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3rd Generation Partnership Project 2 "3GPP2"

Physical Layer Standard for cdma2000 Spread Spectrum Systems

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FOREWORD

(This foreword is not part of this Standard)

This Specification was prepared by Telecommunication Industry Association Subcommittee TR45.5, *Spread Spectrum Digital Technology - Mobile and Personal Communications Standards*. This standard is an enhancement of TIA/EIA-95-B, *Mobile Station - Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum System*.

This Standard does not replace TIA/EIA-95-B.

This specification is comprised of six volumes that form a compatibility specification for land mobile communications systems operating in the 800 MHz cellular mobile telecommunications systems and the 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Communications Services (PCS) systems. The volumes included in this Specification are:

C.S0001-0 *Introduction to cdma2000 Standards for Spread Spectrum Systems*

C.S0002-0 *Physical Layer Standard for cdma2000 Spread Spectrum Systems*

C.S0003-0 *Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems*

C.S0004-0 *Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems*

C.S0005-0 *Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems*

C.S0006-0 *Analog Signaling Standard for cdma2000 Spread Spectrum Systems*

These specifications provide the basic portions of the cdma2000 air interface; however, other specifications and standards are required in order to complete the system. These documents are listed in the References section.

FOREWORD

This volume defines the physical layer of the C.S0002 specification. This volume 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 the document.

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 Standard.

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

NOTES

1. Compatibility, as used in connection with this standard, is understood to mean: Any mobile station that is able to place and receive calls in any 800 MHz cellular system or 1.8 to 2.0 GHz CDMA PCS system. Conversely all systems are able to place and receive calls for any mobile station. In a subscriber's home system, all call placement must be automatic. Preferably, call placement should be automatic when a mobile station is in roam status.
2. This compatibility specification is based upon the specific United States spectrum allocation for cellular and PCS systems.
3. 3GPP2 C.S0010-0 and C.S0011-0 provide specifications and measurement methods for base stations and mobile stations. While several specifications referenced by this document are not included in 3GPP2 C.S0010-0 and C.S0011-0, they will be added in subsequent revisions.
4. Those wishing to deploy systems compliant with this standard should also take notice of the requirement to be compliant with FCC Parts 15, 22, and 24.
5. RF Emissions. Minimum advisory standards of ANSI and the processing guidelines of FCC are contained in ANSI C95.1-1982 Advisory Standards and FCC Rules and Regulations respectively. Members should also take notice of the more stringent exposure criteria for the general public and for radio frequency carriers with low frequency amplitude modulation as given in NCRP Report No. 86.
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 specification to elaborate and further clarify items discussed in the body of the specification.
9. Unless indicated otherwise, this document presents numbers in decimal form. Binary numbers are distinguished in the text by the use of single quotation marks.
10. Some details of Spreading Rate 3 operation are not complete in this version of the Standard, known as Phase 1. Phase 2 will complete these features.
11. While communication between the Medium Access Control Layer and the Physical Layer is specified, there is no requirement to implement layering.
12. The following operators define mathematical operations:

NOTES

- $\times$ 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).
- 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 - ($y \times \lfloor x/y \rfloor$).

REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. ANSI and TIA maintain registers of currently valid national standards published by them.

—*American National Standards:*

1. TIA/EIA-97-C, *Recommended Minimum Performance Standards for Base Stations Supporting Dual-Mode Spread Spectrum Mobile Stations*.

2. TIA/EIA-98-C, *Recommended Minimum Performance Standards for Dual-Mode Spread Spectrum Mobile Stations*.

—*Other Standards:*

3. TSB58-A, *Administration of Parameter Value Assignments for TIA/EIA Spread Spectrum Standards*, 1999.

4. *Common Cryptographic Algorithms,* Revision C, 1997. An EAR-controlled document subject to restricted distribution. Contact the Telecommunications Industry Association, Arlington, VA.

REFERENCES

No text.

