Duration	1.25	2.5	5	ms
PN Chip Rate	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/4	1/4	bits/code symbol
Code Symbol Repetition Rate	1	1	48/37	repeated code symbols/ code symbol
Puncturing Rate	24/37	24/37	1	modulation symbols/repeated code symbol
Modulation Symbol Rate	38,400	38,400	38,400	sps
QPSK Symbol Rate	19,200	19,200	19,200	sps
Walsh Length	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	41.51	83.03	166.05	PN chips/bit

Table 3.1.3.1.2.1-14. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 3

Parameter	Data Rate (bps) 9,600	Units
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	1	modulation symbols/ code symbol
Modulation Symbol Rate	38,400	sps
QPSK Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	128	PN chips/bit

Note: If flexible data rates are supported, symbol repetition and symbol puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.1-15. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 4

Parameter	Data Rate (bps) 9,600	Units
PN Chip Rate	1.2288	Mcps
Code Rate	1/2	bits/code symbol
Code Symbol Repetition	1	modulation symbols/ code symbol
Modulation Symbol Rate	19,200	sps
QPSK Symbol Rate	9,600	sps
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	128	PN chips/bit

Note: If flexible data rates are supported, symbol repetition and symbol puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.1-16. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 5

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	repeated code symbols/ code symbol
Puncturing Rate	1	8/12	modulation symbols/ repeated code symbol
Modulation Symbol Rate	38,400	38,400	sps
QPSK Symbol Rate	19,200	19,200	sps
Walsh Length	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	Walsh functions/QPSK symbol
Processing Gain	128	85.33	PN chips/bit

Notes:

1. The 9600 bps data rate is used for 5 ms frames and the 14400 bps data rate is used for 20 ms frames.
2. If flexible data rates are supported, symbol repetition and symbol puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.1-17. Forward Fundamental Channel and Forward Supplemental Code Channel Modulation Parameters for Radio Configuration 1

	Data Rate (bps)				
Parameter	**9,600**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	4	8	modulation symbols/code symbol
Modulation Symbol Rate	19,200	19,200	19,200	19,200	sps
Walsh Length	64	64	64	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	1	1	Walsh functions/ modulation symbol
Processing Gain	128	256	512	1024	PN chips/bit

Table 3.1.3.1.2.1-18. Forward Fundamental Channel and Forward Supplemental Code Channel Modulation Parameters for Radio Configuration 2

	Data Rate (bps)				
Parameter	**14,400**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/ code symbol
Puncturing Rate	4/6	4/6	4/6	4/6	modulation symbols/repeat-ed code symbol
Modulation Symbol Rate	19,200	19,200	19,200	19,200	sps
Walsh Length	64	64	64	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	1	1	1	1	Walsh functions/ modulation symbol
Processing Gain	85.33	170.7	341.33	682.7	PN chips/bit

Table 3.1.3.1.2.1-19. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 5 or 20 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1	1	8/9	4/5	modulation symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	38,400	38,400	38,400	sps
QPSK Symbol Rate	19,200 × N	19,200	19,200	19,200	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	128/N	256	455.1	819.2	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-20. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/ code symbol
Puncturing Rate	1	1	1	8/9	interleaver symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	19,200	19,200	19,200	sps
QPSK Symbol Rate	19,200 × N	9,600	9,600	9,600	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/QPSK symbol
Processing Gain	128/N	256	512	910.2	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-21. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 3

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/ code symbol
Modulation Symbol Rate	38,400 × N	19,200	9,600	9,600	sps
QPSK Symbol Rate	19,200 × N	9,600	4,800	4,800	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/QPSK symbol
Processing Gain	128/N	256	512	1024	PN chips/bit

Notes:

1. N = 1, 2, or 4, which yields data rates of 9600, 19200, or 38400 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-22. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 5 or 20 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/ code symbol
Puncturing Rate	1	1	8/9	4/5	modulation symbols/repeated code symbol
Modulation Symbol Rate	19,200 × N	19,200	19,200	19,200	sps
QPSK Symbol Rate	9,600 × N	9,600	9,600	9,600	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	128/N	256	455.1	819.2	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-23. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/ code symbol
Puncturing Rate	1	1	1	8/9	interleaver symbols/repeated code symbol
Modulation Symbol Rate	19,200 × N	9,600	9,600	9,600	sps
QPSK Symbol Rate	9,600 × N	4,800	4,800	4,800	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/QPSK symbol
Processing Gain	128/N	256	512	910.2	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-24. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 4

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/ code symbol
Modulation Symbol Rate	19,200 × N	9,600	4,800	4,800	sps
QPSK Symbol Rate	9,600 × N	4,800	2,400	2,400	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/QPSK symbol
Processing Gain	128/N	256	512	1024	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-25. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/ code symbol
Puncturing Rate	8/12	8/12	8/12	8/12	modulation symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	38,400	38,400	38,400	sps
QPSK Symbol Rate	19,200 × N	19,200	19,200	19,200	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	85.33/N	170.7	341.33	682.7	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.
3. The Forward Supplemental Channel also supports outer block coding in Radio Configuration 5 at the data rate of 115200 bps for 20 ms frames. The outer code rates are 11/16, 12/16, 13/16, and 14/16.
4. The code rate does not include the outer code.

Table 3.1.3.1.2.1-26. Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 5 with Outer Coding

	Data Rate (bps)				
Parameter	**115,200**				**Units**
Information Bit Rate	99,750	92,625	85,500	78,375	bps
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Outer Code Rate	14/16	13/16	12/16	11/16	Information code symbol/outer code symbol
Outer Code Symbol Rate	114,000	114,000	114,000	114,000	sps
Inner Code Input Data Rate (Outer Code Symbol Rate plus CRC, Tail /Reserved Bits)	115,200	115,200	115,200	115,200	bps
Inner Code Rate	1/4	1/4	1/4	1/4	outer coded bits, CRC and tail or reserve bits/ inner code symbol
Code Symbol Repetition	1	1	1	1	repeated code symbols/ code symbol
Puncturing Rate	8/12	8/12	8/12	8/12	modulation symbols/ repeated code symbol
Modulation Symbol Rate	307,200	307,200	307,200	307,200	sps
QPSK Symbol Rate	153,600	153,600	153,600	153,600	sps
Walsh Length	8	8	8	8	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	12.32	13.27	14.37	15.68	PN chips/bit

Note: The outer code operates on 8-bit symbols.

Table 3.1.3.1.2.1-27. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/ code symbol
Puncturing Rate	8/12	8/12	8/12	8/12	interleaver symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	19,200	19,200	19,200	sps
QPSK Symbol Rate	19,200 × N	9,600	9,600	9,600	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/QPSK symbol
Processing Gain	85.33/N	170.7	341.33	682.7	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-28. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 5

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/ code symbol
Puncturing Rate	8/12	8/12	8/12	8/12	interleaver symbols/repeated code symbol
Modulation Symbol Rate	38,400 × N	19,200	9,600	9,600	sps
QPSK Symbol Rate	19,200 × N	9,600	4,800	4,800	sps
Walsh Length	64/N	64	64	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/QPSK symbol
Processing Gain	85.33/N	170.7	341.33	682.7	PN chips/bit

Notes:

1. N = 1, 2, or 4, which yields data rates of 14400, 28800, or 57600 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.1-29. Forward Fundamental Channel Modulation Parameters for 5 ms Frames for Radio Configuration 5

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/4	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	38,400	sps
QPSK Symbol Rate	19,200	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	128	PN chips/bit

Table 3.1.3.1.2.1-30. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 20 ms Frames for Forward Link Radio Configuration 11 and Radio Configuration 12

	Data Rate (bps)					
Parameter	**9,600 × N**	**5,000**	**3,000**	**1,800**	**0**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	N/A	Mcps
Code Rate	1/2	1/2	1/2	1/2	N/A	bits/code symbol
Code Symbol Repetition	1	2	4	8	N/A	repeated code symbols/ code symbol
Puncturing Rate	1	24/25	4/5	8/12	N/A	modulation symbols/repeated code symbol
Modulation Symbol Rate	19,200 × N	19,200	19,200	19,200	N/A	sps
QPSK Symbol Rate	9,600 × N	9,600	9,600	9,600	N/A	sps
Walsh Length	128/N	128	128	128	N/A	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	N/A	Walsh functions/QPSK symbol
Processing Gain	128/N	245.76	409.6	682.66	N/A	PN chips/bit
Transmit Duty Cycle	100%	100%	100%	100%	0%	

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.

3.1.3.1.2.2 Spreading Rate 3

The modulation parameters for the Forward CDMA Channel operating in Spreading Rate 3 are shown in Table 3.1.3.1.2.2-1 through Table 3.1.3.1.2.2-23.

Table 3.1.3.1.2.2-1. Sync Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)	
Parameter	**1,200**	**Units**
PN Chip Rate	1.2288	Mcps
Code Rate	1/2	bits/code symbol
Code Symbol Repetition	2	modulation symbols/code symbol
Modulation Symbol Rate	4,800	sps
Walsh Length	64	PN chips
Number of Walsh Function Repetitions per Modulation Symbol	4	Walsh functions/ modulation symbol
Processing Gain	1,024	PN chips/bit

Note: A Spreading Rate 3 Sync Channel can be transmitted on any of the three carriers.

Table 3.1.3.1.2.2-2. Broadcast Control Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)			
Parameter	**19,200**	**9,600**	**4,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/3	1/3	bits/code symbol
Code Sequence Repetition	1	2	4	modulation symbols/code symbol
Modulation Symbol Rate	57,600	57,600	57,600	sps
QPSK Symbol Rate	28,800	28,800	28,800	sps
Walsh Length	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	192	384	768	PN chips/bit

Table 3.1.3.1.2.2-3. Quick Paging Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)		
Parameter	**4,800**	**2,400**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps/carrier
Number of Indicators/80 ms Quick Paging Channel Slot	768	384	indicators/slot
Number of Indicators/Slot/ Mobile Station	2	2	indicators/mobile station
Indicator Rate	9,600	4,800	bps
Indicator Repetition Factor	3	6	modulation symbols/ indicator
Modulation Symbol Rate	28,800	28,800	sps
QPSK Symbol Rate	14,400	14,400	sps
Walsh Length	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	Walsh functions/QPSK symbol
Processing Gain	768	1,536	PN chips/mobile station

Table 3.1.3.1.2.2-4. Forward Indicator Control Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)	
Parameter	**19,200**	**Units**
Frame Duration	10	ms
PN Chip Rate	1.2288	Mcps/carrier
Number of Indicator Control Symbols per Power Control Bit	1	indicator control symbols/power control bit
Repetition Factor for Indicator Control Symbols	3	modulation symbols / indicator control symbol
Modulation Symbol Rate	28,800	sps on I and Q
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per I or Q Arm Modulation Symbol	1	Walsh functions/ modulation symbol
Processing Gain	192	PN chips/bit

Note: I and Q arms are considered as separate BPSK channels.

Table 3.1.3.1.2.2-5. Common Assignment Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps/carrier
Code Rate	1/3	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	28,800	sps
QPSK Symbol Rate	14,400	sps
Walsh Length	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	384	PN chips/bit

Table 3.1.3.1.2.2-6. Forward Common Control Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)			
Parameter	**38,400**	**19,200**	**9,600**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/3	1/3	bits/code symbol
Code Symbol Repetition	1	1	1	Modulation symbols/code symbol
Modulation Symbol Rate	115,200	57,600	28,800	sps
QPSK Symbol Rate	57,600	28,800	14,400	sps
Walsh Length	64	128	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	Walsh functions/QPSK symbol
Processing Gain	96	192	384	PN chips/bit

Table 3.1.3.1.2.2-7. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 6

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps/carrier
Code Rate	1/6	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	57,600	sps
QPSK Symbol Rate	28,800	sps
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	384	PN chips/bit

Note: If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.2-8. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 7

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps/carrier
Code Rate	1/3	bits/code symbol
Code Symbol Repetition	1	modulation symbols/code symbol
Modulation Symbol Rate	28,800	sps
QPSK Symbol Rate	14,400	sps
Walsh Length	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	384	PN chips/bit

Note: If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.2-9. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 8

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/4	bits/code symbol
Code Symbol Repetition	2	1	modulation symbols/code symbol
Modulation Symbol Rate	57,600	57,600	sps
QPSK Symbol Rate	28,800	28,800	sps
Walsh Length	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	Walsh functions/QPSK symbol
Processing Gain	384	256	PN chips/bit

Notes:

1. The 9600 bps data rate is for 5 ms frames and the 14400 bps data rate is for 20 ms frames.
2. If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.2-10. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 9

Parameter	Data Rate (bps) 9,600	Data Rate (bps) 14,400	Units
PN Chip Rate	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/2	bits/code symbol
Code Symbol Repetition	1	1	modulation symbols/code symbol
Modulation Symbol Rate	28,800	28,800	sps
QPSK Symbol Rate	14,400	14,400	sps
Walsh Length	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	Walsh functions/QPSK symbol
Processing Gain	384	256	PN chips/bit

Notes:

1. The 9600 bps data rate is for 5 ms frames and the 14400 bps data rate is for 20 ms frames.
2. If flexible data rates are supported, repetition and puncturing can be used to support data rates not specified in this table.

Table 3.1.3.1.2.2-11. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 5 or 20 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/6	1/6	1/6	1/6	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1	1	8/9	4/5	modulation symbols/ repeated code symbol
Modulation Symbol Rate	57,600 × N	57,600	57,600	57,600	sps
QPSK Symbol Rate	28,800 × N	28,800	28,800	28,800	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,365.3	2,457.6	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-12. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/6	1/6	1/6	1/6	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Puncturing Rate	1	1	1	8/9	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	57,600 × N	28,800	28,800	28,800	sps
QPSK Symbol Rate	28,800 × N	14,400	14,400	14,400	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,536	2,730.7	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-13. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 6

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/6	1/6	1/6	1/6	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/code symbol
Modulation Symbol Rate	57,600 × N	28,800	14,400	14,400	sps
QPSK Symbol Rate	28,800 × N	14,400	7,200	7,200	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,536	3,072	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-14. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 5 or 20 ms Frames for Radio Configuration 7

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,700**	**1,500**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/3	1/3	1/3	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1	1	8/9	4/5	modulation symbols/ repeated code symbol
Modulation Symbol Rate	28,800 × N	28,800	28,800	28,800	sps
QPSK Symbol Rate	14,400 × N	14,400	14,400	14,400	sps
Walsh Length	256/N	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,365.3	2,457.6	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, 32, or 64, which yields data rates of 9600, 19200, 38400, 76800, 153600, 307200, or 614400 bps, respectively.

2, If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-15. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 7

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,350**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/3	1/3	1/3	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Puncturing Rate	1	1	1	8/9	modulation symbols/ repeated code symbol
Modulation Symbol Rate	28,800 × N	14,400	14,400	14,400	sps
QPSK Symbol Rate	14,400 × N	7,200	7,200	7,200	sps
Walsh Length	256/N	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,536	2,730.7	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 9600, 19200, 38400, 76800, 153600, or 307200 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-16. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 7

	Data Rate (bps)				
Parameter	**9,600 × N**	**4,800**	**2,400**	**1,200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/3	1/3	1/3	1/3	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/code symbol
Modulation Symbol Rate	28,800 × N	14,400	7,200	7,200	sps
QPSK Symbol Rate	14,400 × N	7,200	3,600	3,600	sps
Walsh Length	256/N	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/QPSK symbol
Processing Gain	384/N	768	1,536	3,072	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 9600, 19200, 38400, 76800, or 153600 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-17. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 8

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Modulation Symbol Rate	57,600 × N	57,600	57,600	57,600	sps
QPSK Symbol Rate	28,800 × N	28,800	28,800	28,800	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 32, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 460800, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-18. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 8

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Modulation Symbol Rate	57,600 × N	28,800	28,800	28,800	sps
QPSK Symbol Rate	28,800 × N	14,400	14,400	14,400	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-19. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 8

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/4	1/4	1/4	1/4	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/code symbol
Modulation Symbol Rate	57,600 × N	28,800	14,400	14,400	sps
QPSK Symbol Rate	28,800 × N	14,400	7,200	7,200	sps
Walsh Length	128/N	128	128	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-20. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 20 ms Frames for Radio Configuration 9

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	2	4	8	repeated code symbols/code symbol
Puncturing Rate	1 (N ≤ 32) 16/18 (N = 72)	1	1	1	modulation symbols/ repeated code symbol
Modulation Symbol Rate	28,800 × N (N ≤ 32) 1,843,200 (N = 72)	28,800	28,800	28,800	sps
QPSK Symbol Rate	14,400 × N (N ≤ 32) 921,600 (N = 72)	14,400	14,400	14,400	sps
Walsh Length	256/N (N ≤ 32) 4 (N = 72)	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	1	1	1	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, 32, or 72, which yields data rates of 14400, 28800, 57600, 115200, 230400, 460800, or 1036800 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Fundamental Channel or the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-21. Forward Supplemental Channel Modulation Parameters for 40 ms Frames for Radio Configuration 9

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	1	2	4	repeated code symbols/code symbol
Puncturing Rate	1 ($N \le 16$) 16/18 ($N = 36$)	1	1	1	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	28,800 × N ($N \le 16$) 921,600 ($N = 36$)	14,400	14,400	14,400	sps
QPSK Symbol Rate	14,400 × N ($N \le 16$) 460,800 ($N = 36$)	7,200	7,200	7,200	sps
Walsh Length	256/N ($N \le 16$) 8 ($N = 36$)	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	2	2	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, 16, or 36, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 518400 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-22. Forward Supplemental Channel Modulation Parameters for 80 ms Frames for Radio Configuration 9

	Data Rate (bps)				
Parameter	**14,400 × N**	**7,200**	**3,600**	**1,800**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps/carrier
Code Rate	1/2	1/2	1/2	1/2	bits/code symbol
Code Symbol Repetition	1	1	1	2	repeated code symbols/code symbol
Puncturing Rate	1 (N ≤ 8) 16/18 (N = 18)	1	1	1	interleaver symbols/ repeated code symbol
Post-Interleaver Symbol Repetition	1	2	4	4	modulation symbols/ interleaver symbol
Modulation Symbol Rate	28,800 × N (N ≤ 8) 460,800 (N = 18)	14,400	7,200	7,200	sps
QPSK Symbol Rate	14,400 × N (N ≤ 8) 230,400 (N = 18)	7,200	3,600	3,600	sps
Walsh Length	256/N (N ≤ 8) 16 (N = 18)	256	256	256	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	2	4	4	Walsh functions/ QPSK symbol
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Notes:

1. N = 1, 2, 4, 8, or 18, which yields data rates of 14400, 28800, 57600, 115200, or 259200 bps, respectively.
2. If variable-rate Forward Supplemental Channel operation, flexible forward link data rates, or both are supported, the parameters are determined from the specified number of channel bits per frame, the maximum assigned number of channel bits per frame for the Forward Supplemental Channel, and the specified frame quality indicator length.

Table 3.1.3.1.2.2-23. Forward Fundamental Channel Modulation Parameters for 5 ms Frames for Radio Configurations 8 and 9

	Data Rate (bps)	
Parameter	**9,600**	**Units**
PN Chip Rate	1.2288	Mcps/carrier
Code Rate	1/3	bits/code symbol
Code Symbol Repetition	1 (RC 9) 2 (RC 8)	modulation symbols/ code symbol
Modulation Symbol Rate	28,800 (RC 9) 57,600 (RC 8)	sps
QPSK Symbol Rate	14,400 (RC 9) 28,800 (RC 8)	sps
Walsh Length	256 (RC 9) 128 (RC 8)	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK symbol
Processing Gain	384	PN chips/bit

Note: The number of data bits per frame is the same in all 5 ms frames operating in Spreading Rate 3.

3.1.3.1.3 Data Rates

The data rates for channels operating with Spreading Rate 1 shall be as specified in Table 3.1.3.1.3-1 and Table 3.1.3.1.3-2. The data rates for channels operating with Spreading Rate 3 shall be as specified in Table 3.1.3.1.3-3 and Table 3.1.3.1.3-4.

Flexible data rates may be supported with Radio Configurations 3, 4, 5, 6, 7, 8, and 9. If flexible data rates are supported, frame formats that do not match those listed in Table 3.1.3.14.2-1 for the Forward Dedicated Control Channel, Table 3.1.3.15.2-1 for the Forward Fundamental Channel, or Table 3.1.3.16.2-1, Table 3.1.3.16.2-2, and Table 3.1.3.16.2-3 for the Forward Supplemental Channel may be supported in Radio Configurations 3, 4, 5, 6, 7, 8, and 9. These frame formats correspond to a range of data rates up to the highest dedicated channel data rate listed in Table 3.1.3.1.3-1, Table 3.1.3.1.3-2, Table 3.1.3.1.3-3, and Table 3.1.3.1.3-4. These unlisted data rates are called flexible data rates.

Table 3.1.3.1.3-1. Data Rates for Spreading Rate 1 (Part 1 of 2)

Channel Type		Data Rates (bps)
Sync Channel		1200
Paging Channel		9600 or 4800
Broadcast Control Channel		19200 (40 ms slots), 9600 (80 ms slots), or 4800 (160 ms slots)
Quick Paging Channel		4800 or 2400
Common Assignment Channel		9600
Forward Common Acknowledgment Channel		19200 (9600 sps per I and Q arm)
Forward Common Control Channel		38400 (5, 10 or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Forward Indicator Control Channel		19200 (9600 sps per I and Q arm)
Forward Grant Channel		3200 (10 ms frames)
Forward Acknowledgment Channel		19200 (10 ms frames)
Forward Packet Data Control Channel		29600 (1.25 ms frames) 14800 (2.5 ms frames) 7400 (5 ms frames)
Forward Dedicated Control Channel	RC 3 or 4	9600
	RC 5	14400 (20 ms frames) or 9600 (5 ms frames)
Forward Fundamental Channel	RC 1	9600, 4800, 2400, or 1200
	RC 2	14400, 7200, 3600, or 1800
	RC 3 or 4	9600, 4800, 2700, or 1500 (20 ms frames) or 9600 (5 ms frames)
	RC 5	14400, 7200, 3600, or 1800 (20 ms frames) or 9600 (5 ms frames)
	RC 11 or 12	9600, 5000, 3000, 1800, or 0 (20 ms frames)
Forward Supplemental Code Channel	RC 1	9600
	RC 2	14400

Table 3.1.3.1.3-2. Data Rates for Spreading Rate 1 (Part 2 of 2)

Channel Type		Data Rates (bps)
Forward Supplemental Channel	RC 3	153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)
	RC 4	307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 76800, 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)
	RC 5	230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (20 ms frames) 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (40 ms frames) 57600, 28800, 14400, 7200, 3600, or 1800 (80 ms frames)
	RC 11 or 12	307200, 153600, 76800, 38400, 19200, or 9600 (20 ms frames)
Forward Packet Data Channel	RC 10	3091200, 2476800, 1862400, 1248000, 633600, or 326400 (1.25 ms frames) 1545600, 1238400, 931200, 624000, 316800, or 163200 (2.5 ms frames) 772800, 619200, 465600, 312000, 158400, or 81600 (5 ms frames) (see Table 3.1.3.1.15.4-1)

Note: The Forward Supplemental Channel also supports outer block coding in Radio Configuration 5 at the data rate of 115200 bps for 20 ms frames. The outer code rates are 11/16, 12/16, 13/16, and 14/16.

Table 3.1.3.1.3-3. Data Rates for Spreading Rate 3 (Part 1 of 2)

Channel Type		Data Rates (bps)
Sync Channel		1200
Broadcast Control Channel		19200 (40 ms slots), 9600 (80 ms slots), or 4800 (160 ms slots)
Quick Paging Channel		4800 or 2400
Forward Indicator Control Channel		19200 (9600 per I and Q arm)
Common Assignment Channel		9600
Forward Common Control Channel		38400 (5, 10 or 20 ms frames), 19200 (10 or 20 ms frames), or 9600 (20 ms frames)
Forward Dedicated Control Channel	RC 6 or 7	9600
	RC 8 or 9	14400 (20 ms frames) or 9600 (5 ms frames)
Forward Fundamental Channel	RC 6 or 7	9600, 4800, 2700, or 1500 (20 ms frames) or 9600 (5 ms frames)
	RC 8 or 9	14400, 7200, 3600, or 1800 (20 ms frames) or 9600 (5 ms frames)

Table 3.1.3.1.3-4. Data Rates for Spreading Rate 3 (Part 2 of 2)

Channel Type		Data Rates (bps)
Forward Supplemental Channel	RC 6	307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 76800, 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)
	RC 7	614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, or 1500 (20 ms frames) 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1350 (40 ms frames) 153600, 76800, 38400, 19200, 9600, 4800, 2400, or 1200 (80 ms frames)
	RC 8	460800, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (20 ms frames) 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (40 ms frames) 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (80 ms frames)
	RC 9	1036800, 460800, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (20 ms frames) 518400, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (40 ms frames) 259200, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 (80 ms frames)

3.1.3.1.4 Frame Error Detection

Frame quality indicator bits are used to detect errors in the received frames for some forward link channels. They may also assist in determining the data rate of the channel if the receiver performs blind rate detection like the Forward Fundamental Channel supporting voice calls. The frame quality indicator bits are appended to the input bits, and form a Cyclic Redundancy Code.

The input bits to the frame quality indicator calculator and the number of frame quality indicator bits generated for channels with Spreading Rate 1 shall be as specified in Table 3.1.3.1.4-1, and for Spreading Rate 3 shall be as specified in Table 3.1.3.1.4-2.

Table 3.1.3.1.4-1. Frame Error Detection for Spreading Rate 1

Channel Type	Input Bits	Number of Frame Quality Indicator Bits
Sync Channel	None	–
Paging Channel	None	–
Broadcast Control Channel	Information	16
Quick Paging Channel	None	–
Common Assignment Channel	Information	8
Forward Common Control Channel	Information	16 or 12
Forward Indicator Control Channel	None	–
Forward Grant Channel	Information	10
Forward Acknowledgment Channel	None	–
Forward Packet Data Control Channel	Information	8
Forward Dedicated Control Channel	Information and Reserved	16 or 12
Forward Fundamental Channel	Information and Reserved / Flag	16, 12, 10, 8, or 6
Forward Supplemental Channel	Information and Reserved	16, 12, 10, 8, or 6
Forward Supplemental Code Channel	Information and Reserved	12
Forward Packet Data Channel	Information	16

Table 3.1.3.1.4-2. Frame Error Detection for Spreading Rate 3

Channel Type	Input Bits	Number of Frame Quality Indicator Bits
Sync Channel	None	–
Broadcast Control Channel	Information	16
Quick Paging Channel	None	–
Forward Indicator Control Channel	None	–
Common Assignment Channel	Information and Reserved	8
Forward Common Control Channel	Information	10
Forward Dedicated Control Channel	Information and Reserved	16 or 12
Forward Fundamental Channel	Information and Reserved / Flag	16, 12, 10, 8, or 6
Forward Supplemental Channel	Information and Reserved	16, 12, 10, 8, or 6

3.1.3.1.4.1 Generation of the Frame Quality Indicator Bits

The frame quality indicators shall be computed according to the following procedure (see Figure 3.1.3.1.4.1.1-1 through Figure 3.1.3.1.4.1.6-1):

- Initially, all the switches shall be set in the up position and the shift register elements shall be set to logical one except for inner frame quality indicator of the 5 ms frame on the Forward Packet Data Control Channel, in which case the shift register elements shall be set to logical zero.
- The register shall be clocked a number of times equal to the number of input bits in the frame with those bits as input.
- The switches shall be set in the down position so that the output is a modulo-2 addition with a '0' and the successive shift register inputs are '0's.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16, 12, 10, 8, or 6).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

3.1.3.1.4.1.1 Frame Quality Indicator of Length 16

The generator polynomial for the 16-bit frame quality indicator shall be

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^{6} + x^{5} + x^{2} + x + 1.$

The Cyclic Redundancy Code of length 16 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.1-1 and as described in 3.1.3.1.4.1.

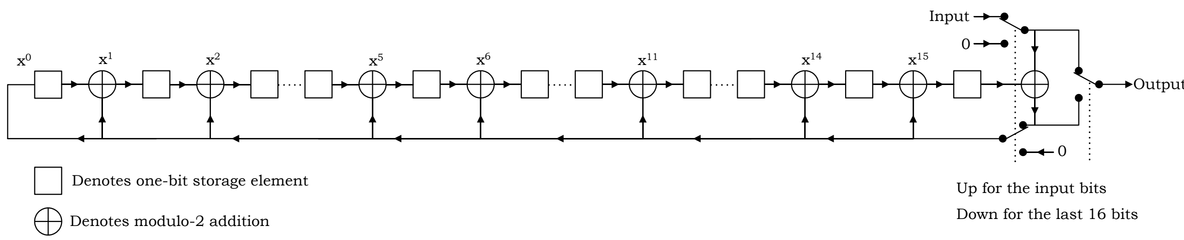


Figure 3.1.3.1.4.1.1-1. Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

3.1.3.1.4.1.2 Frame Quality Indicator of Length 12

The generator polynomial for the 12-bit frame quality indicator shall be

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$

The Cyclic Redundancy Code of length 12 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.2-1 and as described in 3.1.3.1.4.1.

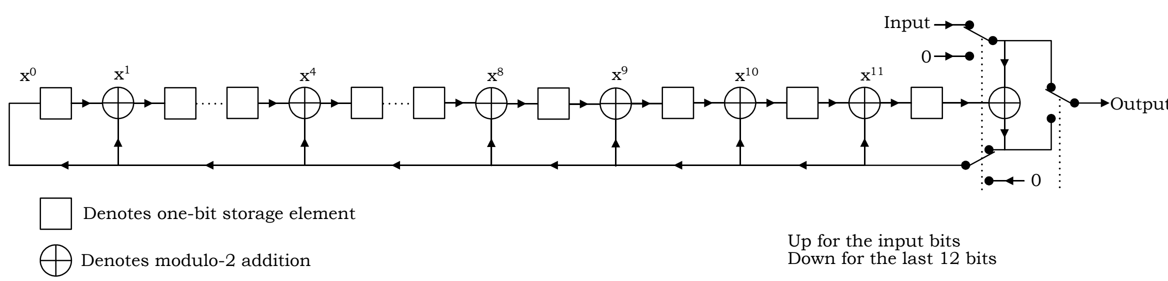


Figure 3.1.3.1.4.1.2-1. Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

3.1.3.1.4.1.3 Frame Quality Indicator of Length 10

The generator polynomial for the 10-bit frame quality indicator shall be

$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1.$

The Cyclic Redundancy Code of length 10 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.3-1 and as described in 3.1.3.1.4.1.

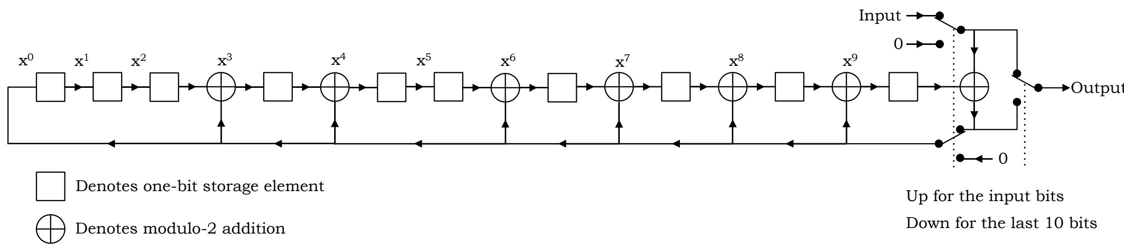


Figure 3.1.3.1.4.1.3-1. Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

3.1.3.1.4.1.4 Frame Quality Indicator of Length 8

The generator polynomial for the 8-bit frame quality indicator shall be

$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$

The Cyclic Redundancy Code of length 8 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.4-1 and as described in 3.1.3.1.4.1.

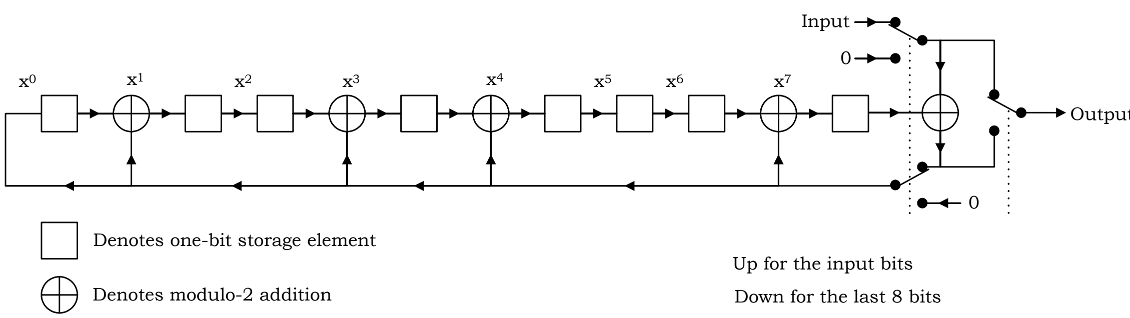


Figure 3.1.3.1.4.1.4-1. Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

3.1.3.1.4.1.5 Frame Quality Indicator of Length 6 except for the Forward Fundamental Channel with Radio Configuration 2

The generator polynomial for the 6-bit frame quality indicator for all forward link channels except the Forward Fundamental Channel with Radio Configuration 2 shall be

$g(x) = x^6 + x^5 + x^2 + x + 1.$

The Cyclic Redundancy Code of length 6 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.5-1 and as described in 3.1.3.1.4.1.

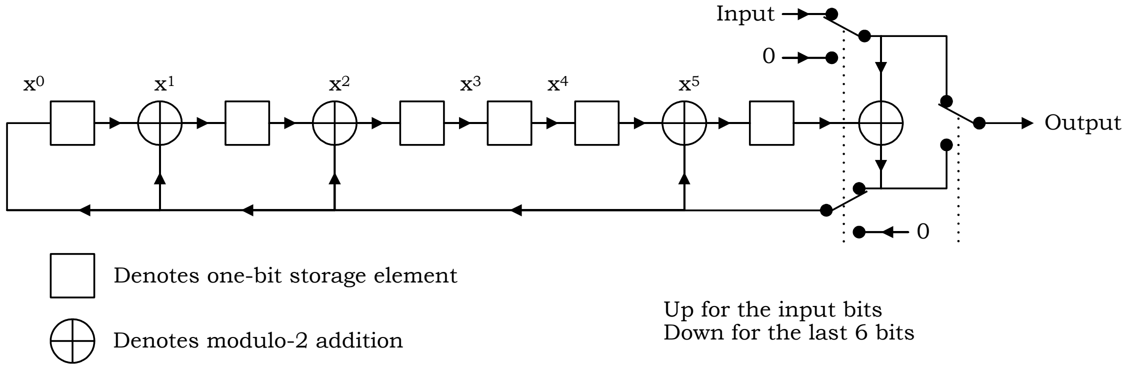


Figure 3.1.3.1.4.1.5-1. Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator except for the Forward Fundamental Channel with Radio Configuration 2

3.1.3.1.4.1.6 Frame Quality Indicator of Length 6 for the Forward Fundamental Channel with Radio Configuration 2

The generator polynomial for the 6-bit frame quality indicator for the Forward Fundamental Channel with Radio Configuration 2 shall be

$g(x) = x^6 + x^2 + x + 1.$

The Cyclic Redundancy Code of length 6 can be generated by the shift register structure shown in Figure 3.1.3.1.4.1.6-1 and as described in 3.1.3.1.4.1.

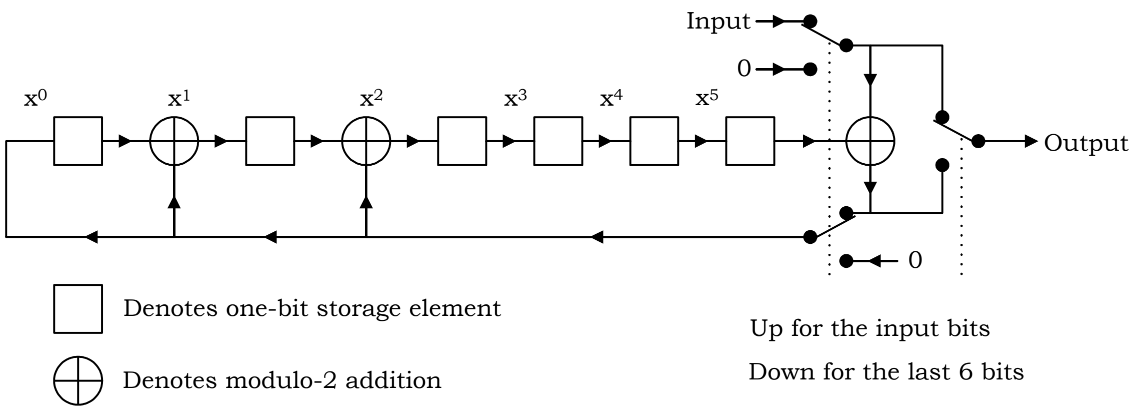


Figure 3.1.3.1.4.1.6-1. Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator of the Forward Fundamental Channel with Radio Configuration 2

3.1.3.1.4.1.7 Outer Frame Quality Indicator for the Forward Packet Data Control Channel

The generator polynomial of the outer frame quality indicator for the Forward Packet Data Control Channel shall be

$g(x) = x^8 + x^2 + x + 1.$

The outer frame quality indicator can be generated by the shift register structure as shown in Figure 3.1.3.1.4.1.7-1 and as described in 3.1.3.1.4.1.

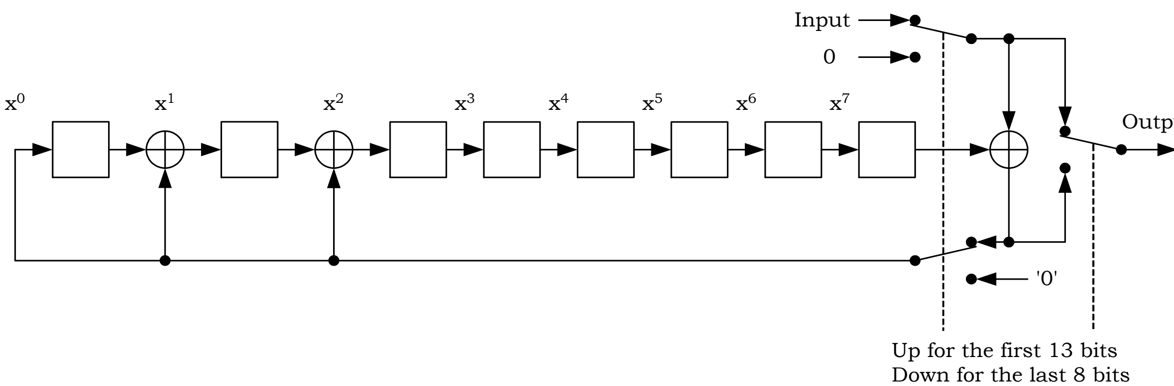


Figure 3.1.3.1.4.1.7-1. Outer Frame Quality Indicator-Calculation for the Forward Packet Data Control Channel

3.1.3.1.5 Forward Error Correction

The forward error correction types for channels with Spreading Rate 1 shall be as specified in Table 3.1.3.1.5-1. The forward error correction types for channels with Spreading Rate 3 shall be as specified in Table 3.1.3.1.5-2.

If the base station supports variable-rate Forward Supplemental Channel operation, flexible data rates, or both, and the specified number of reserved bits, information bits and frame quality indicator bits do not match one of those listed in Table 3.1.3.16.2-1, Table 3.1.3.16.2-2, or Table 3.1.3.16.2-3 for the Forward Supplemental Channel, the forward error correction type of the Forward Supplemental Channel shall be the same as that of the maximum assigned number of bits per frame for that channel if turbo coding is available for the specified number of bits per frame, otherwise convolutional coding shall be used. The forward error correction code rate of a specified frame format, not listed in Table 3.1.3.16.2-1, Table 3.1.3.16.2-2, or Table 3.1.3.16.2-3 for the Forward Supplemental Channel, shall be the same as that of the lowest listed data rate in the same radio configuration that is higher than the specified data rate.

If ERAM is enabled, the code rate of the turbo encoder shall be selected as follows:

- For Radio Configuration 4, the code rate of the turbo encoder shall be

$$R = \begin{cases} 1/2, \text{ if } N/I = 2 \\ 1/3, \text{ if } 2 < N/I \le 3 \\ 1/4, \text{ if } 3 < N/I \le 4 \\ 1/5, \text{ if } N/I > 4 \end{cases}$$

- For Radio Configuration 5, the code rate of the turbo encoder shall be

$$R = \begin{cases} 1/3, \text{ if } 8/3 < N/I \le 3 \\ 1/4, \text{ if } 3 < N/I \le 4 \text{ or } N/I = 8/3 \\ 1/5, \text{ if } N/I > 4 \end{cases}$$

where I denotes the number of encoder input bits per frame and N denotes the interleaver block size.

Table 3.1.3.1.5-1. Forward Error Correction for Spreading Rate 1

Channel Type	Forward Error Correction	R
Sync Channel	Convolutional	1/2
Paging Channel	Convolutional	1/2
Broadcast Control Channel	Convolutional	1/4 or 1/2
Quick Paging Channel	None	-
Common Assignment Channel	Convolutional	1/4 or 1/2
Forward Common Acknowledgment Channel	None	-
Forward Common Control Channel	Convolutional	1/4 or 1/2
Forward Indicator Control Channel	None	-
Forward Grant Channel	Convolutional	1/4
Forward Acknowledgment Channel	None	-
Forward Packet Data Control Channel	Convolutional	1/2 (1.25 ms frames) 1/4 (2.5 ms frames) 1/4 (5 ms frames)
Forward Dedicated Control Channel	Convolutional	1/4 (RC 3 or 5) 1/2 (RC 4)
Forward Fundamental Channel	Convolutional	1/2 (RC 1, 2, 4, 11, or 12) 1/4 (RC 3 or 5)
Forward Supplemental Code Channel	Convolutional	1/2 (RC 1 or 2)
Forward Supplemental Channel	Convolutional	1/2 (RC 4, 11, or 12) 1/4 (RC 3 or 5)
	Turbo (N ≥ 360 for RC 3, 4, 11, and 12 or N ≥ 552 for RC 5)	1/4 (RC 3) 1/2, 1/3, 1/4 or 1/5 (RC 4, 11, or 12) 1/3, 1/4, or 1/5 (RC 5)
Forward Packet Data Channel	Turbo	1/5 (RC 10)

Notes:

1. The state of the convolutional encoder shall not be reset between Sync Channel and Paging Channel frames.
2. N is the number of channel bits per frame.
3. The Forward Supplemental Channel also supports outer block coding in Radio Configuration 5 at the data rate of 115200 bps for 20 ms frames. The outer code rates are 11/16, 12/16, 13/16, and 14/16.

Table 3.1.3.1.5-2. Forward Error Correction for Spreading Rate 3

Channel Type	Forward Error Correction	R
Sync Channel	Convolutional	1/2
Broadcast Control Channel	Convolutional	1/3
Quick Paging Channel	None	-
Forward Indicator Control Channel	None	-
Common Assignment Channel	Convolutional	1/3
Forward Common Control Channel	Convolutional	1/3
Forward Dedicated Control Channel	Convolutional	1/6 (RC 6); 1/3 (RC 7); 1/4 (RC 8, 20 ms), 1/3 (RC 8, 5 ms); or 1/2 (RC 9, 20 ms), 1/3 (RC 9, 5 ms)
Forward Fundamental Channel	Convolutional	1/6 (RC 6); 1/3 (RC 7); 1/4 (RC 8, 20 ms), 1/3 (RC 8, 5 ms); or 1/2 (RC 9, 20 ms), 1/3 (RC 9, 5 ms)
Forward Supplemental Channel	Convolutional	1/6 (RC 6)
	Convolutional or Turbo (N ≥ 360 for RC 6, 7 or N ≥ 552 for RC 8, 9)	1/3 (RC 7) 1/4 (RC 8) 1/2 (RC 9)

Notes:

1. The state of the convolutional encoder shall not be reset between Sync Channel frames.
2. N is the number of channel bits per frame.

3.1.3.1.5.1 Convolutional Encoding

All convolutional codes shall have a constraint length of 9.

3.1.3.1.5.1.1 Rate 1/6 Convolutional Code

The generator functions for the rate 1/6 code shall be g_0 equals 457 (octal), g_1 equals 755 (octal), g_2 equals 551 (octal), g_3 equals 637 (octal), g_4 equals 625 (octal), and g_5 equals 727 (octal). This code generates six code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function

g_0 is output first, the code symbol (c_1) encoded with generator function g_1 is output second, the code symbol (c_2) encoded with generator function g_2 is output third, the code symbol (c_3) encoded with generator function g_3 is output fourth, the code symbol (c_4) encoded with generator function g_4 is output fifth, and the code symbol (c_5) encoded with generator function g_5 is output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol that is output after initialization shall be a code symbol encoded with generator function g_0.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code. Figure 3.1.3.1.5.1.1-1 illustrates the specific K equals 9, rate 1/6 convolutional encoder that is used for these channels.

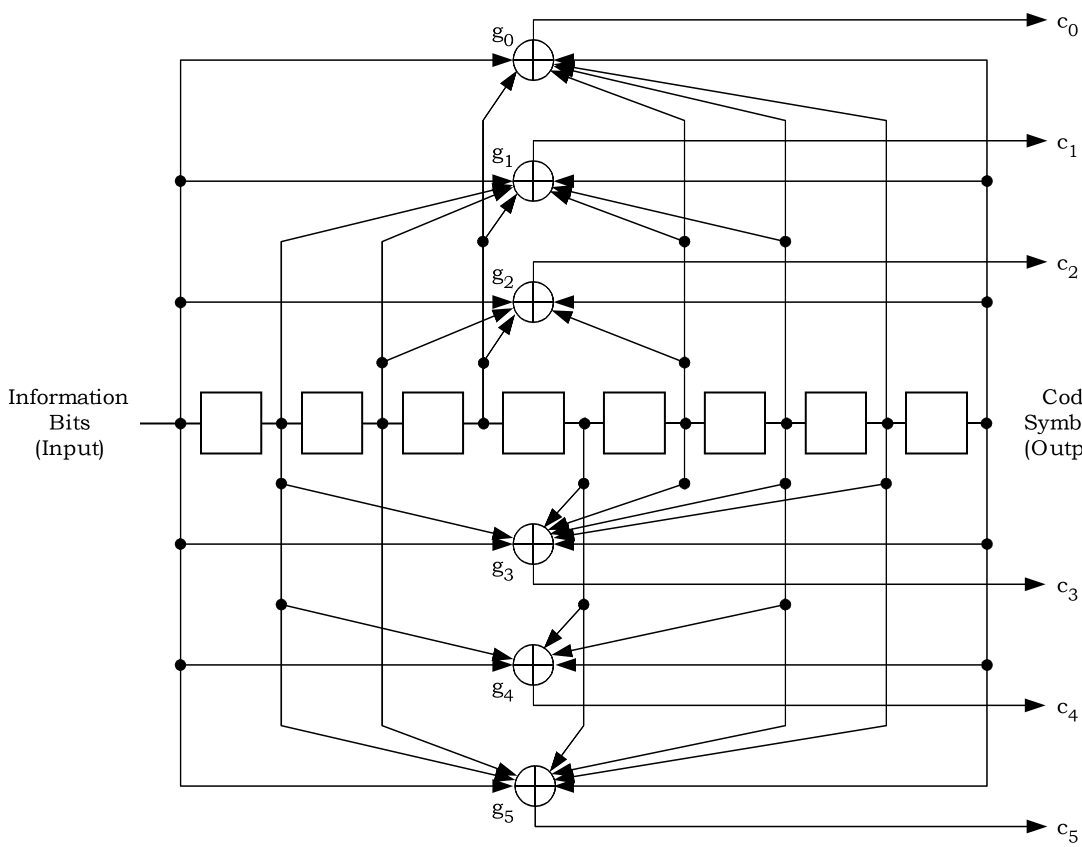


Figure 3.1.3.1.5.1.1-1. K = 9, Rate 1/6 Convolutional Encoder

3.1.3.1.5.1.2 Rate 1/4 Convolutional Code

The generator functions for the rate 1/4 code shall be g_0 equals 765 (octal), g_1 equals 671 (octal), g_2 equals 513 (octal), and g_3 equals 473 (octal). This code generates four code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 is output first, the code symbol

(c_1) encoded with generator function g_1 is output second, the code symbol (c_2) encoded with generator function g_2 is output third, and the code symbol (c_3) encoded with generator function g_3 is output last.

The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol that is output after initialization shall be a code symbol encoded with generator function g_0.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code. Figure 3.1.3.1.5.1.2-1 illustrates the specific K equals 9, rate 1/4 convolutional encoder that is used for these channels.

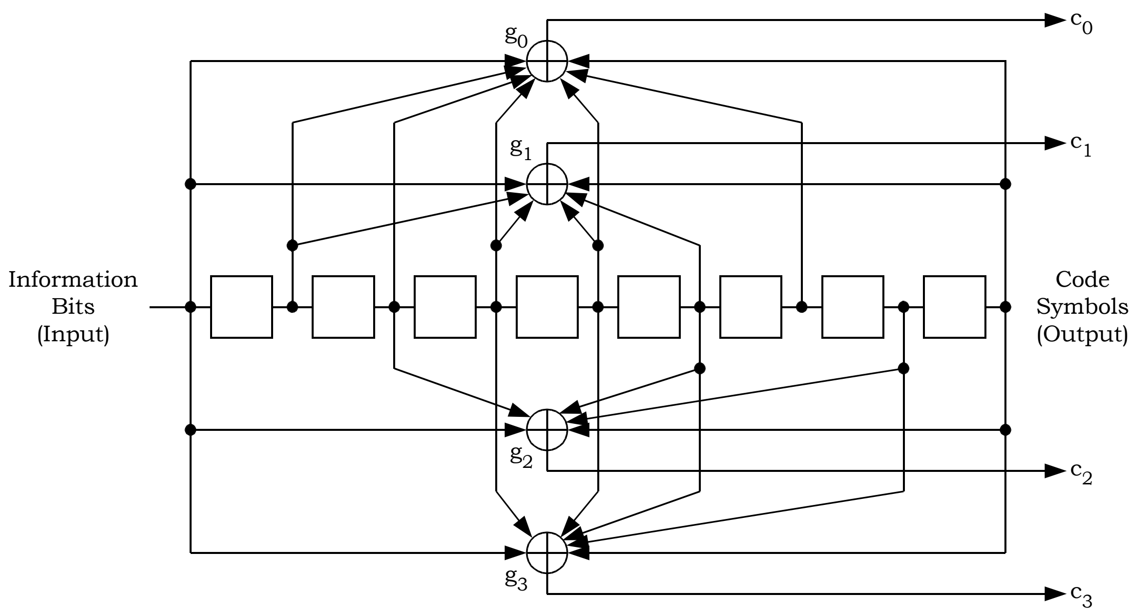


Figure 3.1.3.1.5.1.2-1. K = 9, Rate 1/4 Convolutional Encoder

3.1.3.1.5.1.3 Rate 1/3 Convolutional Code

The generator functions for the rate 1/3 code shall be g_0 equals 557 (octal), g_1 equals 663 (octal), and g_2 equals 711 (octal). This code generates three code symbols for each data bit that is input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 is output first, the code symbol (c_1) encoded with generator function g_1 is output second, and the code symbol (c_2) encoded with generator function g_2 is output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol that is output after initialization shall be a code symbol encoded with generator function g_0.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code. Figure 3.1.3.1.5.1.3-1 illustrates the specific K equals 9, rate 1/3 convolutional encoder that is used for these channels.

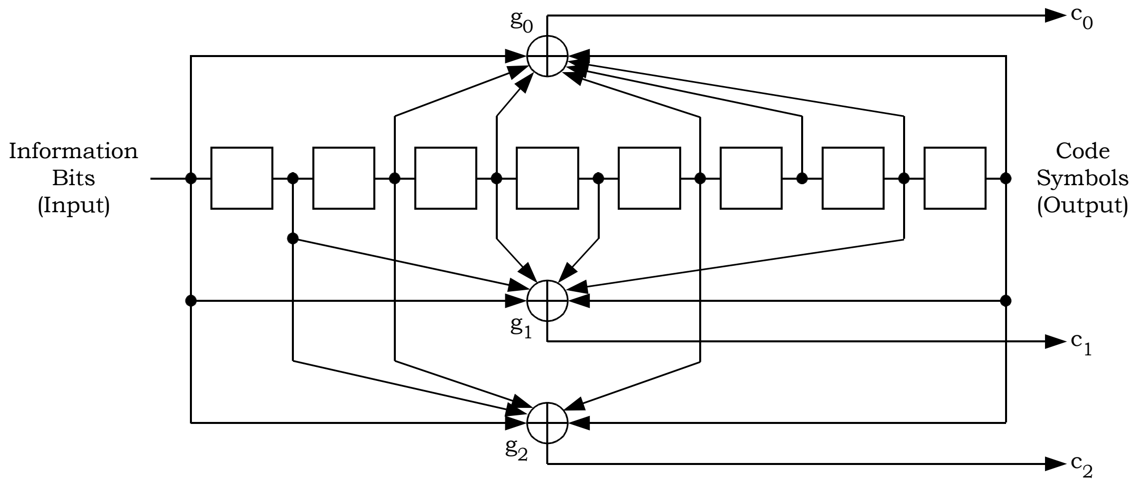


Figure 3.1.3.1.5.1.3-1. K = 9, Rate 1/3 Convolutional Encoder

3.1.3.1.5.1.4 Rate 1/2 Convolutional Code

The generator functions for the rate 1/2 code shall be g_0 equals 753 (octal) and g_1 equals 561 (octal). This code generates two code symbols for each data bit that is input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 is output first, and the code symbol (c_1) encoded with generator function g_1 is output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol that is output after initialization shall be a code symbol encoded with generator function g_0.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code. Figure 3.1.3.1.5.1.4-1 illustrates the specific K equals 9, rate 1/2 convolutional encoder that is used for these channels.

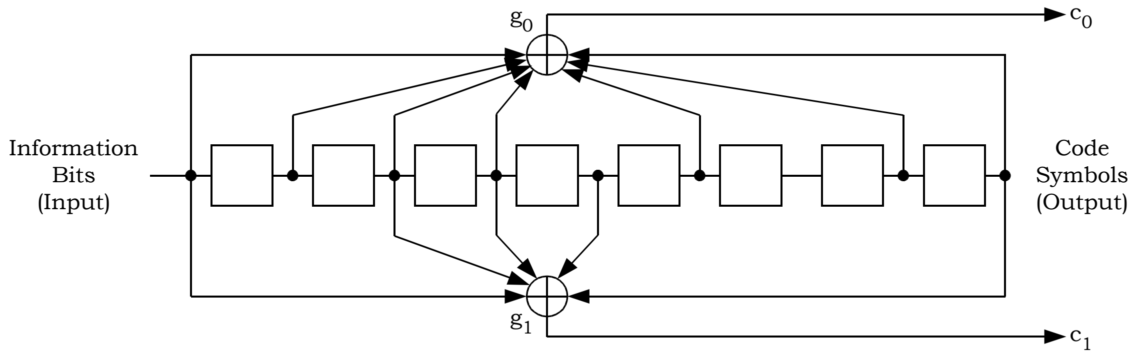


Figure 3.1.3.1.5.1.4-1. K = 9, Rate 1/2 Convolutional Encoder

3.1.3.1.5.2 Turbo Encoding

For Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11, and 12, the turbo encoder encodes the data, frame quality indicator (CRC), and two reserved bits. For the Radio Configuration 10, the turbo encoder encodes the information bits and the frame quality indicator bits. During encoding, an encoder output tail sequence is added. For Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11, and 12, N_{turbo} is the total number of data, frame quality indicator, and reserved input bits, and for Radio Configuration 10 N_{turbo} is the total number of information bits and frame quality indicator bits. Then, the turbo encoder generates N_{turbo}/R encoded data output symbols followed by 6/R tail output symbols, where R is the code rate of 1/2, 1/3, 1/4, or 1/5. The turbo encoder employs two systematic, recursive, convolutional encoders connected in parallel, with an interleaver, the turbo interleaver, preceding the second recursive convolutional encoder. The two recursive convolutional codes are called the constituent codes of the turbo code. The outputs of the constituent encoders are punctured and repeated to achieve the $(N_{turbo} + 6)/R$ output symbols.

3.1.3.1.5.2.1 Rate 1/2, 1/3, 1/4, and 1/5 Turbo Encoders

A common constituent code shall be used for the turbo codes of rate 1/2, 1/3, 1/4, and 1/5. The transfer function for the constituent code shall be

$$G(D) = \begin{bmatrix} 1 & \frac{n_0(D)}{d(D)} & \frac{n_1(D)}{d(D)} \end{bmatrix}$$

where $d(D) = 1 + D^2 + D^3$, $n_0(D) = 1 + D + D^3$, and $n_1(D) = 1 + D + D^2 + D^3$.

The turbo encoder shall generate an output symbol sequence that is identical to the one generated by the encoder shown in Figure 2.1.3.1.5.2.1-1. Initially, the states of the constituent encoder registers in this figure are set to zero. Then, the constituent encoders are clocked with the switches in the positions noted.

When Code Combining Soft Handoff is enabled, the base station may be configured to use either the default turbo encoder or the complementary turbo encoder. When Code Combining Soft Handoff is not enabled, the base station shall use the default turbo encoder. For a base station using the default turbo encoder, the constituent encoder output symbols are generated by clocking the constituent encoders N_{turbo} times with the switches in the up positions and puncturing as specified in Table 3.1.3.1.5.2.1-1. For a base station using the complementary turbo encoder, the constituent encoder output symbols are generated by clocking the constituent encoders N_{turbo} times with the switches in the up positions and puncturing as specified in Table 3.1.3.1.5.2.1-2. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed.

The turbo encoder shall generate symbols for rate 1/2 turbo codes as follows.

- The symbols output by the default encoder for even-indexed data bit periods shall be XY_0.
- The symbols output by the default encoder for odd-indexed data bit periods shall be XY'_0.

- The symbols output by the complementary encoder for even-indexed data bit periods shall be XY'_0.
- The symbols output by the complementary encoder for odd-indexed data bit periods shall be XY_0.

The turbo encoder shall generate symbols for rate 1/3 turbo codes as follows.

- The symbols output by the default encoder for all data bit periods shall be $XY_0Y'_0$.
- The symbols output by the complementary encoder for all data bit periods shall be XY'_0Y_0.

The turbo encoder shall generate symbols for rate 1/4 turbo codes as follows.

- The symbols output by the default encoder for even-indexed data bit periods shall be $XY_0Y_1Y'_1$.
- The symbols output by the default encoder for odd-indexed data bit periods shall be $XY_0Y'_0Y'_1$.
- The symbols output by the complementary encoder for even-indexed data bit periods shall be $XY'_0Y'_1Y_1$.
- The symbols output by the complementary encoder for odd-indexed data bit periods shall be $XY'_0Y_0Y_1$.

The turbo encoder shall generate symbols for rate 1/5 turbo codes as follows.

- The symbols output by the default encoder for all data bit periods shall be $XY_0Y_1Y'_0Y'_1$.
- The symbols output by the complementary encoder for all data bit periods shall be $XY'_0Y'_1Y_0Y_1$.

Symbol repetition is not used in generating the encoded data output symbols.

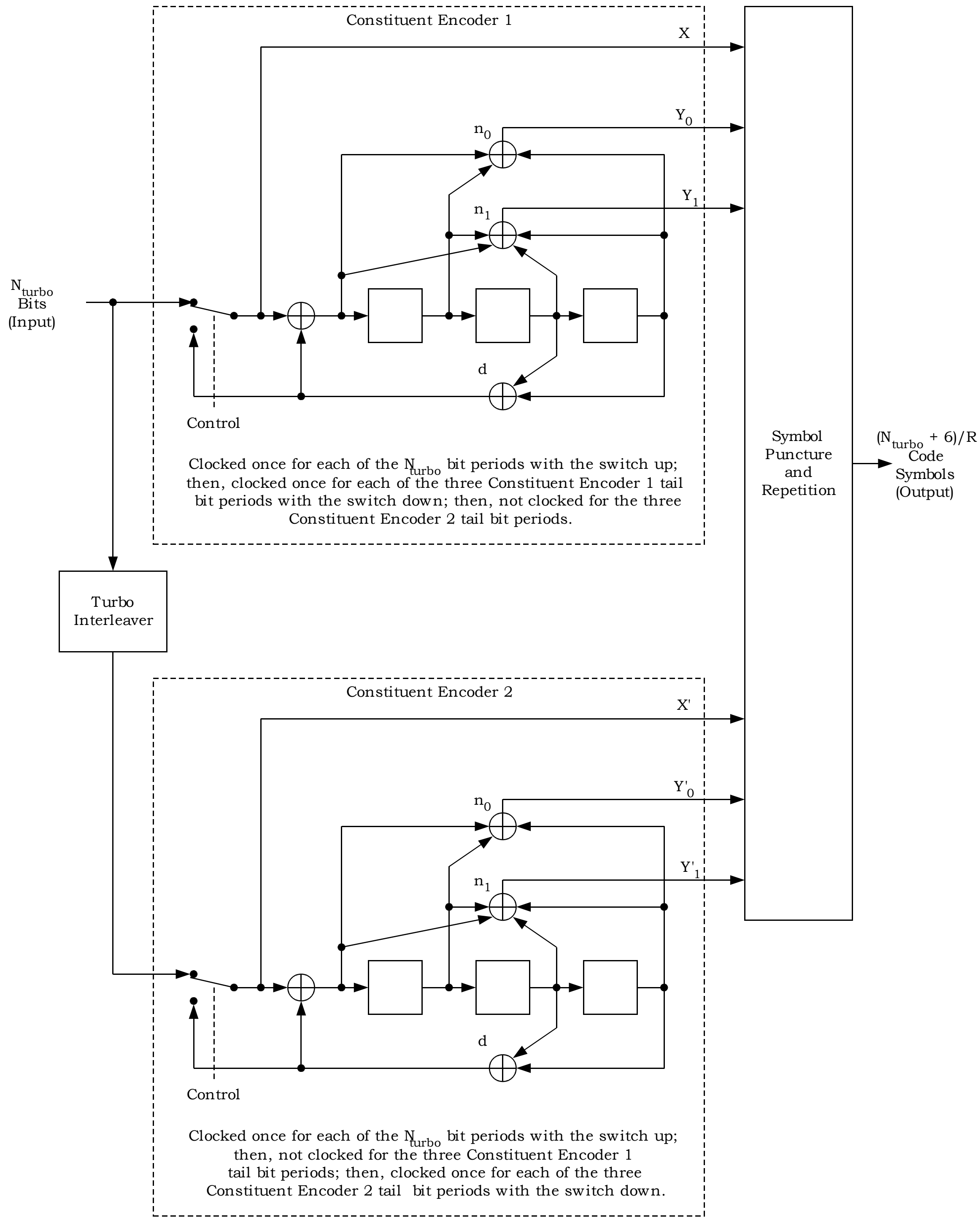


Figure 3.1.3.1.5.2.1-1. Turbo Encoder

Table 3.1.3.1.5.2.1-1. Puncturing Patterns for the Default Turbo Encoder During the Data Bit Periods

	Code Rate			
Output	**1/2**	**1/3**	**1/4**	**1/5**
X	11	11	11	11
Y_0	10	11	11	11
Y_1	00	00	10	11
X′	00	00	00	00
Y'_0	01	11	01	11
Y'_1	00	00	11	11

Note: For each rate, the puncturing table shall be read first from top to bottom and then from left to right.

Table 3.1.3.1.5.2.1-2. Puncturing Patterns for the Complementary Turbo Encoder During the Data Bit Periods

	Code Rate			
Output	**1/2**	**1/3**	**1/4**	**1/5**
X	11	11	11	11
Y'_0	10	11	11	11
Y'_1	00	00	10	11
X′	00	00	00	00
Y_0	01	11	01	11
Y_1	00	00	11	11

Notes:

1. For each rate, the puncturing table shall be read first from top to bottom and then from left to right.
2. For R = 1/3 and 1/5, the puncturing patterns do not result in complementary turbo codes.

3.1.3.1.5.2.2 Turbo Code Termination

The turbo encoder shall generate 6/R tail output symbols following the encoded data output symbols. This tail output symbol sequence shall be identical to the one generated by the encoder shown in Figure 3.1.3.1.5.2.1-1. The tail output symbols are generated after the constituent encoders have been clocked N_{turbo} times with the switches in the up position. The first 3/R tail output symbols are generated by clocking Constituent Encoder 1 three times with its switch in the down position while Constituent Encoder 2 is not clocked and puncturing and repeating the resulting constituent encoder output symbols. The last 3/R tail output symbols are generated by clocking Constituent Encoder 2 three times with its switch in the down position while Constituent Encoder 1 is not clocked and puncturing and repeating the resulting constituent encoder output symbols. The constituent encoder outputs for each bit period shall be output in the sequence X, Y_0, Y_1, X′, Y'_0, Y'_1 with the X output first.

The tail output symbol puncturing and symbol repetition used by both the default and complementary turbo encoders shall be as specified in Table 3.1.3.1.5.2.2-1. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. A 2 or a 3 means that two or three copies of the symbol shall be passed. For rate 1/2 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XY_0, and the tail output symbols for each of the last three tail bit periods shall be $X'Y'_0$. For rate 1/3 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XXY_0, and the tail output symbols for each of the last three tail bit periods shall be $X'X'Y'_0$. For rate 1/4 turbo codes, the tail output symbols for each of the first three tail bit periods shall be XXY_0Y_1, and the tail output symbols for each of the last three tail bit periods shall be $X'X'Y'_0Y'_1$. For rate 1/5 turbo codes, the tail output symbols for each of the first three tail bit periods shall be $XXXY_0Y_1$, and the tail output symbols for each of the last three tail bit periods shall be $X'X'X'Y'_0Y'_1$.

Table 3.1.3.1.5.2.2-1. Puncturing and Symbol Repetition Patterns for the Default and Complementary Turbo Encoders During the Tail Bit Periods

	Code Rate			
Output	**1/2**	**1/3**	**1/4**	**1/5**
X	111 000	222 000	222 000	333 000
Y_0	111 000	111 000	111 000	111 000
Y_1	000 000	000 000	111 000	111 000
X′	000 111	000 222	000 222	000 333
Y'_0	000 111	000 111	000 111	000 111
Y'_1	000 000	000 000	000 111	000 111

Notes:

1. The puncturing table shall be read first from top to bottom and then from left to right with the number of repetitions for each symbol indicated by the number in the table.
2. For R = 1/3 and 1/5, the puncturing patterns do not result in complementary turbo codes.

3.1.3.1.5.2.3 Turbo Interleavers

The turbo interleaver, which is part of the turbo encoder, shall block interleave the N_{turbo} input bits.

The turbo interleaver shall be functionally equivalent to an approach where the entire sequence of turbo interleaver input bits are written sequentially into an array at a sequence of addresses, and then the entire sequence is read out from a sequence of addresses that are defined by the procedure described below.

Let the sequence of input addresses be from 0 to N_{turbo} – 1. Then, the sequence of interleaver output addresses shall be equivalent to those generated by the procedure illustrated in Figure 3.1.3.1.5.2.3-1 and described below:[31]

1. Determine the turbo interleaver parameter, n, where n is the smallest integer such that $N_{turbo} \le 2^{n+5}$. Table 3.1.3.1.5.2.3-1 gives this parameter.
2. Initialize an (n + 5)-bit counter to 0.
3. Extract the n most significant bits (MSBs) from the counter and add one to form a new value. Then, discard all except the n least significant bits (LSBs) of this value.
4. Obtain the n-bit output of the table lookup defined in Table 3.1.3.1.5.2.3-2 with a read address equal to the five LSBs of the counter. Note that this table depends upon the value of n.
5. Multiply the values obtained in Steps 3 and 4, and discard all except the n LSBs.
6. Bit-reverse the five LSBs of the counter.
7. Form a tentative output address that has its MSBs equal to the value obtained in Step 6 and its LSBs equal to the value obtained in Step 5.
8. Accept the tentative output address as an output address if it is less than N_{turbo}; otherwise, discard it.
9. Increment the counter and repeat Steps 3 through 8 until all N_{turbo} interleaver output addresses are obtained.

[31] This procedure is equivalent to one in which the counter values are written into a 2^5-row by 2^n-column array by rows, the rows are shuffled according to a bit-reversal rule, the elements within each row are permuted according to a row-specific linear congruential sequence, and tentative output addresses are read out by column. For i = 0, 1, … , 2^n – 1, the linear congruential sequence rule is $x(i + 1) = (x(i) + c) \bmod 2^n$, where $x(0) = c$ and c is a row-specific value from a table lookup.

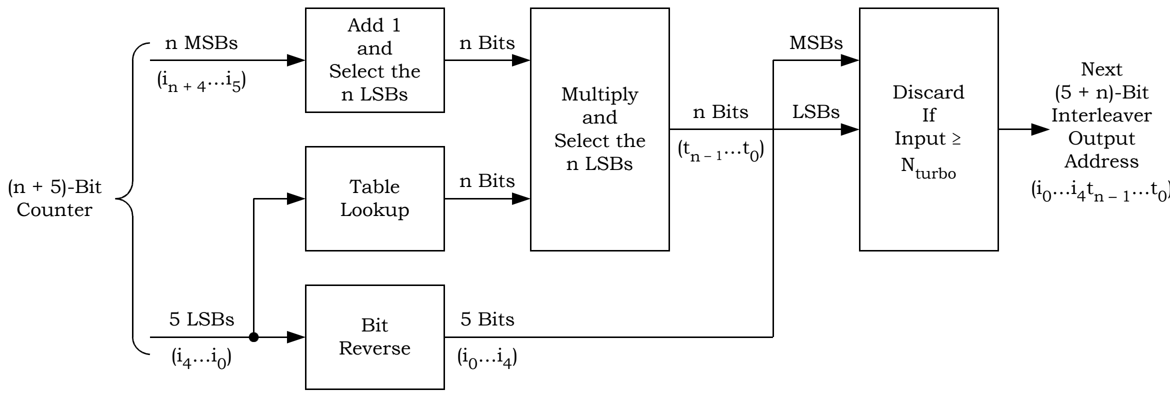


Figure 3.1.3.1.5.2.3-1. Turbo Interleaver Output Address Calculation Procedure

Table 3.1.3.1.5.2.3-1. Turbo Interleaver Parameters

Turbo Interleaver Block Size N_{turbo}	Turbo Interleaver Parameter n
210	3
378	4
402	4
570	5
762	5
786	5
1,146	6
1,530	6
1,554	6
2,298	7
2,322	7
3,066	7
3,090	7
3,858	7
4,602	8
6,138	8
9,210	9
12,282	9
20,730	10

Table 3.1.3.1.5.2.3-2. Turbo Interleaver Lookup Table Definition

Table Index	n = 3 Entries	n = 4 Entries	n = 5 Entries	n = 6 Entries	n = 7 Entries	n = 8 Entries	n = 9 Entries	n = 10 Entries
0	1	5	27	3	15	3	13	1
1	1	15	3	27	127	1	335	349
2	3	5	1	15	89	5	87	303
3	5	15	15	13	1	83	15	721
4	1	1	13	29	31	19	15	973
5	5	9	17	5	15	179	1	703
6	1	9	23	1	61	19	333	761
7	5	15	13	31	47	99	11	327
8	3	13	9	3	127	23	13	453
9	5	15	3	9	17	1	1	95
10	3	7	15	15	119	3	121	241
11	5	11	3	31	15	13	155	187
12	3	15	13	17	57	13	1	497
13	5	3	1	5	123	3	175	909
14	5	15	13	39	95	17	421	769
15	1	5	29	1	5	1	5	349
16	3	13	21	19	85	63	509	71
17	5	15	19	27	17	131	215	557
18	3	9	1	15	55	17	47	197
19	5	3	3	13	57	131	425	499
20	3	1	29	45	15	211	295	409
21	5	3	17	5	41	173	229	259
22	5	15	25	33	93	231	427	335
23	5	1	29	15	87	171	83	253
24	1	13	9	13	63	23	409	677
25	5	1	13	9	15	147	387	717
26	1	9	23	15	13	243	193	313
27	5	15	13	31	15	213	57	757
28	3	11	13	17	81	189	501	189
29	5	3	1	5	57	51	313	15
30	5	15	13	15	31	15	489	75
31	3	5	13	33	69	67	391	163

3.1.3.1.5.3 Outer Block Encoding

The outer code is a Reed-Solomon block code that uses 8-bit symbols and operates in a Galois Field $GF(2^8)$ generated by a primitive polynomial $p(x) = x^8 + x^4 + x^3 + x^2 + 1$. A primitive element α for this field is defined by

$$\alpha^8 + \alpha^4 + \alpha^3 + \alpha^2 + 1 = 0.$$

The elements of GF(2^8) are 0, 1, α, α^2,..., α^{254}. The elements can also be represented as polynomials in terms of the primitive element α. Table 3.1.3.1.5.3-1 specifies the polynomial representation of α^h (h = 0 through 254). The polynomial representation of 0 is also 0.

Table 3.1.3.1.5.3-1. Polynomial Representation of the Elements in GF(2^8)

Power Index h	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)
0	0x1	85	0xd6	170	0xd7
1	0x2	86	0xb1	171	0xb3
2	0x4	87	0x7f	172	0x7b
3	0x8	88	0xfe	173	0xf6
4	0x10	89	0xe1	174	0xf1
5	0x20	90	0xdf	175	0xff
6	0x40	91	0xa3	176	0xe3
7	0x80	92	0x5b	177	0xdb
8	0x1d	93	0xb6	178	0xab
9	0x3a	94	0x71	179	0x4b
10	0x74	95	0xe2	180	0x96
11	0xe8	96	0xd9	181	0x31
12	0xcd	97	0xaf	182	0x62
13	0x87	98	0x43	183	0xc4
14	0x13	99	0x86	184	0x95
15	0x26	100	0x11	185	0x37
16	0x4c	101	0x22	186	0x6e
17	0x98	102	0x44	187	0xdc
18	0x2d	103	0x88	188	0xa5
19	0x5a	104	0xd	189	0x57
20	0xb4	105	0x1a	190	0xae
21	0x75	106	0x34	191	0x41
22	0xea	107	0x68	192	0x82
23	0xc9	108	0xd0	193	0x19
24	0x8f	109	0xbd	194	0x32
25	0x3	110	0x67	195	0x64
26	0x6	111	0xce	196	0xc8
27	0xc	112	0x81	197	0x8d
28	0x18	113	0x1f	198	0x7
29	0x30	114	0x3e	199	0xe

Power Index h	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,…, a_0)
30	0x60	115	0x7c	200	0x1c
31	0xc0	116	0xf8	201	0x38
32	0x9d	117	0xed	202	0x70
33	0x27	118	0xc7	203	0xe0
34	0x4e	119	0x93	204	0xdd
35	0x9c	120	0x3b	205	0xa7
36	0x25	121	0x76	206	0x53
37	0x4a	122	0xec	207	0xa6
38	0x94	123	0xc5	208	0x51
39	0x35	124	0x97	209	0xa2
40	0x6a	125	0x33	210	0x59
41	0xd4	126	0x66	211	0xb2
42	0xb5	127	0xcc	212	0x79
43	0x77	128	0x85	213	0xf2
44	0xee	129	0x17	214	0xf9
45	0xc1	130	0x2e	215	0xef
46	0x9f	131	0x5c	216	0xc3
47	0x23	132	0xb8	217	0x9b
48	0x46	133	0x6d	218	0x2b
49	0x8c	134	0xda	219	0x56
50	0x5	135	0xa9	220	0xac
51	0xa	136	0x4f	221	0x45
52	0x14	137	0x9e	222	0x8a
53	0x28	138	0x21	223	0x9
54	0x50	139	0x42	224	0x12
55	0xa0	140	0x84	225	0x24
56	0x5d	141	0x15	226	0x48
57	0xba	142	0x2a	227	0x90
58	0x69	143	0x54	228	0x3d
59	0xd2	144	0xa8	229	0x7a
60	0xb9	145	0x4d	230	0xf4

Power Index h	Polynomial Representation of α^h hex(a_7, a_6,..., a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,..., a_0)	Power Index	Polynomial Representation of α^h hex(a_7, a_6,..., a_0)
61	0x6f	146	0x9a	231	0xf5
62	0xde	147	0x29	232	0xf7
63	0xa1	148	0x52	233	0xf3
64	0x5f	149	0xa4	234	0xfb
65	0xbe	150	0x55	235	0xeb
66	0x61	151	0xaa	236	0xcb
67	0xc2	152	0x49	237	0x8b
68	0x99	153	0x92	238	0xb
69	0x2f	154	0x39	239	0x16
70	0x5e	155	0x72	240	0x2c
71	0xbc	156	0xe4	241	0x58
72	0x65	157	0xd5	242	0xb0
73	0xca	158	0xb7	243	0x7d
74	0x89	159	0x73	244	0xfa
75	0xf	160	0xe6	245	0xe9
76	0x1e	161	0xd1	246	0xcf
77	0x3c	162	0xbf	247	0x83
78	0x78	163	0x63	248	0x1b
79	0xf0	164	0xc6	249	0x36
80	0xfd	165	0x91	250	0x6c
81	0xe7	166	0x3f	251	0xd8
82	0xd3	167	0x7e	252	0xad
83	0xbb	168	0xfc	253	0x47
84	0x6b	169	0xe5	254	0x8e

Notes:

1. The polynomial representation of α^h is $a_7\alpha^7 + a_6\alpha^6 + \ldots + a_0$, where a_7, a_6,…, a_0 are either 0 or 1.
2. The polynomial representation of α^h is denoted by hex(a_7, a_6,…, a_0), which is the hexadecimal value of an eight-bit number a_7, a_6,…, a_0; with a_7 as the most significant bit and a_0 as the least significant bit.

The j-th code symbol (j = 0, 1,…, n – 1), v_j, shall be defined by

$$v_j = \begin{cases} u_j & 0 \le j \le k-1 \\ \sum_{i=0}^{k-1} u_i * p_{i,j} & k \le j \le n-1 \end{cases},$$

where

n = 16,

k = 11 for the (16, 11) code, 12 for the (16, 12) code, 13 for the (16, 13) code, and 14 for the (16, 14) code,

u_j is the j-th symbol of a block of k information symbols,

$p_{i,j}$ is the entry on the i-th row and the j-th column in the parity matrix of the code as shown in Table 3.1.3.1.5.3.1-1, Table 3.1.3.1.5.3.2-1, Table 3.1.3.1.5.3.3-1, and Table 3.1.3.1.5.3.4-1, and

$*$ and Σ indicate multiplication and summation in GF(2^8), respectively.

3.1.3.1.5.3.1 (16, 11) Reed-Solomon Code

The (16, 11) Reed-Solomon block code generates 16 code symbols for each block of 11 information symbols input to the encoder. The first 11 code symbols are the information symbols and the remaining five code symbols are parity symbols.

The generator polynomial for the (16, 11) code is

$$g(x) = 1 + \alpha^{111}x + \alpha^{160}x^2 + \alpha^{160}x^3 + \alpha^{111}x^4 + x^5.$$

The parity matrix for the (16, 11) block code shall be as specified in Table 3.1.3.1.5.3.1-1.

Table 3.1.3.1.5.3.1-1. Parity Matrix for the (16, 11) Outer Code

Row Index i	$h_{i,11}$	$h_{i,12}$	$h_{i,13}$	$h_{i,14}$	$h_{i,15}$
0	63	0	201	159	22
1	22	127	163	19	76
2	76	249	198	144	99
3	99	253	15	129	174
4	174	160	158	85	43
5	43	196	26	189	215
6	215	236	233	228	235
7	235	16	136	43	137
8	137	79	214	244	250
9	250	151	192	237	111
10	111	160	160	111	0

Note: This table lists the power h of the entry on the i-th row and the j-th column in the parity matrix, $p_{i,j} = \alpha^{h_{i,j}}$, where α is the primitive element of $GF(2^8)$ specified in 3.1.3.1.5.3, i = 0,…,10, and j = 11 through 15. For example, the entry of 63 in the upper left-hand corner indicates $p_{0,11} = \alpha^{63}$.

3.1.3.1.5.3.2 (16, 12) Reed-Solomon Code

The (16, 12) Reed-Solomon block code generates 16 code symbols for each block of 12 information symbols input to the encoder. The first 12 code symbols are the information symbols and the remaining four code symbols are parity symbols.

The generator polynomial for the (16, 12) code is

$$g(x) = 1 + \alpha^{201}x + \alpha^{246}x^2 + \alpha^{201}x^3 + x^4.$$

The parity matrix for the (16, 12) block code shall be as specified in Table 3.1.3.1.5.3.2-1.

Table 3.1.3.1.5.3.2-1. Parity Matrix for the (16, 12) Outer Code

Row Index i	$h_{i,12}$	$h_{i,13}$	$h_{i,14}$	$h_{i,15}$
0	40	138	141	8
1	8	196	97	158
2	158	4	250	209
3	209	123	27	76
4	76	226	198	160
5	160	142	95	125
6	125	19	59	70
7	70	87	39	137
8	137	169	244	254
9	254	192	27	160
10	160	57	53	201
11	201	246	201	0

Note: This table lists the power h of the entry on the i-th row and the j-th column in the parity matrix, $p_{i,j} = \alpha^{h_{i,j}}$, where α is the primitive element of GF(2^8) specified in 3.1.3.1.5.3, i = 0,..., 11, and j = 12 through 15. For example, the entry of 40 in the upper left-hand corner indicates $p_{0,12} = \alpha^{40}$.

3.1.3.1.5.3.3 (16, 13) Reed-Solomon Code

The (16, 13) Reed-Solomon block code generates 16 code symbols for each block of 13 information symbols input to the encoder. The first 13 code symbols are the information symbols and the remaining three code symbols are parity symbols.

The generator polynomial for the (16, 13) code is

$$g(x) = 1 + \alpha^{197}x + \alpha^{197}x^2 + x^3.$$

The parity matrix for the (16, 13) block code shall be as specified in Table 3.1.3.1.5.3.3-1.

Table 3.1.3.1.5.3.3-1. Parity Matrix for the (16, 13) Outer Code

Row Index i	$h_{i,13}$	$h_{i,14}$	$h_{i,15}$
0	169	69	236
1	236	34	140
2	140	28	32
3	32	88	182
4	182	51	58
5	58	163	238
6	238	175	231
7	231	80	223
8	223	195	250
9	250	237	160
10	160	53	246
11	246	98	197
12	197	197	0

Note: This table lists the power h of the entry on the i-th row and the j-th column in the parity matrix, $p_{i,j} = \alpha^{h_{i,j}}$, where α is the primitive element of $GF(2^8)$ specified in 3.1.3.1.5.3 and i = 0,…, 12, and j = 13, 14, and 15. For example, the entry of 169 in the upper left-hand corner indicates $p_{0,13} = \alpha^{169}$.

3.1.3.1.5.3.4 (16, 14) Reed-Solomon Code

The (16, 14) Reed-Solomon block code generates 16 code symbols for each block of 14 information symbols input to the encoder. The first 14 code symbols are the information symbols and the remaining two code symbols are parity symbols.

The generator polynomial for the (16, 14) code is

$$g(x) = 1 + \alpha^{152}x + x^2.$$

The parity matrix for the (16, 14) block code shall be as specified in Table 3.1.3.1.5.3.4-1.