1 GENERAL

1.1 Terms

Access Channel. A Reverse CDMA Channel used by mobile stations for communicating to 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.

AWGN. Additive White Gaussian Noise.

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 9600 bps primary traffic only, 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.

bps. Bits per second.

BPSK. Biphase shift keying.

Broadcast 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.

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

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. For CDMA cellular systems, the channel is centered on one of the 30 kHz channels of the existing analog cellular system. For CDMA PCS systems, the channel is centered on one of the 50 kHz channels.

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.

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 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. Information bits are input to the encoder and code symbols are output from the encoder. See 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 Common Power Control Subchannel.

Common Power Control Channel. A forward common channel which transmits power control bits (i.e., common power control subchannels) to multiple mobile stations. The Common Power Control Channel is used by mobile stations operating in the Power Controlled Access Mode or Reservation Access Mode.

Common Power Control Group. A 1.25, 2.5, or 5 ms interval on the Common Power Control Channel which carries power control information for multiple mobile stations.

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 Power Controlled Access Mode on the Enhanced Access Channel or when operating in the Reservation Access Mode on the Reverse Common Control Channel.

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.

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.

Designated Access Mode. A mode of operation on the Reverse Common Control Channel where the mobile station responds to requests received on the Forward Common Control Channel.

Direct-Spread Forward Channel. A mode of operation used in all spreading rates that uses a single RF carrier.

Discontinuous Transmission (DTX). A mode of operation in which a base station or a mobile station switches on and off its transmitter or a particular code channel 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 Forward Channel.

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.

EIRP. See Effective Isotropic Radiated Power.

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

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, Power Controlled Access Mode, and 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 or Power Controlled Access Mode on the Enhanced Access Channel or while in the Reservation 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 Power Controlled Access Mode or 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.

Erasure Indicator Bit. A bit used in the Radio Configuration 2 Reverse Traffic Channel frame structure to indicate an erased Forward Fundamental Channel frame.

ERP. See Effective Radiated Power.

ESN. See Electronic Serial Number.

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 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 convolutional or turbo codes to assist in error correction of the link.

Forward Fundamental Channel. A portion of a Forward Traffic Channel which carries a combination of higher-level data and power 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 means for signal strength comparisons between base stations for determining when to handoff.

Forward Power Control Subchannel. A subchannel on the Forward Fundamental Channel or 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 Supplemental Channel. A portion of a Radio Configuration 3 through 9 Forward Traffic Channel which operates in conjunction with a Forward Fundamental Channel or a Forward Dedicated Control Channel in that Forward Traffic Channel to provide 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, and (optionally) with other Forward Supplemental Code Channels 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, and Forward Supplemental Code 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 Broadcast 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.

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 Forward Traffic Channel frames for Radio Configurations 2 through 9, all Reverse Traffic Channel frames for Radio Configurations 2 through 6, the Broadcast Channel, Common Assignment Channel, Enhanced Access Channel, and the Reverse Common Control Channel.

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

GHz. Gigahertz (10^9 Hertz).

Global Positioning System (GPS). A US government satellite system that provides location and time information to users. See Navstar GPS Space Segment / Navigation User Interfaces ICD-GPS-200 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.

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 with period 2^{42} -1 that is used for scrambling on the Forward CDMA Channel and spreading on the Reverse CDMA Channel. On the Forward Traffic Channel, the Paging Channel, the Broadcast Channel, the Common Assignment Channel, and the Forward Common Control Channel, the long code provides limited privacy. For Radio Configurations 3 through 6 on the Reverse Traffic Channel, the Enhanced Access Channel, and the Reverse Common Control Channel, the long code uniquely identifies a mobile station. See also Public Long Code and Private Long Code.

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 Forward Channel.

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 Switching Center (MSC). A configuration of equipment that provides cellular radiotelephone service. Also called the Mobile Telephone Switching Office (MTSO).

Modulation Symbol. The input to the signal point mapping block and the output of the interleaver or the sequence repetition block, if present.

Multi-Carrier Forward Channel. A mode of operation used with Spreading Rate N, with N > 1, that uses N adjacent 1.2288 Mcps direct-spread RF carriers. Interleaved data is demultiplexed onto each of the N adjacent carriers.

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.

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 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 for Spreading Rate 1 and Spreading Rate 3 MC and 192 PN chips for Spreading Rate 3 DS 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.

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

Power Controlled Access Mode. A mode used on the Enhanced Access Channel where a mobile station transmits an Enhanced Access preamble, an Enhanced Access header, and Enhanced Access data in the Enhanced Access probe using closed loop power control.

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 or Forward Fundamental 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 ESN, and 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 coder output.

QPSK. Quadrature phase shift keying.

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 transmission rates, modulation characteristics, and spreading rate.

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 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 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 a Reservation Access Mode or Designated Access Mode. It can be power controlled, and may support soft handoff when in Reservation Access Mode.

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 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 Reverse Traffic Channel which carries higher-level data and control information from a mobile station to a base station.

Reverse Pilot Channel. An unmodulated, direct-sequence spread spectrum signal transmitted continuously 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 through 9.

Reverse Supplemental Channel. A portion of a Radio Configuration 3 through 6 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. A traffic channel on which data and signaling are transmitted from a mobile station to a base station. The Reverse Traffic Channel is composed of up to one Reverse Dedicated Control Channel, up to one Reverse Fundamental Channel, zero to two Reverse Supplemental Channels, and zero to seven Reverse Supplemental Code Channels.

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 Reverse Fundamental Channel.

RF Carrier. A direct-spread RF channel. For direct-spread systems, the number of RF carriers per channel is one. For multi-carrier systems, the number of RF carriers is equal to the Spreading Rate.

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 a Forward Supplemental Channel.

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

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

Spreading Rate. The PN chip rate of the system, defined as a multiple of 1.2288 Mcps.

Spreading Rate 1. A 1.2288 Mcps chip rate-based system using a direct-spread single carrier.

Spreading Rate 3. A 3.6864 Mcps chip rate-based system using three 1.2288 Mcps carriers (see Multi-Carrier Forward Channel) or a single 3.6864 Mcps direct-spread carrier (see Direct-Spread Forward Channel) on the Forward CDMA Channel. The Reverse CDMA Channel uses a 3.6864 Mcps direct-spread carrier.

SR. See Spreading Rate.

sps. Symbols per second.

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). Mobile stations use the same System Time, offset by the propagation delay from the base station to the mobile station. See also Universal Coordinated Time.

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.

Universal Coordinated Time (UTC). An internationally agreed-upon time scale maintained by the Bureau International de l'Heure (BIH) used as the time reference by nearly all commonly available time and frequency distribution systems i.e., WWV, WWVH, LORAN-C, Transit, Omega, and GPS.

UTC. Universal Temps Coordiné. See Universal Coordinated Time.

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).

µs. Microsecond (10^{-6} second).

1.2 Numeric Information

1.2.1 Mobile Station Stored Parameters

BASE_ID$_s$ – Base station identification of the current base station.

BEGIN_PREAMBLE$_s$ – A storage variable in the mobile station which contains the size of the preamble which shall be transmitted on a Reverse Supplemental Code Channel at the beginning of a Reverse Supplemental Code Channel transmission.

CURRENT_PUF_PROBE$_s$ – Number of the next PUF probe to be transmitted within the PUF attempt.

EACH_PREAMBLE_ADD_DURATION$_s$ – Length, in units of 1.25 ms, of the additional preamble sent prior to initializing the Enhanced Access Channel.

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.

EACH_PREAMBLE_ENABLED$_s$ – Indicates that a preamble will be sent on the Enhanced Access Channel.

EACH_PREAMBLE_NUM_FRAC$_s$ – Number of fractional preambles less one sent prior to initializing the Enhanced Access Channel.

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.