Table 3.1.3.1.5.3.4-1. Parity Matrix for the (16, 14) Outer Code

Row Index i	$h_{i,14}$	$h_{i,15}$
0	1	65
1	65	68
2	68	224
3	224	215
4	215	119
5	119	91
6	91	44
7	44	84
8	84	36
9	36	111
10	111	201
11	201	197
12	197	152
13	152	0

Note: This table lists the power h of the entry on the i-th row and the j-th column in the parity matrix, $p_{i,j} = \alpha^{h_{i,j}}$, where α is the primitive element of $GF(2^8)$ specified in 3.1.3.1.5.3 and i = 0,…, 13, and j = 14 and 15. For example, the entry of 1 in the upper left-hand corner indicates $p_{0,14} = \alpha$.

3.1.3.1.6 Code Symbol Repetition

For the Sync Channel, the Paging Channel, the Broadcast Control Channel, the Quick Paging Channel, the Forward Indicator Control Channel, the Common Assignment Channel, the Forward Common Control Channel, the Forward Dedicated Control Channel, the Forward Fundamental Channel, the Forward Supplemental Code Channel, and the Forward Supplemental Channel, the code symbols output from the forward error correction encoder shall be repeated as specified in Table 3.1.3.1.6-1. Since the Quick Paging Channel, the Forward Indicator Control Channel, and the Forward Common Acknowledgment Channel are not coded, the term code symbol repetition refers to symbol repetition for the Quick Paging Channel Indicators, the Forward Indicator Control Channel symbols, and the Forward Common Acknowledgment Channel symbols.

If variable-rate Forward Supplemental Channel operation is supported and the specified number of bits per frame on the Forward Supplemental Channel is not the maximum assigned, repetition is calculated as follows: The symbol repetition factor is the ratio of the interleaver block size of the maximum assigned rate and the specified number of encoded symbols per frame.

If flexible data rates are used, the repetition factor is calculated as follows:

- If the specified data rate is the maximum assigned; the repetition factor is the ratio of the interleaver block size of the next higher listed rate and the specified number of encoded symbols per frame.
- Otherwise, the repetition factor is the ratio of the interleaver block size of the maximum assigned and the specified number of encoded symbol per frame.

If the repetition factor is less than 1, then code symbol repetition shall be disabled. Otherwise, the symbol repetition[32] shall be performed as follows:

The k-th output symbol from the repetition block shall be the $\lfloor kL/N \rfloor$-th input symbol

where k = 0 to $N – 1$,

L = Number of specified encoded symbols per frame at encoder output, and

N = Desired channel interleaver block size ($N \geq L$).

For the Forward Packet Data Control Channel with 1.25- or 2.5-ms frames, the code symbol repetition block shall be disabled. For the Forward Packet Data Control Channel with 5-ms frames, the symbol repetition shall be performed such that the k-th output symbol from the repetition block is the $\lfloor 148k/192 \rfloor$-th input symbol, where k = 0 to 191.

[32] The symbol repetition factor is N/L.

Table 3.1.3.1.6-1. Code Symbol Repetition

Channel Type		Number of Repeated Code Symbols/Code Symbol
Sync Channel		2 (SR 1) 2 (SR 3)
Paging Channel		2 (4800 bps) 1 (9600 bps)
Broadcast Control Channel		1
Quick Paging Channel		2 (SR 1 at 4800 bps) 4 (SR 1 at 2400 bps) 3 (SR 3 at 4800 bps) 6 (SR 3 at 2400 bps)
Common Assignment Channel		1
Forward Common Acknowledgment Channel		1
Forward Common Control Channel		1 (SR 1, non-TD) 2 (SR 1, TD) 3 (SR 3)
Forward Indicator Control Channel	Forward Rate Control Channel	2, 4, and 8 (SR 1, non-TD)
	Common Power Control Channel	1 (SR 1, non-TD) 2 (SR 1, TD) 3 (SR 3)
Forward Dedicated Control Channel		1 (RC 3, 4, 5, 6, 7, and 9; and RC 8, 20 ms) 2 (RC 8, 5 ms)
Forward Fundamental Channel		N/A (0 bps) 8 (1200, 1500, or 1800 bps) 4 (2400, 2700, 3000, or 3600 bps) 2 (4800, 5000, or 7200 bps; and RC 8, 5 ms) 1 (9600 or 14400 bps, 20 ms; and RC 3, 4, 5, 6, 7, and 9, 5 ms)
Forward Supplemental Code Channel		1 (RC 1 or 2)
Forward Supplemental Channel	20 ms frames	8 (1500 or 1800 bps) 4 (2700 or 3600 bps) 2 (4800 or 7200 bps) 1 (> 7200 bps)
	40 ms frames	4 (1350 or 1800 bps) 2 (2400 or 3600 bps) 1 (> 3600 bps)
	80 ms frames	2 (1200 or 1800 bps) 1 (> 1800 bps)

3.1.3.1.7 Puncturing

3.1.3.1.7.1 Convolutional Code Symbol Puncturing

This section specifies the puncturing pattern of convolutional code symbols for all channels except for the Forward Packet Data Control Channel and the Forward Grant Channel. Table 3.1.3.1.7.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted, and '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncturing pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.7.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 6	'110101'	2
1/2	4 of 12	'110110011011'	11, 12
1/2	1 of 5	'11110'	4, 11, 12
1/2	1 of 9	'111111110'	4
1/2	2 of 18	'111011111 111111110'	9
1/2	1 of 25	'1111111111111 111111111110'	11, 12
1/3	1 of 5	'11110'	7
1/3	1 of 9	'111111110'	7
1/4	4 of 12	'110110011011'	5
1/4	1 of 5	'11110'	3
1/4	1 of 9	'111111110'	3
1/6	1 of 5	'11110'	6
1/6	1 of 9	'111111110'	6

For example, the puncturing pattern for Radio Configuration 2 is '110101', meaning that the first, second, fourth, and sixth symbols are passed, while the third and the fifth symbols of each consecutive group of six symbols are removed.

3.1.3.1.7.2 Turbo Code Symbol Puncturing

Table 3.1.3.1.7.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncturing pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.7.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	‘111110101 111111111’	9
1/4	4 of 12	‘110111011010’	5

3.1.3.1.7.3 Flexible and Variable Rate Puncturing

If variable-rate Forward Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, the puncturing in 3.1.3.1.7.1 and 3.1.3.1.7.2 is used for the frame formats listed in Table 3.1.3.14.2-1 for the Forward Dedicated Control Channel, Table 3.1.3.15.2-1 for the Forward Fundamental Channel, or Table 3.1.3.16.2-1, Table 3.1.3.16.2-2, or Table 3.1.3.16.2-3 for the Forward Supplemental Channel.

If the number of specified encoded symbols per frame at the encoder output, L, is less than the desired channel interleaver block size, N, puncturing after symbol repetition shall be disabled.

Otherwise, code symbol puncturing shall be applied to the encoder output as follows.

- For turbo codes with ERAM disabled or for convolutional codes, the k-th output symbol from the puncturing block shall be the $\lfloor kL/N \rfloor$-th input symbol, where k = 0 to N – 1.
- For turbo codes with ERAM enabled for Radio Configurations 4 and 5, puncturing shall be as follows:
  - Let I denote the number of information bits per frame, including reserved and tail bits.
  - If N/I = 2 for Radio Configuration 4 or N/I = 8/3 for Radio Configuration 5, puncturing as specified in 3.1.3.1.7.2 shall be used.
  - Otherwise, let

    $J = \lfloor I/2 \rfloor$ and

    $K = \lfloor (L - N)/2 \rfloor$.

    All symbols for a frame shall be sequentially grouped into groups of L/I symbols each so that the first symbol at the encoder output is in symbol group 0 and the last symbol at the encoder output is in symbol group I – 1. Symbol puncturing shall be enabled for symbol groups with indices 2j and 2j + 1 if (j·K) mod J < K, where j = 0 to J – 1. The pattern used to puncture the i-th symbol group shall be $P_{(i \bmod 2)}$, as defined in Table 3.1.3.1.7.3-1. Symbol groups corresponding to data bit periods of the turbo encoded frame shall be punctured with the data puncturing pattern, whereas symbol groups corresponding to tail bit periods shall be punctured with the tail puncturing pattern. If L is odd, the (I – 1)-th symbol group shall also be punctured.

Table 3.1.3.1.7.3-1. Puncturing Pattern for Turbo Codes with ERAM Enabled

	2 < N/I ≤ 3 R = 1/3		**3 < N/I ≤ 4 R = 1/4**		**4 < N/I < 5 R = 1/5**	
	P_0	**P_1**	**P_0**	**P_1**	**P_0**	**P_1**
Data Puncturing Pattern	‘110’	‘101’	‘1011’	‘1110’	‘11101’	‘11011’
Tail Puncturing Pattern	‘101’	‘101’	‘1011’	‘1011’	‘11011’	‘11011’

3.1.3.1.7.4 Forward Grant Channel Puncturing

Table 3.1.3.1.7.4-1 lists the base code rate, puncturing ratio, and puncturing patterns that shall be used for the Forward Grant Channel. The definition for the puncturing pattern can be found in 3.1.3.1.7.1.

Table 3.1.3.1.7.4-1. Punctured Codes Used with Convolutional Codes for Forward Grant Channel

Base Code Rate	Puncturing Ratio	Puncturing Pattern
1/4	4 of 16	‘1011111001111101’

3.1.3.1.7.5 Forward Packet Data Control Channel Puncturing

With 5-ms frames, the Forward Packet Data Control Channel puncturing shall be disabled. With 1.25- or 2.5-ms frames, the Forward Packet Data Control Channel puncturing shall be performed such that the k-th output symbol from the encoder is the $\lfloor 37k/24 \rfloor$-th input symbol, where k = 0 to 47 for 1.25-ms frames and k = 0 to 95 for 2.5-ms frames.

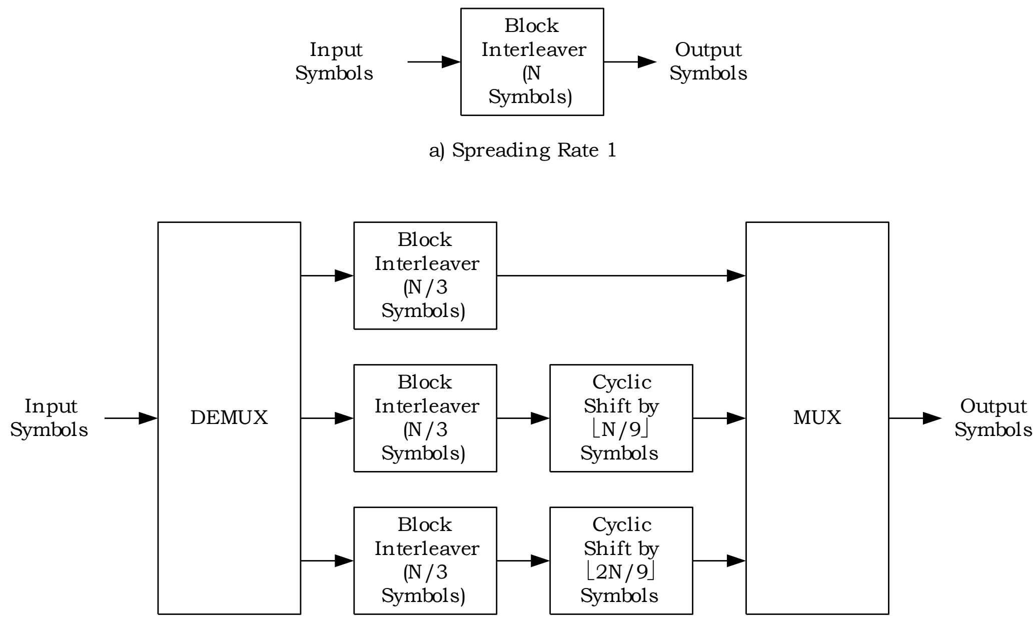
3.1.3.1.8 Block Interleaving

For the Sync Channel, the Paging Channels, the Broadcast Control Channels, the Common Assignment Channel, the Forward Common Control Channel, the Forward Grant Channel, the Forward Packet Data Control Channel, and the Forward Traffic Channels with Radio Configurations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, and 12, all the symbols after symbol repetition and subsequent puncturing, if used, shall be block interleaved. The interleaver parameters m and J for these channels are specified in Table 3.1.3.1.8-1. Figure 3.1.3.1.8-1 shows the configuration of the interleaver.

For the Forward Packet Data Channel with Radio Configuration 10, all the symbols after encoding shall be block interleaved as described in 3.1.3.1.8.1.3.

Table 3.1.3.1.8-1. Interleaver Parameters

Interleaver Block Size	m	J
48	4	3
96	5	3
192	6	3
384	6	6
768	6	12
1,536	6	24
3,072	6	48
6,144	7	48
12,288	7	96
144	4	9
288	5	9
576	5	18
1,152	6	18
2,304	6	36
4,608	7	36
9,216	7	72
18,432	8	72
36,864	8	144
128	7	1



b) Spreading Rate 3

The DEMUX functions distribute input symbols sequentially from the top to the bottom output paths.
The MUX functions combine the input symbols sequentially from the top to the bottom input paths.

Figure 3.1.3.1.8-1. Structure for the N-Symbol Block Interleavers

3.1.3.1.8.1 Spreading Rate 1 Interleaving

3.1.3.1.8.1.1 Bit-Reversal Order Interleaver

When operating on the Sync Channel, the Paging Channel, the Forward Packet Data Control Channel, the Forward Grant Channel, or the Forward Traffic Channel with Radio Configuration 1 and 2, the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one. The interleaved symbols are read out in permuted order from address A_i, as follows:

$$A_i = 2^m (i \bmod J) + BRO_m(\lfloor i / J \rfloor)$$

where

$i = 0$ to $N - 1$,

m and J are given in Table 3.1.3.1.8-1 using interleaver block size N,

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$BRO_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $BRO_3(6) = 3$).

3.1.3.1.8.1.2 Forward-Backwards Bit-Reversal Order Interleaver

When operating on the Broadcast Control Channel, the Common Assignment Channel, the Forward Common Control Channel, or the Forward Traffic Channel with Radio Configuration 3, 4, 5, 11 and 12, the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one. When Code Combining Soft Handoff is enabled for Radio Configuration 12, the base station shall be configured to use either the default interleaver pattern or the alternate interleaver pattern.

For Radio Configuration 3, 4, 5, 11 and Radio Configuration 12 if using code combining soft handoff and the default interleaver pattern (FOR_FCH_CCSH_INTERLEAVER_TYPE = 0 in [5]) the even interleaved symbols (i is even) are read out in permuted order from address A_i, as follows:

$$A_i = 2^m\left[\frac{i}{2} \bmod J\right] + BRO_m\left(\left\lfloor \frac{i}{2} / J \right\rfloor\right)$$

where

$i = 0, 2, \ldots, N - 2,$

m and J are given in Table 3.1.3.1.8-1 using interleaver block size N,

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$BRO_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $BRO_3(6) = 3$).

For Radio Configuration 3, 4, 5, 11 and Radio Configuration 12 if using code combining soft handoff and the default interleaver pattern (FOR_FCH_CCSH_INTERLEAVER_TYPE = 0 in [5]) the odd interleaved symbols (i is odd) are read out in permuted order from address A_i, as follows: $A_i = 2^m\left[\left(N - \frac{(i+1)}{2}\right) \bmod J\right] + BRO_m\left(\left\lfloor \left(N - \frac{(i+1)}{2}\right) / J \right\rfloor\right)$

where

$i = 1, 3, \ldots, N - 1,$ and

m and J are given in Table 3.1.3.1.12-1 using interleaver block size N.

For Radio Configuration 12 if using code combining soft handoff and the alternate interleaver pattern (FOR_FCH_CCSH_INTERLEAVER_TYPE = 1 in [5]) the even interleaved symbols (i is even) are read out in permuted order from address A_i, as follows:

$$A_i = \left(\left(2^m\left[\frac{i}{2} \bmod J\right] + BRO_m\left(\left\lfloor \frac{i}{2} / J \right\rfloor\right)\right) + \frac{N}{2}\right) \bmod N$$

where

$i = 0, 2, \ldots, N - 2,$

m and J are given in Table 3.1.3.1.8-1 using interleaver block size N,

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$BRO_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $BRO_3(6) = 3$).

For Radio Configuration 12 if using code combining soft handoff and the alternate interleaver pattern (FOR_FCH_CCSH_INTERLEAVER_TYPE = 1 in [5]) the odd interleaved symbols (i is odd) are read out in permuted order from address A_i, as follows:

$$A_i = \left(\left(2^m\left[\left(N - \frac{(i+1)}{2}\right) mod\ J\right] + BRO_m\left(\left\lfloor\left(N - \frac{(i+1)}{2}\right)/J\right\rfloor\right)\right) + \frac{N}{2}\right) mod\ N$$

where

i = 1, 3,..., N – 1, and

m and J are given in Table 3.1.3.1.12-1 using interleaver block size N.

The Spreading Rate 1 block interleaving procedure is diagrammed in Figure 3.1.3.1.8-1.

3.1.3.1.8.1.3 Interleaving for the Forward Packet Data Channel

The channel interleaving for the Forward Packet Data Channel shall consist of symbol separation, subblock interleaving, and symbol grouping.

3.1.3.1.8.1.3.1 Symbol Separation

All of the encoded symbols shall be demultiplexed into five subblocks denoted by S, P_0, P_1, P'_0, and P'_1. The encoder output symbols shall be sequentially distributed into five subblocks with the first encoder output symbol going to the S subblock, the second to the P_0 subblock, the third to the P_1 subblock, the fourth to the P'_0 subblock, the fifth to the P'_1 subblock, the sixth to the S subblock, etc.

3.1.3.1.8.1.3.2 Subblock Interleaving

The five subblocks shall be interleaved separately. The sequence of interleaver output symbols for each subblock shall be generated by the procedure described below. The entire subblock of symbols to be interleaved is written into an array at addresses from 0 to the interleaver subblock size (N_{int}) minus one, and the interleaved symbols are read out in a permuted order with the i-th symbol being read from an address, A_i (i = 0 to N_{int} – 1), as follows:

1. Determine the subblock interleaver parameters, m and J. Table 3.1.3.1.8.1.3.2-1 gives these parameters.
2. Initialize i and k to 0.
3. Form a tentative output address Tk according to the formula

Tk= 2m (k mod J) + BROm (⌊ k/J⌋),

where BROm(y) indicates the bit-reversed m-bit value of y (i.e., BRO3(6) = 3).

4. If Tk is less than Nint, Ai = Tk and increment i and k by 1. Otherwise, discard Tk and increment k only.
5. Repeat steps 3 and 4 until all Nint interleaver output addresses are obtained.

The parameters for the subblock interleavers are specified in Table 3.1.3.1.8.1.3.2-1.

Table 3.1.3.1.8.1.3.2-1. Subblock Interleaver Parameters

Encoder Packet Size	Subblock Interleaver Parameters		
	N_{int}	m	J
216	216	6	4
408	408	7	4
792	792	8	4
1,560	1,560	9	4
2,328	2,328	10	3
3,096	3,096	10	4
3,864	3,864	11	2

3.1.3.1.8.1.3.3 Symbol Grouping

The channel interleaver output sequence shall consist of the interleaved S subblock sequence followed by a symbol-by-symbol multiplexed sequence of the interleaved P_0 and P'_0 subblock sequences followed by a symbol-by-symbol multiplexed sequence of the interleaved P_1 and P'_1 subblock sequences. The symbol-by-symbol multiplexed sequence of interleaved P_0 and P'_0 subblock sequences shall consist of the first interleaved P_0 subblock output, the first interleaved P'_0 subblock output, the second interleaved P_0 subblock output, the second interleaved P'_0 subblock output, etc. The symbol-by-symbol multiplexed sequence of interleaved P_1 and P'_1 subblock sequences shall consist of the first interleaved P_1 subblock output, the first interleaved P'_1 subblock output, the second interleaved P_1 subblock output, the second interleaved P'_1 subblock output, etc.

Figure 3.1.3.1.8.1.3.3-1 shows the subblock symbol grouping.

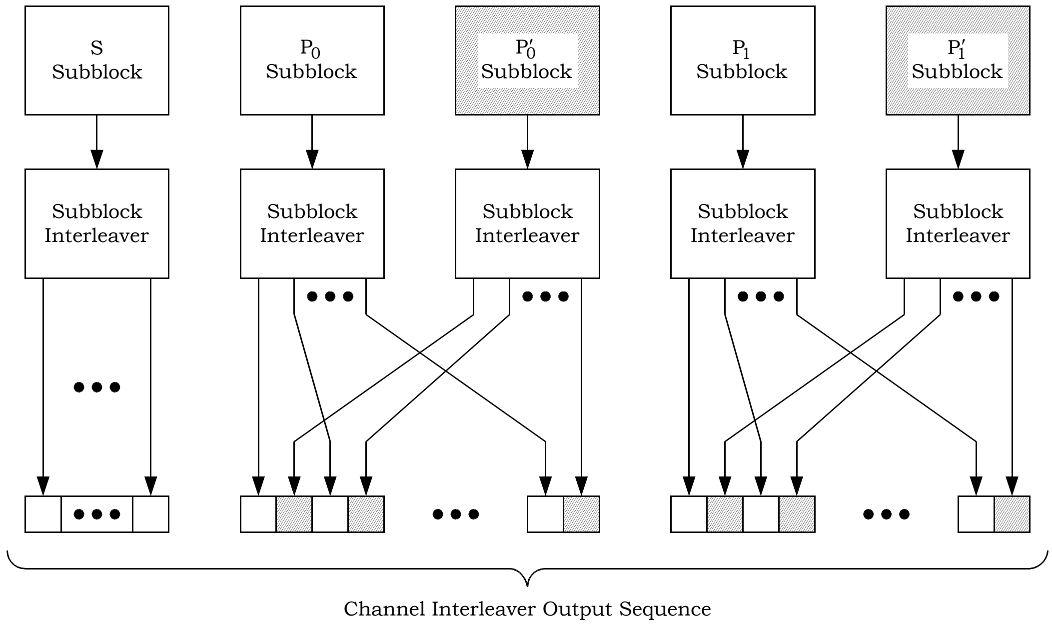


Figure 3.1.3.1.8.1.3.3-1. Subblock Symbol Grouping

3.1.3.1.8.2 Spreading Rate 3 Interleaving

The block interleaver shall demultiplex its input symbols into three blocks with N/3 symbols each.

The symbols input to block interleaver k (k = 0, 1, 2) are written sequentially into addresses 0 to N/3 – 1. The interleaved symbols are read out in a permuted order, with the i-th address being read from address A_i, as follows:

$$A_i = 2^m\left[\left(i + \left\lfloor \frac{kN}{9} \right\rfloor\right) \bmod J\right] + \mathrm{BRO}_m\left\{\left\lfloor\left[\left(i + \left\lfloor \frac{kN}{9} \right\rfloor\right) \bmod \left(\frac{N}{3}\right)\right] / J\right\rfloor\right\}$$

where

i = 0 to N/3 – 1,

m and J are given in Table 3.1.3.1.8-1 using interleaver block size N/3,

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$\mathrm{BRO}_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $\mathrm{BRO}_3(6) = 3$).

The three interleaved block outputs shall then be multiplexed together.

The Spreading Rate 3 block interleaving procedure is diagrammed in Figure 3.1.3.1.8-1. Note that the equation describes the operation performed by both the interleaver block and cyclic shift block in Figure 3.1.3.1.8-1.

3.1.3.1.9 Sequence Repetition

Sequence repetition applies to the Broadcast Control Channel.

When operating at 4800 bps, the encoded and interleaved sequence of symbols of the first Broadcast Control Channel frame (40 ms) of a Broadcast Control Channel slot (160 ms) shall be repeated in the next three Broadcast Control Channel frames. When operating at 9600 bps, the encoded and interleaved sequence of symbols of the first Broadcast Control Channel frame (40 ms) of a Broadcast Control Channel slot (80 ms) shall be repeated in the next Broadcast Control Channel frame. When operating at 19,200 bps, the encoded and interleaved sequence of symbols of the first Broadcast Control Channel frame (40 ms) of a Broadcast Control Channel slot (40 ms) shall not be repeated.

3.1.3.1.10 Data Scrambling

Data scrambling applies to the Paging Channels, the Broadcast Control Channels, the Common Assignment Channels, the Forward Common Control Channels, the Forward Grant Channels, and the Forward Traffic Channels with Radio Configurations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, and 12. The Forward Traffic Channel with Radio Configuration 10 uses packet data scrambling, which is described in 3.1.3.1.11.

Data scrambling for the Paging Channels, the Common Assignment Channels, the Forward Common Control Channels, the Forward Grant Channels, and the Forward Traffic Channels with Radio Configurations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, and 12, is performed on the modulation symbols output from the block interleaver at the modulation symbol rate. Data scrambling for the Broadcast Control Channel is performed on the modulation symbols after sequence repetition at the modulation symbol rate.

When operating on the Paging Channel or the Forward Traffic Channel with Radio Configurations 1 and 2, the data scrambling shall be accomplished by performing the modulo-2 addition of the modulation symbol with the binary value of the long code PN chip that is valid at the start of the transmission period for that symbol as shown in Figure 3.1.3.1.1.1-1, Figure 3.1.3.1.1.1-17 and Figure 3.1.3.1.1.1-18. This PN sequence shall be the equivalent of the long code operating at 1.2288 MHz clock rate. Only the first output of every 64 chips is used for the data scrambling.

When operating on the Broadcast Control Channel, the Common Assignment Channel, the Forward Common Control Channel, the Forward Grant Channel, and the Forward Traffic Channel with Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11, and 12, the data scrambling shall be accomplished by operating on groups of 2M modulation symbols, where M is 1 for the Spreading Rate 1 non-TD mode, 2 for the Spreading Rate 1 TD mode, and 3 for the Spreading Rate 3 mode. For the first M modulation symbols of each group, modulo-2 addition shall be performed on the modulation symbols with the binary value of the long code PN chip that is valid at the start of the transmission period for the 2M modulation symbols as shown in Figure 3.1.3.1.1.1-2, Figure 3.1.3.1.1.1-3, Figure 3.1.3.1.1.1-5, Figure 3.1.3.1.1.1-6, Figure 3.1.3.1.1.1-7, Figure 3.1.3.1.1.1-8, Figure 3.1.3.1.1.1-11, Figure 3.1.3.1.1.1-25, Figure 3.1.3.1.1.2-2, Figure 3.1.3.1.1.2-5, Figure 3.1.3.1.1.2-6, and Figure 3.1.3.1.1.2-15. For the second M modulation symbols of each group, modulo-2 addition shall be performed on the modulation symbols with the binary value of the long code PN chip that is valid just prior to the start of the transmission period for the 2M modulation symbols. This PN sequence shall be the equivalent of the long code described in Figure

2.1.3.1.16-1 for Spreading Rate 1 and the equivalent of the long code described in Figure 2.1.3.1.17-1 for Spreading Rate 3.

The long code shall be generated as described in 2.1.3.1.17. The long code masks to be used for the Paging Channels, the Broadcast Control Channel, the Common Assignment Channels, the Forward Common Control Channels, the Forward Grant Channels, and the Forward Traffic Channels are specified in 3.1.3.4.6, 3.1.3.5.6, 3.1.3.8.5, 3.1.3.9.5, 3.1.3.14.7, 3.1.3.15.7, 3.1.3.16.7, 3.1.3.11.6, and 3.1.3.17.7 respectively.

3.1.3.1.11 Data Scrambling for the Forward Packet Data Channel

The interleaved symbols shall be scrambled by exclusive-ORing a scrambling sequence with the symbols out of the block interleaver. The scrambling sequence shall be equivalent to one generated with a 17-tap linear feedback shift register with a generator sequence of $h(D) = D^{17} + D^{14} + 1$, as shown in Figure 3.1.3.1.11-1. At the start of every encoder packet, the shift register shall be initialized to the state $[1b_{15}b_{14}b_{13}b_{12}b_{11}b_{10}b_9b_8b_7b_6b_5b_4b_3b_2b_1b_0]$, where the $b_{15}b_{14}b_{13}b_{12}b_{11}b_{10}b_9b_8b_7b_6b_5b_4b_3b_2b_1b_0$ bits are the least significant bits of the long code mask (see 3.1.3.18.5). The initial state shall generate the first scrambling bit. The shift register shall be clocked once for every interleaver output symbol to generate a bit of the scrambling sequence. Every interleaver output symbol shall be exclusive-OR'd with the corresponding bit of the scrambling sequence to yield a scrambled output bit.

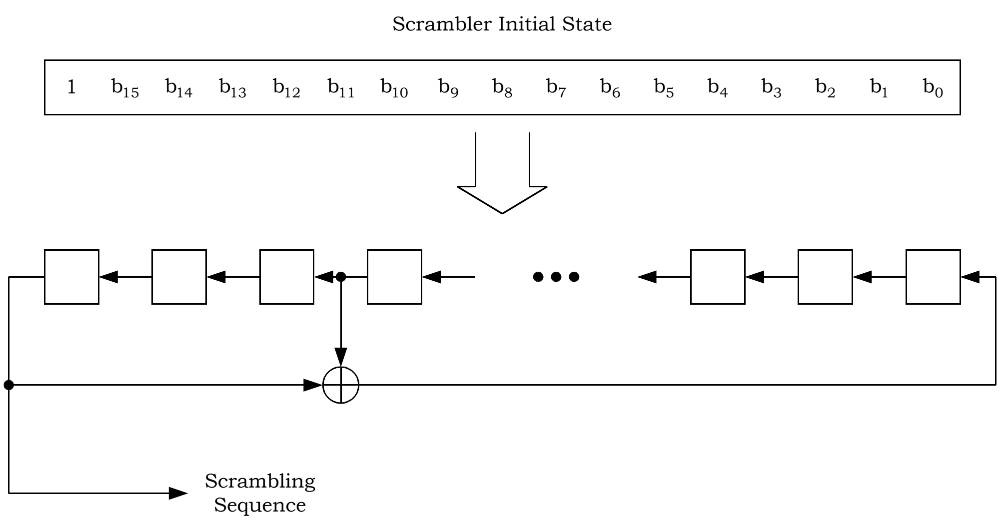


Figure 3.1.3.1.11-1. Symbol Scrambler

3.1.3.1.12 Forward Power Control Subchannel

A forward power control subchannel is transmitted only on the Forward Fundamental Channel or on the Forward Dedicated Control Channel.

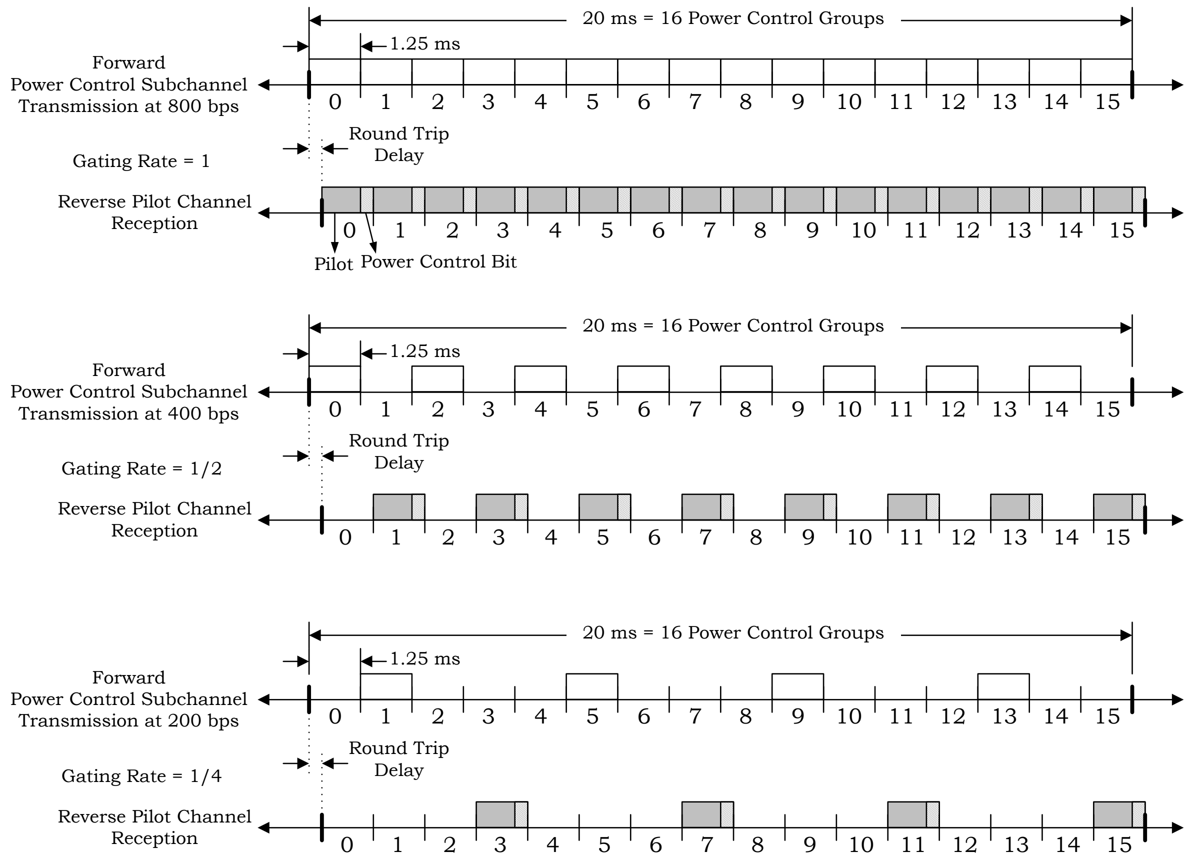
When the mobile station is not operating in the gated transmission mode and not operating with forward link Radio Configuration 11 or forward link Radio Configuration 12, the subchannel shall transmit at a rate of one bit ('0' or '1') every 1.25 ms (i.e., 800 bps).

When the mobile station is operating with forward link Radio Configuration 11 or forward link Radio Configuration 12, the subchannel shall transmit at a rate of one bit ('0' or '1') every 2.5 ms (i.e., 400 bps) or at a rate of one bit ('0' or '1') every 5 ms (i.e., 200 bps). When the mobile station is operating in the gated transmission mode, the subchannel shall transmit at a rate of 400 or 200 bps when the gating rate is 1/2 or 1/4 respectively as shown in Figure 3.1.3.1.12-1.

When the mobile station is operating with Radio Configuration 11 or Radio Configuration 12 on the forward link and Radio Configuration 8 on the reverse link, the subchannel shall transmit at a rate of 400 bps or 200bps as shown in Figure 3.1.3.1.12-2. The power control groups within a 20 ms frame are numbered from 0 to 15. When operating with 1/2 rate Reverse Pilot Channel gating, the forward power control subchannel shall be transmitted only in the even numbered power control groups. When operating with 1/4 rate Reverse Pilot Channel gating, the forward power control subchannel shall be transmitted only in power control groups 1, 5, 9, and 13.When using gating other than Reverse Pilot Channel gating with Reverse Radio Configurations 3 through 7, the base station shall transmit the power control bit in the power control group that begins (REV_PWR_CNTL_DELAY + 1) × 1.25 ms following the end of a power control group in which the mobile station transmitted.

When the common power control subchannel is not assigned, the power control bit on the forward power control subchannel is defined as follows: a '0' bit shall indicate to the mobile station that it is to increase the mean output power level, and a '1' bit shall indicate to the mobile station that it is to decrease the mean output power level. The amount that the mobile station increases or decreases its power for every power control bit is specified in 2.1.2.3.2.

When the common power control subchannel and the Forward Fundamental Channel are simultaneously assigned, the power control bit on the forward power control subchannel shall be set to '1'.



power control subchannel transmission as specified in Table 3.1.3.1.12-1 and Figure 3.1.3.1.12-2

Figure 3.1.3.1.12-1. Forward and Reverse Power Control Subchannel Transmission Timing

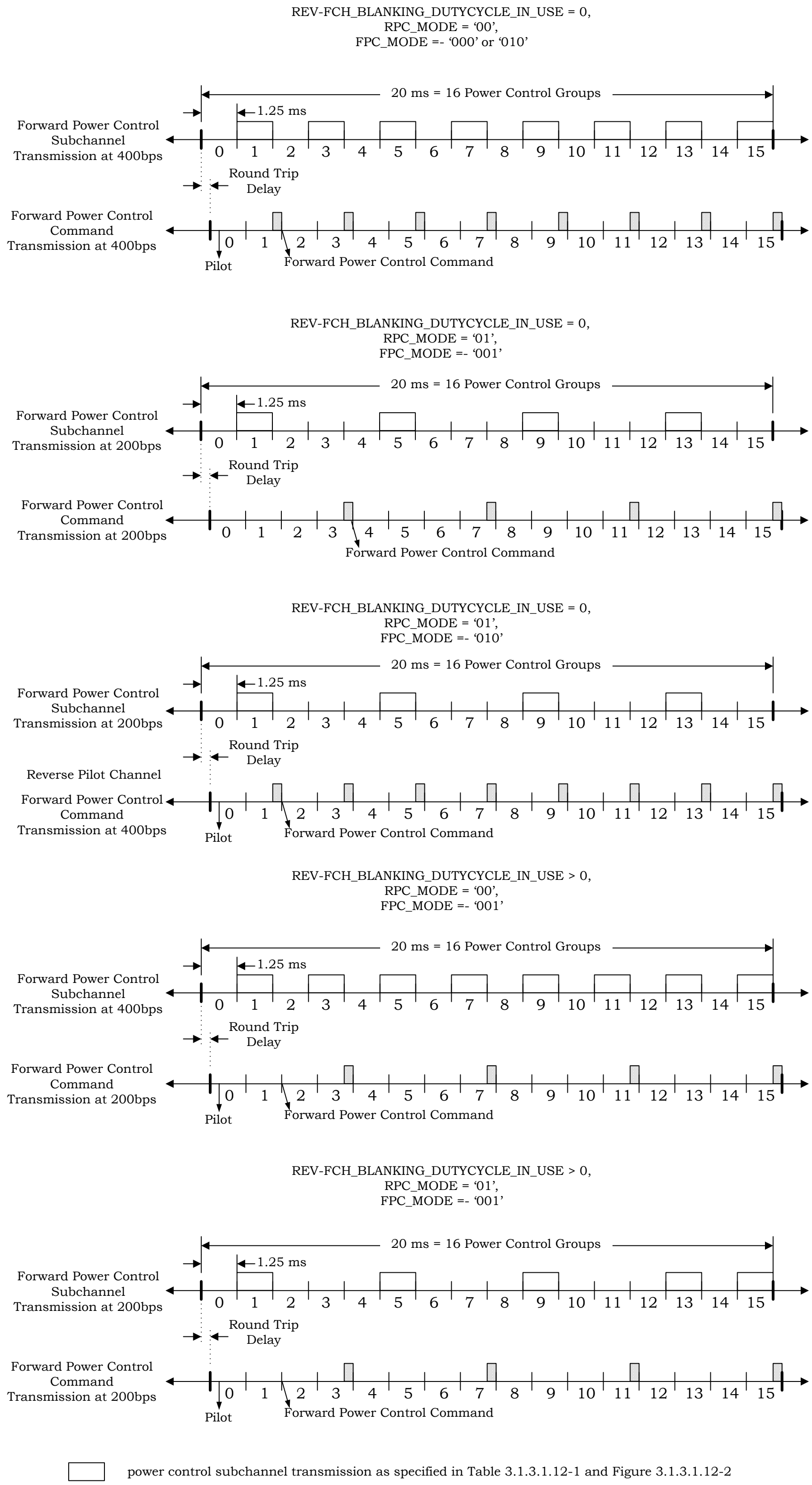


Figure 3.1.3.1.12-2. Forward and Reverse Power Control Timing (Forward Link Radio Configuration 11 or 12 and Reverse Link Radio Configuration 8)

The base station receiver shall estimate the received signal strength of the particular mobile station to which it is assigned over a 1.25 ms period. The base station receiver shall use the estimate to determine the value of the power control bit (‘0’ or ‘1’), except for the case where the Common Power Control Channel is also assigned to the mobile station. The base station shall transmit the power control bit on the Forward Fundamental Channel or on the Forward Dedicated Control Channel using the puncturing technique described below.

For Radio Configurations 1 and 2, the transmission of the power control bit shall occur in the second power control group following the corresponding reverse channel power control group in which the signal strength was estimated[33].

For Radio Configuration 3 through 9, in the case of non-gated transmission mode, the transmission of the power control bit shall occur on the Forward Fundamental Channel or on the Forward Dedicated Control Channel (as specified by FPC_PRI_CHAN_s) in all of the power control groups. For Radio Configuration 3 through 9, in the case of Reverse Pilot Channel gated transmission mode (at 1/2 or 1/4 rate), the transmission of the power control bit shall occur on the Forward Dedicated Control Channel in every second or fourth power control group as shown in Figure 3.1.3.1.12-1.

For forward link Radio Configuration 11 and forward link Radio Configuration 12, the transmission of the power control bit shall occur on the Forward Fundamental Channel in power control groups 1, 3, 5, 7, 9, 11, 13, and 15 if RPC_MODE_s = ‘00’ and shall occur on the Forward Fundamental Channel in power control groups 1, 5, 9, and 13 if RPC_MODE_s = ‘01’.

The duration and power level of power control bits for each radio configuration are specified in Table 3.1.3.1.12-1. When a power control bit is transmitted in a power control group, the power control bit shall replace the number of modulation symbols specified in Table 3.1.3.1.12-1. Each power control bit shall be transmitted with minimum energy as specified in Table 3.1.3.1.12-1. The power control bits shall be inserted into the Forward Dedicated Control Channel or into the Forward Fundamental Channel data stream, after the data scrambling.

An n-bit (n = 3 or 4) binary number with values 0 through $2^n - 1$ formed by the decimated bits specified in Table 3.1.3.1.12-1 shall be used to determine the power control bit starting position by indexing the list in Table 3.1.3.1.12-1. For example, if the values of decimated bits for Radio Configuration 4 (non-TD) are ‘110’ (6 decimal), the power control bit starting position is 12 as shown in Figure 3.1.3.1.12-3. The value of the decimated bits shall be equal to the first of the chips into the decimator (see Figure 3.1.3.1.1.1-25 and Figure 3.1.3.1.1.2-15) for each modulation symbol.