EACH_SLOT$_s$ – Enhanced Access Channel slot number.

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$_S$ – Indicates the channel that is associated with the Primary Reverse Power Control Subchannel and the channel (Forward Dedicated Control Channel or Forward Fundamental Channel) that includes a Forward Power Control Subchannel.

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

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

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

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

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

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

IC_THRES$_S$ – The threshold level at which the interference correction begins to be applied.

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

INIT_PWR_RCCCH$_S$ – Initial power offset for the Reverse Common Control Channel.

INIT_PWR_EACH$_S$ – Initial power offset for the Enhanced Access Channel.

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_EACH$_S$ – Nominal transmit power offset. A correction factor to be used by mobile stations in the open loop power estimate, initially applied on the Enhanced 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.

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

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, or 6.

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).

NUM_STEP$_s$ – Number of access probes in a single access probe sequence.

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$_s$ – Indicates 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.

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.

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

REV_SCH_FRAME_LENGTH$_s$ – Duration of the Reverse Supplemental Channel frames in multiples of 20 ms.

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

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.

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.

RCCCH_PREAMBLE_ENABLED$_s$ – Indicates that a preamble will be sent on Reverse Common Control Channel.

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

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.

RESUME_PREAMBLE$_s$ – A storage variable in the mobile station which contains the size of the preamble which shall be transmitted on a Reverse Supplemental Code Channel at the beginning of transmission on a Reverse Supplemental Code Channel when resuming transmission following an interruption when discontinuous transmission is occurring.

REV_DTX_DURATION$_s$ – Maximum duration of time in units of 20 ms that the mobile station is allowed to stop transmitting on a Reverse Supplemental Code Channel within the reverse assignment duration.

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

RL_GAIN_COMMON_PILOT$_s$ – Gain adjustment of the Enhanced Access Channel Header, Enhanced Access Channel Data, or Reverse Common Control Channel Data relative to the Reverse Pilot Channel.

RLGAIN_PILOT_ACCESS$_s$ – Power of the first Reverse Pilot Channel transmission relative to the last Access Channel probe.

RLGAIN_TRAFFIC_PILOT$_s$ – Gain adjustment of the Reverse Traffic Channel with Radio Configurations 3 through 6 relative to the Reverse Pilot Channel.

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

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 Channel.

CACN – Index number of the Common Assignment Channel.

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

FOR_SCH_FRAME_LENGTH – Duration of the Forward Supplemental Channel frames in multiples of 20 ms.

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

FPC_PRI_CHAN – Indicates the channel that is associated with the Primary Reverse Power Control Subchannel and the channel (Forward Dedicated Control Channel or Forward Fundamental Channel) that includes a Forward Power Control Subchannel.

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

FCCN – Index number of the Forward Common Control Channel.

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

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

1.2.3 MAC Interface Variables

FRAME_QUALITY_INDICATOR – An indication of the quality of the frame.

FRAME_RATE – The data rate of the frame.

FRAME_SIZE – The duration of the frame.

SDU – Service data unit.

NUM_PREAMBLE_FRAMES - The number of Access Channel preamble frames, sent in the *Transmit R-ACH Preamble Request*.

PWR_LVL – Power level adjustment of the Access probe, in units of PWR_STEP_S, sent in the *Transmit R-ACH Preamble Request* and *Transmit R-ACH Frame Request*.

RA – The Access Channel number, sent in the *Transmit R-ACH Preamble Request* and *Transmit R-ACH Frame Request*.

RN – The pseudo-random offset of the Access probe from a zero-offset Access Channel frame, sent in the *Transmit R-ACH Preamble Request* and *Transmit R-ACH Frame Request*.

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 Universal Coordinated 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.

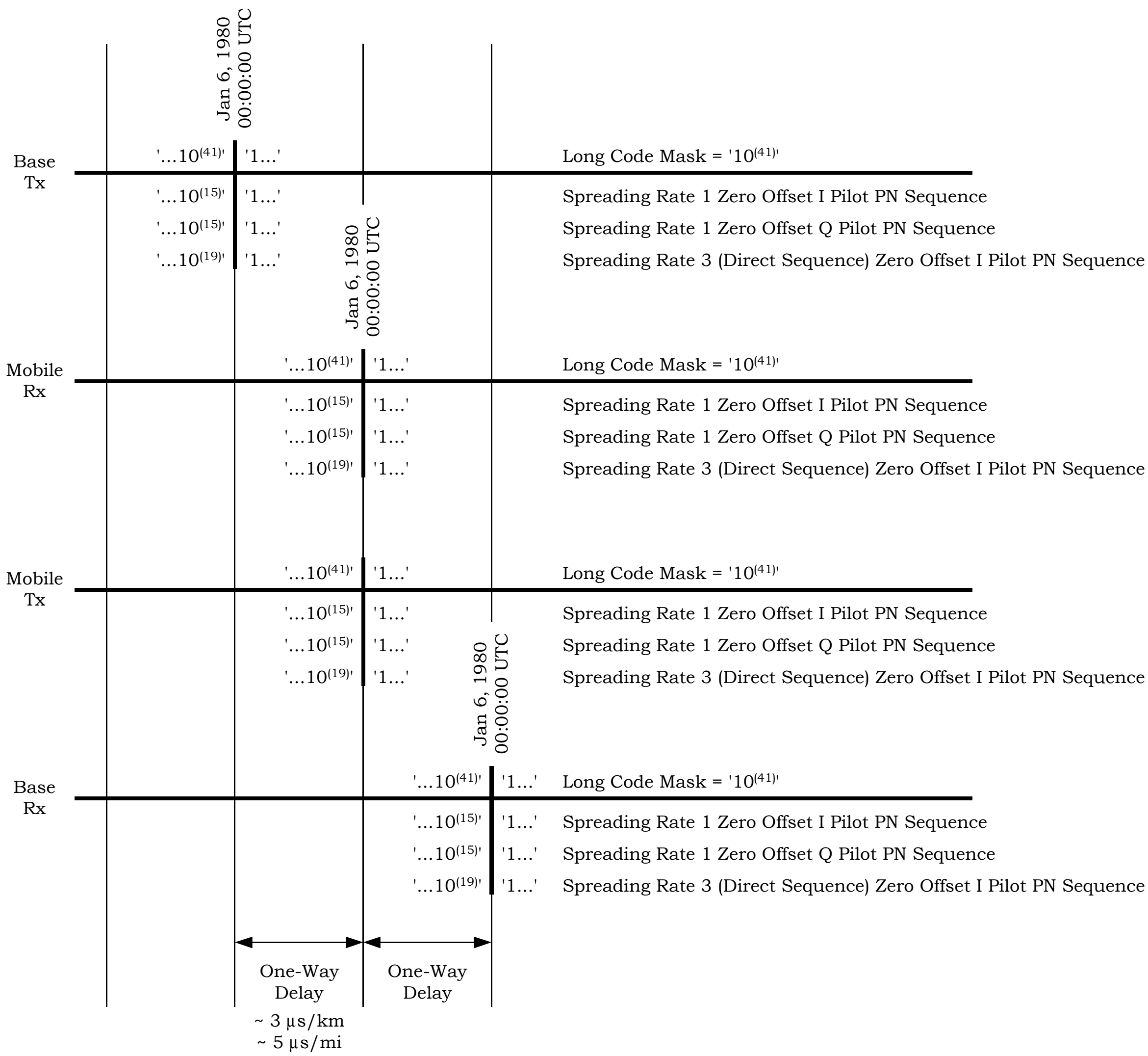
System Time keeps track of leap second corrections to UTC but does not use these corrections for physical adjustments to the System Time clocks.

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 2.1.3.1.12, 2.1.3.1.13, 3.1.3.1.10, and 3.1.3.1.14) 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 2.1.3.1.12-1, 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'.