When operating with Radio Configurations 1 and 2, all unpunctured modulation symbols in a frame are transmitted at the same power level. Modulation symbols in adjacent frames may be sent at different power levels.

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[33] For example, the signal is received on the Reverse Traffic Channel in power control group number 7, and the corresponding power control bit is transmitted on the Forward Traffic Channel during power control group number 7 + 2 = 9.

Table 3.1.3.1.12-1. Power Control Bit Duration and Power Level

Radio Configuration	Punctured Modulation Symbols	Minimum Power Control Bit Energy	Starting Symbol Positions	Decimated Bits (MSB → LSB)
1	2	E_b	0, 1,..., 15	23, 22, 21, 20
2	1	$3E_b/4$	0, 1,..., 15	23, 22, 21, 20
3 (non-TD)	4	E_b	0, 2,..., 30	47, 46, 45, 44
3 (TD)	4	E_b	0, 4,..., 28	47, 46, 45
4 (non-TD)	2	E_b	0, 2,..., 14	23, 22, 21
4 (TD)	2	E_b	0, 2,..., 14	23, 22, 21
5 (non-TD)	4	E_b	0, 2,..., 30	47, 46, 45, 44
5 (TD)	4	E_b	0, 4,..., 28	47, 46, 45
6	6	E_b	0, 6,..., 42	71, 70, 69
7	3	E_b	0, 3,..., 21	35, 34, 33
8	6	E_b	0, 6,..., 42	71, 70, 69
9	3	E_b	0, 3,..., 21	35, 34, 33
11	2	Eb	0, 2,..., 14	23, 22, 21
12	2	Eb	0, 2,..., 14	23, 22, 21

Notes:

1. E_b is the energy per bit of the Forward Fundamental Channel or Forward Dedicated Control Channel (RC 3, 4, 5, 6, 7, 8, 9, 11 or 12) being punctured.
2. The decimated bits are numbered so that the first bit from the decimator in every power control group is the zeroth, the next one is the first, etc.

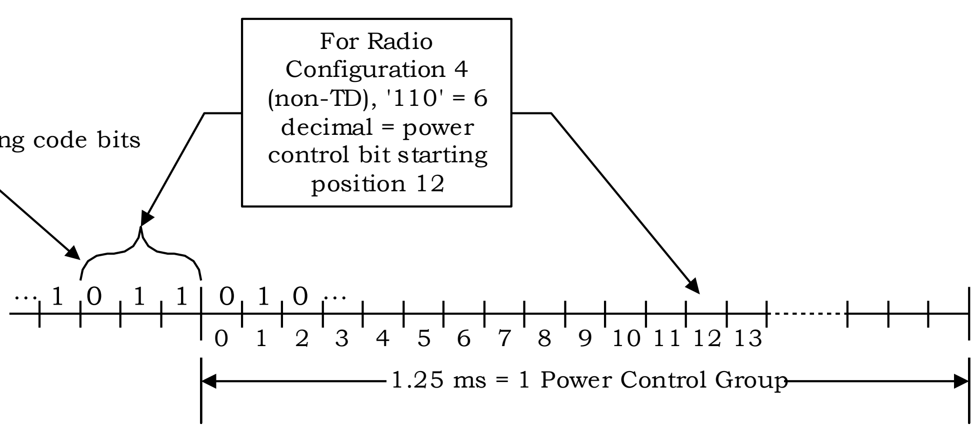

Figure 3.1.3.1.12-3. Randomization of Power Control Bit Starting Positions

3.1.3.1.13 Forward Acknowledgment Subchannel

If the mobile station is operating with Radio Configuration 11 or 12 on the forward link and Radio Configuration 8 on the reverse link, the base station indicates whether or not it was able to successfully receive the Reverse Fundamental Channel frame prior to the nominal termination of the frame. The base station shall specify the power control groups in which the Forward Acknowledgment Subchannel can be transmitted using the acknowledgment mask.

The Forward Acknowledgment Subchannel can be transmitted in power control groups 0, 2, 4, 6, 8, 10, 12, and 14. The power control groups in which the Forward Acknowledgment Channel for the Reverse Fundamental Channel can be transmitted are indicated by a 16-bit Acknowledgment mask. The Acknowledgment mask for the Reverse Fundamental Channel is specified by R-FCH_ACK_MASK.

The mobile station shall stop transmission of the Reverse Fundamental Channel at the half power control group boundary following the power control group in which a positive acknowledgment is received on the Forward Acknowledgment Subchannel.

When acknowledging successful reception of a Reverse Fundamental Channel frame, the Forward Acknowledgment Subchannel shall use OOK (ON-OFF keying) modulation, with 1 (ON) representing positive acknowledgment (ACK) and 0 (OFF) representing negativeacknowledgment (NAK). The forward acknowledgment bit is defined as follows: a ‘1’ bit shall indicate to the mobile to stop transmission on the Reverse Fundamental Channel. A forward acknowledgment subchannel is transmitted at a maximum rate of 1 bit every 2.5 ms (i.e., 400bps).

The duration and power level of the acknowledgment bits are specified in Table 3.1.3.1.13-1. When an acknowledgment bit is transmitted in a power control group, the acknowledgment bit shall replace the number of modulation symbols specified in Table 3.1.3.1.13-1. Each positive acknowledgment bit (‘1’ or ACK) shall be transmitted with minimum energy as specified in Table 3.1.3.1.13-1. The acknowledgment bits shall be inserted into the Forward Fundamental Channel data stream, after the data scrambling.

An n-bit (n = 3 or 4) binary number with values 0 through $2^n – 1$ formed by the decimated bits specified in Table 3.1.3.1.13-1 shall be used to determine the acknowledgment bit starting position by indexing the list in Table 3.1.3.1.13-1. For example, if the values of decimated bits for forward link Radio Configuration 11 are ‘110’ (6 decimal), the acknowledgment bit starting position is 12 as shown in Figure 3.1.3.1.13-1. The value of the decimated bits shall be equal to the first of the chips into the decimator (see Figure 3.1.3.1.1.1-26) for each modulation symbol. Modulation symbols in adjacent frames may be sent at different power levels.

Table 3.1.3.1.13-1. Acknowledgment Bit Duration and Power Level

Radio Configuration	Punctured Modulation Symbols	Minimum Acknowledgment Bit Energy	Starting Symbol Positions	Decimated Bits (MSB → LSB)
11	2	Eb	0, 2,…, 14	23, 22, 21
12	2	Eb	0, 2,…, 14	23, 22, 21

Notes:

1. E_b is the energy per bit of the Forward Fundamental Channel (RC 11 or 12) being punctured.
2. The decimated bits are numbered so that the first bit from the decimator in every power control group is the zero^th^, the next one is the first, etc.

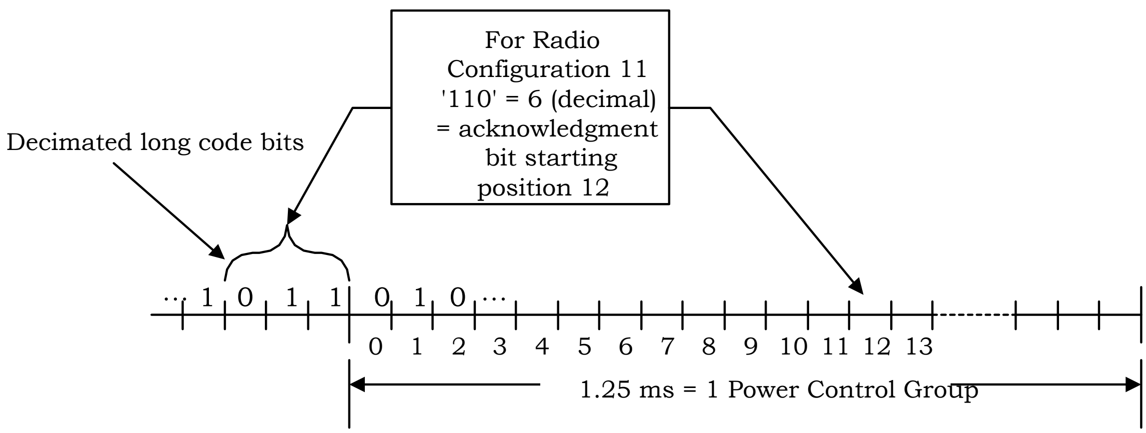

Figure 3.1.3.1.13-1. Randomization of Acknowledgment Bit Starting Positions

Figure 3.1.3.1.13-2 shows an example of frame early termination for the Reverse Fundamental Channel for reverse link Radio Configuration 8. The Acknowledgment mask of '0000000000101010' indicates that the mobile station can receive an Acknowledgment only in power control groups 10, 12, or 14. In the example shown the base station attempts to decode after power control group 7 and is able to successfully receive the frame. The base station then transmits an acknowledgment on the Forward Acknowledgment Channel in power control group 10. The mobile station receives the Forward Acknowledgment Channel in power control group 10 and stops transmissions on the Reverse Fundamental Channel at the half power control group boundary in power control group 11.

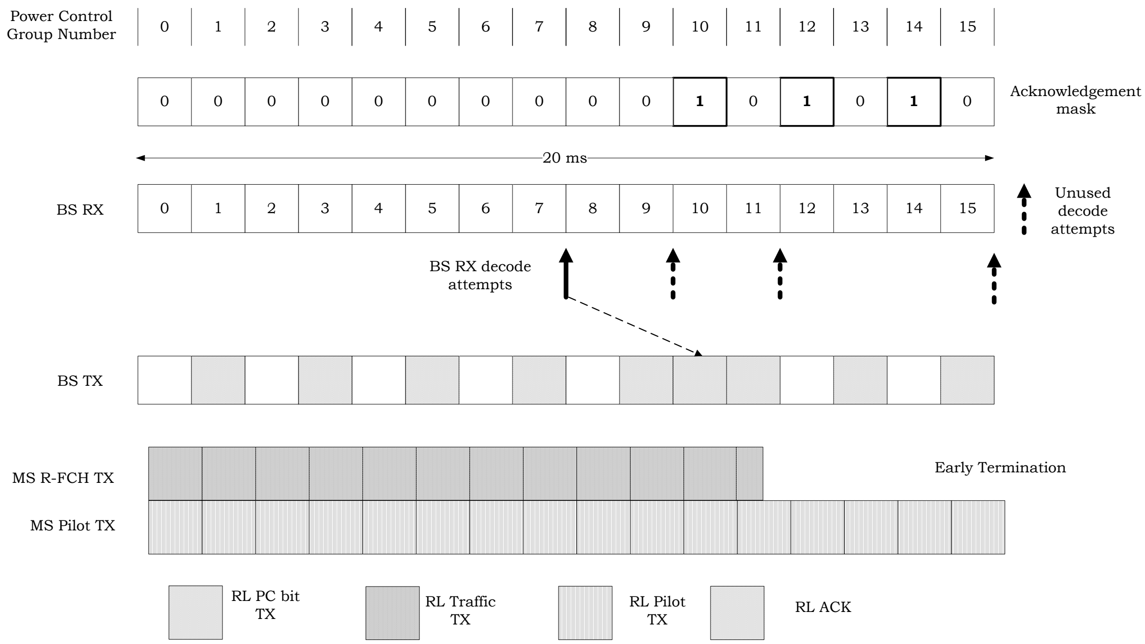

Figure 3.1.3.1.13-2. Reverse Link Radio Configuration 8 Frame Early Termination Example

3.1.3.1.14 Subpacket Symbol Selection for the Forward Packet Data Channel

Encoder packets are transmitted as one or more subpackets. Initially, the first subpacket is transmitted. Then, subsequent subpackets are transmitted if requested by the mobile station. See [3] for a more complete description of the control of the Forward packet Data Channel. The symbols in a subpacket are formed by selecting specific sequences of symbols from the interleaved and scrambled turbo encoder output sequence. The resulting subpacket sequence is a binary sequence of symbols for the modulator.

Let

k be the subpacket index;

N_{EP} be the number of bits in the encoder packet (N_{EP} = 216, 408, 792, 1560, 2328, 3096, or 3864);

$N_{Walsh,k}$ be the number of 32-chip Walsh channels for the k-th subpacket;

$N_{slots,k}$ be the number of 1.25-ms slots for the k-th subpacket;

m_k be the modulation order for the k-th subpacket (m_k = 2 for QPSK, 3 for 8-PSK, and 4 for 16-QAM); and

$SPID_k$ be the subpacket ID for the k-th subpacket ($SPID_k$ = 0, 1, 2, or 3).

Also, let the scrambled and selected symbols be numbered from zero with the 0-th symbol being the first symbol in the sequence. Then, the index of the i-th symbol for the k-th subpacket shall be

$$S_{k,i} = (F_k + i)\bmod(P_{MAX}),$$

where i = 0 to $L_k - 1$,

$$L_k = 48 N_{Walsh,k} N_{slots,k} m_k ,$$

$$F_k = (SPID_k L_k) \bmod (P_{MAX}) \text{, and}$$

$$P_{MAX} = \min(7800,\ 5N_{EP}) .$$

The N_{EP}, $N_{Walsh,k}$, and $N_{slots,k}$ values are determined by the base station and are provided to the mobile station through the Forward Packet Data Control Channels. The m_k parameter is determined according to the rule specified in 3.1.3.1.15.4.

3.1.3.1.15 Modulation for the Forward Packet Data Channel

For the Forward Packet Data Channel operating with Radio Configuration 10, the symbols from the subpacket symbol selection operation are mapped into a sequence of QPSK, 8-PSK, or 16-QAM modulation symbols. The type of modulation depends on the encoder packet size, number of Walsh channels, and number of slots, as specified in 3.1.3.1.15.4.

3.1.3.1.15.1 QPSK Modulation

For subpackets that use QPSK modulation (modulation order = 2), groups of two successive symbols out of the subpacket symbol selection operation shall be grouped to form QPSK modulation symbols. Each group of two adjacent symbol-selection-operation output symbols, s_0 = x(2i) and s_1 = x(2i + 1), i = 0,…, M − 1, shall be mapped into a complex modulation symbol ($m_I(i)$, $m_Q(i)$) as specified in Table 3.1.3.1.15.1-1. The parameter M is the number of QPSK modulation symbols in all the Walsh channels of the Forward Packet Data Channel subpacket. Figure 3.1.3.1.15.1-1 shows the signal constellation of the QPSK modulator.

Table 3.1.3.1.15.1-1. QPSK Modulation Table

Symbol-Selection-Operation Output Symbols		Modulation Symbols	
s_1	s_0	$m_I(i)$	$m_Q(i)$
0	0	D	D
0	1	–D	D
1	0	D	–D
1	1	–D	–D

Note: $D = 1/\sqrt{2}$.

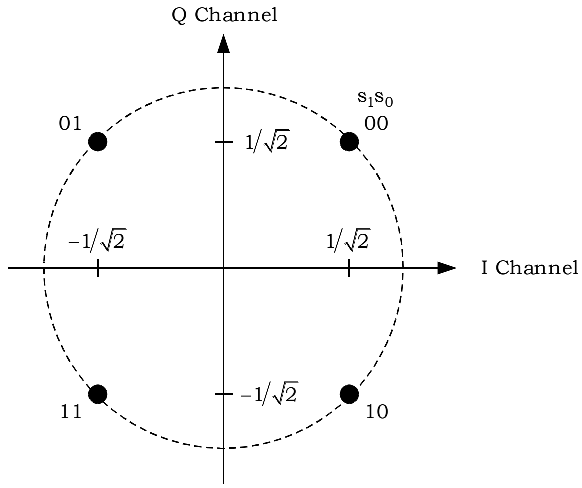

Figure 3.1.3.1.15.1-1. Signal Constellation for QPSK Modulation

3.1.3.1.15.2 8-PSK Modulation

For subpackets that use 8-PSK modulation (modulation order = 3), the symbols out of the subpacket symbol selection operation shall be grouped to form 8-PSK modulation symbols: $s_0 = x(2M + i)$, $s_1 = x(2i)$, and $s_2 = x(2i + 1)$. These groups of three symbol-selection-operation output symbols shall be mapped into complex modulation symbols $(m_I(i), m_Q(i))$, i = 0,…, M – 1, as specified in Table 3.1.3.1.15.2-1. The parameter M is the number of 8-PSK modulation symbols in all the Walsh channels of the Forward Packet Data Channel subpacket. Figure 3.1.3.1.15.2-1 shows the signal constellation of the 8-PSK modulator.

Table 3.1.3.1.15.2-1. 8-PSK Modulation Table

Symbol-Selection-Operation Output Symbols			**Modulation Symbols**	
s_2	s_1	s_0	$m_I(i)$	$m_Q(i)$
0	0	0	C	S
0	0	1	S	C
0	1	1	–S	C
0	1	0	–C	S
1	1	0	–C	–S
1	1	1	–S	–C
1	0	1	S	–C
1	0	0	C	–S

Note: $C = \cos(\pi/8) \approx 0.9239$ and $S = \sin(\pi/8) \approx 0.3827$.

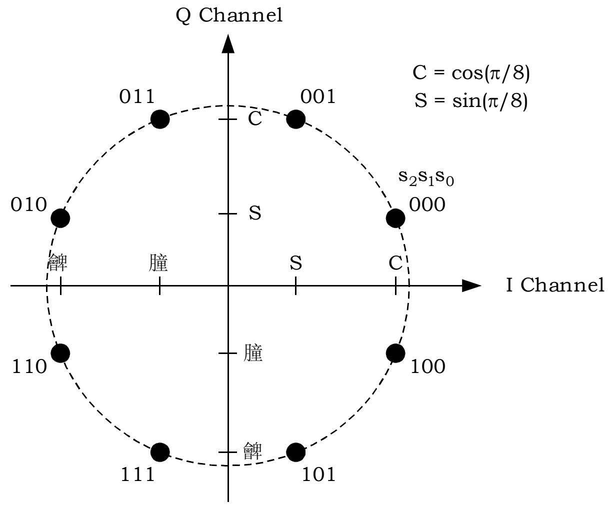

Figure 3.1.3.1.15.2-1. Signal Constellation for 8-PSK Modulation

3.1.3.1.15.3 16-QAM Modulation

For subpackets that use 16-QAM modulation (modulation order = 4), the symbols out of the subpacket symbol selection operation shall be grouped to form 16-QAM modulation symbols: s_0 = x(2M + 2i), s_1 = x(2i), s_2 = x(2M + 2i + 1), and s_3 = x(2i + 1). These groups of four symbol-selection-operation output symbols shall be mapped into complex modulation symbols (m_I(i), m_Q(i)), i = 0,..., M – 1, as specified in Table 3.1.3.1.15.3-1. The parameter M is the number of 16-QAM modulation symbols in all the Walsh channels of the Forward Packet Data Channel subpacket. Figure 3.1.3.1.15.3-1 shows the signal constellation of the 16-QAM modulator.

Table 3.1.3.1.15.3-1. 16-QAM Modulation Table

Symbol-Selection-Operation Output Symbols				Modulation Symbols	
s_3	s_2	s_1	s_0	$m_I(i)$	$m_Q(i)$
0	0	0	0	3A	3A
0	0	0	1	A	3A
0	0	1	1	–A	3A
0	0	1	0	–3A	3A
0	1	0	0	3A	A
0	1	0	1	A	A
0	1	1	1	–A	A
0	1	1	0	–3A	A
1	1	0	0	3A	–A
1	1	0	1	A	–A
1	1	1	1	–A	–A
1	1	1	0	–3A	–A
1	0	0	0	3A	–3A
1	0	0	1	A	–3A
1	0	1	1	–A	–3A
1	0	1	0	–3A	–3A

Note: $A = 1/\sqrt{10} \approx 0.3162$.

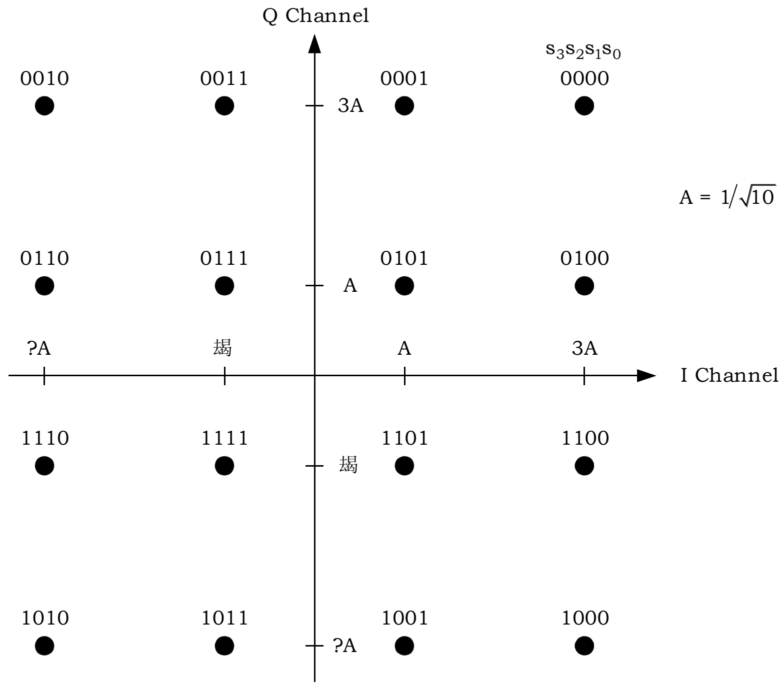

Figure 3.1.3.1.15.3-1. Signal Constellation for 16-QAM Modulation

3.1.3.1.15.4 Modulation Order

The base station shall set the modulation order for all the allowed subpacket formats that can be transmitted by the base station as shown in Table 3.1.3.1.15.4-1.[34] The subpacket modulation symbols are the QPSK, 8-PSK, or 16-QAM symbols. The subpacket data rate is the number of encoder packet bits divided by the subpacket duration. The effective subpacket code rate is defined as the number of bits in the encoder packet divided by the number of subpacket binary code symbols in all of the slots and Walsh channels of the Forward Packet Data Channel subpacket. In the notation of 3.1.3.1.13, the effective subpacket code rate of the k-th subpacket of an encoder packet is equal to N_{EP}/L_k.

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[34]In the notation of 3.1.3.1.13, define the Modulation order Product code Rate of the k-th subpacket of an encoder packet as

$$MPR_k = \frac{N_{EP}}{48\, N_{Walsh,k}\, N_{slots,k}}.$$

Then, the modulation order is specified by the following rule:

- If $0 < MPR_k \le 3/2$, then a modulation order of 2 (i.e., QPSK) is used.
- If $3/2 < MPR_k \le 2$, then a modulation order of 3 (i.e., 8-PSK) is used.
- If $2 < MPR_k \le 3.2$, then a modulation order of 4 (i.e., 16-QAM) is used.

Table 3.1.3.1.15.4-1. Forward Packet Data Channel Parameters with Radio Configuration 10

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order	Effective Subpacket Code Rate	Number of Subpacket Modulation Symbols per Walsh Channel	Number of Subpacket Binary Code Symbols
2,328	28	1,862.4	1	3	0.5774	48	4,032
3,864	27	1,545.6	2	2	0.7454	96	5,184
3,096	26	2,476.8	1	4	0.6202	48	4,992
3,864	26	3,091.2	1	4	0.7740	48	4,992
1,560	25	1,248.0	1	2	0.6500	48	2,400
2,328	25	1,862.4	1	3	0.6467	48	3,600
3,096	25	1,238.4	2	2	0.6450	96	4,800
3,864	25	1,545.6	2	3	0.5367	96	7,200
2,328	23	931.2	2	2	0.5272	96	4,416
2,328	23	1,862.4	1	4	0.5272	48	4,416
3,096	23	2,476.8	1	4	0.7011	48	4,416
3,864	23	1,545.6	2	3	0.5833	96	6,624
1,560	22	1,248.0	1	2	0.7386	48	2,112
3,096	22	1,238.4	2	2	0.7330	96	4,224
1,560	21	1,248.0	1	3	0.5159	48	3,024
3,096	21	1,238.4	2	3	0.5119	96	6,048
3,096	21	2,476.8	1	4	0.7679	48	4,032
3,864	21	1,545.6	2	3	0.6389	96	6,048
1,560	20	624.0	2	2	0.4063	96	3,840
2,328	20	465.6	4	2	0.3031	192	7,680
2,328	20	931.2	2	2	0.6063	96	3,840
2,328	20	1,862.4	1	4	0.6063	48	3,840
3,096	20	619.2	4	2	0.4031	192	7,680
408	19	326.4	1	2	0.2237	48	1,824
792	19	316.8	2	2	0.2171	96	3,648
792	19	633.6	1	2	0.4342	48	1,824

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order	Effective Subpacket Code Rate	Number of Subpacket Modulation Symbols per Walsh Channel	Number of Subpacket Binary Code Symbols
1,560	19	1,248.0	1	3	0.5702	48	2,736
3,096	19	1,238.4	2	3	0.5658	96	5,472
3,864	19	772.8	4	2	0.5296	192	7,296
3,864	19	1,545.6	2	4	0.5296	96	7,296
2,328	18	1,862.4	1	4	0.6736	48	3,456
1,560	17	1,248.0	1	3	0.6373	48	2,448
2,328	17	931.2	2	2	0.7132	96	3,264
3,096	17	1,238.4	2	3	0.6324	96	4,896
3,864	17	1,545.6	2	4	0.5919	96	6,528
2,328	16	1,862.4	1	4	0.7578	48	3,072
3,096	16	619.2	4	2	0.5039	192	6,144
3,864	16	772.8	4	2	0.6289	192	6,144
792	15	633.6	1	2	0.5500	48	1,440
1,560	15	624.0	2	2	0.5417	96	2,880
1,560	15	1,248.0	1	4	0.5417	48	2,880
2,328	15	931.2	2	3	0.5389	96	4,320
3,096	15	1,238.4	2	4	0.5375	96	5,760
3,864	15	1,545.6	2	4	0.6708	96	5,760
1,560	14	312.0	4	2	0.2902	192	5,376
2,328	14	465.6	4	2	0.4330	192	5,376
3,864	14	772.8	4	2	0.7188	192	5,376
3,864	14	1,545.6	2	4	0.7188	96	5,376
792	13	633.6	1	2	0.6346	48	1,248
1,560	13	624.0	2	2	0.6250	96	2,496
1,560	13	1,248.0	1	4	0.6250	48	2,496
2,328	13	931.2	2	3	0.6218	96	3,744
3,096	13	619.2	4	2	0.6202	192	4,992
3,096	13	1,238.4	2	4	0.6202	96	4,992

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order	Effective Subpacket Code Rate	Number of Subpacket Modulation Symbols per Walsh Channel	Number of Subpacket Binary Code Symbols
3,864	13	1,545.6	2	4	0.7740	96	4,992
1,560	12	1,248.0	1	4	0.6771	48	2,304
3,096	12	1,238.4	2	4	0.6719	96	4,608
3,864	12	772.8	4	3	0.5590	192	6,912
408	11	326.4	1	2	0.3864	48	1,056
792	11	158.4	4	2	0.1875	192	4,224
792	11	316.8	2	2	0.3750	96	2,112
792	11	633.6	1	2	0.7500	48	1,056
1,560	11	624.0	2	2	0.7386	96	2,112
1,560	11	1,248.0	1	4	0.7386	48	2,112
2,328	11	465.6	4	2	0.5511	192	4,224
2,328	11	931.2	2	4	0.5511	96	4,224
3,096	11	619.2	4	2	0.7330	192	4,224
3,096	11	1,238.4	2	4	0.7330	96	4,224
3,864	11	772.8	4	3	0.6098	192	6,336
792	10	633.6	1	3	0.5500	48	1,440
1,560	10	624.0	2	3	0.5417	96	2,880
2,328	10	931.2	2	4	0.6063	96	3,840
3,096	10	619.2	4	3	0.5375	192	5,760
792	9	633.6	1	3	0.6111	48	1,296
1,560	9	312.0	4	2	0.4514	192	3,456
1,560	9	624.0	2	3	0.6019	96	2,592
2,328	9	465.6	4	2	0.6736	192	3,456
2,328	9	931.2	2	4	0.6736	96	3,456
3,096	9	619.2	4	3	0.5972	192	5,184
3,864	9	772.8	4	4	0.5590	192	6,912
216	8	172.8	1	2	0.2813	48	768
408	8	163.2	2	2	0.2656	96	1,536

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order	Effective Subpacket Code Rate	Number of Subpacket Modulation Symbols per Walsh Channel	Number of Subpacket Binary Code Symbols
408	8	326.4	1	2	0.5313	48	768
792	8	316.8	2	2	0.5156	96	1,536
792	8	633.6	1	4	0.5156	48	1,536
1,560	8	624.0	2	4	0.5078	96	3,072
2,328	8	465.6	4	3	0.5052	192	4,608
2,328	8	931.2	2	4	0.7578	96	3,072
3,096	8	619.2	4	4	0.5039	192	6,144
3,864	8	772.8	4	4	0.6289	192	6,144
408	7	326.4	1	2	0.6071	48	672
792	7	316.8	2	2	0.5893	96	1,344
792	7	633.6	1	4	0.5893	48	1,344
1,560	7	312.0	4	2	0.5804	192	2,688
1,560	7	624.0	2	4	0.5804	96	2,688
2,328	7	465.6	4	3	0.5774	192	4,032
3,096	7	619.2	4	4	0.5759	192	5,376
3,864	7	772.8	4	4	0.7188	192	5,376
408	6	326.4	1	2	0.7083	48	576
792	6	158.4	4	2	0.3438	192	2,304
792	6	316.8	2	2	0.6875	96	1,152
792	6	633.6	1	4	0.6875	48	1,152
1,560	6	312.0	4	2	0.6771	192	2,304
1,560	6	624.0	2	4	0.6771	96	2,304
2,328	6	465.6	4	4	0.5052	192	4,608
3,096	6	619.2	4	4	0.6719	192	4,608
216	5	172.8	1	2	0.4500	48	480
408	5	163.2	2	2	0.4250	96	960
408	5	326.4	1	3	0.5667	48	720
792	5	316.8	2	3	0.5500	96	1,440

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order	Effective Subpacket Code Rate	Number of Subpacket Modulation Symbols per Walsh Channel	Number of Subpacket Binary Code Symbols
1,560	5	312.0	4	3	0.5417	192	2,880
2,328	5	465.6	4	4	0.6063	192	3,840
216	4	86.4	2	2	0.2813	96	768
216	4	172.8	1	2	0.5625	48	384
408	4	81.6	4	2	0.2656	192	1,536
408	4	163.2	2	2	0.5313	96	768
408	4	326.4	1	4	0.5313	48	768
792	4	158.4	4	2	0.5156	192	1,536
792	4	316.8	2	4	0.5156	96	1,536
1,560	4	312.0	4	4	0.5078	192	3,072
2,328	4	465.6	4	4	0.7578	192	3,072
216	3	86.4	2	2	0.3750	96	576
216	3	172.8	1	2	0.7500	48	288
408	3	81.6	4	2	0.3542	192	1,152
408	3	163.2	2	2	0.7083	96	576
408	3	326.4	1	4	0.7083	48	576
792	3	158.4	4	2	0.6875	192	1,152
792	3	316.8	2	4	0.6875	96	1,152
1,560	3	312.0	4	4	0.6771	192	2,304
216	2	43.2	4	2	0.2813	192	768
216	2	86.4	2	2	0.5625	96	384
216	2	172.8	1	4	0.5625	48	384
408	2	81.6	4	2	0.5313	192	768
408	2	163.2	2	4	0.5313	96	768
792	2	158.4	4	4	0.5156	192	1,536
216	1	43.2	4	2	0.5625	192	384
216	1	86.4	2	4	0.5625	96	384
408	1	81.6	4	4	0.5313	192	768

3.1.3.1.16 Symbol Demultiplexing and Repetition

3.1.3.1.16.1 Spreading Rate 1 Symbol Demultiplexing

The symbol demultiplexing shown in Figure 3.1.3.1.1.1-27 is performed on the Broadcast Control Channel, the Quick Paging Channel, the Common Assignment Channel, the Forward Common Control Channel, the Forward Indicator Control Channel, the Forward Grant Channel, the Forward Acknowledgment Channel, the Forward Dedicated Control Channel, the Forward Fundamental Channel, the Forward Supplemental Code Channel, and the Forward Supplemental Channel. The Walsh channel processing and demultiplexing for the Forward Packet Data Channel with Radio Configuration 10 is described in 3.1.3.1.16.4.

The demultiplexer with scalar input not supporting transmit diversity shall output the first symbol in each frame to the Y_I output, and the subsequent symbols to the Y_Q, Y_I,… outputs.

The demultiplexer with scalar input supporting transmit diversity shall output the first symbol in each frame to the Y_{I1} output, and the subsequent symbols to the Y_{I2}, Y_{Q1}, Y_{Q2}, Y_{I1},… outputs. The demultiplexer with complex input supporting transmit diversity shall output the first complex symbol in each frame to the Y_{I1} and Y_{Q1} outputs, and the subsequent complex symbols to the Y_{I2} and Y_{Q2}, Y_{I1} and Y_{Q1},… outputs.

The Forward Pilot Channel, the Transmit Diversity Pilot Channel, the Auxiliary Pilot Channels, and the Auxiliary Transmit Diversity Pilot Channels shall be demultiplexed using the non-TD demultiplexer (i.e., the TD demultiplexer is not allowed).

The Sync Channel, Paging Channels, the Forward Packet Data Control Channel, and the Forward Traffic Channels with Radio Configurations 1 and 2 shall be demultiplexed using the non-TD demultiplexer only (i.e., the TD demultiplexer is not allowed).

The Broadcast Control Channels, the Common Power Control Channels, the Common Assignment Channels, the Forward Common Control Channels, and Forward Traffic Channels with Radio Configurations 3, 4, 5, 11 and 12 shall be demultiplexed using either the non-TD or TD demultiplexer.

The Quick Paging Channel, when used in conjunction with the Paging Channel, shall be demultiplexed using the non-TD demultiplexer (see Figure 3.1.3.1.1.1-27). Otherwise, the Quick Paging Channel may be demultiplexed using the non-TD or TD demultiplexer. The Forward Common Acknowledgment Channel shall be demultiplexed using a non-TD demultiplexer.

3.1.3.1.16.2 Spreading Rate 1 Symbol Repetition for Transmit Diversity

If OTD mode is enabled, each symbol output on Y_{I1}, Y_{I2}, Y_{Q1}, and Y_{Q2} shall be repeated once, to create two output symbols for each input symbol to the symbol repeater. The first repeated symbol output from both the Y_{I2} and Y_{Q2} symbol repetition blocks during a frame shall not be inverted. Subsequent outputs from both the Y_{I2} and Y_{Q2} symbol repetition blocks shall be alternatively inverted.

If STS mode is enabled, each symbol output on Y_{I1}, Y_{I2}, Y_{Q1}, and Y_{Q2} shall be applied to two repeaters, one for each transmit antenna, as shown in Figure 3.1.3.1.1.1-30 to create two output symbols for each symbol input to the symbol repeater. On antenna 1 the first repeated output symbol from the Y_{I2} repetition block shall be inverted and the second repeated output symbol shall not be inverted. Subsequent output symbols from the Y_{I2} repetition block on antenna 1 shall be alternatively inverted. The first repeated output symbol from the Y_{Q2} symbol repetition block on antenna 1 shall not be inverted and the second repeated output symbol shall be inverted. Subsequent output symbols from the Y_{Q2} symbol repetition block shall be alternatively inverted. On antenna 2 the first repeated output symbol from the Y_{Q1} repetition block shall be inverted and the second repeated output symbol shall not be inverted. Subsequent output symbols from Y_{Q1} repetition block on antenna 2 shall be alternatively inverted. The first repeated output symbol from the Y_{I1} symbol repetition block on antenna 2 shall not be inverted and the second repeated output symbol shall be inverted. Subsequent output symbols from the Y_{I1} symbol repetition block shall be alternatively inverted.

3.1.3.1.16.3 Spreading Rate 3 Symbol Demultiplexing

Symbol demultiplexing is performed on every code channel in the Forward CDMA Channel as shown in Figure 3.1.3.1.1.2-16.

The demultiplexer shall output the first symbol in each frame to the Y_{I1} output and the subsequent symbols to the Y_{I2}, Y_{I3}, Y_{Q1}, Y_{Q2}, Y_{Q3}, Y_{I1},… outputs. The demultiplexer shall output the first complex symbol in each frame to the Y_{I1} and Y_{Q1} outputs, and the subsequent complex symbols to the Y_{I2} and Y_{Q2}, Y_{I3} and Y_{Q3}, Y_{I1} and Y_{Q1},… outputs.

The Forward Pilot Channel and the Auxiliary Pilot Channels, shall be demultiplexed using the demultiplexer shown in Figure 3.1.3.1.1.2-16.

The Broadcast Control Channels, the Forward Indicator Control Channels, the Common Assignment Channels, the Forward Common Control Channels, the Quick Paging Channels, and Forward Traffic Channels with Radio Configurations 6 through 9 shall be demultiplexed using the demultiplexer shown in Figure 3.1.3.1.1.2-16.

3.1.3.1.16.4 Symbol Demultiplexing and Walsh Channel Processing for the Forward Packet Data Channel

When using the Forward Packet Data Channel, the in-phase stream at the output of QPSK/8-PSK/16-QAM modulator shall be demultiplexed into N parallel streams labeled I_1, I_2,…, I_N, where N is the total number of 32-chip Walsh codes that are indicated in WCI_SET. WCI_SET is a parameter that the Physical layer received from the MAC Layer in PHY-FPDCH.Request or PHY-DecodeFPDCH.Request. WCI_SET is a vector of N elements with each element specifying a 32-chip Walsh code index $W_{WCI\_SET[n]}^{32}$ ($0 \le n \le N-1$) that is used for the Forward Packet Data Channel. If $m_I(1)$, $m_I(2)$, $m_I(3)$,… denotes the sequence of the modulation output in the in-phase stream, then for each k = 1, 2,…, N, the k^{th} demultiplexed stream I_k shall consist of the values $m_I(k)$, $m_I(N + k)$, $m_I(2N + k)$, $m_I(3N + k)$,….

Similarly, the quadrature stream at the output of the QPSK/8-PSK/16-QAM modulator shall be demultiplexed into N parallel streams labeled Q_1, Q_2,..., Q_N. If $m_Q(1)$, $m_Q(2)$, $m_Q(3)$,... denotes the sequence of the modulation output values in the quadrature stream, then for each k = 1, 2,..., N, the k^{th} demultiplexed stream Q_k shall consist of the values $m_Q(k)$, $m_Q(N + k)$, $m_Q(2N + k)$, $m_Q(3N + k)$,....

For each k = 1, 2,..., N, the demultiplexed streams with labels I_k and Q_k shall be assigned to the in-phase and quadrature phases, respectively, of the k^{th} Walsh code that appears in the WCI_SET.

Following the Walsh channel spreading, the spread subpacket modulation symbols from the Walsh channels shall be summed to form a single sequence of (I, Q) symbols.

3.1.3.1.17 Spreading for the Forward Acknowledgment Subchannel

The forward acknowledgment subchannel shall be spread by a sequence as specified in Table 3.1.3.1.17-1. The forward acknowledgment subchannel shall be spread by the sequence with the index equal to $(\lfloor \text{FOR\_ACKSCH\_INDEX}/3 \rfloor \bmod 32)$. Note that in Table 3.1.3.1.17-1, a bit with a value of ‘0’ means multiplying by “+1” and a bit with a value of ‘1’ means multiplying by “−1”.

Table 3.1.3.1.17-1. Forward Acknowledgment Channel Orthogonal Covering Sequences

Sequence Index	Output Sequence
0	‘00000000000000000000000000000000’
1	‘00100100010111110110011100001101’
2	‘01010010001011111011001110000110’
3	‘00101001000101111101100111000011’
4	‘01010100100010111110110011100001’
5	‘01101010010001011111011001110000’
6	‘00110101001000101111101100111000’
7	‘00011010100100010111110110011100’
8	‘00001101010010001011111011001110’
9	‘00000110101001000101111101100111’
10	‘01000011010100100010111110110011’
11	‘01100001101010010001011111011001’
12	‘01110000110101001000101111101100’
13	‘00111000011010100100010111110110’
14	‘00011100001101010010001011111011’
15	‘01001110000110101001000101111101’
16	‘01100111000011010100100010111110’
17	‘00110011100001101010010001011111’
18	‘01011001110000110101001000101111’
19	‘01101100111000011010100100010111’
20	‘01110110011100001101010010001011’
21	‘01111011001110000110101001000101’
22	‘01111101100111000011010100100010’
23	‘00111110110011100001101010010001’
24	‘01011111011001110000110101001000’
25	‘00101111101100111000011010100100’
26	‘00010111110110011100001101010010’
27	‘00001011111011001110000110101001’
28	‘01000101111101100111000011010100’
29	‘00100010111110110011100001101010’
30	‘00010001011111011001110000110101’
31	‘01001000101111101100111000011010’

3.1.3.1.18 Orthogonal and Quasi-Orthogonal Spreading

Walsh functions are used with Radio Configurations 1, 2, and 10. Walsh functions or quasi-orthogonal functions are used with Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11 and 12.

Each code channel transmitted on the Forward CDMA Channel shall be spread with a Walsh function or a quasi-orthogonal function at a fixed chip rate of 1.2288 Mcps to provide channelization among all code channels on a given Forward CDMA Channel.