For Spreading Rate 1 and Spreading Rate 3 MC, the initial state of the PN sequence, 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. For Spreading Rate 3 DS, the initial state of the I-channel PN sequence is the state in which the output of the PN sequence generator is the first '1' output following 19 consecutive '0' outputs. For Spreading Rate 3 DS, the Q-channel PN sequence is the I-channel PN sequence delayed by 524,288 chips.

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.

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 3GPP2 C.S0010-0 and C.S0011-0.

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.

No text.

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

2.1.1.1.1 Cellular Band

The Band Class 0 system designators for the mobile station and base station shall be as specified in Table 2.1.1.1.1-1.

Mobile stations supporting Band Class 0 shall be capable of transmitting in Band Class 0. The channel spacings, CDMA channel designations, and transmitter center frequencies of Band Class 0 shall be as specified in Table 2.1.1.1.1-2. Mobile stations supporting Band Class 0 and Spreading Rate 1 shall support operations on channel numbers 1013 through 1023, 1 through 311, 356 through 644, 689 through 694, and 739 through 777 inclusive as shown in Table 2.1.1.1.1-3. Mobile stations supporting Band Class 0 and Spreading Rate 3 shall support operations on channel numbers 51 through 250 and 417 through 583 inclusive as shown in Table 2.1.1.1.1-4.

Channel numbers for the Primary CDMA Channel and the Secondary CDMA Channel are given in 2.1.1.1.1-5.

A preferred set of Sync Channel frequency assignments for the multi-carrier mode is given in Table 2.1.1.1.1-6.

Table 2.1.1.1.1-1. Band Class 0 System Frequency Correspondence

System Designator	Transmit Frequency Band (MHz)	
	Mobile Station	**Base Station**
A	824.025–835.005 844.995–846.495	869.025–880.005 889.995–891.495
B	835.005–844.995 846.495–848.985	880.005–889.995 891.495–893.985

Table 2.1.1.1.1-2. CDMA Channel Number to CDMA Frequency Assignment Correspondence for Band Class 0

Transmitter	CDMA Channel Number	Center Frequency for CDMA Channel (MHz)
Mobile Station	$1 \le N \le 799$	0.030 N + 825.000
	$991 \le N \le 1023$	0.030 (N – 1023) + 825.000
Base Station	$1 \le N \le 799$	0.030 N + 870.000
	$991 \le N \le 1023$	0.030 (N – 1023) + 870.000

Table 2.1.1.1.1-3. CDMA Channel Numbers and Corresponding Frequencies for Band Class 0 and Spreading Rate 1

System Designator	CDMA Channel Validity	CDMA Channel Number	Transmit Frequency Band (MHz)	
			Mobile Station	Base Station
A" (1 MHz)	Not Valid Valid	991–1012 1013–1023	824.040–824.670 824.700–825.000	869.040–869.670 869.700–870.000
A (10 MHz)	Valid Not Valid	1–311 312–333	825.030–834.330 834.360–834.990	870.030–879.330 879.360–879.990
B (10 MHz)	Not Valid Valid Not Valid	334–355 356–644 645–666	835.020–835.650 835.680–844.320 844.350–844.980	880.020–880.650 880.680–889.320 889.350–889.980
A' (1.5 MHz)	Not Valid Valid Not Valid	667–688 689–694 695–716	845.010–845.640 845.670–845.820 845.850–846.480	890.010–890.640 890.670–890.820 890.850–891.480
B' (2.5 MHz)	Not Valid Valid Not Valid	717–738 739–777 778–799	846.510–847.140 847.170–848.310 848.340–848.970	891.510–892.140 892.170–893.310 893.340–893.970

Table 2.1.1.1.1-4. CDMA Channel Numbers and Corresponding Frequencies for Band Class 0 and Spreading Rate 3