The maximum length of the assigned Walsh functions (N_{max}) for code channels, except for the Auxiliary Pilot Channels and the Auxiliary Transmit Diversity Pilot Channels, transmitted on the Forward CDMA Channel is 256. One of N-ary ($N \leq N_{max}$) time-orthogonal Walsh functions, generated as described in 2.1.3.1.13.2, shall be used. A code channel that is spread using Walsh function n from the N-ary orthogonal set ($0 \leq n \leq N - 1$) shall be assigned to code channel W_n^N. Walsh function time alignment shall be such that the first Walsh chip begins at an even second time mark referenced to base station transmission time (see 3.1.5). The Walsh function spreading sequence shall repeat with a period of (N/1.2288) μs.

Quasi-orthogonal functions (QOFs) shall be created using a non-zero sign multiplier QOF mask and a non-zero rotate enable Walsh function as specified in Table 3.1.3.1.18-1. The repeated sequence of an appropriate Walsh function shall be multiplied by the repeated sequence of masks with symbols +1 and –1, which correspond to the sign multiplier QOF mask values of 0 and 1, respectively. The sequence shall also be multiplied by the repeated sequence of masks with symbols 1 and j (j is the complex number representing a 90° phase shift) which correspond to the rotate enable Walsh function values of 0 and 1, respectively. The sign multiplier QOF masks (QOF_{sign}) and the rotate enable Walsh functions ($Walsh_{rot}$) given in Table 3.1.3.1.18-1 shall be used. The mask sequence order shall be output by rows from left to right for each row from top to bottom. Each hex symbol is output from the most-significant bit to the least-significant bit. The time alignment of QOF_{sign} and $Walsh_{rot}$ shall be such that the first Walsh chip of the quasi-orthogonal function begins at an even second time mark referenced to base station transmission time (see 3.1.5).

Table 3.1.3.1.18-1. Masking Functions for Quasi-Orthogonal Functions with Length 256

Function	Masking Function	
	Hexadecimal Representation of QOF_{sign}	**$Walsh_{rot}$**
0	00000000000000000000000000000000 00000000000000000000000000000000	W_0^{256}
1	7228d7724eebebb1eb4eb1ebd78d8d28 278282d81b41be1b411b1bbe7dd8277d	W_{130}^{256}
2	114b1e4444e14beeee4be144bbe1b4ee dd872d77882d78dd2287d277772d87dd	W_{173}^{256}
3	1724bd71b28118d48ebddb172b187eb2 e7d4b27ebd8ee82481b22be7dbe871bd	W_{47}^{256}

The assignment of code channels shall be such that each code channel is orthogonal or quasi-orthogonal to all other code channels in use.

Code channel W_0^{64} shall be assigned to the Forward Pilot Channel. Code channel W_0^{64} shall not be used with a non-zero quasi-orthogonal function. Non-zero quasi-orthogonal functions shall not be used for the Forward Transmit Diversity Pilot Channel, the Broadcast Control Channel, the Quick Paging Channel, the Common Assignment Channel, the

Forward Common Control Channel, the Forward Packet Data Control Channel, the Forward Indicator Control Channel, the Forward Acknowledgment Channel, the Forward Grant Channel, and the Forward Packet Data Channel. Code channels W_{64k}^{N}, with and without a non-zero quasi-orthogonal function, where N > 64 and k is an integer such that 0 ≤ 64k < N, shall not be used.

If the Transmit Diversity Pilot Channel is present, it shall be assigned code channel W_{16}^{128}.

If an Auxiliary Pilot Channel is present, it shall be assigned a code channel W_{n}^{N}, where N ≤ 512 and 1 ≤ n ≤ N – 1. The value of N and n are specified by the base station.

If an Auxiliary Pilot Channel is used with an Auxiliary Transmit Diversity Pilot Channel, then the Auxiliary Pilot Channel shall be assigned a code channel W_{n}^{N}, and the Auxiliary Transmit Diversity Pilot Channel shall be assigned a code channel $W_{n+N/2}^{N}$, where N ≤ 512 and 1 ≤ n ≤ N/2 – 1. The value of N and n are specified by the base station.

If the Sync Channel is present, it shall be assigned code channel W_{32}^{64}.

If Paging Channels are present, they shall be assigned to code channels W_{1}^{64} to W_{7}^{64}, consecutively.

If a Spreading Rate 1, rate 1/2 coded Broadcast Control Channel is present, it shall be assigned to a code channel W_{n}^{64}, where 1 ≤ n ≤ 63. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 1, rate 1/4 coded Broadcast Control Channel is present, it shall be assigned to a code channel W_{n}^{32}, where 1 ≤ n ≤ 31. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 3 Broadcast Control Channel is present, it shall be assigned to a code channel W_{n}^{128}, where 1 ≤ n ≤ 127. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

If a Spreading Rate 1 Forward Common Acknowledgment Channel operating in the non-TD mode is present, it shall be assigned to a code channel W_{n}^{128}, where 1 ≤ n ≤ 127. See Figure 3.1.3.1.1.1-28. The value of n is specified by the base station.

If Spreading Rate 1 Quick Paging Channels are present, they shall be assigned to code channels W_{80}^{128}, W_{48}^{128}, and W_{112}^{128}, in that order. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30.

If a Spreading Rate 3 Quick Paging channel is present, it shall be assigned to a code channel W_{n}^{256}, where 1 ≤ n ≤ 255. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

If a Spreading Rate 3 Forward Indicator Control Channel is present, it shall be assigned to a code channel W_{n}^{128}, where 1 ≤ n ≤ 127. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

If a Spreading Rate 1, rate 1/2 coded Common Assignment Channel is present, it shall be assigned to a code channel W_n^{128}, where $1 \le n \le 127$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 1, rate 1/4 coded Common Assignment Channel is present, it shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 3 Common Assignment Channel is present, it shall be assigned to a code channel W_n^{256}, where $1 \le n \le 255$. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

If a Spreading Rate 1, rate 1/2 coded Forward Common Control Channel is present, it shall be assigned to a code channel W_n^N, where N = 32, 64, and 128 for the data rate of 38400 bps, 19200 bps, and 9600 bps, respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 1, rate 1/4 coded Forward Common Control Channel is present, it shall be assigned to a code channel W_n^N, where N = 16, 32, and 64 for the data rate of 38400 bps, 19200 bps, and 9600 bps, respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 3 Forward Common Control Channel is present, it shall be assigned to a code channel W_n^N, where N = 64, 128, and 256 for the data rate of 38400 bps, 19200 bps, and 9600 bps, respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

If a Spreading Rate 1 Forward Indicator Control Channel operating in the non-TD mode is present, it shall be assigned to a code channel W_n^{128}, where $1 \le n \le 127$. See Figure 3.1.3.1.1.1-28. The value of n is specified by the base station.

If a Spreading Rate 1 Common Power Control Channel operating in the OTD or STS mode is present, it shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$. See Figure 3.1.3.1.1.1-29 and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 1 Forward Grant Channel is present, it shall be assigned to a code channel W_n^{256}, where $1 \le n \le 255$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Spreading Rate 1 Forward Acknowledgment Channel is present, it shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

If a Forward Packet Data Control Channel is present, it shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$ (see Figure 3.1.3.1.1.1-28). The value of n is specified by the base station.

Each Forward Fundamental Channel and Forward Supplemental Code Channel with Radio Configuration 1 or 2 shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$. See Figure 3.1.3.1.1.1-28. The value of n is specified by the base station.

Each Forward Fundamental Channel and Forward Dedicated Control Channel with Radio Configuration 3 or 5 shall be assigned to a code channel W_n^{64}, where $1 \le n \le 63$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station.

Each Forward Fundamental Channel and Forward Dedicated Control Channel with Radio Configuration 4 shall be assigned to a code channel W_n^{128}, where $1 \le n \le 127$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is specified by the base station. Each Forward Fundamental Channel and Forward Dedicated Control Channel with Radio Configuration 6 or 8 shall be assigned to a code channel W_n^{128}, where $1 \le n \le 127$. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

Each Forward Fundamental Channel and Forward Dedicated Control Channel with Radio Configuration 7 or 9 shall be assigned to a code channel W_n^{256}, where $1 \le n \le 255$. See Figure 3.1.3.1.1.2-17. The value of n is specified by the base station.

Each Forward Fundamental Channel with forward link Radio Configuration 11 and forward link Radio Configuration 12 shall be assigned to a code channel W_n^{128}, where $1 \le n \le 127$. See Figure 3.1.3.1.1.1-28. The value of n is specified by the base station.

Each Forward Supplemental Channel with Radio Configuration 3, 4, or 5 shall be assigned to a code channel W_n^N, where N = 4, 8, 16, 32, 64, 128, 128, and 128 for the maximum assigned QPSK symbol rate of 307200 sps, 153600 sps, 76800 sps, 38400 sps, 19200 sps, 9600 sps, 4800 sps, and 2400 sps, respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, and Figure 3.1.3.1.1.1-30. The value of n is explicitly specified by the base station, while the value of N is indirectly specified by the base station by explicitly specifying the radio configuration, the number of bits in the frame, and the frame duration. For QPSK symbol rates of 4800 sps and 2400 sps, the Walsh function is transmitted two times and four times per QPSK symbol, respectively. The effective length of the Walsh function is 256 for the QPSK symbol rate of 4800 sps, and 512 for the QPSK symbol rate of 2400 sps.

Each Forward Supplemental Channel with Radio Configuration 6, 7, 8, or 9 shall be assigned to a code channel W_n^N, where N = 4, 8, 16, 32, 64, 128, 256, 256, and 256 for the maximum assigned QPSK symbol rate of 921600 sps, 460800 sps, 230400 sps, 115200 sps, 57600 sps, 28800 sps, 14400 sps, 7200 sps, and 3600 sps, respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.2-17. The value of n is explicitly specified by the base station, while the value of N is indirectly specified by the base station by explicitly specifying the radio configuration, the number of bits in the frame, and the frame duration. For QPSK symbol rates of 7200 sps and 3600 sps, the Walsh function is transmitted two times and four times per QPSK symbol, respectively. The effective length of the Walsh function is 512 for the QPSK symbol rate of 7200 sps, and 1024 for the QPSK symbol rate of 3600 sps.

Each Forward Supplemental Channel with Radio Configuration 11 or Radio Configuration 12 shall be assigned to a code channel W_n^N, where N = 4, 8, 16, 32, 64, and 128 for the maximum assigned QPSK symbol rate of 307200 sps, 153600 sps, 76800 sps, 38400 sps, 19200 sps, and 9600 sps respectively, and $1 \le n \le N - 1$. See Figure 3.1.3.1.1.1-28. The value of n is explicitly specified by the base station, while the value of N is indirectly specified by the base station by explicitly specifying the radio configuration, the number of bits in the frame, and the frame duration. If a Forward Packet Data Channel with Radio Configuration 10 is present, it shall be assigned to one to 28 code channels W_n^{32}, where $1 \le n \le 31$ (see Figure 3.1.3.1.1.1-23), depending on the number of Walsh Channels in WCI_SET (see 3.1.3.1.16.4). The value of n is specified by the base station. For specific data rates and modulations, refer to Table 3.1.3.1.15.4-1.

3.1.3.1.19 Quadrature Spreading

Following the orthogonal spreading, each code channel is spread in quadrature as shown in Figure 3.1.3.1.1.1-13, Figure 3.1.3.1.1.1-23, Figure 3.1.3.1.1.1-28, Figure 3.1.3.1.1.1-29, Figure 3.1.3.1.1.1-30, and Figure 3.1.3.1.1.2-17. The spreading sequence shall be a quadrature sequence of length 2^{15} (i.e., 32768 PN chips in length) for Spreading Rate 1 and each carrier of Spreading Rate 3. This sequence is called the pilot PN sequence.

For Spreading Rate 1 and each carrier of Spreading Rate 3, the pilot PN sequence shall be based on the following characteristic polynomials:

$$P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1$$

(for the in-phase (I) sequence)

and

$$P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1$$

(for the quadrature-phase (Q) sequence).

The maximum length linear feedback shift register sequences i(n) and q(n) based on the above polynomials are of length $2^{15} - 1$ and can be generated by the following linear recursions:

$$i(n) = i(n-15) \oplus i(n-10) \oplus i(n-8) \oplus i(n-7) \oplus i(n-6) \oplus i(n-2)$$

(based on $P_I(x)$ as the characteristic polynomial)

and

$$q(n) = q(n-15) \oplus q(n-12) \oplus q(n-11) \oplus q(n-10) \oplus q(n-9) \oplus q(n-5) \oplus q(n-4) \oplus q(n-3)$$

(based on $P_Q(x)$ as the characteristic polynomial),

where i(n) and q(n) are binary-valued ('0' and '1') and the additions are modulo-2. In order to obtain the I and Q pilot PN sequences (of period 2^{15}), a '0' is inserted in i(n) and q(n) after 14 consecutive '0' outputs (this occurs only once in each period); therefore, the pilot PN sequences have one run of 15 consecutive '0' outputs instead of 14.

The chip rate for Spreading Rate 1 and each carrier of Spreading Rate 3 shall be 1.2288 Mcps. The pilot PN sequence period is 32768/1228800 = 26.666... ms, and exactly 75 pilot PN sequence repetitions occur every 2 seconds. The pilot PN sequence offset shall be as specified in 3.1.3.2.1.

3.1.3.1.20 Filtering

3.1.3.1.20.1 Baseband Filtering

Following the spreading operation, the I and Q impulses are applied to the inputs of the I and Q baseband filters as described in 3.1.3.1.1.1 and 3.1.3.1.1.2. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 3.1.3.1.20.1-1. Specifically, the normalized frequency response of the filter shall be contained within $\pm\delta_1$ in the passband $0 \leq f \leq f_p$, and shall be less than or equal to $-\delta_2$ in the stopband $f \geq f_s$. The numerical values for the parameters are δ_1 = 1.5 dB, δ_2 = 40 dB, f_p = 590 kHz, and f_s = 740 kHz.

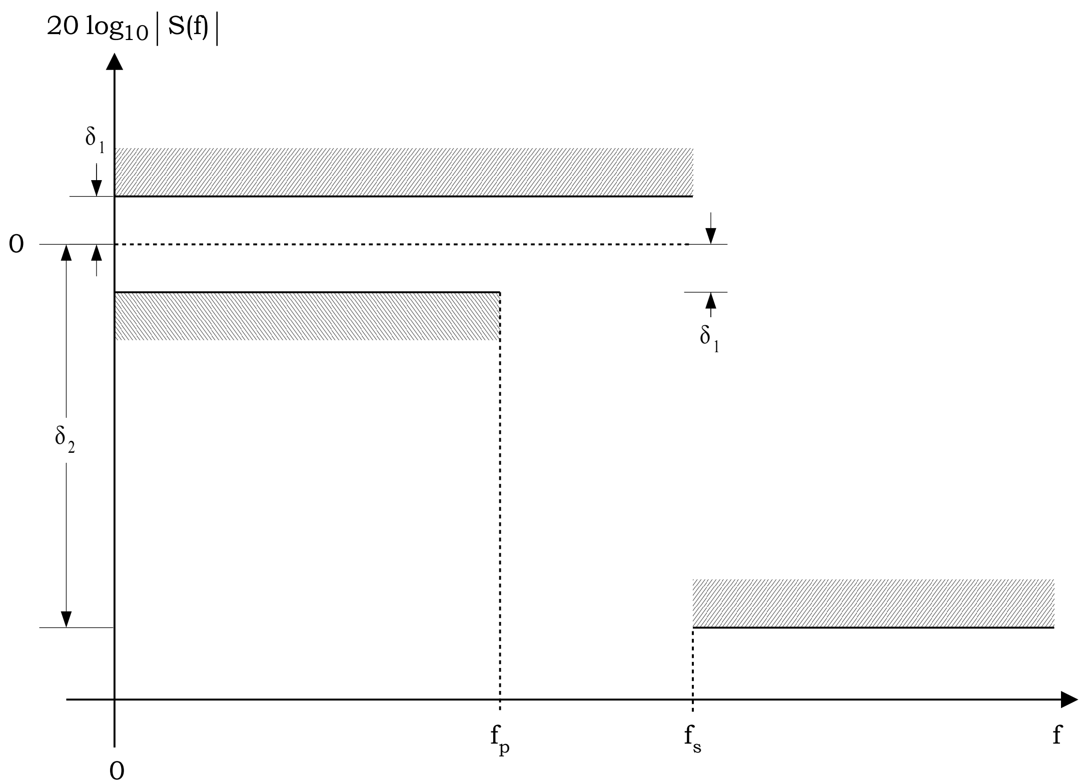


Figure 3.1.3.1.20.1-1. Baseband Filters Frequency Response Limits

If s(t) is the impulse response of the baseband filter, then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty}\left[\alpha s\left(kT_S - \tau\right) - h(k)\right]^2 \le 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_S is equal to 203.51... ns. T_S equals one quarter of a PN chip. The values of the coefficients h(k), for k < 48, are given in Table 3.1.3.1.20.1-1; h(k) = 0 for k ≥ 48. Note that h(k) equals h(47 – k).

Table 3.1.3.1.20.1-1. Coefficients of h(k)

k	h(k)
0, 47	–0.025288315
1, 46	–0.034167931
2, 45	–0.035752323
3, 44	–0.016733702
4, 43	0.021602514
5, 42	0.064938487
6, 41	0.091002137
7, 40	0.081894974
8, 39	0.037071157
9, 38	–0.021998074
10, 37	–0.060716277
11, 36	–0.051178658
12, 35	0.007874526
13, 34	0.084368728
14, 33	0.126869306
15, 32	0.094528345
16, 31	–0.012839661
17, 30	–0.143477028
18, 29	–0.211829088
19, 28	–0.140513128
20, 27	0.094601918
21, 26	0.441387140
22, 25	0.785875640
23, 24	1.0

3.1.3.1.20.2 Phase Characteristics

The base station shall provide phase equalization for the transmit signal path.[35] The equalizing filter shall be designed to provide the equivalent baseband transfer function

$$H(\omega) = K \frac{\omega^2 + j\alpha\omega\omega_0 - \omega_0^2}{\omega^2 - j\alpha\omega\omega_0 - \omega_0^2},$$

where K is an arbitrary gain, j equals $\sqrt{-1}$, α equals 1.36, ω_0 equals $2\pi \times 3.15 \times 10^5$, and ω is the radian frequency. The equalizing filter implementation shall be equivalent to applying baseband filters with this transfer function, individually, to the baseband I and Q waveforms.

A phase error test filter is defined to be the overall base station transmitter filter (including the equalizing filter) cascaded with a filter having a transfer function that is the inverse of the equalizing filter specified above. The response of the test filter should have a mean squared phase error from the best fit linear phase response that is no greater than 0.01 squared radians when integrated over the frequency range 1 kHz $\le |f - f_c| \le$ 630 kHz. For purposes of this requirement, "overall" shall mean from the I and Q baseband filter inputs (see 3.1.3.1.20.1) to the RF output of the transmitter.

3.1.3.2 Pilot Channels

The Forward Pilot Channel, the Transmit Diversity Pilot Channel, the Auxiliary Pilot Channels, and the Auxiliary Transmit Diversity Pilot Channels are unmodulated spread spectrum signals used for synchronization by a mobile station operating within the coverage area of the base station.

The Forward Pilot Channel is transmitted at all times by the base station on each active Forward CDMA Channel, unless the base station is classified as a hopping pilot beacon. If the Forward Pilot Channel is transmitted by a hopping pilot beacon, then the timing requirements in 3.1.3.2.5 shall apply. Hopping pilot beacons change frequency periodically to simulate multiple pilot beacons transmitting pilot information. This results in discontinuous transmissions on a given Forward CDMA Channel. If transmit diversity is used on a Forward CDMA Channel, then the base station shall transmit a Transmit Diversity Pilot.

When the Transmit Diversity Pilot Channel is transmitted, the base station should continue to use sufficient power on the Forward Pilot Channel to ensure that a mobile station is able to acquire and estimate the Forward CDMA Channel without using energy from the Transmit Diversity Pilot Channel.

Zero or more Auxiliary Pilot Channels can be transmitted by the base station on an active Forward CDMA Channel. If transmit diversity is used on the Forward CDMA Channel associated with an Auxiliary Pilot Channel, then the base station shall transmit an Auxiliary Transmit Diversity Pilot.

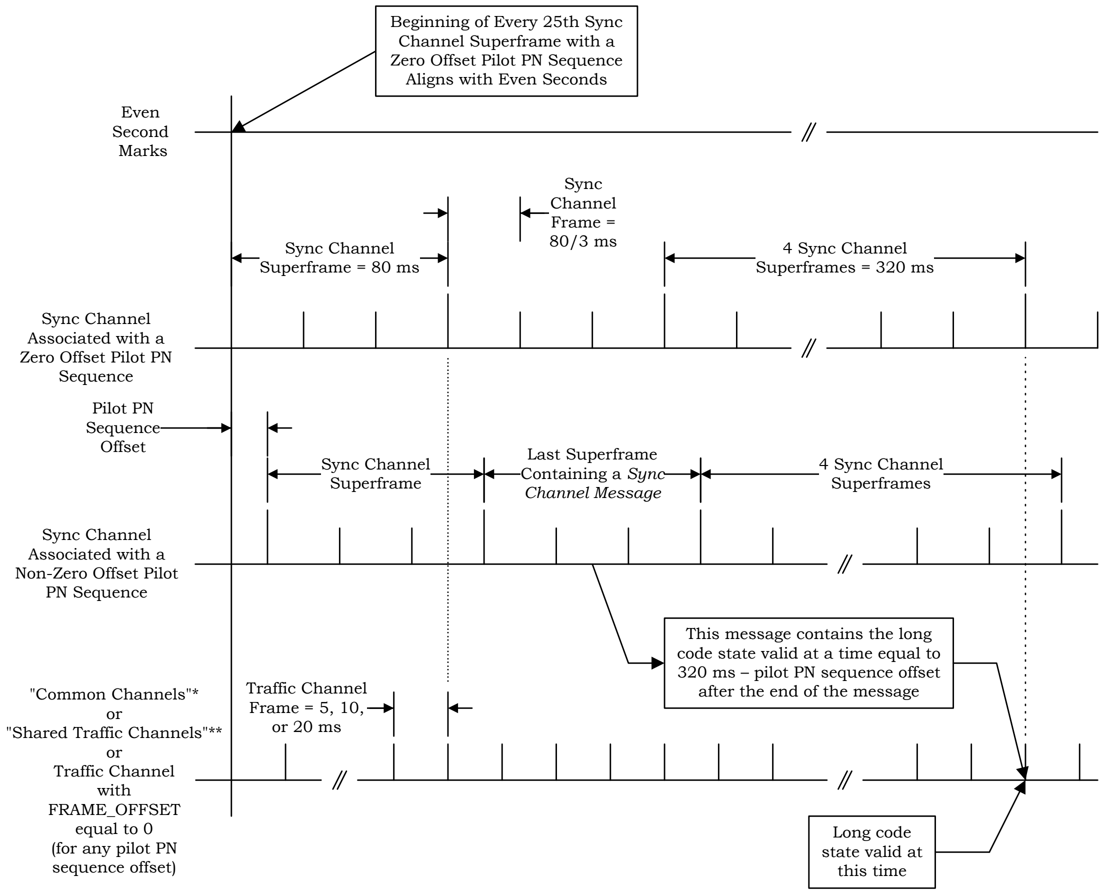
[35] This equalization simplifies the design of the mobile station receive filters.

3.1.3.2.1 Pilot PN Sequence Offset

Each base station shall use a time offset of the pilot PN sequence to identify a Forward CDMA Channel. Time offsets may be reused within a CDMA cellular system.

Distinct pilot channels shall be identified by an offset index (0 through 511 inclusive). This offset index specifies the offset time from the zero offset pilot PN sequence in multiples of 64 chips. The zero offset pilot PN sequence shall be such that the start of the sequence shall be output at the beginning of every even second in time, referenced to the base station transmission time (see 3.1.5). For Spreading Rate 1 and for each carrier of Spreading Rate 3, the start of the zero offset pilot PN sequence for either the I or Q sequence shall be defined as the state of the sequence for which the previous 15 outputs were ‘0’s (see Figure 1.3-1).

There are 512 unique values that are possible for the pilot PN sequence offset. The offset (in chips) for a given pilot PN sequence from the zero offset pilot PN sequence is equal to the index value multiplied by 64; for example, if the pilot PN sequence offset index is 15, the pilot PN sequence offset will be $15 \times 64 = 960$ PN chips. The pilot PN sequence offset is illustrated in Figure 3.1.3.2.1-1. The same pilot PN sequence offset shall be used on all CDMA frequency assignments for a given base station.



Note: "Common Channels" consist of the Paging Channel, the Broadcast Control Channel, the Quick Paging Channel, the Common Acknowledgment Channel, the Common Assignment Channel, the Forward Common Control Channel, the Forward Indicator Control Channel, the Forward Grant Channel, and the Forward Acknowledgment Channel. "Shared Traffic Channels" consist of the Forward Dedicated Channel when the common power control subchannel is assigned, the Forward Fundamental Channel with FCH_BCMC_INDs = '1', and the Forward Supplemental Channel with SCH_BCMC_INDs[i] = '1', where i = 1 or 2.

Figure 3.1.3.2.1-1. Forward CDMA Channel Pilot PN Sequence Offset

3.1.3.2.2 Pilot Channel Orthogonal and Quasi-Orthogonal Spreading

3.1.3.2.2.1 Forward Pilot Channel

The Forward Pilot Channel shall be spread by W_0 as specified in 3.1.3.1.18.

3.1.3.2.2.2 Forward Transmit Diversity Pilot Channel

If transmit diversity is supported on the Forward CDMA Channel, then the Transmit Diversity Pilot Channel shall be spread with W_{16}^{128} as specified in 3.1.3.1.18 and shall be transmitted at a power level of 0, –3, –6, or –9 dB relative to the power level of the Forward Pilot Channel.

3.1.3.2.2.3 Auxiliary Pilot Channel

Code multiplexed Auxiliary Pilots are generated by assigning a different Walsh function or a different quasi-orthogonal function to each Auxiliary Pilot. The Walsh function length may be extended to increase the number of available Walsh functions or quasi-orthogonal functions, thereby achieving a smaller impact to the number of orthogonal codes available for Traffic Channels.

Every Walsh function W_i^m (where i is the index of the Walsh function and m is 256) may be used to generate N Walsh functions of order N × m, where N is a non-negative integer power of 2 ($N = 2^n$). A Walsh function of order N × m can be constructed by concatenating N times W_i^m, with certain permissible polarities for the concatenated W_i^m. Concatenation of W_0^m shall not be allowed, since it is incompatible with continuous or non-periodic integration of the Forward Pilot Channel. Additionally, concatenation of W_{64}^{256}, W_{128}^{256}, and W_{192}^{256} shall not be allowed. Walsh function time alignment shall be such that the first Walsh chip begins at an even second time mark referenced to base station transmission time (see 3.1.5). The Walsh function spreading sequence shall repeat with a period of (N × m)/1.2288 μs.

The maximum length of the Walsh functions that may be used for Walsh function spreading or quasi-orthogonal function spreading of an Auxiliary Pilot shall be 512. The value of N shall be 1 or 2. The two possible Walsh functions of order 2 × m are $W_i^m\ W_i^m$ (W_i^{2m}) and $W_i^m\ \overline{W_i^m}$ (W_{i+m}^{2m}), where the overbar denotes a polarity change and $i < m$.

When the Auxiliary Transmit Diversity Pilot Channel is transmitted, the base station should continue to use sufficient power on the Auxiliary Pilot Channel to ensure that a mobile station is able to acquire and estimate the Forward CDMA Channel without using energy from the Auxiliary Transmit Diversity Pilot Channel.

3.1.3.2.2.4 Auxiliary Transmit Diversity Pilot Channel

If transmit diversity is supported on the Forward CDMA Channel associated with an Auxiliary Pilot Channel, then the Auxiliary Transmit Diversity Pilot Channel shall be spread with a Walsh function or a quasi-orthogonal function. The length of the Walsh function, the sign multiplier QOF mask, and the rotate enable Walsh function used to spread the Auxiliary Transmit Diversity Pilot Channel shall be the same as the length of the Walsh function, the sign multiplier QOF mask, and the rotate enable Walsh function, respectively, that are used to spread the associated Auxiliary Pilot Channel.

3.1.3.2.3 Pilot Channel Quadrature Spreading

Each pilot channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.2.4 Pilot Channel Filtering

For each pilot channel, the filtering shall be as specified in 3.1.3.1.20.

3.1.3.2.5 Hopping Pilot Beacon Timing

The hopping pilot beacon shall be transmitted periodically. The transmission time of a hopping pilot beacon is defined by three parameters: NGHBR_TX_PERIOD, NGHBR_TX_OFFSET, and NGHBR_TX_DURATION, as shown in Figure 3.1.3.2.5-1. NGHBR_TX_PERIOD, in units of 80 ms, is the period between pilot beacon transmissions.

The start of the transmission period shall be aligned to the beginning of the System Time. NGHBR_TX_OFFSET, in units of 80 ms, is the time offset of the pilot beacon transmission from the beginning of the transmission period. NGHBR_TX_DURATION, in units of 80 ms, is the duration of each pilot beacon transmission.

Each pilot beacon transmission shall be NGHBR_TX_DURATION in duration. Pilot beacon shall be transmitted when

$$(\lfloor t/4 \rfloor - \text{NGHBR\_TX\_OFFSET}) \bmod \text{NGHBR\_TX\_PERIOD} = 0,$$

where t is the System Time in units of 20 ms.

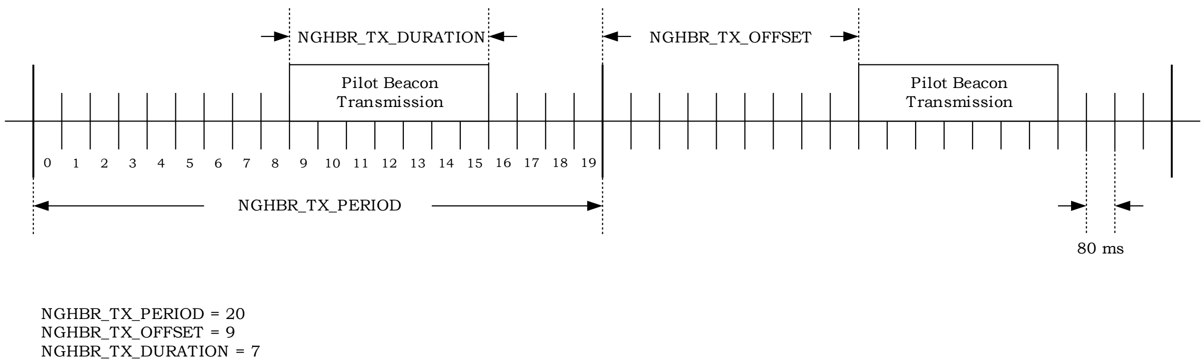


Figure 3.1.3.2.5-1. Hopping Pilot Beacon Timing

3.1.3.3 Sync Channel

The Sync Channel is an encoded, interleaved, spread, and modulated spread spectrum signal that is used by mobile stations operating within the coverage area of the base station to acquire initial time synchronization.

3.1.3.3.1 Sync Channel Time Alignment and Modulation Rates

The bit rate for the Sync Channel is 1200 bps. A Sync Channel frame is 26.666... ms in duration. For a given base station, the I and Q channel pilot PN sequences for the Sync Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

Once the mobile station achieves pilot PN sequence synchronization by acquiring the Forward Pilot Channel, the synchronization for the Sync Channel is immediately known. This is because the Sync Channel (and all other channels) is spread with the same pilot PN sequence, and because the frame and interleaver timing on the Sync Channel are aligned with the pilot PN sequence.

The start of the interleaver block and the frame of the Sync Channel shall align with the start of the pilot PN sequence being used to spread the Forward CDMA Channel (see Figure 3.1.3.1.1.1-1 and Figure 3.1.3.1.1.2-1). See Table 3.1.3.1.2.1-1 and Table 3.1.3.1.2.2-1 for a summary of Sync Channel modulation parameters.

3.1.3.3.2 Sync Channel Structure

A Sync Channel superframe is formed by three Sync Channel frames (i.e., 80 ms) as shown in Figure 3.1.3.2.1-1.

When using the zero-offset Pilot PN sequence, Sync Channel superframes shall begin at the even second time mark referenced to base station transmission time (see 3.1.5) or at the end of any third Sync Channel frame thereafter. When using a Pilot PN sequence other than the zero-offset sequence, the Sync Channel superframe shall begin at the even second time mark plus the pilot PN offset value in time or at the end of any third Sync Channel frame thereafter.

3.1.3.3.3 Sync Channel Convolutional Encoding

The Sync Channel data shall be convolutionally encoded prior to transmission, as specified in 3.1.3.1.5. The state of the Sync Channel convolutional encoder shall not be reset between Sync Channel frames.

3.1.3.3.4 Sync Channel Code Symbol Repetition

The Sync Channel code symbols shall be repeated as specified in 3.1.3.1.6.

3.1.3.3.5 Sync Channel Interleaving

The modulation symbols on the Sync Channel shall be interleaved as specified in 3.1.3.1.8.

3.1.3.3.6 Sync Channel Orthogonal Spreading

The Sync Channel shall be spread by W_{32}^{64} as specified in 3.1.3.1.18. When operating in Spreading Rate 3, a Sync Channel should be transmitted on a frequency from the Sync Channel preferred set of frequency assignments for Spreading Rate 3.

3.1.3.3.7 Sync Channel Quadrature Spreading

The Sync Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.3.8 Sync Channel Filtering

The Sync Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.3.9 Sync Channel Transmission Processing

When the Physical Layer receives a PHY-SYNCH.Request(SDU) from the MAC Layer, the base station shall perform the following:

- Set the information bits to SDU.
- Transmit a Sync Channel frame.

3.1.3.4 Paging Channel

The Paging Channel applies to Spreading Rate 1 only.

The Paging Channel is an encoded, interleaved, spread, and modulated spread spectrum signal that is used by mobile stations operating within the coverage area of the base station. The base station uses the Paging Channel to transmit system overhead information and mobile station-specific messages.

The Primary Paging Channel shall be Paging Channel number 1.

3.1.3.4.1 Paging Channel Time Alignment and Modulation Rates

The Paging Channel shall transmit information at a fixed data rate of 9600 or 4800 bps. All Paging Channels in a given system (i.e., with the same SID) should transmit information at the same data rate. A Paging Channel frame is 20 ms in duration.

For a given base station, the I and Q channel pilot PN sequences for the Paging Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The start of the interleaver block and the frame of the Paging Channel shall align with the start of the zero-offset pilot PN sequence at every even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) as shown in Figure 3.1.3.2.1-1. The first Paging Channel frame shall begin at the start of base station transmission time (see 3.1.5). See Table 3.1.3.1.2.1-2 for a summary of Paging Channel modulation parameters.

3.1.3.4.2 Paging Channel Structure

The Paging Channel shall be divided into Paging Channel slots that are each 80 ms in duration.

3.1.3.4.3 Paging Channel Convolutional Encoding

The Paging Channel data shall be convolutionally encoded as specified in 3.1.3.1.5. The state of the Paging Channel convolutional encoder shall not be reset between Paging Channel frames.

3.1.3.4.4 Paging Channel Code Symbol Repetition

The Paging Channel code symbols shall be repeated as specified in 3.1.3.1.6.

3.1.3.4.5 Paging Channel Interleaving

The modulation symbols on the Paging Channel shall be interleaved, as specified in 3.1.3.1.8. The interleaver block shall align with the Paging Channel frame. The alignment shall be such that the first bit of the frame influences the first 18 modulation symbols (for 9600 bps) or 36 modulation symbols (for 4800 bps) input into the interleaver.

Since the Paging Channel is not convolutionally encoded by blocks, the last 8 bits of a Paging Channel frame influence symbols in the successive interleaver block.

3.1.3.4.6 Paging Channel Data Scrambling

The Paging Channel data shall be scrambled as specified in 3.1.3.1.10, utilizing the Paging Channel long code mask as shown in Figure 3.1.3.4.6-1.

41 … 29	28 … 24	23 … 21	20 … 9	8 … 0
1100011001101	00000	PCN	000000000000	PILOT_PN

PCN - Paging Channel Number
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.4.6-1. Paging Channel Long Code Mask

3.1.3.4.7 Paging Channel Orthogonal Spreading

The Paging Channel shall be spread by W_i^{64}, where i is equal to the Paging Channel number, as specified in 3.1.3.1.18.

3.1.3.4.8 Paging Channel Quadrature Spreading

The Paging Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.4.9 Paging Channel Filtering

The Paging Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.4.10 Paging Channel Transmission Processing

When the Physical Layer receives a PHY-PCH.Request(SDU) from the MAC Layer, the base station shall perform the following:

- Set the information bits to SDU.
- Transmit a Paging Channel frame.

3.1.3.5 Broadcast Control Channel

The Broadcast Control Channel is an encoded, interleaved, spread, and modulated spread spectrum signal that is used by mobile stations operating within the coverage area of the base station.

3.1.3.5.1 Broadcast Control Channel Time Alignment and Modulation Rates

The Broadcast Control Channel shall transmit information at a data rate of 19200, 9600, or 4800 bps, which correspond to slot durations of 40, 80, and 160 ms respectively. The base station may support discontinuous transmission on the Broadcast Control Channel. The decision to enable or disable transmission shall be made on a Broadcast Control Channel slot basis.

For a given base station, the I and Q channel pilot PN sequences for the Broadcast Control Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

The start of the Broadcast Control Channel slot shall align with the start of the zero-offset pilot PN sequence at every four-second time mark (t mod 200 = 0, where t is the System

Time in 20 ms frames) as shown in Figure 3.1.3.2.1-1. The first Broadcast Control Channel slot shall begin at the start of base station transmission time (see 3.1.5).

3.1.3.5.2 Broadcast Control Channel Structure

The Broadcast Control Channel shall be divided into Broadcast Control Channel slots that are 40, 80, or 160 ms in duration. For the 80 ms Broadcast Control Channel slot case, each Broadcast Control Channel slot shall consist of two 40 ms Broadcast Control Channel frames. For the 160 ms Broadcast Control Channel slot case, each Broadcast Control Channel slot shall consist of four 40 ms Broadcast Control Channel frames.

The first Broadcast Control Channel frame of a Broadcast Control Channel slot shall consist of a sequence of encoded and interleaved symbols. The following Broadcast Control Channel frames of a Broadcast Control Channel slot shall consist of the same sequence of encoded and interleaved symbols that were used on the first Broadcast Control Channel frame.

A Broadcast Control Channel frame shall consist of 768 bits. These shall be composed of 744 information bits followed by 16 Broadcast Control Channel frame quality indicator (CRC) bits and 8 Encoder Tail Bits, as shown in Figure 3.1.3.5.2-1.

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.5.2-1. Broadcast Control Channel Frame Structure

3.1.3.5.2.1 Broadcast Control Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The Broadcast Control Channel shall use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

The frame quality indicator shall be computed as specified in 3.1.3.1.4.

3.1.3.5.2.2 Broadcast Control Channel Encoder Tail Bits

The last eight bits of each Broadcast Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to '0'.

3.1.3.5.3 Broadcast Control Channel Convolutional Encoding

The Broadcast Control Channel data shall be convolutionally encoded as specified in 3.1.3.1.5.

When generating Broadcast Control Channel data, the encoder shall be initialized to the all-zero state at the end of each Broadcast Control Channel frame.

3.1.3.5.4 Broadcast Control Channel Interleaving

The modulation symbols on the Broadcast Control Channel shall be interleaved, as specified in 3.1.3.1.8. The interleaver block shall align with the Broadcast Control Channel frame.

3.1.3.5.5 Broadcast Control Channel Sequence Repetition

When operating at 4800 and 9600 bps, the sequence shall be repeated as specified in 3.1.3.1.9.

3.1.3.5.6 Broadcast Control Channel Data Scrambling

The Broadcast Control Channel data shall be scrambled as specified in 3.1.3.1.10 utilizing the Broadcast Control Channel long code mask as shown in Figure 3.1.3.5.6-1.

41 … 29	28 … 24	23 … 21	20 … 9	8 … 0
1100011001101	00100	BCN	000000000000	PILOT_PN

BCN - Broadcast Control Channel Number
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.5.6-1. Broadcast Control Channel Long Code Mask

3.1.3.5.7 Broadcast Control Channel Orthogonal Spreading

The Broadcast Control Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.5.8 Broadcast Control Channel Quadrature Spreading

The Broadcast Control Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.5.9 Broadcast Control Channel Filtering

The Broadcast Control Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.5.10 Broadcast Control Channel Transmission Processing

When the Physical Layer receives a PHY-BCCH.Request(SDU, NUM_BITS) from the MAC Layer, the base station shall:

- Store the arguments SDU and NUM_BITS.
- Set the information bits (see Figure 3.1.3.5.2-1) to SDU.
- Transmit a Broadcast Control Channel frame.

3.1.3.6 Quick Paging Channel

The Quick Paging Channel is an uncoded, spread, and On-Off-Keying (OOK) modulated spread spectrum signal that is used by mobile stations operating within the coverage area of the base station. The base station uses the Quick Paging Channel to inform mobile stations, operating in the slotted mode while in the idle state, whether or not they should receive the Forward Common Control Channel or the Paging Channel starting in the next Forward Common Control Channel or Paging Channel slot.

3.1.3.6.1 Quick Paging Channel Time Alignment and Modulation Rates

The Quick Paging Channel shall transmit information at a fixed data rate of 4800 or 2400 bps. For a given base station, the I and Q channel pilot PN sequences for the Quick Paging Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

The Quick Paging Channel slots shall be aligned such that they begin 20 ms before the start of the zero-offset pilot PN sequence at every even-second time mark ($t \bmod 100 = 0$, where t is the System Time in 20 ms frames).

3.1.3.6.2 Quick Paging Channel Structure

The Quick Paging Channel shall be divided into Quick Paging Channel slots that are each 80 ms in duration. Quick Paging Channel slots shall be divided into Paging Indicators, Configuration Change Indicators, and Broadcast Indicators. The indicator data rate is 9600 or 4800 bps.

3.1.3.6.3 Quick Paging Channel Paging Indicator Enabling

The base station enables the Paging Indicators for the mobile stations operating in slotted mode in its coverage area that are to receive the Forward Common Control Channel or the Paging Channel starting 20 ms following the end of the current Quick Paging Channel slot.

The base station enables two Paging Indicators in the Quick Paging Channel slot for each mobile station that is to receive the next Forward Common Control Channel or Paging Channel slot. The first of the two Paging Indicators is enabled in the first 40 ms of the Quick Paging Channel slot. The second Paging Indicator is enabled in either the third 20 ms portion or the fourth 20 ms portion of the Quick Paging Channel slot. The third 20 ms portion of the Quick Paging Channel slot is used when the first Paging Indicator is enabled in the first 20 ms portion of the Quick Paging Channel slot; otherwise, the fourth 20 ms portion of the Quick Paging Channel slot is used. The signal shall be turned off for Paging Indicators that have not been enabled for any mobile station. The base station should refrain from setting Paging Indicators for mobile stations that do not monitor the Quick Paging Channel.

3.1.3.6.4 Quick Paging Channel Configuration Change Indicator Enabling

Configuration Change Indicators are only used on Quick Paging Channel 1.

If the Quick Paging Channel indicator data rate is 4800 bps, the last two indicators of the first 40 ms of a Quick Paging Channel slot and the last two indicators of the Quick Paging Channel slot are reserved as Configuration Change Indicators. If the Quick Paging Channel indicator data rate is 9600 bps, the last four indicators of the first 40 ms of a Quick Paging Channel slot and the last four indicators of the Quick Paging Channel slot are reserved as Configuration Change Indicators. The base station enables the Configuration Change Indicators in each Quick Paging Channel slot for a period of time following a change in configuration parameters.

3.1.3.6.5 Quick Paging Channel Broadcast Indicator Enabling

Broadcast Indicators are only used on Quick Paging Channel 1.

If the Quick Paging Channel indicator data rate is 4800 bps, the two indicators prior to the last two indicators of the first 40 ms of a Quick Paging Channel slot and the two indicators prior to the last two indicators of the Quick Paging Channel slot are reserved as Broadcast Indicators. If the Quick Paging Channel indicator data rate is 9600 bps, the four indicators prior to the last four indicators of the first 40 ms of a Quick Paging Channel slot and the four indicators prior to the last four indicators of the Quick Paging Channel slot are reserved as Broadcast Indicators. The base station enables the Broadcast Indicators in the Quick Paging Channel slot corresponding to a Broadcast Slot on the Forward Common Control Channel or Paging Channel which mobile stations configured to receive broadcast messages are to monitor.

3.1.3.6.6 Quick Paging Channel Paging Indicator, Configuration Change Indicator, and Broadcast Indicator Repetition

For Spreading Rate 1, each Paging Indicator, Configuration Change Indicator, and Broadcast Indicator at the 9600 bps rate shall be repeated one time (each indicator occurs two consecutive times) and each indicator at the 4800 bps rate shall be repeated three times (each indicator occurs four consecutive times) as specified in Table 3.1.3.1.2.1-5.

For Spreading Rate 3, each Paging Indicator, Configuration Change Indicator, and Broadcast Indicator at the 9600 bps rate shall be repeated two times (each indicator occurs three consecutive times) and each indicator at the 4800 bps rate shall be repeated five times (each indicator occurs six consecutive times) as specified in Table 3.1.3.1.2.2-3.

3.1.3.6.7 Quick Paging Channel Orthogonal Spreading

The Quick Paging Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.6.8 Quick Paging Channel Quadrature Spreading

The Quick Paging Channel shall be PN spread using the PN sequence specified in 3.1.3.1.19.

3.1.3.6.9 Quick Paging Channel Filtering

The Quick Paging Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.6.10 Quick Paging Channel Transmit Power Level

The enabled Paging Indicator modulation symbols shall be transmitted at the power level relative to that of the Forward Pilot Channel that is specified by QPCH_POWER_LEVEL_PAGE.

The enabled Configuration Change Indicator modulation symbols shall be transmitted at the power level relative to that of the Forward Pilot Channel that is specified by QPCH_POWER_LEVEL_CONFIG.

The enabled Broadcast Indicator modulation symbols shall be transmitted at the power level relative to that of the Forward Pilot Channel that is specified by QPCH_POWER_LEVEL_BCAST.

3.1.3.6.11 Quick Paging Channel Transmission Processing

Not specified.

3.1.3.7 Forward Common Acknowledgment Channel

For reverse link Radio Configuration 8, the base station indicates whether or not it was able to successfully receive the Reverse Supplemental Channel frame prior to the nominal termination of the frame. The base station shall specify the power control groups in which an acknowledgment can be transmitted using the acknowledgment mask.

The power control groups in which the Forward Common Acknowledgment Channel for the Reverse Supplemental Channels can be transmitted are indicated by a 16-bit Acknowledgment mask. The Acknowledgment mask for the Reverse Supplemental Channel is specified by R-SCH_ACK_MASK.

For reverse link Radio Configuration 8, the base station should attempt to decode the Reverse Supplemental Channel frames prior to the nominal termination (20 ms) of the frame. If the base station successfully receives the Reverse Supplemental Channels, it shall transmit an acknowledgment on the corresponding Forward Common Acknowledgment Subchannel of the Forward Common Acknowledgment Channel as specified by the acknowledgment mask.

The base station may support operation on one or more Forward Common Acknowledgment Channels.

The Forward Common Acknowledgment Channel is used by the base station for transmitting forward common acknowledgment subchannels (one bit per subchannel) for early termination of multiple Reverse Supplemental Channels for mobile stations operating with Radio Configuration 8 on the reverse link and Radio Configuration 11 or 12 on the forward link. The forward common acknowledgment subchannels are time multiplexed on the Forward Common Acknowledgment Channel. Each forward common acknowledgment subchannel controls a Reverse Supplemental Channel.

While operating with reverse link Radio Configuration 8, the mobile station shall terminate transmission of the Reverse Supplemental Channel prior to the nominal termination of the frame if it receives a positive acknowledgment. When acknowledging successful reception of a Reverse Supplemental Channel frame, the base station shall use BPSK modulation, with a 1 representing positive acknowledgment (ACK) and a –1 representing negative acknowledgment (NAK). The base station shall transmit an ACK or NAK for each of the Reverse Supplemental Channels only in power control groups where the Acknowledgment mask for the respective channel is equal to ‘1’. The mobile station shall terminate transmission of the Reverse Supplemental Channel at the end of the power control group following the power control group in which it receives a positive acknowledgment on the Forward Common Acknowledgment Channel from the base station.

3.1.3.7.1 Forward Common Acknowledgment Channel Time Alignment and Modulation Rates

The forward common acknowledgment subchannels are multiplexed into separate data streams on the I and Q arms of the Forward Common Acknowledgment Channels. The data rate on both the I arm and Q arm is 9600 bps. In a 20 ms frame, there are 16 power control groups for an 800 bps update rate. The start of the first acknowledgment bit in the first common power control group aligns with the beginning of the 20 ms frame. The start of the Forward Common Acknowledgment Channel frame shall align with the start of the zero-offset pilot PN sequence at every even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) as shown in Figure 3.1.3.2.1-1. The first Forward Common Acknowledgment Channel frame shall begin at the start of the base station transmission time (see 3.1.5).

For Spreading Rate 1, the acknowledgment bits on each of the I and Q arms are not repeated (1 symbol/bit).

For a given base station, the I and Q channel pilot PN sequences for the Forward Common Acknowledgment Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

3.1.3.7.2 Forward Common Acknowledgment Channel Structure

The channel structure for the Forward Common Acknowledgment Channel is shown in Figure 3.1.3.1.1.1-10.

There are 2N forward common acknowledgment subchannels, numbered from 0 through 2N – 1, in one power control group of the Forward Common Acknowledgment Channel. These are divided equally between the I arm and the Q arm of the Forward Common Acknowledgment Channel. Table 3.1.3.7.2-1 gives the number of forward common acknowledgment subchannels for update rate of 800 bps per subchannel.

Table 3.1.3.7.2-1. Forward Common Acknowledgment Subchannels

Rate (bps)	Duration (ms)	Acknowledgment Subchannels (N) per I and Q Arms	Acknowledgment Subchannels (2N)
800	1.25	12	24

The bit sequence for forward common acknowledgment subchannel n, n = 0 to 23, shall be mapped to multiplexer input symbol position n, where n is defined as REV_SCH0_ACK_BIT or REV_SCH1_ACK_BIT in [5].

3.1.3.7.3 Pseudo-Randomization of Acknowledgment Bit Positions

There are 2N multiplexer input symbol positions numbered 0 through 2N – 1. Multiplexer input symbol positions 0 through N – 1 are transmitted on the I arm, and multiplexer input symbol positions N through 2N – 1 are transmitted on the Q arm. The multiplexer output sequences depend on a randomization parameter called the “relative offset.” The multiplexer output sequence on the I arm shall be a sequence of N symbols from multiplexer input symbol positions (i + N – relative offset) mod N, where i = 0 to N – 1, i = 0 corresponds to the first output symbol on the I arm, and i = N – 1 corresponds to the last output symbol. The multiplexer output sequence on the Q arm shall be a sequence of N symbols from multiplexer input symbol positions N + ((i + N – relative offset) mod N), where i = 0 to N – 1, i = 0 corresponds to the first output symbol on the Q arm, and i = N – 1 corresponds to the last output symbol.The Forward Common Acknowledgment Channel shall use the decimated output of the long code generator specified in 2.1.3.1.17 with the long code mask shown in Figure 3.1.3.7.3-1 to randomize the acknowledgment bit position as shown in Figure 3.1.3.1.1.1-10. For Spreading Rate 1, a decimation factor of 128 shall be realized by outputting the first chip of each 128 chips output from the long code generator.

41 … 29	28 … 26	25 24	23 … 9	8 … 0
1100011001101	100	00	000000000000000	000000000

Figure 3.1.3.7.3-1. Acknowledgment Bit Randomization Long Code Mask

The following algorithm shall be used to compute the relative offset using the long code decimator output. The decimator output bit rate shall be 9600 bps, giving exactly N scrambling bits in one power control group. During the power control group, the N bits from the long code decimator are numbered from 0 through N – 1, with bit 0 occurring first, and bit N – 1 occurring last. The last L bits from the decimator appearing in the previous common power control group shall be used to compute the relative offset for the current power control group, where L is listed in Table 3.1.3.7.3-1.

Table 3.1.3.7.3-1. Parameters for Relative Offset Computation

PCG (ms)	Number of Offset Position Bits (L)	First Offset Position Bits (L_1)	Second Offset Position Bits (L_2)	Computed Relative Offset (P)
1.25	5	2	3	0 to 10

The L bits are separated into L_1-bit and L_2-bit blocks, with the L_1-bit block occurring first. The relative offset P is computed from the sum of P_1 and P_2, the unsigned binary integers given by the L_1-bit block and the L_2-bit block, respectively, where the first bit in each block is considered as the LSB. The value of the relative offset (P) is from 0 through N – 2 as shown in Table 3.1.3.7.3-1.

3.1.3.7.4 Forward Common Acknowledgment Channel Orthogonal Spreading

The Forward Common Acknowledgment Channel shall be spread by a Walsh function as specified in 3.1.3.1.17.

3.1.3.7.5 Forward Common Acknowledgment Channel Quadrature Spreading

The Forward Common Acknowledgment Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.7.6 Forward Common Acknowledgment Channel Filtering

Filtering for the Forward Common Acknowledgment Channel shall be as specified in 3.1.3.1.20.

3.1.3.7.7 Forward Common Acknowledgment Channel Transmission Processing

When the Physical Layer receives a PHY-CACKCH.Request(PN, CACKCH_ID, RES_SCH_ADDR) from the MAC Layer, the base station shall perform the following:

- Store the arguments PN, CACKCH_ID, and RES_SCH_ADDR.
- For the base station with its pilot PN offset equal to the stored value of PN, set the common acknowledgment subchannel index to RES_SCH_ADDR and compute the relative offset for the common acknowledgment subchannel as specified in 3.1.3.7.3.
- Transmit the common acknowledgment subchannel with the relative offset (computed in the previous step) on the Forward Common Acknowledgment Channel specified by CACKCH_ID and the rate specified by CACKCH_RATE (see [5]).

3.1.3.8 Common Assignment Channel

The Common Assignment Channel is specifically designed to provide fast-response reverse link channel assignments to support transmission of random access packets on the reverse link. This channel controls the Reverse Common Control Channel and the associated common power control subchannel in the Reservation Access Mode. It also implements congestion control. The base station may choose not to support Common Assignment Channels and inform the mobile stations on the Broadcast Control Channel of this choice.

3.1.3.8.1 Common Assignment Channel Time Alignment and Modulation Rates

The base station shall transmit information on the Common Assignment Channel at a fixed data rate of 9600 bps. The Common Assignment Channel frame length shall be 5 ms.

For a given base station, the I and Q channel pilot PN sequences for the Common Assignment Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

The Common Assignment Channel block interleaver shall always be aligned with the Common Assignment Channel frame.

The base station shall support discontinuous transmission on the Common Assignment Channel. The decision to enable or disable the Common Assignment Channel shall be made by the base station on a frame-by-frame basis (i.e., 5 ms basis).

The start of the Common Assignment Channel block interleaver shall align with the start of the zero-offset pilot PN sequence at every even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames). The first Common Assignment Channel frame shall begin at the start of the base station transmission time.

3.1.3.8.2 Common Assignment Channel Structure

Common Assignment Channel frames shall consist of 48 bits. These 48 bits shall be composed of 32 information bits followed by 8 frame quality indicator (CRC) bits and 8 Encoder Tail Bits, as shown in Figure 3.1.3.8.2-1.

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.8.2-1. Common Assignment Channel Frame Structure

3.1.3.8.2.1 Common Assignment Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The Common Assignment Channel shall use a 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.8.2.2 Common Assignment Channel Encoder Tail Bits

The last eight bits of each Common Assignment Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to '0'.

3.1.3.8.3 Common Assignment Channel Convolutional Encoding

The Common Assignment Channel shall be convolutionally encoded as specified in 3.1.3.1.5. When generating Common Assignment Channel data, the encoder shall be initialized to the all-zero state at the end of each frame.

3.1.3.8.4 Common Assignment Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.8.

3.1.3.8.5 Common Assignment Channel Data Scrambling

The Common Assignment Channel shall be scrambled as specified in 3.1.3.1.10, using the Common Assignment Channel long code mask which shall be as shown in Figure 3.1.3.8.5-1.

41 … 29	28 … 24	23 … 21	20 … 9	8 … 0
1100011001101	01100	CACH_ID	000000000000	PILOT_PN

CACH_ID - Common Assignment Channel ID
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.8.5-1. Common Assignment Channel Long Code Mask

3.1.3.8.6 Common Assignment Channel Orthogonal Spreading

The Common Assignment Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.8.7 Common Assignment Channel Quadrature Spreading

The Common Assignment Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.8.8 Common Assignment Channel Filtering

The Common Assignment Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.8.9 Common Assignment Channel Transmission Processing

When the Physical Layer receives a PHY-CACH.Request(SDU, CACH_ID, NUM_BITS) from the MAC Layer, the base station shall:

- Store the arguments SDU, CACH_ID and NUM_BITS;

- Set the information bits (see Figure 3.1.3.8.2-1) to SDU;
- Transmit a Common Assignment Channel frame.

3.1.3.9 Forward Common Control Channel

The Forward Common Control Channel is an encoded, interleaved, spread, and modulated spread spectrum signal that is used by mobile stations operating within the coverage area of the base station. The base station uses the Forward Common Control Channel to transmit mobile station-specific messages.

3.1.3.9.1 Forward Common Control Channel Time Alignment and Modulation Rates

The Forward Common Control Channel shall be transmitted at a variable data rate of 9600, 19200, or 38400 bps. A Forward Common Control Channel frame is 20, 10, or 5 ms in duration. Although the data rate of the Forward Common Control Channel is variable from frame to frame, the data rate transmitted to a mobile station in a given frame is predetermined and known to that mobile station.

For a given base station, the I and Q channel pilot PN sequences for the Forward Common Control Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The start of the interleaver block and the frame of the Forward Common Control Channel shall align with the start of the zero-offset pilot PN sequence at every even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) as shown in Figure 3.1.3.2.1-1. The first Forward Common Control Channel frame shall begin at the start of base station transmission time (see 3.1.5).

3.1.3.9.2 Forward Common Control Channel Structure

Table 3.1.3.9.2-1 specifies the Forward Common Control Channel bit allocations, and the structure is shown in Figure 3.1.3.9.2-1.

All frames shall consist of the information bits, followed by a frame quality indicator (CRC) and eight Encoder Tail Bits.

The Forward Common Control Channel shall be divided into Forward Common Control Channel slots that are each 80 ms in duration.

Table 3.1.3.9.2-1. Forward Common Control Channel Frame Structure Summary

Frame Length (ms)	Data Rate (bps)	Number of Bits per Frame			
		Total	Information Bits	Frame Quality Indicator	Encoder Tail
20	9600	192	172	12	8
20	19200	384	360	16	8
20	38400	768	744	16	8
10	19200	192	172	12	8
10	38400	384	360	16	8
5	38400	192	172	12	8

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.9.2-1. Forward Common Control Channel Frame Structure

3.1.3.9.2.1 Forward Common Control Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The 20 ms Forward Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 for the 9600 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 for the 38400 bps and 19200 bps frames. The 10 ms Forward Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 for the 19200 bps frame and a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 for the 38400 bps frame. The 5 ms Forward Common Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.9.2.2 Forward Common Control Channel Encoder Tail Bits

The last eight bits of each Forward Common Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

3.1.3.9.3 Forward Common Control Channel Encoding

The Forward Common Control Channel data shall be encoded as specified in 3.1.3.1.5.

When generating Forward Common Control Channel data, the encoder shall be initialized to the all-zero state at the end of each 5, 10, or 20 ms frame.

3.1.3.9.4 Forward Common Control Channel Interleaving

The modulation symbols on the Forward Common Control Channel shall be interleaved, as specified in 3.1.3.1.8. The interleaver block shall align with the Forward Common Control Channel frame.

3.1.3.9.5 Forward Common Control Channel Data Scrambling

The Forward Common Control Channel data shall be scrambled as specified in 3.1.3.1.10 utilizing the Forward Common Control Channel long code mask as shown in Figure 3.1.3.9.5-1.

41 … 29	28 … 24	23 … 21	20 … 9	8 … 0
1100011001101	01000	000	000000000000	000000000

Figure 3.1.3.9.5-1. Forward Common Control Channel Long Code Mask

3.1.3.9.6 Forward Common Control Channel Orthogonal Spreading.

The Forward Common Control Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.9.7 Forward Common Control Channel Quadrature Spreading

The Forward Common Control Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.19.

3.1.3.9.8 Forward Common Control Channel Filtering

The Forward Common Control Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.9.9 Forward Common Control Channel Transmission Processing

When the Physical Layer receives a PHY-FCCCH.Request(SDU, FCCCH_ID, FRAME_DURATION, NUM_BITS) from the MAC Layer, the base station shall:

- Store the arguments SDU, FCCCH_ID, FRAME_DURATION, and NUM_BITS;
- Set the information bits (see Figure 3.1.3.9.2-1) to SDU;

- Transmit a Forward Common Control Channel frame of duration FRAME_DURATION (5 ms, 10 ms, or 20 ms) at a data rate that corresponds to NUM_BITS and FRAME_DURATION as specified in Table 3.1.3.9.2-1.

3.1.3.10 Forward Indicator Control Channel

For Spreading Rate 1, the Forward Indicator Control Channel consists of the Common Power Control Channel and the Forward Rate Control Channel. For Spreading Rate 3, the Forward Indicator Control Channel only consists of the Common Power Control Channel. A base station may support operation on one or more Forward Indicator Control Channels.

The Forward Indicator Control Channel consists of indicator control subchannels. Each indicator control subchannel is used for power control or rate control. Indicator control subchannels that are used for power control are also called common power control subchannels, and indicator control subchannels that are used for rate control are also called rate control subchannels. The set of common power control subchannels within a Forward Indicator Control Channel comprises the Common Power Control Channel. The set of rate control subchannels within a Forward Indicator Control Channel comprises the Forward Rate Control Channel. Each indicator control subchannel consists of 2, 4, or 8 indicator control symbols per 10 ms of a Forward Indicator Control Channel frame. Indicator control symbols are transmitted at 9.6 ksps on the I and the Q arms of the Forward Indicator Control Channel, producing 192 indicator control symbols per Forward Indicator Control Channel frame.

The base station uses the Common Power Control Channel to transmit power control information to one or more mobile stations. One indicator control subchannel is assigned for the power control information transmitted to each mobile station. The power control information consists of power control bits at an update rate of 800, 400, or 200 updates/s. The power control information to a mobile station uses 8, 4, or 2 of the 192 indicator control symbols per 10 ms indicator control frame for update rates of 800, 400, or 200 updates/s, respectively.

The base station may use the Common Power Control Channel to adjust the transmit power of the Reverse Secondary Pilot Channel, the Reverse Common Control Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, and the Reverse Traffic Channel, if they are being transmitted by the mobile station. While operating in the Reservation Access Mode, the mobile station uses the power control information transmitted on the assigned common power control subchannel to adjust the transmit power of the Reverse Common Control Channel. While the Forward Traffic Channel is assigned simultaneously with the common power control subchannel, the mobile station uses the power control information transmitted on the assigned common power control subchannel to adjust the transmit power of the Reverse Secondary Pilot Channel, the Reverse Packet Data Control Channel, the Reverse Request Channel, the Reverse Acknowledgment Channel, the Reverse Channel Quality Indicator Channel, and the Reverse Traffic Channel, if they are being transmitted by the mobile station.

The base station may use the Forward Rate Control Channel to transmit rate control information for use in controlling the data rates on the Reverse Packet Data Channels from one or more mobile stations. Each Reverse Packet Data Channel may be controlled by a rate control subchannel, or multiple Reverse Packet Data Channels may be controlled by the same rate control subchannel. When a single Reverse Packet Data Channel is controlled by a rate control subchannel, the mobile station operates in the Dedicated Rate Control Mode. When multiple Reverse Packet Data Channels are controlled by one rate control subchannel, the mobile stations operate in the Common Rate Control Mode. The rate control information on a rate control subchannel consists of rate control symbols that are updated at a rate of 100 updates/s. The same rate control symbol is transmitted on the 2, 4, or 8 indicator control symbols per 10 ms indicator control frame.

3.1.3.10.1 Forward Indicator Control Channel Time Alignment and Modulation Rates

The Forward Indicator Control Channel forms indicator control subchannels by mapping input power control bits and rate control symbols into I-arm and Q-arm multiplexers and selecting the appropriate indicator control symbols of the multiplexer output sequences. The rate of the indicator control symbols at the outputs of the I-arm and Q-arm multiplexers shall be 9.6 ksps. The set of symbols into the multiplexers shall be updated at rates of 800, 400, or 200 updates/s, resulting in update periods of 1.25, 2.5, or 5 ms, respectively. The update rate for the set of symbols into the multiplexers is called the Forward Indicator Control Channel update rate. The Forward Indicator Control Channel shall have a 10 ms indicator control frame structure. A 10 ms Forward Indicator Control Channel frame shall begin only when System Time is an integral multiple of 10 ms as shown in Figure 3.1.3.2.1-1.

For Spreading Rate 1, the indicator control symbols on the I and Q arms shall not be repeated (each symbol is transmitted once) for the non-TD mode, and they shall be repeated once (each symbol is transmitted twice) for the TD mode. The non-TD indicator control symbols, when spread by the appropriate Walsh function, may be time multiplexed with the TD indicator control symbols. For Spreading Rate 3, the indicator control symbols on the I and Q arms shall be repeated twice (each symbol is transmitted three times).

For a given base station, the I and Q channel pilot PN sequences for the Forward Indicator Control Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

3.1.3.10.2 Forward Indicator Control Channel Structure

The channel structure for the Forward Indicator Control Channel is shown in Figure 3.1.3.1.1.2-4 and Figure 3.1.3.1.1.1-9. The Forward Indicator Control Channel parameters are given in Table 3.1.3.10.2-1.

The Forward Indicator Control Channel maps sequences of power control bits and rate control symbols to indicator control subchannels that are time multiplexed to form sequences of indicator control symbols at a rate of 9.6 ksps on the I and the Q arms. The power control bits shall have one of two values where a ‘0’ is mapped to a +1 modulation symbol and a ‘1’ is mapped to a –1 modulation symbol. The rate control symbols shall have one of three values where an “UP” is mapped to a +1 modulation symbol, a “DOWN” is mapped to a –1 modulation symbol, and a “HOLD” is mapped to a 0 modulation symbol.

The Forward Indicator Control Channel is structured into 10 ms indicator control frames that produce a total of 192 indicator control symbols per indicator control frame. Each indicator control subchannel shall use 2, 4, or 8 of the indicator control symbols per indicator control frame. The procedure for determining the indicator control symbols of an indicator control subchannel shall consist of mapping the input power control bits and rate control symbols to the I-arm and Q-arm multiplexer inputs and then randomizing the multiplexer output symbols as described in 3.1.3.10.3. The mapping shall produce 2N multiplexer inputs, N for the I-arm multiplexer and N for the Q-arm multiplexer, every 1.25, 2.5, or 5 ms for Forward Indicator Control Channel update rates of 800, 400, or 200 updates per second. The N multiplexer inputs on each arm are called a multiplexer input set and the multiplexer input sets are numbered from 0 to 7, 0 to 3, or 0 and 1 for the multiplexer input sets of an indicator control frame, where the first multiplexer input set is numbered 0.

All of the indicator control subchannels of a Forward Indicator Control Channel shall have the same Forward Indicator Control Channel update rate. However, a Forward Indicator Control Channel may have indicator control subchannels with different numbers of indicator control symbols per indicator control frame. The base station shall assign the indicator control subchannels such that the indicator control symbols that they produce are not used by any of the other indicator control subchannels.

Table 3.1.3.10.2-1. Forward Indicator Control Channel Parameters

Forward Indicator Control Channel Update Rate (Updates/s)	Number of MUX Inputs per I or Q Arm (N)	Number of Indicator Control Symbols per 10 ms Indicator Control Frame per Indicator Control Subchannel	MUX Input Sets Used for Indicator Control Subchannel n	MUX Input Symbol Positions Used for Indicator Control Subchannel n	Indicator Control Subchannel Use
800	12	8	0 to 7 for n = 0 to 23	n for n = 0 to 23	Power Control at 800 bps or Rate Control
800	12	4	0, 2, 4, and 6 for n = 0 to 23 1, 3, 5, and 7 for n = 24 to 47	n for n = 0 to 23 n ? 24 for n = 24 to 47	Power Control at 400 bps or Rate Control
800	12	2	0 and 4 for n = 0 to 23 1 and 5 for n = 24 to 47 2 and 6 for n = 48 to 71 3 and 7 for n = 72 to 95	n for n = 0 to 23 n ? 24 for n = 24 to 47 n ? 48 for n = 48 to 71 n ? 72 for n = 72 to 95	Power Control at 200 bps or Rate Control
400	24	8	0 to 3 for n = 0 to 23	n and n + 12 for n = 0 to 11 n + 12 and n + 24 for n = 12 to 23	Rate Control
400	24	4	0 to 3 for n = 0 to 47	n for n = 0 to 47	Power Control at 400 bps or Rate Control
400	24	2	0 and 2 for n = 0 to 47 1 and 3 for n = 48 to 95	n for n = 0 to 47 n ? 48 for n = 48 to 95	Rate Control
200	48	8	0 and 1 for n = 0 to 23	n, n + 12, n + 24, and n + 36 for n = 0 to 11; n + 36, n + 48, n + 60, and n + 72 for n = 12 to 23	Rate Control
200	48	4	0 and 1 for n = 0 to 47	n and n + 24 for n = 0 to 23; n + 24 and n + 48 for n = 24 to 47	Rate Control
200	48	2	0 and 1 for n = 0 to 95	n for n = 0 to 95	Power Control at 200 bps or Rate Control

3.1.3.10.2.1 Common Power Control Subchannels

When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = ‘00’) and the power control update rate is 800 bps (FOR_CPCCH_RATE = ‘00’), the power control bit sequence for indicator control subchannel n, n = 0 to 23, shall be mapped to multiplexer input symbol position n.

When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = ‘00’) and the power control update rate is 400 bps (FOR_CPCCH_RATE = ‘01’), the power control bit sequence for indicator control subchannel n, n = 0 to 23, shall be mapped to multiplexer input symbol position n and multiplexer input sets 0, 2, 4, and 6 shall be used. When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = ‘00’) and the power control update rate is 400 bps (FOR_CPCCH_RATE = ‘01’), the power control bit sequence for indicator control subchannel n, n = 24 to 47, shall be mapped to multiplexer input symbol position n – 24 and multiplexer input sets 1, 3, 5, and 7 shall be used.

When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = '00') and the power control update rate is 200 bps (FOR_CPCCH_RATE = '10'), the power control bit sequence for indicator control subchannel n, n = 0 to 23, shall be mapped to multiplexer input symbol position n and multiplexer input sets 0 and 4 shall be used. When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = '00') and the power control update rate is 200 bps, (FOR_CPCCH_RATE = '10') the power control bit sequence for indicator control subchannel n, n = 24 to 47, shall be mapped to multiplexer input symbol position n – 24 and multiplexer input sets 1 and 5 shall be used. When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = '00') and the power control update rate is 200 bps (FOR_CPCCH_RATE = '10'), the power control bit sequence for indicator control subchannel n for n = 48 to 71 shall be mapped to multiplexer input symbol position n – 48 and multiplexer input sets 2 and 6 shall be used. When the Forward Indicator Control Channel update rate is 800 updates/s (FOR_CPCCH_UPDATE_RATE = '00') and the power control update rate is 200 bps (FOR_CPCCH_RATE = '10'), the power control bit sequence for indicator control subchannel n, n = 72 to 95, shall be mapped to multiplexer input symbol position n – 72 and multiplexer input sets 3 and 7 shall be used.

When the Forward Indicator Control Channel update rate is 400 updates/s (FOR_CPCCH_UPDATE_RATE = '01') and the power control update rate is 400 bps (FOR_CPCCH_RATE = '01'), the power control bit sequence for indicator control subchannel n, n = 0 to 47, shall be mapped to multiplexer input symbol position n.

When the Forward Indicator Control Channel update rate is 200 updates/s (FOR_CPCCH_UPDATE_RATE = '10') and the power control update rate is 200 bps (FOR_CPCCH_RATE = '10'), the power control bit sequence for indicator control subchannel n, n = 0 to 95, shall be mapped to multiplexer input symbol position n.

3.1.3.10.2.2 Rate Control Subchannels

Rate control subchannels should use the Forward Indicator Control Channel structure with a Forward Indicator Control Channel update rate of 800 updates/s (FOR_RCCH_UPDATE_RATE = '00') and 8 indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '10').

Rate control subchannels may also use a Forward Indicator Control Channel structure with a Forward Indicator Control Channel update rate of 800 updates/s (FOR_RCCH_UPDATE_RATE = '00') and one of the following configurations:

- Four indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '01') with an indicator control subchannel, n, of n = 0 to 23. With this configuration, the same rate control symbol is used for multiplexer input sets 0, 2, 4, and 6 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n.

- Four indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘01’) with an indicator control subchannel, n, of n = 24 to 47. With this configuration, the same rate control symbol is used for multiplexer input sets 1, 3, 5, and 7 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n – 24.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘00’) with an indicator control subchannel, n, of n = 0 to 23. With this configuration, the same rate control symbol is used for multiplexer input sets 0 and 4 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘00’) with an indicator control subchannel, n, of n = 24 to 47. With this configuration, the same rate control symbol is used for multiplexer input sets 1 and 5 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n – 24.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘00’) with an indicator control subchannel, n, of n = 48 to 71. With this configuration, the same rate control symbol is used for multiplexer input sets 2 and 6 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n – 48.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘00’) with an indicator control subchannel, n, of n = 72 to 95. With this configuration, the same rate control symbol is used for multiplexer input sets 3 and 7 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n – 72.

Rate control subchannels may also use a Forward Indicator Control Channel structure with a Forward Indicator Control Channel update rate of 400 updates/s (FOR_RCCH_UPDATE_RATE = ‘01’) and one of the following configurations:

- Eight indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘10’) with an indicator control subchannel, n, of n = 0 to 23. With this configuration, the same rate control symbol is used for all 4 multiplexer input sets of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol positions n and n + 12 for n = 0 to 11 and to multiplexer input symbol positions n + 12 and n + 24 for n = 12 to 23.
- Four indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = ‘01’) with an indicator control subchannel, n, of n = 0 to 47. With this configuration, the same rate control symbol is used for all 4 multiplexer input sets of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n.

- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '00') with an indicator control subchannel, n, of n = 0 to 47. With this configuration, the same rate control symbol is used for multiplexer input sets 0 and 2 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '00') with an indicator control subchannel, n, of n = 48 to 95. With this configuration, the same rate control symbol is used for multiplexer input sets 1 and 3 of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n – 48.

Rate control subchannels may also use a Forward Indicator Control Channel structure with a Forward Indicator Control Channel update rate of 200 updates/s (FOR_RCCH_UPDATE_RATE = '10') and one of the following configurations:

- Eight indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '10') with an indicator control subchannel, n, of n = 0 to 23. With this configuration, the same rate control symbol is used for both multiplexer input sets of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol positions n, n + 12, n + 24, and n + 36 for n = 0 to 11 and to multiplexer input symbol positions n + 36, n + 48, n + 60, and n + 72 for n = 12 to 23.
- Four indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '01') with an indicator control subchannel, n, of n = 0 to 47. With this configuration, the same rate control symbol is used for both multiplexer input sets of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol positions n and n + 24 for n = 0 to 23 and to multiplexer input symbol positions n + 24 and n + 48 for n = 24 to 47.
- Two indicator control symbols per indicator control frame (FOR_RCCH_REPETITION = '00') with an indicator control subchannel, n, of n = 0 to 95. With this configuration, the same rate control symbol is used for both multiplexer input sets of the indicator control frame and the rate control symbols for indicator control subchannel n are mapped to multiplexer input symbol position n.

3.1.3.10.3 Pseudo-Randomization of Indicator Control Symbol Positions

There are 2N multiplexer input symbol positions numbered 0 through 2N – 1. Multiplexer input symbol positions 0 through N – 1 are transmitted on the I arm, and multiplexer input symbol positions N through 2N – 1 are transmitted on the Q arm. The multiplexer output sequences depend on a randomization parameter called the "relative offset". The multiplexer output sequence on the I arm shall be a sequence of N symbols from multiplexer input symbol positions (i + N – relative offset) mod N, where i = 0 to N – 1, i = 0 corresponds to the first output symbol on the I arm and i = N – 1 corresponds to the last output symbol. The multiplexer output sequence on the Q arm shall be a sequence of N symbols from multiplexer input symbol positions N + ((i + N – relative offset) mod N), where i = 0 to N – 1, i = 0 corresponds to the first output symbol on the Q arm and i = N – 1 corresponds to the last output symbol.

The Forward Indicator Control Channel shall use the decimated output of the long code generator specified in 2.1.3.1.16 with the long code mask shown in Figure 3.1.3.10.3-1to randomize the indicator control symbol position as shown in Figure 3.1.3.1.1.1-9 and Figure 3.1.3.1.1.2-4. For Spreading Rate 1, a decimation factor of 128 shall be realized by outputting the first chip of each 128 chips output from the long code generator. For Spreading Rate 3, a decimation factor of 384 shall be realized by outputting the first chip of each 384 chips output from the long code generator.

41 … 29	28 … 26	25 24	23 … 9	8 … 0
1100011001101	100	00	000000000000000	000000000

Figure 3.1.3.10.3-1. Forward Indicator Control Symbol Position Randomization Long Code Mask

The following algorithm shall be used to compute the relative offset using the long code decimator output. The decimator output bit rate shall be 9.6 kbps, giving exactly N scrambling bits in one Forward Indicator Control Channel update period. During the Forward Indicator Control Channel update period, the N bits from the long code decimator are numbered from 0 through N – 1, with bit 0 occurring first and bit N – 1 occurring last. The last L bits from the decimator appearing in the previous Forward Indicator Control Channel update period shall be used to compute the relative offset for the current Forward Indicator Control Channel update period, where L is listed in Table 3.1.3.10.3-1.

Table 3.1.3.10.3-1. Parameters for Relative Offset Computation

Forward Indicator Control Channel Update Period (ms)	Number of Offset Position Bits (L)	First Offset Position Bits (L_1)	Second Offset Position Bits (L_2)	Computed Relative Offset (P)
1.25	5	2	3	0 to 10
2.5	7	3	4	0 to 22
5	9	4	5	0 to 46

The L bits are separated into L_1-bit and L_2-bit blocks, with the L_1-bit block occurring first. The relative offset P is computed from the sum of P_1 and P_2, the unsigned binary integers given by the L_1-bit block and the L_2-bit block, respectively, where the first bit in each block is considered as the LSB. The value of the relative offset (P) is from 0 through N – 2 as shown in Table 3.1.3.10.3-1.

3.1.3.10.4 Forward Indicator Control Channel Orthogonal Spreading

The Forward Indicator Control Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.10.5 Forward Indicator Control Channel Quadrature Spreading

The Forward Indicator Control Channel shall be PN spread using the PN sequence specified in 3.1.3.1.19.

3.1.3.10.6 Forward Indicator Control Channel Filtering

The Forward Indicator Control Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.10.7 Forward Indicator Control Channel Transmission Processing

3.1.3.10.7.1 Common Power Control Channel Transmission Processing

When the Physical Layer receives a PHY-CPCCH.Request(PN, CPCCH_ID, RES_SCH_ADDR) from the MAC Layer, the base station shall perform the following:

- Store the arguments PN, CPCCH_ID, and RES_SCH_ADDR.
- For the base station with its pilot PN offset equal to the stored value of PN, set the common power control subchannel index to RES_SCH_ADDR and compute the relative offset for the common power control subchannel as specified in 3.1.3.10.3.
- Transmit the common power control subchannel with the relative offset (computed in the previous step) on the Common Power Control Channel specified by CPCCH_ID and the rate specified by CPCCH_RATE (see [5]).

3.1.3.10.7.2 Forward Rate Control Channel Transmission Processing

When the Physical Layer receives a PHY-FRCCH.Request(COMMAND, SYS_TIME) from the MAC Layer, the base station shall

- Store the arguments COMMAND and SYS_TIME.
- Transmit the rate control command COMMAND on the Forward Rate Control Channel frame starting at SYS_TIME.

3.1.3.11 Forward Grant Channel

The base station uses the Forward Grant Channel to grant mobile stations operating with Spreading Rate 1 permission to transmit on the Reverse Packet Data Channel. The Forward Grant Channel gives permission to the mobile station to transmit one or more encoder packets (see [3] for more details).

3.1.3.11.1 Forward Grant Channel Time Alignment and Modulation Rates

The base station shall transmit information on the Forward Grant Channel at a fixed data rate of 3200 bps. The Forward Grant Channel frame duration shall be 10 ms.

For a given base station, the I and Q channel pilot PN sequences for the Forward Grant Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

The base station shall support discontinuous transmission on the Forward Grant Channel. The decision to enable or disable the Forward Grant Channel shall be made by the base station on a frame-by-frame basis (i.e., 10 ms basis).

A 10-ms Forward Grant Channel frame shall begin only when System Time is an integral multiple of 10 ms.

3.1.3.11.2 Forward Grant Channel Structure

The structure of the Forward Grant Channel is shown in Figure 3.1.3.11.2-1.

All frames shall consist of 14 information bits, followed by a 10-bit frame quality indicator (CRC) and eight Encoder Tail Bits.

Information Bits	F	T

Notation

F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.11.2-1. Forward Grant Channel Frame Structure

3.1.3.11.2.1 Forward Grant Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The Forward Grant Channel shall use a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3.

The frame quality indicator shall be computed as specified in 3.1.3.1.4.

3.1.3.11.2.2 Forward Grant Channel Encoder Tail Bits

The last eight bits of each Forward Grant Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

3.1.3.11.3 Forward Grant Channel Convolutional Encoding

The Forward Grant Channel data shall be convolutionally encoded as specified in 3.1.3.1.5.

When generating Forward Grant Channel data, the encoder shall be initialized to the all-zero state at the end of each 10 ms frame.

3.1.3.11.4 Forward Grant Channel Puncturing

The Forward Grant Channel code symbol shall be punctured as specified in 3.1.3.1.7.4.

3.1.3.11.5 Forward Grant Channel Interleaving

The modulation symbols on the Forward Grant Channel shall be interleaved, as specified in 3.1.3.1.8. The interleaver block shall align with the Forward Grant Channel frame.

3.1.3.11.6 Forward Grant Channel Data Scrambling

The Forward Grant Channel shall be scrambled as specified in 3.1.3.1.10 utilizing the Forward Grant Channel long code mask as shown in Figure 3.1.3.11.6-1.

41 … 29	28 … 24	23 … 16	15 … 9	8 … 0
1100011001101	10100	FOR_GCH_WALSH	0000000	PILOT_PN

FOR_GCH_WALSH - Walsh code index for the Forward Grant Channel
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.11.6-1. Forward Grant Channel Long Code Mask

3.1.3.11.7 Forward Grant Channel Orthogonal Spreading

The Forward Grant Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.11.8 Forward Grant Channel Quadrature Spreading

The Forward Grant Channel shall be PN spread using the PN sequence specified in 3.1.3.1.19.

3.1.3.11.9 Forward Grant Channel Filtering

The Forward Grant Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.11.10 Forward Grant Channel Transmission Processing

When the Physical Layer receives a PHY-FGCH.Request(SDU, SYS_TIME) from the MAC Layer, the base station shall:

- Store the arguments SDU and SYS_TIME.
- Set the information bits to SDU.
- Transmit the Forward Grant Channel frame starting at SYS_TIME.