System Designator	CDMA Channel Validity	CDMA Channel Number	Transmit Frequency Band (MHz)	
			Mobile Station	Base Station
A" (1 MHz)	Not Valid	991–1023	824.040–825.000	869.040–870.000
A (10 MHz)	Not Valid Valid Not Valid	1–36 37–262 263–333	825.030–826.080 826.110–832.860 832.890–834.990	870.030–871.080 871.110–877.860 877.890–879.990
B (10 MHz)	Not Valid Valid Not Valid	334–404 405–595 596–666	835.020–837.120 837.150–842.850 842.880–844.980	880.020–882.120 882.150–887.850 887.880–889.980
A' (1.5 MHz)	Not Valid	667–716	845.010–846.480	890.010–891.480
B' (2.5 MHz)	Not Valid	717–799	846.510–848.970	891.510–893.970

Table 2.1.1.1.1-5. CDMA Preferred Set of Frequency Assignments for Band Class 0

System Designator	Spreading Rate	Preferred Set Channel Numbers
A	1	283 (Primary) and 691 (Secondary)
	3	37, 78, 119, 160, 201, 242[1]
B	1	384 (Primary) and 777 (Secondary)
	3	425, 466, 507, 548, 589[1]

Table 2.1.1.1.1-6. Sync Channel Preferred Set of Frequency Assignments for Spreading Rate 3 MC for Band Class 0

Block Designator	Preferred Set of Channel Numbers
A	37, 160, 283
B	384, 507, 630

[1] The use of preferred channel numbers 242 or 425 for Spreading Rate 3 ensures that overlaid multi-channel forward link systems with 1.23 MHz inter-channel spacing will contain a Spreading Rate 1 Forward CDMA Channel that aligns with one of the Spreading Rate 1 preferred channel numbers.

2.1.1.1.2 PCS Band

The Band Class 1 block designators for the mobile station and base station shall be as specified in Table 2.1.1.1.2-1.

Mobile stations supporting Band Class 1 shall be capable of transmitting in Band Class 1. The channel spacings, CDMA channel designations, and transmitter center frequencies of Band Class 1 shall be as specified in Table 2.1.1.1.2-2. Mobile stations supporting Band Class 1 and Spreading Rate 1 shall support operations on channel numbers 25 through 1175 as shown in Table 2.1.1.1.2-3. Mobile stations supporting Band Class 1 and Spreading Rate 3 shall support operations on channel numbers 50 through 1150 as shown in Table 2.1.1.1.2-4. Note that certain channel assignments are not valid and others are conditionally valid. Transmission on conditionally valid channels is permissible if the adjacent block is allocated to the same licensee or if other valid authorization has been obtained.

A preferred set of CDMA frequency assignments is given in Table 2.1.1.1.2-5.

A preferred set of Sync Channel frequency assignments for the multi-carrier mode is given in Table 2.1.1.1.2-6.

Table 2.1.1.1.2-1. Band Class 1 System Frequency Correspondence

Block Designator	Transmit Frequency Band (MHz)	
	Mobile Station	Base Station
A	1850–1865	1930–1945
D	1865–1870	1945–1950
B	1870–1885	1950–1965
E	1885–1890	1965–1970
F	1890–1895	1970–1975
C	1895–1910	1975–1990

Table 2.1.1.1.2-2. CDMA Channel Number to CDMA Frequency Assignment Correspondence for Band Class 1

Transmitter	CDMA Channel Number	Center Frequency for CDMA Channel (MHz)
Mobile Station	$0 \leq N \leq 1199$	$1850.000 + 0.050\ N$
Base Station	$0 \leq N \leq 1199$	$1930.000 + 0.050\ N$

Table 2.1.1.1.2-3. CDMA Channel Numbers and Corresponding Frequencies for Band Class 1 and Spreading Rate 1