3.1.3.12 Forward Acknowledgment Channel

The Forward Acknowledgment Channel provides feedback for the Reverse Packet Data Channel transmissions to mobile stations operating with Spreading Rate 1 on the forward acknowledgment subchannels. See [3] for a description of the protocol that is used on the Forward Acknowledgment Channel.

3.1.3.12.1 Forward Acknowledgment Channel Time Alignment

The forward acknowledgment subchannels are multiplexed into separate data streams on the I and Q arms of the Forward Acknowledgment Channel. The data rate on the forward acknowledgment subchannel shall be 100 bps. The data rate on the Forward Acknowledgment Channel shall be 19.2 kbps. The Forward Acknowledgment Channel frame shall be 10 ms in duration.

A 10-ms Forward Acknowledgment Channel frame shall begin only when System Time is an integral multiple of 10 ms.

For a given base station, the I and Q channel pilot PN sequences for the Forward Acknowledgment Channel shall use the same pilot PN sequence offset as for the Pilot Channel.

3.1.3.12.2 Forward Acknowledgment Channel Structure

The channel structure for the Forward Acknowledgment Channel is shown in Figure 3.1.3.1.1.1-12.

There are 192 forward acknowledgment subchannels, numbered from 0 through 191, per Forward Acknowledgment Channel. The forward acknowledgment subchannels numbered 0 through 95 shall correspond to the I arm and those numbered 96 through 191 shall correspond to the Q arm.

When the forward acknowledgment subchannel is transmitted, it shall transmit an ACK_OR_NAK response as specified by the MAC Layer as a parameter in the PHY-FACKCH.Request primitive, where ACK_OR_NAK is set to ACK or NAK. Otherwise (if no PHY-FACKCH.Request primitive is received from the MAC Layer), the forward acknowledgment subchannel shall be gated off. See [3] for more details.

A “+1” value shall be transmitted for an ACK response and a ‘0’ value shall be transmitted for a NAK response. When a NAK is transmitted, the forward acknowledgment subchannel shall be gated off.

3.1.3.12.3 Forward Acknowledgment Channel Multiplexing

Every three forward acknowledgment subchannels are time multiplexed. Based on IQM_IDX, the 192 forward acknowledgment subchannels in the Forward Acknowledgment Channel are multiplexed into I and Q arms, each consisting of 32 code groups identified by CDM_IDX. Each code group contains three forward acknowledgment subchannels that have the same IQM_IDX and the same CDM_IDX. The three forward acknowledgment subchannels in a group shall be time multiplexed. The bit from the forward acknowledgment subchannel in the group with TDM_IDX equal to 0 shall be output first, the bit for the forward acknowledgment subchannel in the group with TDM_IDX equal to 1 shall be output second, and the bit for the forward acknowledgment subchannel in the group with TDM_IDX equal to 2 shall be output last.

3.1.3.12.4 Forward Acknowledgment Channel Orthogonal Covering

The multiplexer output symbols of the three forward acknowledgment subchannels of a group with the same CDM_IDX shall be spread by a sequence specified in Table 3.1.3.1.17-1 with the sequence index equal to CDM_IDX as specified in 3.1.3.1.17. The sequence of bits in Table 3.1.3.1.17-1 shall be read from left-to-right, i.e., the leftmost bit listed in the table shall be the first covering bit of the sequence.

3.1.3.12.5 Forward Acknowledgment Channel Sequence Repetition

The sequence obtained after covering the Forward Acknowledgment Channel shall be repeated once.

The symbols of the forward acknowledgment subchannel after sequence repetition shall be multiplied by the channel gain of the forward acknowledgment subchannel. The symbols for different forward acknowledgment subchannels may have different channel gains.

The forward acknowledgment subchannels with IQM_IDX equal to 0 shall be summed. The forward acknowledgment subchannels with IQM_IDX equal to 1 shall be summed separately. The forward acknowledgment subchannels with IQM_IDX equal to 0 shall correspond to the I arm and those with IQM_IDX equal to 1 shall correspond to the Q arm.

3.1.3.12.6 Forward Acknowledgment Channel Orthogonal Spreading

The Forward Acknowledgment Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.12.7 Forward Acknowledgment Channel Quadrature Spreading

The Forward Acknowledgment Channel shall be PN spread using the PN sequence specified in 3.1.3.1.19.

3.1.3.12.8 Forward Acknowledgment Channel Filtering

The Forward Acknowledgment Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.12.9 Forward Acknowledgment Channel Transmission Processing

When the Physical Layer receives a PHY-FACKCH.Request(ACK_OR_NAK, SYS_TIME) from the MAC Layer, the base station shall:

- Store the arguments ACK_OR_NAK and SYS_TIME.
- If ACK_OR_NAK is equal to ACK, transmit an ACK on the Forward Acknowledgment Channel; otherwise, transmit a NAK on the Forward Acknowledgment Channel starting at SYS_TIME.

3.1.3.13 Forward Packet Data Control Channel

The Forward Packet Data Control Channel is used by the base station for transmitting control information for the associated Forward Packet Data Channel or transmitting a Walsh mask to the mobile station with Spreading Rate 1. A forward CDMA channel may contain up to two Forward Packet Data Control Channels. The Forward Packet Data Control Channels are identified by a channel identifier (PDCCH_ID), which is set to '0' for the first Forward Packet Data Control Channel and to '1' for the second Forward Packet Data Control Channel, if supported.

If the base station supports one Forward Packet Data Channel with Radio Configuration 10, the base station shall support one or two Forward Packet Data Control Channels. If the base station supports two Forward Packet Data Channels with Radio Configuration 10, the base station shall support two Forward Packet Data Control Channels.

3.1.3.13.1 Forward Packet Data Control Channel Time Alignment, and Modulation Rates

The base station shall transmit on the Forward Packet Data Control Channel at variable data rates of 29600, 14800, and 7400 bps depending on the frame duration. The frame duration is NUM_SLOTS (NUM_SLOTS = 1, 2, or 4) 1.25-ms slots. All Forward Packet Data Control Channels and Forward Packet Data Channels transmitted simultaneously shall start their transmissions at the same time (SYS_TIME) and have the same durations.

For a given base station, the I and Q pilot PN sequences for the Forward Packet Data Control Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The modulation symbols transmitted on the first Forward Packet Data Control Channel (PDCCH_ID = '0') should be transmitted using at least as much energy as the modulation symbols transmitted on the second Forward Packet Data Control Channel (PDCCH_ID = '1') that is being transmitted simultaneously.

3.1.3.13.2 Forward Packet Data Control Channel Frame Structure

The information transmitted on the Forward Packet Data Control Channel consists of the scrambled SDU[8…20] and the frame quality indicator-covered SDU[0…7], where SDU is a parameter passed by the MAC Layer in the PHY-FPDCCH.Request primitive.

The Forward Packet Data Control Channel frame consists of the scrambled SDU[8…20], the 8-bit frame quality indicator-covered SDU[0…7], the 8-bit inner frame quality indicator (CRC), and the eight Encoder Tail Bits, as shown in Figure 3.1.3.13.2-1.

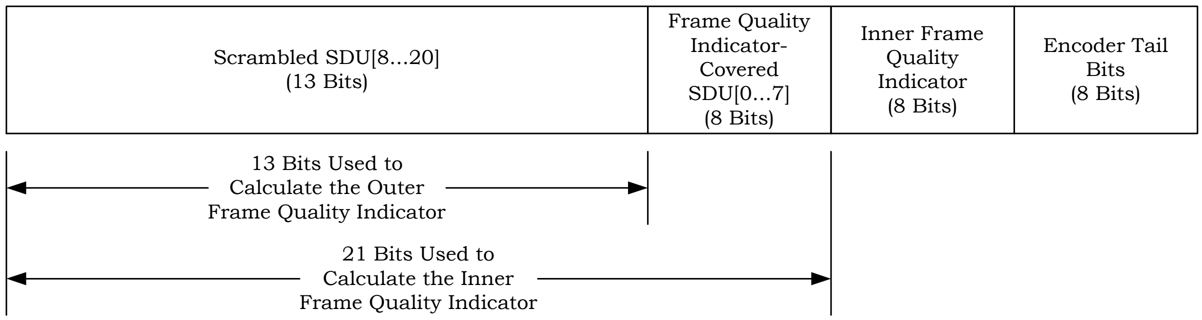


Figure 3.1.3.13.2-1. Forward Packet Data Control Channel Frame Structure

3.1.3.13.2.1 Forward Packet Data Control Channel Scrambling

SDU[8…20] (see Figure 3.1.3.13.2-1) shall be scrambled by bit-by-bit modulo-2 adding a 13-bit scrambler sequence. The scrambler sequence shall be equal to the 13 least significant bits of (SYS_TIME + NUM_SLOTS), where SYS_TIME is the system time in units of 1.25 ms of the first slot of the Forward Packet Data Control Channel transmission. The bit-by-bit modulo 2 additions shall be such that SDU[8] is added to the most significant bit of the scrambler sequence and SDU[20] to the least significant bit of the scrambler sequence.

3.1.3.13.2.2 Frame Quality Indicator-Covered SDU[0…7] for the Forward Packet Data Control Channel

The 8-bit frame quality indicator-covered SDU[0…7] shall be generated by performing the modulo-2 addition of the SDU[0…7] passed by the MAC Layer with an outer frame quality indicator. The outer frame quality indicator shall be calculated on the scrambled SDU[8…20] with the generator polynomial specified in 3.1.3.1.4.1.7. The first input bit to the generator of the outer frame quality indicator shall be the scrambled SDU[8] and the last input bit shall be the scrambled SDU[20]. The outer frame quality indicator shall be computed according to the procedure specified in 3.1.3.1.4.1. The bit-by-bit modulo-2 addition of the SDU[0…7] with the outer frame quality indicator shall be such that SDU[0] is added to the first output bit of the outer frame quality indicator and SDU[7] to the last output bit of the outer frame quality indicator. The frame quality indicator-covered SDU[0] shall be output followed by the frame quality indicator-covered SDU[1], etc.

3.1.3.13.2.3 Forward Packet Data Control Channel Inner Frame Quality Indicator

The inner frame quality indicator (CRC) shall be calculated on all bits within the frame, except the inner frame quality indicator itself and the Encoder Tail Bits. The Forward Packet Data Control Channel shall use an 8-bit inner frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4.

The generator polynomial for the inner frame quality indicator shall be

$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$

The inner frame quality indicator shall be computed as specified in 3.1.3.1.4.

3.1.3.13.3 Forward Packet Data Control Channel Encoder Tail Bits

The last eight bits of each Forward Packet Data Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to '0'.

3.1.3.13.4 Forward Packet Data Control Channel Convolutional Encoding

The Forward Packet Data Control Channel shall be convolutionally encoded as specified in 3.1.3.1.5. When generating Forward Packet Data Control Channel data, the encoder shall be initialized to the all-zero state at the end of each frame.

3.1.3.13.5 Forward Packet Data Control Channel Code Symbol Repetition

Forward Packet Data Control Channel code symbol repetition shall be as specified in 3.1.3.1.6.

3.1.3.13.6 Forward Packet Data Control Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.7.5.

3.1.3.13.7 Forward Packet Data Control Channel Interleaving

The modulation symbols on the Forward Packet Data Control Channel shall be interleaved, as specified in 3.1.3.1.8. The interleaver block shall align with the Forward Packet Data Control Channel frame.

3.1.3.13.8 Forward Packet Data Control Channel Orthogonal Spreading

The Forward Packet Data Control Channel shall be spread by a Walsh function as specified in 3.1.3.1.18.

3.1.3.13.9 Forward Packet Data Control Channel Quadrature Spreading

The Forward Packet Data Control Channel shall be PN spread as specified in 3.1.3.1.19.

3.1.3.13.10 Forward Packet Data Control Channel Filtering

The Forward Packet Data Control Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.13.11 Forward Packet Data Control Channel Transmission Processing

When the Physical Layer receives a PHY-FPDCCH.Request(PDCCH_ID, SDU, NUM_SLOTS, SYS_TIME) from the MAC Layer, the base station shall:

- Store the arguments PDCCH_ID, SDU, NUM_SLOTS, and SYS_TIME.
- Scramble SDU[8…20] as specified in 3.1.3.13.2.1.
- Use the scrambled SDU[8…20] and the SDU[0…7] to compute the 8-bit frame quality indicator-covered SDU[0…7] as specified in 3.1.3.13.2.2.

- Transmit the scrambled SDU[8…20], the computed frame quality indicator-covered SDU[0…7], the computed 8-bit inner frame quality indicator, and eight Encoder Tail Bits on the Forward Packet Data Control Channel frame of duration NUM_SLOTS starting at SYS_TIME on the Forward Packet Data Control Channel with identifier PDCCH_ID.

3.1.3.14 Forward Dedicated Control Channel

The Forward Dedicated Control Channel is used for the transmission of user and signaling information to a specific mobile station during a call. Each Forward Traffic Channel may contain one Forward Dedicated Control Channel.

3.1.3.14.1 Forward Dedicated Control Channel Time Alignment and Modulation Rates

The base station shall transmit information on the Forward Dedicated Control Channel at a fixed data rate.

A Forward Dedicated Control Channel frame shall be 5 or 20 ms in duration.

The base station shall transmit information on the Forward Dedicated Control Channel at a fixed data rate of 9600 bps for Radio Configurations 3, 4, 6, and 7. If flexible data rates are supported for 20 ms frames, a fixed data rate between 1050 and 9600 bps can be used for the Forward Dedicated Control Channel in Radio Configurations 3, 4, 6, and 7.

The base station shall transmit information on the Forward Dedicated Control Channel at a fixed data rate of 14400 bps for 20 ms frames and 9600 bps for 5 ms frames for Radio Configurations 5, 8, and 9. The base station may support flexible data rates. If flexible data rates are supported for 20 ms frames, a fixed data rate between 1050 and 14400 bps can be used for the Forward Dedicated Control Channel in Radio Configurations 5, 8, and 9.

For a given base station, the I and Q channel pilot PN sequences for the Forward Dedicated Control Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The base station shall support discontinuous transmission on the Forward Dedicated Control Channel. The decision to enable or disable transmission shall be made on a frame-by-frame (i.e., 5 or 20 ms) basis.

The base station may support Forward Dedicated Control Channel frames that are time offset by multiples of 1.25 ms when a common power control subchannel is not assigned. The amount of the time offset is specified by FRAME_OFFSET. A zero-offset 20 ms Forward Dedicated Control Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 5 ms Forward Dedicated Control Channel frame shall begin only when System Time is an integral multiple of 5 ms. An offset 20 ms Forward Dedicated Control Channel frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset 20 ms Forward Dedicated Control Channel frame when a common power control subchannel is not assigned. An offset 5 ms Forward Dedicated Control Channel frame shall begin 1.25 × (FRAME_OFFSET mod 4) ms later than the zero-offset 5 ms Forward Dedicated Control Channel frame when a common power control subchannel is not assigned. The interleave block for the Forward Dedicated Control Channel shall be aligned with the Forward Dedicated Control Channel frame.

3.1.3.14.2 Forward Dedicated Control Channel Frame Structure

Table 3.1.3.14.2-1 specifies the Forward Dedicated Control Channel bit allocations. Table 3.1.3.14.2-2 specifies the Forward Dedicated Control Channel bit allocations for flexible data rates. All frames that carry data shall consist of zero or one Reserved Bits and the information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits, as shown in Figure 3.1.3.14.2-1.

Table 3.1.3.14.2-1. Forward Dedicated Control Channel Frame Structure Summary for Non-flexible Data Rates

Radio Config.	Frame Length (ms)	Data Rate (bps)	Number of Bits per Frame				
			Total	Reserved	Information	Frame Quality Indicator	Encoder Tail
3 4, 6, and 7	20	9600	192	0	172	12	8
5, 8, and 9	20	14400	288	1	267	12	8
3, 4, 5, 6, 7, 8, and 9	5	9600	48	0	24	16	8

Table 3.1.3.14.2-2. Forward Dedicated Control Channel Frame Structure Summary for Flexible Data Rates

Radio Config.	Frame Length (ms)	Data Rate (bps)	Number of Bits per Frame			
			Total	Information	Frame Quality Indicator	Encoder Tail
3, 4, 6, and 7	20	1250 to 9600	25 to 192	1 to 168	16	8
	20	1050 to 9550	21 to 191	1 to 171	12	8
5, 8, and 9	20	1250 to 14400	25 to 288	1 to 264	16	8
	20	1050 to 14300, 14400	21 to 286, 288	1 to 266, 268	12	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.14.2-1. Forward Dedicated Control Channel Frame Structure

3.1.3.14.2.1 Forward Dedicated Control Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The 20 ms Forward Dedicated Control Channel shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. If flexible data rates are supported, a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 may be used. The 5 ms Forward Dedicated Control Channel shall use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.14.2.2 Forward Dedicated Control Channel Encoder Tail Bits

The last eight bits of each Forward Dedicated Control Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

3.1.3.14.2.3 Forward Dedicated Control Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.14.3 Forward Dedicated Control Channel Convolutional Encoding

The Forward Dedicated Control Channel shall be convolutionally encoded as specified in 3.1.3.1.5.

When generating Forward Dedicated Control Channel data, the encoder shall be initialized to the all-zero state at the end of each 5 or 20 ms frame.

3.1.3.14.4 Forward Dedicated Control Channel Code Symbol Repetition

Forward Dedicated Control Channel code symbol repetition shall be as specified in 3.1.3.1.6.

3.1.3.14.5 Forward Dedicated Control Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.7.

3.1.3.14.6 Forward Dedicated Control Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.8.

3.1.3.14.7 Forward Dedicated Control Channel Data Scrambling

The Forward Dedicated Control Channel shall be scrambled as specified in 3.1.3.1.10. The public long code mask shall be specified by PLCM_42 (see 2.3.6 in [5]). The generation of the private long code mask shall be as specified in 2.1.3.1.17.

3.1.3.14.8 Forward Dedicated Control Channel Power Control Subchannel

If the forward power control subchannel is enabled on the Forward Dedicated Control Channel (FPC_PRI_CHAN = '1') and the Common Power Control Channel is not assigned to the mobile station, the base station shall transmit continuously a forward power control subchannel on the Forward Dedicated Control Channel as specified in 3.1.3.1.12.

3.1.3.14.9 Forward Dedicated Control Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Dedicated Control Channel shall be spread by a Walsh function or quasi-orthogonal function as specified in 3.1.3.1.18.

3.1.3.14.10 Forward Dedicated Control Channel Quadrature Spreading

The Forward Dedicated Control Channel shall be PN spread as specified in 3.1.3.1.19.

3.1.3.14.11 Forward Dedicated Control Channel Filtering

The Forward Dedicated Control Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.14.12 Forward Dedicated Control Channel Transmission Processing

When the Physical Layer receives a PHY-DCCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Forward Dedicated Control Channel frame of duration FRAME_DURATION (5 ms or 20 ms). If a PHY-DCCH.Request primitive for a 5 ms frame is received coincident with a PHY-DCCH.Request primitive for a 20 ms frame or during transmission of a 20 ms frame, then the base station may preempt transmission of the 20 ms frame and transmit a 5 ms frame. Transmission of the 20 ms frame may start or resume after completion of the 5 ms frame.

3.1.3.15 Forward Fundamental Channel

The Forward Fundamental Channel is used for the transmission of user and signaling information to a specific mobile station during a call. Each Forward Traffic Channel may contain one Forward Fundamental Channel.

3.1.3.15.1 Forward Fundamental Channel Time Alignment and Modulation Rates

When operating in Radio Configuration 1, the base station shall transmit information on the Forward Fundamental Channel at variable data rates of 9600, 4800, 2400, and 1200 bps.

When operating in Radio Configuration 2, the base station shall transmit information on the Forward Fundamental Channel at variable data rates of 14400, 7200, 3600, and 1800 bps.

When operating in Radio Configurations 3, 4, 6, or 7, the base station shall transmit information on the Forward Fundamental Channel at variable data rates of 9600, 4800, 2700, and 1500 bps during 20 ms frames or at 9600 bps during 5 ms frames. The base station may support flexible data rates. If flexible data rates are supported for 20 ms frames, the base station should support variable rates corresponding to 1 to 171 information bits per 20 ms frame on the Forward Fundamental Channel. The minimum number of flexible data rates used in variable rate operation is not specified.

When operating in Radio Configurations 5, 8, or 9, the base station shall transmit information on the Forward Fundamental Channel at variable data rates of 14400, 7200, 3600, and 1800 bps during 20 ms frames or at 9600 bps during 5 ms frames. If flexible data rates are supported, the base station should support variable rates corresponding to 1 to 268 information bits per 20 ms frame on the Forward Fundamental Channel. The minimum number of flexible data rates used in variable rate operation is not specified.

Forward Fundamental Channel frames with Radio Configurations 1 and 2 shall be 20 ms in duration. Forward Fundamental Channel frames with Radio Configurations 3 through 9 shall be 5 or 20 ms in duration. Forward Fundamental Channel frames with Radio Configurations 11 or Radio Configuration 12 shall be 20 ms in duration. The data rate and frame duration on a Forward Fundamental Channel within a radio configuration shall be selected on a frame-by-frame basis. Although the data rate may vary on a frame-by-frame basis, the modulation symbol rate is kept constant by code repetition for data rates lower than the maximum. A base station operating with Radio Configurations 3 through 9 may discontinue transmission of the Forward Fundamental Channel for up to three 5 ms frames in a 20 ms frame. A base station operating with Radio Configurations 11 or Radio Configuration 12 shall discontinue transmission of the Forward Fundamental Channel for the remainder of the frame if an acknowledgment is received for the frame prior to the nominal duration of the frame (20ms).

For a given base station, the I and Q channel pilot PN sequences for the Forward Fundamental Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The modulation symbols that are transmitted at lower data rates shall be transmitted using lower energy. Specifically, the energy per modulation symbol (E_s) for the supported data rates should be:

$$E_s = E_{max} \times R / R_{max}$$

where E_{max} is the energy per symbol at the maximum data rate for the Forward Fundamental Channel with the associated radio configuration, R is the data rate, and R_{max}

is the maximum data rate for the Forward Fundamental Channel for the associated radio configuration. For example, when transmitting a Radio Configuration 1 frame at 4800 bps, the energy per symbol should be one half the energy per symbol in a 9600 bps frame.

The base station may support Forward Fundamental Channel frames that are time offset by multiples of 1.25 ms if FCH_BCMC_INDs is not '1'. The amount of the time offset is specified by FRAME_OFFSET. A zero-offset 20 ms Forward Fundamental Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 5 ms Forward Fundamental Channel frame shall begin only when System Time is an integral multiple of 5 ms. An offset 20 ms Forward Fundamental Channel frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset 20 ms Forward Fundamental Channel frame. An offset 5 ms Forward Fundamental Channel frame shall begin 1.25 × (FRAME_OFFSET mod 4) ms later than the zero-offset 5 ms Forward Fundamental Channel frame. The interleaver block for the Forward Fundamental Channel shall be aligned with the Forward Fundamental Channel frame.

When operating with forward link Radio Configuration 11 or forward link Radio Configuration 12, the base station shall transmit a frame at 9600, 5000, 3000, or 1800 bps on the Forward Fundamental Channel in frames when (FRAME_NUMBER + FRAME_OFFSET_s) mod M = 0, where M = 1, 4, or 8 for $\text{FOR-FCH\_BLANKING\_DUTYCYCLE}_s$ = 0, 1, or 2, respectively. The base station shall transmit the Null Traffic Data on the Forward Fundamental Channel if no other traffic data is available in a frame when a non-zero data rate frame is required to be transmitted.

3.1.3.15.2 Forward Fundamental Channel Frame Structure

Table 3.1.3.15.2-1 summarizes the Forward Fundamental Channel bit allocations. Table 3.1.3.15.2-2 and Table 3.1.3.15.2-3 summarize the Forward Fundamental Channel bit allocations for flexible data rates. The order of the bits is shown in Figure 3.1.3.15.2-1.

The 2400 and 1200 bps frames with Radio Configuration 1 shall consist of the information bits followed by 8 Encoder Tail Bits. All frames with Radio Configurations 3, 4, 6, and 7, and the 9600 and 4800 bps frames with Radio Configuration 1, shall consist of the information bits followed by a frame quality indicator (CRC) and 8 Encoder Tail Bits. All frames with Radio Configurations 2, 5, 8, and 9 shall consist of zero or one Reserved/Flag Bits followed by the information bits, a frame quality indicator (CRC), and 8 Encoder Tail Bits.

Table 3.1.3.15.2-1. Forward Fundamental Channel Frame Structure Summary for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved/ Flag	Informa- tion	Frame Quality Indicator	Encoder Tail
1	9600	192	0	172	12	8
	4800	96	0	80	8	8
	2400	48	0	40	0	8
	1200	24	0	16	0	8
2	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
3, 4, 6, and 7	9600 (5 ms)	48	0	24	16	8
	9600 (20 ms)	192	0	172	12	8
	4800	96	0	80	8	8
	2700	54	0	40	6	8
	1500	30	0	16	6	8
5, 8, and 9	9600	48	0	24	16	8
	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
11 and 12	9600 (20 ms)	192	0	172	12	8
	5000	100	0	80	12	8
	3000	60	0	40	12	8
	1800	36	0	16	12	8
	0	0	0	0	0	0

Table 3.1.3.15.2-2. Forward Fundamental Channel Frame Structure Summary for Flexible Data Rates (Part 1 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Encoder Tail
3, 4, 6, and 7	4850 to 9600	97 to 192	73 to 168	16	8
	4850 to 9550	97 to 191	77 to 171	12	8
	2750 to 4800	55 to 96	31 to 72	16	8
	2750 to 4800	55 to 96	35 to 76	12	8
	2750 to 4750	55 to 95	39 to 79	8	8
	1550 to 2700	31 to 54	7 to 30	16	8
	1550 to 2700	31 to 54	11 to 34	12	8
	1550 to 2700	31 to 54	15 to 38	8	8
	1550 to 2650	31 to 53	17 to 39	6	8
	1250 to 1500	25 to 30	1 to 6	16	8
	1050 to 1500	21 to 30	1 to 10	12	8
	850 to 1500	17 to 30	1 to 14	8	8
	750 to 1450	15 to 29	1 to 15	6	8

Table 3.1.3.15.2-3. Forward Fundamental Channel Frame Structure Summary for Flexible Data Rates (Part 2 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Encoder Tail
5, 8, and 9	7250 to 14400	145 to 288	121 to 264	16	8
	7250 to 14300, 14400	145 to 286, 288	125 to 266, 268	12	8
	3650 to 7200	73 to 144	49 to 120	16	8
	3650 to 7200	73 to 144	53 to 124	12	8
	3650 to 7100, 7200	73 to 142, 144	55 to 124, 126	10	8
	1850 to 3600	37 to 72	13 to 48	16	8
	1850 to 3600	37 to 72	17 to 52	12	8
	1850 to 3600	37 to 72	19 to 54	10	8
	1850 to 3500, 3600	37 to 70, 72	21 to 54, 56	8	8
	1250 to 1800	25 to 36	1 to 12	16	8
	1050 to 1800	21 to 36	1 to 16	12	8
	950 to 1800	19 to 36	1 to 18	10	8
	850 to 1800	17 to 36	1 to 20	8	8
	750 to 1700, 1800	15 to 34, 36	1 to 20, 22	6	8

R/F	Information Bits	F	T

Notation

R/F - Reserved/Flag Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.15.2-1. Forward Fundamental Channel Frame Structure

3.1.3.15.2.1 Forward Fundamental Channel Frame Quality Indicator

Each frame with Radio Configurations 2, 3, 4, 5, 6, 7, 8, 9, 11 and 12, and the 9600 and 4800 bps frames of Radio Configuration 1 shall include a frame quality indicator. This frame quality indicator is a CRC.[36] No frame quality indicator is used for the 2400 and 1200 bps data rates of Radio Configuration 1.

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits.

The 5 ms frames use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

The 9600 bps transmissions with Radio Configuration 1 and the 14400 bps transmissions with Radio Configuration 2 shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2.

The 7200 bps transmissions with Radio Configuration 2 shall use a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3.

The 4800 bps transmissions with Radio Configuration 1 and the 3600 bps transmissions with Radio Configuration 2 shall use an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4.

The 1800 bps transmissions with Radio Configuration 2 shall use a 6-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.6.

The 20 ms frames in Radio Configurations 3, 4, 6, and 7 with more than 96 total bits and in Radio Configurations 5, 8, and 9 with more than 144 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 may be used if flexible data rates are supported.The 20 ms frames in Radio Configurations 5, 8, and 9 with 73 to 144 total bits shall use a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 3, 4, 6, and 7 with 55 to 96 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 5, 8, and 9 with 37 to 72 total bits shall use an 8-bit frame quality indicator. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, or a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3 may be used if flexible data rates are supported.

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[36]The frame quality indicator supports two functions at the receiver: The first function is to determine whether the frame is in error. The second function is to assist in the determination of the data rate of the received frame. Other parameters may be needed for rate determination in addition to the frame quality indicator, such as symbol error rate evaluated at the four data rates of the Forward Fundamental Channel.

The 20 ms frames in Radio Configurations 3, 4, 6, and 7 with 54 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, or an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configurations 5, 8, and 9 with 36 or fewer total bits shall use a 6-bit frame quality indicator. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3, or an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4 may be used if flexible data rates are supported.

The 20 ms frames in Radio Configuration 11 and Radio Configuration 12 shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.15.2.2 Forward Fundamental Channel Encoder Tail Bits

The last eight bits of each Forward Fundamental Channel frame are called the Encoder Tail Bits. These eight bits shall each be set to ‘0’.

3.1.3.15.2.3 Forward Fundamental Channel Reserved/Flag Bit

The Reserved/Flag Bit is used with Radio Configurations 2, 5, 8, and 9.

The Reserved/Flag Bit may be used on the Forward Fundamental Channel when one or more Forward Supplemental Code Channels are in use; otherwise, this bit is reserved and shall be set to ‘0’.

If the Reserved/Flag bit is used, the base station shall set this bit to ‘0’ if the mobile station is to process the Forward Supplemental Code Channels in the second transmitted frame after the current frame (see 2.2.2.1). The base station should set this bit to ‘1’ if the base station will not transmit to the mobile station on the Forward Supplemental Code Channels in the second frame after the current frame.

3.1.3.15.3 Forward Fundamental Channel Convolutional Encoding

The Forward Fundamental Channel data shall be convolutionally encoded as specified in 3.1.3.1.5. When generating Forward Fundamental Channel data, the encoder shall be initialized to the all-zero state at the end of each 5 or 20 ms frame.

3.1.3.15.4 Forward Fundamental Channel Code Symbol Repetition

Forward Fundamental Channel code symbol repetition shall be as specified in 3.1.3.1.6.

3.1.3.15.5 Forward Fundamental Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.7.

3.1.3.15.6 Forward Fundamental Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.8.

3.1.3.15.7 Forward Fundamental Channel Data Scrambling

The Forward Fundamental Channel data shall be scrambled as specified in 3.1.3.1.10. If ADD_PLCM_FOR_FCH_42 is assigned, bits M_{41} through M_0 of the public long code mask shall be specified by ADD_PLCM_FOR_FCH_42; otherwise, they shall be specified by PLCM_42 (see 2.3.6 in [5]). The generation of the private long code mask shall be as specified in 2.1.3.1.16 and 2.1.3.1.17.

3.1.3.15.8 Forward Fundamental Channel Power Control Subchannel

If the forward power control subchannel is enabled on the Forward Fundamental Channel (that is when FPC_PRI_CHAN = '0' or when FPC_PRI_CHAN = '1' and the Forward Fundamental Channel with $FCH\_BCMC\_IND_s$ = '1' is assigned to the mobile station), the base station shall transmit continuously a forward power control subchannel on the Forward Fundamental Channel as specified in 3.1.3.1.12.

3.1.3.15.9 Forward Fundamental Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Fundamental Channel shall be spread by a Walsh function (Radio Configurations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11 and 12) or quasi-orthogonal function (Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11 and 12) as specified in 3.1.3.1.18.

3.1.3.15.10 Forward Fundamental Channel Quadrature Spreading

The Forward Fundamental Channel shall be PN spread as specified in 3.1.3.1.19.

3.1.3.15.11 Forward Fundamental Channel Filtering

The Forward Fundamental Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.15.12 Forward Fundamental Channel Transmission Processing

When the Physical Layer receives a PHY-FCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- Set the information bits to SDU.
- Transmit NUM_BITS bits of SDU on a Forward Fundamental Channel frame of duration FRAME_DURATION (5 ms or 20 ms). If a PHY-FCH.Request primitive for a 5 ms frame is received coincident with a PHY-FCH.Request primitive for a 20 ms frame or during transmission of a 20 ms, then the base station may preempt transmission of the 20 ms frame and transmit a 5 ms frame. Transmission of the 20 ms frame may start or resume after completion of the 5 ms frame.

3.1.3.16 Forward Supplemental Channel

The Forward Supplemental Channel applies to Radio Configurations 3, 4, 5, 6, 7, 8, 9, 11 and 12.

The Forward Supplemental Channel is used for the transmission of higher-level data to a specific mobile station during a call. Each Forward Traffic Channel contains up to two Forward Supplemental Channels.

3.1.3.16.1 Forward Supplemental Channel Time Alignment and Modulation Rates

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 3, the base station shall transmit at a fixed rate of 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.

The base station may support flexible data rates. If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 3, the base station should transmit information at a fixed rate corresponding to 15 to 3071 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 3, the base station should transmit information at a fixed rate corresponding to 31 to 3071 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 3, the base station should transmit information at a fixed rate corresponding to 55 to 3071 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 4, the base station shall transmit at a fixed rate of 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 4, the base station should transmit information at a fixed rate corresponding to 15 to 6143 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configurations 4, the base station should transmit information at a fixed rate corresponding to 31 to 6143 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 4, the base station should transmit information at a fixed rate corresponding to 55 to 6143 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 5, the base station shall transmit at a fixed rate of 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps without outer coding or 115200 bps with the use of outer coding.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 5, the base station should transmit information at a fixed rate corresponding to 15 to 4607 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 5, the base station should transmit information at a fixed rate corresponding to 37 to 4607 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 5, the base station should transmit information at a fixed rate corresponding to 73 to 4607 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 6, the base station shall transmit at a fixed rate of 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 6, the base station should transmit information at a fixed rate corresponding to 15 to 6143 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configurations 6, the base station should transmit information at a fixed rate corresponding to 31 to 6143 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 6, the base station should transmit information at a fixed rate corresponding to 55 to 6143 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 7, the base station shall transmit at a fixed rate of 614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 7, the base station should transmit information at a fixed rate corresponding to 15 to 12287 total bits per frame in 1 bit increments.

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 7, the base station should transmit information at a fixed rate corresponding to 31 to 12287 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 7, the base station should transmit information at a fixed rate corresponding to 55 to 12287 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 8, the base station shall transmit at a fixed rate of 460800, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 8, the base station should transmit information at a fixed rate corresponding to 15 to 9215 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 8, the base station should transmit information at a fixed rate corresponding to 37 to 9215 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 8, the base station should transmit information at a fixed rate corresponding to 73 to 9215 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 9, the base station shall transmit at a fixed rate of 1036800, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

If flexible data rates are supported,

- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 20 ms frames in Radio Configuration 9, the base station should transmit information at a fixed rate corresponding to 15 to 20735 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 40 ms frames in Radio Configuration 9, the base station should transmit information at a fixed rate corresponding to 37 to 20735 total bits per frame in 1 bit increments.
- When transmitting on the Forward Supplemental Channel with a single assigned data rate and 80 ms frames in Radio Configuration 9, the base station should transmit information at a fixed rate corresponding to 73 to 20735 total bits per frame in 1 bit increments.

When transmitting on the Forward Supplemental Channel with a single assigned data rate in Radio Configuration 11 or Radio Configuration 12, the base station shall transmit at a fixed rate of 307200, 153600, 76800, 38400, 19200, or 9600 bps.

When using variable-rate transmission on the Forward Supplemental Channel with multiple assigned data rates in Radio Configurations 3, 4, 5, 6, 7, 8, and 9, the base station shall

- Transmit information at the maximal assigned data rate, or
- Transmit information at the other assigned data rates with the same modulation symbol rate as that of the maximal assigned data rate. To achieve a higher modulation symbol rate, repetition or puncturing is applied to the specified data rate.

The base station shall not use forward power control mode FPC_MODE = '001' nor FPC_MODE '010' when the Forward Supplemental Channel is operated in a variable rate mode.

Forward Supplemental Channel frames shall be 20, 40, or 80 ms in duration. A base station may support discontinuous transmission of Forward Supplemental Channel frames. The Forward Supplemental Channel also supports outer coding in Radio Configuration 5 at the data rate of 115200 bps for 20 ms frames. The Forward Supplemental Channel outer coding buffer shall be 1.28 s in duration.

For a given base station, the I and Q channel pilot PN sequences for the Forward Supplemental Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The base station may support Forward Supplemental Channel frames that are time offset by multiples of 1.25 ms as specified by FRAME_OFFSET if FCH_BCMC_INDs is not '1'. The base station may support 40 or 80 ms Forward Supplemental Channel frames that are time offset by multiples of 20 ms as specified by FOR_SCH_FRAME_OFFSET[i] if FCH_BCMC_INDs is not '1', where i = 1 and 2 for Forward Supplemental Channel 1 and Forward Supplemental Channel 2, respectively.

The amount of the time offset is specified by FRAME_OFFSET and FOR_SCH_FRAME_OFFSET[i], where i = 1 or 2. A zero-offset 20 ms Forward Supplemental Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). A zero-offset 40 ms Forward Supplemental Channel frame shall begin only when System Time is an integral multiple of 40 ms. A zero-offset 80 ms Forward Supplemental Channel frame shall begin only when System Time is an integral multiple of 80 ms. An offset 20 ms Forward Supplemental Channel frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset 20 ms Forward Supplemental Channel frame. An offset 40 ms Forward Supplemental Channel frame shall begin (1.25 × FRAME_OFFSET + 20 × FOR_SCH_FRAME_OFFSET[i]) ms later than the zero-offset 40 ms Forward Supplemental Channel frame. An offset 80 ms Forward Supplemental Channel frame shall begin (1.25 × FRAME_OFFSET + 20 × FOR_SCH_FRAME_OFFSET[i]) ms later than the zero-offset 80 ms Forward Supplemental Channel frame. The interleaver block for the Forward Supplemental Channel shall be aligned with the Forward Supplemental Channel frame.

When outer encoding is used for the i-th Forward Supplemental Channel, the base station may support outer coding buffers that are time offset by multiples of 20 ms as specified by $\text{FSCH\_OUTERCODE\_OFFSET}_s[i]$. A zero-offset outer coding buffer shall begin only when System Time is an integral multiple of 1.28 s. An offset outer coding buffer for the i-th Forward Supplemental Channel shall begin 20 × $\text{FSCH\_OUTERCODE\_OFFSET}_s[i]$ ms later than the zero-offset outer coding buffer. The Forward Supplemental Channel time alignment shall be such that the first Forward Supplemental Channel frame in an outer coding buffer begins at the first chip of the outer coding buffer.

3.1.3.16.2 Forward Supplemental Channel Frame Structure

Table 3.1.3.16.2-1 through Table 3.1.3.16.2-3 specify the Forward Supplemental Channel bit allocations for non-flexible data rates. Table 3.1.3.16.2-4 through Table 3.1.3.16.2-9 specify the Forward Supplemental Channel bit allocations for flexible data rates.

All frames shall consist of zero or one Reserved Bits and the information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits, as shown in Figure 3.1.3.16.2-1.

Table 3.1.3.16.2-1. Forward Supplemental Channel Frame Structure Summary for 20 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Reserved/ Encoder Tail
3, 4, 6, and 7	614400	12288	0	12264	16	8
	307200	6144	0	6120	16	8
	153600	3072	0	3048	16	8
	76800	1536	0	1512	16	8
	38400	768	0	744	16	8
	19200	384	0	360	16	8
	9600	192	0	172	12	8
	4800	96	0	80	8	8
	2700	54	0	40	6	8
	1500	30	0	16	6	8
5, 8, and 9	1036800	20736	0	20712	16	8
	460800	9216	0	9192	16	8
	230400	4608	0	4584	16	8
	115200	2304	0	2280	16	8
	57600	1152	0	1128	16	8
	28800	576	0	552	16	8
	14400	288	1	267	12	8
	7200	144	1	125	10	8
	3600	72	1	55	8	8
	1800	36	1	21	6	8
11 and 12	307200	6144	0	6120	16	8
	153600	3072	0	3048	16	8
	76800	1536	0	1512	16	8
	38400	768	0	744	16	8
	19200	384	0	360	16	8
	9600	192	0	172	12	8

Note: The 614400 bps rate applies to Radio Configuration 7. The 307200 bps rate applies to Radio Configurations 4, 6, and 7. The 1036800 bps rate applies to Radio Configuration 9. The 460800 bps rate applies to Radio Configurations 8 and 9. The 115200 bps rate in Radio Configuration 5 for 20 ms frames supports outer coding at code rates of 14/16, 13/16, 12/16, and 11/16.

Table 3.1.3.16.2-2. Forward Supplemental Channel Frame Structure Summary for 40 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail
3, 4, 6, and 7	307200	12288	0	12264	16	8
	153600	6144	0	6120	16	8
	76800	3072	0	3048	16	8
	38400	1536	0	1512	16	8
	19200	768	0	744	16	8
	9600	384	0	360	16	8
	4800	192	0	172	12	8
	2400	96	0	80	8	8
	1350	54	0	40	6	8
5, 8, and 9	518400	20736	0	20712	16	8
	230400	9216	0	9192	16	8
	115200	4608	0	4584	16	8
	57600	2304	0	2280	16	8
	28800	1152	0	1128	16	8
	14400	576	0	552	16	8
	7200	288	1	267	12	8
	3600	144	1	125	10	8
	1800	72	1	55	8	8

Note: The 307200 bps rate applies to Radio Configuration 7. The 153600 bps rate applies to Radio Configurations 4, 6, and 7. The 518400 bps rate applies to Radio Configuration 9. The 230400 bps rate applies to Radio Configurations 8 and 9.

Table 3.1.3.16.2-3. Forward Supplemental Channel Frame Structure Summary for 80 ms Frames for Non-flexible Data Rates

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Reserved/ Encoder Tail
3, 4, 6, and 7	153600	12288	0	12264	16	8
	76800	6144	0	6120	16	8
	38400	3072	0	3048	16	8
	19200	1536	0	1512	16	8
	9600	768	0	744	16	8
	4800	384	0	360	16	8
	2400	192	0	172	12	8
	1200	96	0	80	8	8
5, 8, and 9	259200	20736	0	20712	16	8
	115200	9216	0	9192	16	8
	57600	4608	0	4584	16	8
	28800	2304	0	2280	16	8
	14400	1152	0	1128	16	8
	7200	576	0	552	16	8
	3600	288	1	267	12	8
	1800	144	1	125	10	8

Note: The 153600 bps rate applies to Radio Configuration 7. The 76800 bps rate applies to Radio Configurations 4, 6, and 7. The 259200 bps rate applies to Radio Configuration 9. The 115200 bps rate applies to Radio Configurations 8 and 9.

Table 3.1.3.16.2-4. Forward Supplemental Channel Frame Structure Summary for 20 ms Frames for Flexible Data Rates (Part 1 and 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
7	307250 to 614350	6145 to 12287	6121 to 12263	16	8
4, 6, and 7	153650 to 307150	3073 to 6143	3049 to 6119	16	8
3, 4, 6, and 7	76850 to 153550	1537 to 3071	1513 to 3047	16	8
	38450 to 76750	769 to 1535	745 to 1511	16	8
	19250 to 38350	385 to 767	361 to 743	16	8
	9650 to 19150	193 to 383	169 to 359	16	8
	4850 to 9600	97 to 192	73 to 168	16	8
	4850 to 9550	97 to 191	77 to 171	12	8
	2750 to 4800	55 to 96	31 to 72	16	8
	2750 to 4800	55 to 96	35 to 76	12	8
	2750 to 4750	55 to 95	39 to 79	8	8
	1550 to 2700	31 to 54	7 to 30	16	8
	1550 to 2700	31 to 54	11 to 34	12	8
	1550 to 2700	31 to 54	15 to 38	8	8
	1550 to 2650	31 to 53	17 to 39	6	8
	1250 to 1500	25 to 30	1 to 6	16	8
	1050 to 1500	21 to 30	1 to 10	12	8
	850 to 1500	17 to 30	1 to 14	8	8
	750 to 1450	15 to 29	1 to 15	6	8

Table 3.1.3.16.2-5. Forward Supplemental Channel Frame Structure Summary for 20 ms Frames for Flexible Data Rates (Part 2 and 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
9	460850 to 1036750	9217 to 20735	9193 to 20711	16	8
8 and 9	230450 to 460750	4609 to 9215	4585 to 9191	16	8
	115250 to 230350	2305 to 4607	2281 to 4583	16	8
5	115250 to 230350	2305 to 4607	2281 to 4583	16	8
5, 8, and 9	57650 to 115150	1153 to 2303	1129 to 2279	16	8
	28850 to 57550	577 to 1151	553 to 1127	16	8
	14450 to 28750	289 to 575	265 to 551	16	8
	7250 to 14400	145 to 288	121 to 264	16	8
	7250 to 14300, 14400	145 to 286, 288	125 to 266, 268	12	8
	3650 to 7200	73 to 144	49 to 120	16	8
	3650 to 7200	73 to 144	53 to 124	12	8
	3650 to 7100, 7200	73 to 142, 144	55 to 124, 126	10	8
	1850 to 3600	37 to 72	13 to 48	16	8
	1850 to 3600	37 to 72	17 to 52	12	8
	1850 to 3600	37 to 72	19 to 54	10	8
	1850 to 3500, 3600	37 to 70, 72	21 to 54, 56	8	8
	1250 to 1800	25 to 36	1 to 12	16	8
	1050 to 1800	21 to 36	1 to 16	12	8
	950 to 1800	19 to 36	1 to 18	10	8
	850 to 1800	17 to 36	1 to 20	8	8
	750 to 1700, 1800	15 to 34, 36	1 to 20, 22	6	8

Table 3.1.3.16.2-6. Forward Supplemental Channel Frame Structure Summary for 40 ms Frames for Flexible Data Rates (Part 1 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
7	153625 to 307175	6145 to 12287	6121 to 12263	16	8
4, 6, and 7	76825 to 153575	3073 to 6143	3049 to 6119	16	8
3, 4, 6, and 7	38425 to 76775	1537 to 3071	1513 to 3047	16	8
	19225 to 38375	769 to 1535	745 to 1511	16	8
	9625 to 19175	385 to 767	361 to 743	16	8
	4825 to 9575	193 to 383	169 to 359	16	8
	2425 to 4800	97 to 192	73 to 168	16	8
	2425 to 4775	97 to 191	77 to 171	12	8
	1375 to 2400	55 to 96	31 to 72	16	8
	1375 to 2400	55 to 96	35 to 76	12	8
	1375 to 2375	55 to 95	39 to 79	8	8
	775 to 1350	31 to 54	7 to 30	16	8
	775 to 1350	31 to 54	11 to 34	12	8
	775 to 1350	31 to 54	15 to 38	8	8
	775 to 1325	31 to 53	17 to 39	6	8

Table 3.1.3.16.2-7. Forward Supplemental Channel Frame Structure Summary for 40 ms Frames for Flexible Data Rates (Part 2 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
9	230425 to 518375	9217 to 20735	9193 to 20711	16	8
8 and 9	115225 to 230375	4609 to 9215	4585 to 9191	16	8
	57625 to 115175	2305 to 4607	2281 to 4583	16	8
5	57625 to 115175	2305 to 4607	2281 to 4583	16	8
5, 8, and 9	28825 to 57575	1153 to 2303	1129 to 2279	16	8
	14425 to 28775	577 to 1151	553 to 1127	16	8
	7225 to 14375	289 to 575	265 to 551	16	8
	3625 to 7200	145 to 288	121 to 264	16	8
	3625 to 7150, 7200	145 to 286, 288	125 to 266, 268	12	8
	1825 to 3600	73 to 144	49 to 120	16	8
	1825 to 3600	73 to 144	53 to 124	12	8
	1825 to 3550, 3600	73 to 142, 144	55 to 124, 126	10	8
	925 to 1800	37 to 72	13 to 48	16	8
	925 to 1800	37 to 72	17 to 52	12	8
	925 to 1800	37 to 72	19 to 54	10	8
	925 to 1750, 1800	37 to 70, 72	21 to 54, 56	8	8

Table 3.1.3.16.2-8. Forward Supplemental Channel Frame Structure Summary for 80 ms Frames for Flexible Data Rates (Part 1 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
7	76812.5 to 153587.5	6145 to 12287	6121 to 12263	16	8
4, 6, and 7	38412.5 to 76787.5	3073 to 6143	3049 to 6119	16	8
3, 4, 6, and 7	19212.5 to 38387.5	1537 to 3071	1513 to 3047	16	8
	9612.5 to 19187.5	769 to 1535	745 to 1511	16	8
	4812.5 to 9587.5	385 to 767	361 to 743	16	8
	2412.5 to 4787.5	193 to 383	169 to 359	16	8
	1212.5 to 2400	97 to 192	73 to 168	16	8
	1212.5 to 2387.5	97 to 191	77 to 171	12	8
	687.5 to 1200	55 to 96	31 to 72	16	8
	687.5 to 1200	55 to 96	35 to 76	12	8
	687.5 to 1187.5	55 to 95	39 to 79	8	8

Table 3.1.3.16.2-9. Forward Supplemental Channel Frame Structure Summary for 80 ms Frames for Flexible Data Rates (Part 2 of 2)

Radio Config.	Data Rate (bps)	Number of Bits per Frame			
		Total	Information	Frame Quality Indicator	Reserved/ Encoder Tail
9	115212.5 to 259187.5	9217 to 20735	9193 to 20711	16	8
8 and 9	57612.5 to 115187.5	4609 to 9215	4585 to 9191	16	8
	28812.5 to 57587.5	2305 to 4607	2281 to 4583	16	8
5	28812.5 to 57587.5	2305 to 4607	2281 to 4583	16	8
5, 8, and 9	14412.5 to 28787.5	1153 to 2303	1129 to 2279	16	8
	7212.5 to 14387.5	577 to 1151	553 to 1127	16	8
	3612.5 to 7187.5	289 to 575	265 to 551	16	8
	1812.5 to 3600	145 to 288	121 to 264	16	8
	1812.5 to 3575, 3600	145 to 286, 288	125 to 266, 268	12	8
	912.5 to 1800	73 to 144	49 to 120	16	8
	912.5 to 1800	73 to 144	53 to 124	12	8
	912.5 to 1775, 1800	73 to 142, 144	55 to 124, 126	10	8

R	Information Bits	F	R/T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
R/T - Reserved/Encoder Tail Bits

Figure 3.1.3.16.2-1. Forward Supplemental Channel Frame Structure

3.1.3.16.2.1 Forward Supplemental Channel Outer Coding

The Forward Supplemental Channel may use outer coding in Radio Configuration 5. The outer code rate of the i-th Forward Supplemental Channel shall be specified by $\text{FSCH\_OUTERCODE\_RATE}_s[i]$. When outer coding is used, the information bits are stored in the outer coding buffer and then outer encoded. The outer coded symbols of the outer coding buffer are transmitted in 64 consecutive 20-ms Forward Supplemental Channel frames with Radio Configuration 5 and data rate 115.2 kbps format as shown in Figure 3.1.3.1.1.1-21 and Figure 3.1.3.1.1.1-22.

3.1.3.16.2.1.1 Forward Supplemental Channel Outer Coding Demultiplexing

The outer coding buffer shall be an array with 64 rows and 2280 columns (i.e., 145920 cells). The outer coding buffers are divided into four outer coding sub-buffers, each with 16 rows and 2280 columns (i.e., 36480 cells). Row i of the outer coding buffer shall be in the $\lfloor i/16 \rfloor$-th outer coding sub-buffer, i = 0,…, 63. That is, rows 0 through 15 shall be in the outer coding sub-buffer 0, rows 16 through 31 shall be in the outer coding sub-buffer 1, rows 32 through 47 shall be in the outer coding sub-buffer 2, and rows 48 through 63 shall be in the outer coding sub-buffer 3.

The j-th bit (j = 0 to 9120k – 1) of the input to the outer coding buffer shall be written into the following location of that buffer:

$$(\text{Row Number},\ \text{Column Number}) = \left(\left(\left\lfloor j/Z \right\rfloor \right) \bmod k + \left\lfloor \frac{\left\lfloor j/Z \right\rfloor}{k} \right\rfloor n,\ j \bmod Z \right),$$

where

n and k are the parameters specifying the corresponding (n, k) outer code with n = 16 and k = 11, 12, 13, or 14, and

Z = 2280 is the number of columns in the outer coding buffer.

For the (16, 11) outer code, the number of outer encoder bits per outer coding buffer shall be 100320 bits. The 100320 outer encoder bits shall be in the first 11 rows of each of the four outer coding sub-buffers of the outer coding buffer.

For the (16, 12) outer code, the number of outer encoder bits per outer coding buffer shall be 109440 bits. The 109440 outer encoder bits shall be in the first 12 rows of each of the four outer coding sub-buffers of the outer coding buffer.

For the (16, 13) outer code, the number of outer encoder bits per outer coding buffer shall be 118560 bits. The 118560 outer encoder bits shall be in the first 13 rows of each of the four outer coding sub-buffers of the outer coding buffer.

For the (16, 14) outer code, the number of outer encoder bits per outer coding buffer shall be 127680 bits. The 127680 outer encoder bits shall be in the first 14 rows of each of the four outer coding sub-buffers of the outer coding buffer.

3.1.3.16.2.1.2 Forward Supplemental Channel Outer Coding

The bits in every eight consecutive columns of a row in the outer coding sub-buffer shall be treated as a symbol in $GF(2^8)$ for outer coding. Let $b_{m,t}$ be the entry of the m-th row and the t-th column in the outer coding sub-buffer (m = 0 through 15, and t = 0 through 2279). Then, $b_{m,0}, b_{m,1},\ldots, b_{m,7}$ shall be treated as one symbol such that $b_{m,0}\alpha^7 + b_{m,1}\alpha^6 + \ldots + b_{m,7}$ is an element of $GF(2^8)$, $b_{m,8}, b_{m,9},\ldots, b_{m,15}$ shall be treated as one symbol such that $b_{m,8}\alpha^7 + b_{m,9}\alpha^6 + \ldots + b_{m,15}$ is an element of $GF(2^8)$, etc. The outer coding sub-buffer has 16 rows, with each row containing 285 symbols in $GF(2^8)$. The outer coding sub-buffer is divided into 285 groups by grouping every eight columns together. Columns 0 through 7 belong to the first group; columns 8 through 15 belong to the second group, etc.

The outer encoder bits in the outer coding sub-buffer shall be outer coded group-by-group. For an (n, k) outer code, the k information symbols in $GF(2^8)$ contained in the first k rows of a group in the outer coding sub-buffer shall be outer encoded to generate n code symbols, as specified in 3.1.3.1.5.3. The first k code symbols are the k information symbols. The last n – k code symbols are parity symbols and shall fill the last (n – k) rows of the same group in the outer coding sub-buffer. The j-th symbol (j = k, k+1,..., n – 1), v_j, shall be used to fill the j-th row of the same group in the outer coding sub-buffer. Let $v_j = a_0\alpha^7 + a_1\alpha^6 + \ldots + a_7$. Then a_s (s = 0 through 7) shall be written to the j-th row and the s-th column within the group. The number of outer encoding operations necessary to encode one outer coding sub-buffer is 285.

The (16, 11) Reed-Solomon outer coder shall be as specified in 3.1.3.1.5.3.1. The resultant last five 8-bit code symbols in $GF(2^8)$ shall be sequentially written into the bottom five rows of the outer coding sub-buffer. That is, the j-th code symbol, v_j, shall be on the j-th row, j = 11,..., 15.

The (16, 12) Reed-Solomon outer coder shall be as specified in 3.1.3.1.5.3.2. The resultant last four 8-bit code symbols in $GF(2^8)$ shall be sequentially written into the bottom four rows of the outer coding sub-buffer. That is, the j-th code symbol, v_j, shall be on the j-th row, j = 12,..., 15.

The (16, 13) Reed-Solomon outer coder shall be as specified in 3.1.3.1.5.3.3. The resultant last three 8-bit code symbols in $GF(2^8)$ shall be sequentially written into the bottom three rows of the outer coding sub-buffer. That is, the j-th code symbol, v_j, shall be on the j-th row, j = 13, 14, 15.

The (16, 14) Reed-Solomon outer coder shall be as specified in 3.1.3.1.5.3.4. The resultant last two 8-bit code symbols in GF(2^8) shall be sequentially written into the bottom two rows of the outer coding sub-buffer. That is, the j-th code symbol, v_j, shall be on the j-th row, j = 14 and 15.

3.1.3.16.2.1.3 Forward Supplemental Channel Outer Coding Multiplexing

The outer coded symbols in each row of the outer coding buffer shall be transmitted as a Forward Supplemental Channel 20-ms frame of Radio Configuration 5 with a data rate of 115.2 kbps. One outer coding buffer shall be transmitted in 64 consecutive 20-ms Forward Supplemental Channel frames. The rows from the four outer coding sub-buffers are time-multiplexed to be transmitted alternatively. The row sent in the i-th 20-ms interval for an outer coding buffer is the g-th row of the buffer where

$$g = \lfloor i/4 \rfloor + (16 \times i) \bmod 64 \qquad i = 0, \ldots, 63.$$

That is, the first row of outer coding sub-buffer 0 shall be transmitted in the first 20 ms interval, the first row of outer coding sub-buffer 1 shall be transmitted in the second 20 ms interval, the first row of outer coding sub-buffer 2 shall be transmitted in the third 20 ms interval, the first row of outer coding sub-buffer 3 shall be transmitted in the fourth 20 ms interval, the second row of outer coding sub-buffer 0 shall be transmitted in the fifth 20 ms interval, the second row of outer coding sub-buffer 1 shall be transmitted in the sixth 20 ms interval, etc.

The outer coded symbol at the t-th column (t = 0 through 2279) of each row in the outer coding buffer shall be the t-th channel bits in the corresponding Forward Supplemental Channel frame.

3.1.3.16.2.2 Forward Supplemental Channel Frame Quality Indicator

Each frame shall include a frame quality indicator. This frame quality indicator is a CRC.

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Reserved/Encoder Tail Bits.

Frames in Radio Configurations 3, 4, 6, and 7 with more than 192 total bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

Frames in Radio Configurations 5, 8, and 9 with more than 288 total bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

Frames in Radio Configurations 3, 4, 6, and 7 with 97 to 192 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 may be used if flexible data rates are supported.

Frames in Radio Configurations 5, 8, and 9 with 145 to 288 total bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 may be used if flexible data rates are supported.

Frames in Radio Configurations 5, 8, and 9 with 73 to 144 total bits shall use a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 may be used if flexible data rates are supported.

Frames in Radio Configurations 3, 4, 6, and 7 with 55 to 96 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 or a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2 may be used if flexible data rates are supported.

Frames in Radio Configurations 5, 8, and 9 with 37 to 72 total bits shall use an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, or a 10-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.3 may be used if flexible data rates are supported.

Frames in Radio Configurations 3, 4, 6, and 7 with 54 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, or an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4 may be used if flexible data rates are supported.

Frames in Radio Configurations 5, 8, and 9 with 36 or fewer total bits shall use a 6-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.5. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1, a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2, a 10-bit with the generator polynomial specified in 3.1.3.1.4.1.3, or an 8-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.4 may be used if flexible data rates are supported.

Frames in Radio Configuration 11 and Radio Configuration 12 with 192 or fewer bits shall use a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. Frames in Radio Configuration 11 and Radio Configration 12 with more than 192 bits shall use a 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.16.2.3 Forward Supplemental Channel Encoder Tail Bits

The last eight bits of each Forward Supplemental Channel frame are called the Reserved/Encoder Tail Bits. For the convolutional encoder, these eight bits shall each be set to '0'. For the turbo encoder, the first two of the eight bits shall each be set to '0', and the turbo encoder will calculate and append the remaining six tail bits.

3.1.3.16.2.4 Forward Supplemental Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.16.3 Forward Supplemental Channel Forward Error Correction Encoding

The data for Forward Supplemental Channels shall be convolutionally or turbo encoded as specified in 3.1.3.1.5. When outer coding is used on the Forward Supplemental Channel with Radio Configuration 5, turbo coding shall be used.

3.1.3.16.4 Forward Supplemental Channel Code Symbol Repetition

Forward Supplemental Channel code symbol repetition shall be as specified in 3.1.3.1.6.

3.1.3.16.5 Forward Supplemental Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.7.

3.1.3.16.6 Forward Supplemental Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.8.

3.1.3.16.7 Forward Supplemental Channel Data Scrambling

The data for Forward Supplemental Channels shall be scrambled as specified in 3.1.3.1.10. The same long code mask is used for all code channels of the Forward Traffic Channel. If ADD_PLCM_FOR_SCH_42 is assigned and SCH_BCMC_IND_s[i] equals ‘1’, bits M_{41} through M_0 of the public long code mask for the i-th Forward Supplemental Channel shall be specified by ADD_PLCM_FOR_SCH_42; otherwise, they shall be specified by PLCM_42 (see 2.3.6 in [5]). The generation of the private long code mask shall be as specified in 2.1.3.1.17.

3.1.3.16.8 Forward Supplemental Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Supplemental Channels shall be spread by a Walsh function or quasi-orthogonal function as specified in 3.1.3.1.18.

3.1.3.16.9 Forward Supplemental Channel Quadrature Spreading

The Forward Supplemental Channels shall be PN spread as specified in 3.1.3.1.19.

3.1.3.16.10 Forward Supplemental Channel Filtering

The Forward Supplemental Channels shall be filtered as specified in 3.1.3.1.20.

3.1.3.16.11 Forward Supplemental Channel Transmission Processing

When the Physical Layer receives a PHY-SCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.

- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Forward Supplemental Channel frame of duration FRAME_DURATION.

3.1.3.16.12 Forward Supplemental Channel Outer Coding Transmission Processing

When the Physical Layer receives a PHY-SCHOuterCode.Request(SDU, NUM_BITS, SYS_TIME) from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, NUM_BITS, and SYS_TIME.
- If SDU is not equal to NULL, fill the outer coding buffer with the SDU and outer encode the outer coding buffer.
- If SDU is not equal to NULL, transmit the bits in the outer coding buffer in 64 Forward Supplemental Channel frames starting at SYS_TIME.

3.1.3.17 Forward Supplemental Code Channel

The Forward Supplemental Code Channel applies to Radio Configurations 1 and 2 only.

The Forward Supplemental Code Channel is used for the transmission of higher-level data to a specific mobile station during a call. Each Forward Traffic Channel contains up to seven Forward Supplemental Code Channels.

3.1.3.17.1 Forward Supplemental Code Channel Time Alignment and Modulation Rates

When transmitting on Forward Supplemental Code Channels with Radio Configuration 1, the base station shall transmit information at 9600 bps. When transmitting on Forward Supplemental Code Channels with Radio Configuration 2, the base station shall transmit information at 14400 bps.

All Forward Supplemental Code Channel frames shall be 20 ms in duration.

For a given base station, the I and Q channel pilot PN sequences for the Forward Supplemental Code Channels shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The base station may support Forward Supplemental Code Channel frames that are time offset by multiples of 1.25 ms. The amount of the time offset is specified by FRAME_OFFSET. A zero-offset Forward Supplemental Code Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). An offset Forward Supplemental Code Channel frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset Forward Supplemental Code Channel frame. The base station shall transmit frames on the Forward Supplemental Code Channels in time alignment with the Forward Fundamental Channel. The interleave block for the Forward Supplemental Code Channel shall be aligned with the Forward Supplemental Code Channel frame.

3.1.3.17.2 Forward Supplemental Code Channel Frame Structure

Table 3.1.3.17.2-1 specifies the Forward Supplemental Code Channel bit allocations. All frames shall consist of zero or one Reserved Bits and information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits, as shown in Figure 3.1.3.17.2-1.

Table 3.1.3.17.2-1. Forward Supplemental Code Channel Frame Structure Summary

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Encoder Tail
1	9600	192	0	172	12	8
2	14400	288	1	267	12	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.17.2-1. Forward Supplemental Code Channel Frame Structure

3.1.3.17.2.1 Forward Supplemental Code Channel Frame Quality Indicator

The frame quality indicator (CRC) shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. Each frame with Radio Configuration 1 and 2 shall include a 12-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.2. This frame quality indicator is a CRC.

The frame quality indicators shall be computed as specified in 3.1.3.1.4.

3.1.3.17.2.2 Forward Supplemental Code Channel Encoder Tail Bits

The last eight bits of each Forward Supplemental Code Channel frame are called the Reserved/Encoder Tail Bits. These eight bits shall each be set to ‘0’.

3.1.3.17.2.3 Forward Supplemental Code Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.17.3 Forward Supplemental Code Channel Convolutional Encoding

The data for Forward Supplemental Code Channels shall be convolutionally encoded as specified in 3.1.3.1.5.

When generating Forward Supplemental Code Channel data, the encoder shall be initialized to the all-zero state at the end of each 20 ms frame.

3.1.3.17.4 Forward Supplemental Code Channel Code Symbol Repetition

Forward Supplemental Code Channel code symbol repetition shall be as specified in 3.1.3.1.6.

3.1.3.17.5 Forward Supplemental Code Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.7.

3.1.3.17.6 Forward Supplemental Code Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.8.

3.1.3.17.7 Forward Supplemental Code Channel Data Scrambling

The data for Forward Supplemental Code Channels shall be scrambled as specified in 3.1.3.1.10. The same long code mask is used for all code channels of the Forward Traffic Channel. The public long code mask shall be specified by PLCM_42 (see 2.3.6 in [5]). The generation of the private long code mask shall be as specified in 2.1.3.1.16.

3.1.3.17.8 Forward Supplemental Code Channel Orthogonal Spreading

The Forward Supplemental Code Channels shall be spread by a Walsh function of length 64 as specified in 3.1.3.1.18.

3.1.3.17.9 Forward Supplemental Code Channel Quadrature Spreading

The Forward Supplemental Code Channels shall be PN spread as specified in 3.1.3.1.19.

3.1.3.17.10 Forward Supplemental Code Channel Filtering

The Forward Supplemental Code Channels shall be filtered as specified in 3.1.3.1.20.

3.1.3.17.11 Forward Supplemental Code Channel Transmission Processing

When the Physical Layer receives a PHY-SCCH.Request(SDU, FRAME_DURATION, NUM_BITS) from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and NUM_BITS.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit NUM_BITS bits of SDU in a Forward Supplemental Code Channel frame.

3.1.3.18 Forward Packet Data Channel

The Forward Packet Data Channel is used for the transmission of higher-level data to the mobile stations with Spreading Rate 1. A forward CDMA channel may contain up to two Forward Packet Data Channels. Each Forward Packet Data Channel transmits information to one specific mobile station at a time.

3.1.3.18.1 Forward Packet Data Channel Structure, Time Alignment, and Subpacket Data Rates

The Forward Packet Data Channel shall transmit 194, 386, 770, 1538, 2306, 3074, or 3842 information bits. Sixteen frame quality indicator bits and six turbo encoder tail allowance bits shall be added to the information bits to form encoder packets. The encoder packets shall be encoded with a rate-1/5 turbo encoder, interleaved, and scrambled. Then, symbols from the scrambled sequence shall be selected for transmission as a subpacket. The selected symbols may not include all of the scrambled output symbols or they may include all of the scrambled output symbols with some symbols repeated one or more times. The selected subpacket symbols shall be modulated into QPSK, 8-PSK, or 16-QAM symbols and demultiplexed into one to 28 32-chip Walsh channels used for that Forward Packet Data Channel. Each of these Walsh channels shall be spread with a different 32-chip Walsh function. Then, the spread symbols on the Walsh channels shall be summed to obtain a single sequence of I/Q-symbols.

If the base station supports the Forward Packet Data Channel with Radio Configuration 10, the base station shall support one or two Forward Packet Data Channels. If the base station supports one Forward Packet Data Channel with Radio Configuration 10, the base station shall support from one to 28 32-chip Walsh channels on the Forward Packet Data Channel. If the base station supports two Forward Packet Data Channels with Radio Configuration 10, the base station shall support from one to 28 32-chip Walsh channels on each Forward Packet Data Channel, and shall not support more than 28 32-chip Walsh channels on both Forward Packet Data Channels. The subpackets of an encoder packet shall be transmitted using 1-, 2-, or 4-slot durations. If 16-QAM is used, the channel gain of the Forward Packet Data Channel shall be constant within a slot and may vary from slot to slot. If two Forward Packet Data Channels are used at a particular time, both shall use the same time-aligned subpacket duration during that subpacket. If two Forward Packet Data Channels are used, the information on the two channels shall be for different mobile stations.

An encoder packet shall be transmitted using one or more subpackets and the symbols selected for the subpackets, their slot duration, their modulation, and the number of Walsh channels that they use may vary from subpacket to subpacket.

The encoder packets shall be associated with a 2-bit ACID. See [3] for more details. Base stations that support the Forward Packet Data Channel with Radio Configuration 10 shall be capable of transmitting subpackets from two to four encoder packets with different ACIDs (‘00’, ‘01’, ‘10’, and ‘11’) to any mobile station. A base station that transmits to a mobile station that supports a maximum of 2 ACIDs shall only use ACIDs of ‘00’ and ‘01’. A base station that transmits to a mobile station using a maximum of three ACIDs shall only use ACIDs of ‘00’, ‘01’, and ‘10’.

For a given base station, the I and Q pilot PN sequences for the Forward Packet Data Channel shall use the same pilot PN sequence offset as for the Forward Pilot Channel.

The subpacket data rates shall be from 43.2 kbps to 3.0912 Mbps, as given in Table 3.1.3.1.15.4-1.

3.1.3.18.2 Forward Packet Data Channel Encoder Packet Structure

Encoder packets shall consist of the information bits followed by 16 frame quality indicator bits followed by 6 turbo encoder tail allowance bits. The structure and order of the encoder packet is shown in Figure 3.1.3.17.2.3-1.

Information Bits 194, 386, 770, 1538, 2306, 3074, or 3842 Bits	Frame Quality Indicator (16 Bits)	Turbo Encoder Tail Allowance (6 Bits)

Figure 3.1.3.17.2.3-1. Forward Packet Data Channel Encoder Packet Structure

3.1.3.18.2.1 Forward Packet Data Channel Packet Frame Quality Indicator

The frame quality indicator shall be calculated based on the input information bits. A 16-bit frame quality indicator with the generator polynomial specified in 3.1.3.1.4.1.1 shall be used. The frame quality indicator shall be computed as specified in 3.1.3.1.4.

3.1.3.18.2.2 Forward Packet Data Channel Turbo Encoder Tail Allowance

Encoder packets include a 6-bit turbo encoder tail allowance, as described in 3.1.3.18.2. The turbo encoder discards the turbo encoder tail allowance bits and adds turbo encoder output tail bits such that the number of bits out of the rate-1/5 turbo encoder is five times the number of bits in an encoder packet.

3.1.3.18.3 Forward Packet Data Channel Turbo Encoding

Encoder packets shall be turbo encoded with a code rate of 1/5 as specified in 3.1.3.1.5.2.

3.1.3.18.4 Forward Packet Data Channel Interleaving

The turbo encoder output sequence shall be interleaved as specified in 3.1.3.1.8.1.3.

3.1.3.18.5 Forward Packet Data Channel Packet Data Scrambling

The interleaved sequence shall be covered with a scrambler sequence as specified in 3.1.3.1.11. The public long code mask shall be specified by PLCM_42 (see 2.3.6 in [5]). The generation of the private long code mask shall be as specified in 2.1.3.1.17.

3.1.3.18.6 Forward Packet Data Channel Subpacket Symbol Selection

Subpacket symbols are selected from the scrambler output sequence as specified in 3.1.3.1.13.

3.1.3.18.7 Forward Packet Data Channel Modulation

The symbols from the subpacket symbol selection process shall be modulated as specified in 3.1.3.1.15.

3.1.3.18.8 Forward Packet Data Channel Walsh Channel Processing

The modulated symbols shall be demultiplexed into Walsh channels, each Walsh channel shall be Walsh spread, and the spread symbols from the Walsh channels shall be summed as specified in 3.1.3.1.16.4.

3.1.3.18.9 Forward Packet Data Channel Quadrature Spreading

The Forward Packet Data Channel shall be PN spread as specified in 3.1.3.1.19.

3.1.3.18.10 Forward Packet Data Channel Filtering

The Forward Packet Data Channel shall be filtered as specified in 3.1.3.1.20.

3.1.3.18.11 Forward Packet Data Channel Transmission Processing

When the Physical Layer receives a PHY-FPDCH.Request(EP, SPID, NUM_SLOTS, WCI_SET, SYS_TIME) from the MAC Layer, the base station shall:

- Store the arguments EP, SPID, NUM_SLOTS, WCI_SET, and SYS_TIME.
- Use the EP, and SPID as information to form an encoder packet as specified in 3.1.3.1.13 with duration NUM_SLOTS. The Physical Layer shall use the Walsh codes corresponding to the Walsh code indices specified in WCI_SET to encode the encoder packet.
- Transmit the encoder packet on the Forward Packet Data Channel frame at SYS_TIME with duration NUM_SLOTS.

3.1.4 Limitations on Emissions

3.1.4.1 Conducted Spurious Emissions

The base station shall meet the requirements in Section 4.4.1 of the current version of [10].

3.1.4.2 Radiated Spurious Emissions

The base station shall meet the requirements in Section 4.4.2 of the current version of [10].

3.1.4.3 Intermodulation Products

The base station shall meet the requirements in Section 4.4.3 of the current version of [10].

3.1.5 Synchronization, Timing, and Phase

3.1.5.1 Timing Reference Source

Each base station shall use a time base reference from which all time-critical CDMA transmission components, including pilot PN sequences, frames, and Walsh functions, shall be derived. The time base reference shall be time-aligned to CDMA System Time, as described in 1.3. Reliable external means should be provided at each base station to synchronize each base station's time base reference to CDMA System Time. Each base station should use a frequency reference of sufficient accuracy to maintain time alignment to CDMA System Time.

In the event that the external source of System Time is lost,[37] the system shall maintain the base station transmit time within the tolerance specified in 3.1.5.2 for a period of time specified in the current version of [10].

3.1.5.2 Base Station Transmission Time

The base station shall meet the requirements in Section 4.2.1.1 of the current version of [10].

Time measurements are made at the base station antenna connector. If a base station has multiple radiating antenna connectors for the same CDMA channel, time measurements are made at the antenna connector having the earliest radiated signal.

The rate of change for timing corrections shall not exceed 101.725 ns per 200 ms.

3.1.5.3 Pilot to Walsh Cover Time Tolerance

The base station shall meet the requirements in Section 4.2.1.2 of the current version of [10].

3.1.5.4 Pilot to Walsh Cover Phase Tolerance

The base station shall meet the requirements in Section 4.2.1.3 of the current version of [10].

3.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in the current version of [10].

3.2 Receiver

3.2.1 Channel Spacing and Designation

Channel spacing and designations for the base station reception shall be as specified in 2.1.1.1.

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[37] These guidelines on time keeping requirements reflect the fact that the amount of time error between base stations that can be tolerated in a CDMA network is not a hard limit. Each mobile station can search an ever increasing time window as directed by the base stations. However, increasing this window gradually degrades performance, since wider windows require a longer time for the mobile stations to search out and to locate the various arrivals from all base stations that may be in view. An eventual limit on time errors occurs, since pilot addresses are derived as 64 chip time shifts of a length 32768 chip sequence. In a very extreme case where the maximum number of 512 sequences were assigned to base stations, these address sequences would be 64 chips apart. In this situation, it is possible that large time errors between base station transmissions would be confused with path-delayed arrivals from a given base station.

3.2.2 Demodulation Characteristics

The base station demodulation process shall perform complementary operations to the mobile station modulation process on the Reverse CDMA Channel (see 2.1.3).

If the base station supports the Forward Packet Data Channel with Radio Configuration 10, then it shall support the Reverse Acknowledgment Channel and the Reverse Channel Quality Indicator Channel.If the base station supports the Reverse Packet Data Channel with Radio Configuration 7, then it shall support the Reverse Packet Data Control Channel and may support the Reverse Request Channel.

If the base station supports the Forward Fundamental Channel with forward link Radio Configuration 11 or forward link Radio Configuration 12, then it shall support the Reverse Acknowledgment Channel 1. If the base station supports the Forward Supplemental Channel with forward link Radio Configuration 11 or forward link Radio Configuration 12, then it should support the Reverse Acknowledgment Channel 2 and the Reverse Acknowledgment Channel 3.

The base station receiver shall support the operation of the reverse power control subchannel as specified in 3.1.3.1.12.

The Reverse Traffic Channel frame is described in 2.1.3.9.2, 0, 2.1.3.13.2, 2.1.3.14.2, and 2.1.3.15.2. A base station may implement offset Reverse Traffic Channel frames as described in 2.1.3.9.1, 2.1.3.12.1, 2.1.3.13.1, 2.1.3.14.1, and 2.1.3.15.1.

3.2.2.1 Interface to the MAC Layer

This section specifies the passing of the received physical layer frames.

3.2.2.1.1 Reverse Pilot Channel Reception Processing

If $PILOT\_GATING\_USE\_RATE_S$ = 1, the base station shall monitor the Reverse Pilot Channel and continue monitoring the Reverse Fundamental Channel and/or the Reverse Dedicated Control Channel if they existed in active mode. If the base station detects the continuous Reverse Pilot or a valid frame for the Reverse Fundamental Channel or Reverse Dedicated Control Channel, the Physical Layer shall send a CONTINUOUS-REVERSE-PILOT.Indication to the MAC Layer.

3.2.2.1.2 Reverse Secondary Pilot Channel Reception Processing

Not specified.

3.2.2.1.3 Access Channel Reception Processing

When the base station receives an Access Channel frame, the Physical Layer shall send a PHY-ACH.Indication(SDU, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.4 Enhanced Access Channel Reception Processing

When the base station receives an Enhanced Access Channel Preamble, the Physical Layer shall send a PHY-EACHPreamble.Indication to the MAC Layer.

When the base station receives an Enhanced Access header, the Physical Layer shall send a PHY-EACHHeader.Indication(SDU, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set SDU to the received information bits.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

When the base station receives an Enhanced Access data frame, the Physical Layer shall send a PHY-EACH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of data bits of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.5 Reverse Common Control Channel Reception Processing

When the base station receives a Reverse Common Control Channel preamble, the Physical Layer shall send a PHY-RCCCHPreamble.Indication to the MAC Layer.

When the base station receives a Reverse Common Control Channel frame, the Physical Layer shall send a PHY-RCCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of data bits of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.6 Reverse Packet Data Control Channel Reception Processing

When the base station receives a Reverse Packet Data Control Channel frame, the Physical Layer shall send a PHY-RPDCCH.Indication(SDU, MSIB, BOOST, SYS_TIME) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set MSIB to the received value of MSIB.
- Set BOOST to the received value of BOOST.

- Set SYS_TIME to the system time (in 1.25 ms units) at which the first power control group of the Reverse Packet Data Control Channel frame was received.

3.2.2.1.7 Reverse Request Channel Reception Processing

When the base station receives a Reverse Request Channel frame, the Physical Layer shall send a PHY-RREQCH.Indication(SDU, SYS_TIME) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set SYS_TIME to the system time (in 1.25 ms units) at which the first power control group of the Reverse Request Channel frame was received.

3.2.2.1.8 Reverse Dedicated Control Channel Reception Processing

When the base station receives a Reverse Dedicated Control Channel frame, the Physical Layer shall send a PHY-DCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of information bits in the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

If the base station does not receive a Reverse Dedicated Control Channel frame at the end of a 20 ms frame boundary, the Physical Layer shall send a PHY-DCCH.Indication(SDU) to the MAC Layer after the base station performs the following actions:

- Set the SDU to NULL.
- Pass the SDU as an argument.

3.2.2.1.9 Reverse Acknowledgment Channel Reception Processing

When the base station receives a Reverse Acknowledgment Channel frame, the Physical Layer shall send a PHY-RACKCH.Indication(ACK_OR_NAK) to the MAC Layer after the base station performs the following actions:

- Set ACK_OR_NAK to NAK if a NAK was received on the Reverse Acknowledgment Channel and to ACK if an ACK was received on the Reverse Acknowledgment Channel.

When the base station receives a Reverse Acknowledgment Channel 1 frame, the Physical Layer shall send a PHY-RACKCH.Indication(ACK_OR_NAK) to the MAC Layer after the base station performs the following actions:

- Set ACK_OR_NAK to NAK if a NAK was received on the Reverse Acknowledgment Channel 1 and to ACK if an ACK was received on the Reverse Acknowledgment Channel 1.

When the base station receives a Reverse Acknowledgment Channel 2 frame, the Physical Layer shall send a PHY-RACKCH.Indication(ACK_OR_NAK) to the MAC Layer after the base station performs the following actions:

- Set ACK_OR_NAK to NAK if a NAK was received on the Reverse Acknowledgment Channel 2 and to ACK if an ACK was received on the Reverse Acknowledgment Channel 2.

When the base station receives a Reverse Acknowledgment Channel 3 frame, the Physical Layer shall send a PHY-RACKCH.Indication(ACK_OR_NAK) to the MAC Layer after the base station performs the following actions:

- Set ACK_OR_NAK to NAK if a NAK was received on the Reverse Acknowledgment Channel 3 and to ACK if an ACK was received on the Reverse Acknowledgment Channel 3.

3.2.2.1.10 Reverse Channel Quality Indicator Channel Reception Processing

When the base station receives a Reverse Channel Quality Indicator Channel frame, the Physical Layer shall send a PHY-RCQICH.Indication(CQI_VALUE, WALSH_COVER) to the MAC Layer after the base station performs the following action:

- Set the CQI_VALUE to the received channel quality indicator value.
- Set the WALSH_COVER to the 3-bit value corresponding to the 8-ary Walsh function received on the Reverse Channel Quality Indicator Channel as specified in Table 2.1.3.11.1-1.

3.2.2.1.11 Reverse Fundamental Channel Reception Processing

When the base station receives a Reverse Fundamental Channel frame, the Physical Layer shall send a PHY-FCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of bits of the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.12 Reverse Supplemental Channel Reception Processing

When the base station receives a Reverse Supplemental Channel frame, the Physical Layer shall send a PHY-SCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of bits of the SDU.

- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.13 Reverse Supplemental Code Channel Reception Processing

When the base station receives a Reverse Supplemental Code Channel frame, the Physical Layer shall send a PHY-SCCH.Indication(SDU, FRAME_DURATION, NUM_BITS, FRAME_QUALITY) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_DURATION to the duration of the received frame.
- Set NUM_BITS to the number of bits of the SDU.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

3.2.2.1.14 Reverse Packet Data Channel Reception Processing

When the base station receives a Reverse Packet Data Channel frame, the Physical Layer shall send a PHY-RPDCH.Indication(SDU, FRAME_QUALITY, SYS_TIME) to the MAC Layer after the base station performs the following actions:

- Set the SDU to the received information bits.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”
- Set SYS_TIME to the system time (in 1.25 ms units) at which the first power control group of the Reverse Packet Data Channel frame was received.

3.2.3 Limitations on Emissions

The base station shall meet the requirements in Section 3.6 of the current version of [10].

3.2.4 Receiver Performance Requirements

System performance is predicated on receivers meeting the requirements set forth in the current version of [10].