Block Designator	CDMA Channel Validity	CDMA Channel Number	Transmit Frequency Band (MHz)	
			Mobile Station	Base Station
A (15 MHz)	Not Valid Valid Cond. Valid	0–24 25–275 276–299	1850.000–1851.200 1851.250–1863.750 1863.800–1864.950	1930.000–1931.200 1931.250–1943.750 1943.800–1944.950
D (5 MHz)	Cond. Valid Valid Cond. Valid	300–324 325–375 376–399	1865.000–1866.200 1866.250–1868.750 1868.800–1869.950	1945.000–1946.200 1946.250–1948.750 1948.800–1949.950
B (15 MHz)	Cond. Valid Valid Cond. Valid	400–424 425–675 676–699	1870.000–1871.200 1871.250–1883.750 1883.800–1884.950	1950.000–1951.200 1951.250–1963.750 1963.800–1964.950
E (5 MHz)	Cond. Valid Valid Cond. Valid	700–724 725–775 776–799	1885.000–1886.200 1886.250–1888.750 1888.800–1889.950	1965.000–1966.200 1966.250–1968.750 1968.800–1969.950
F (5 MHz)	Cond. Valid Valid Cond. Valid	800–824 825–875 876–899	1890.000–1891.200 1891.250–1893.750 1893.800–1894.950	1970.000–1971.200 1971.250–1973.750 1973.800–1974.950
C (15 MHz)	Cond. Valid Valid Not Valid	900–924 925–1175 1176–1199	1895.000–1896.200 1896.250–1908.750 1908.800–1909.950	1975.000–1976.200 1976.250–1988.750 1988.800–1989.950

Table 2.1.1.1.2-4. CDMA Channel Numbers and Corresponding Frequencies for Band Class 1 and Spreading Rate 3

Block Designator	CDMA Channel Validity	CDMA Channel Number	Transmit Frequency Band (MHz)	
			Mobile Station	Base Station
A (15 MHz)	Not Valid Valid Cond. Valid	0–49 50–250 251–299	1850.000–1852.450 1852.500–1862.500 1862.550–1864.950	1930.000–1932.450 1932.500–1942.500 1942.550–1944.950
D (5 MHz)	Cond. Valid Valid Cond. Valid	300–349 350 351–399	1865.000–1867.450 1867.500 1867.550–1869.950	1945.000–1947.450 1947.500 1947.550–1949.950
B (15 MHz)	Cond. Valid Valid Cond. Valid	400–449 450–650 651–699	1870.000–1872.450 1872.500–1882.500 1882.550–1884.950	1950.000–1952.450 1952.500–1962.500 1962.550–1964.950
E (5 MHz)	Cond. Valid Valid Cond. Valid	700–749 750 751–799	1885.000–1887.450 1887.500 1887.550–1889.950	1965.000–1967.450 1967.500 1967.550–1969.950
F (5 MHz)	Cond. Valid Valid Cond. Valid	800–849 850 851–899	1890.000–1892.450 1892.500 1892.550–1894.950	1970.000–1972.450 1972.500 1972.550–1974.950
C (15 MHz)	Cond. Valid Valid Not Valid	900–949 950–1150 1151–1199	1895.000–1897.450 1897.500–1907.500 1907.550–1909.950	1975.000–1977.450 1977.500–1987.500 1987.550–1989.950

Table 2.1.1.1.2-5. CDMA Preferred Set of Frequency Assignments for Band Class 1

Block Designator	Spreading Rate	Preferred Set Channel Numbers
A	1	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275
	3	50, 75, 100, 125, 150, 175, 200, 225, 250
D	1	325, 350, 375
	3	350
B	1	425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675
	3	450, 475, 500, 525, 550, 575, 600, 625, 650
E	1	725, 750, 775
	3	750
F	1	825, 850, 875
	3	850
C	1	925, 950, 975, 1000, 1025, 1050, 1075, 1100, 1125, 1150, 1175
	3	950, 975, 1000, 1025, 1050, 1075, 1100, 1125, 1150

Table 2.1.1.1.2-6. Sync Channel Preferred Set of Frequency Assignments for Spreading Rate 3 MC for Band Class 1

Block Designator	Preferred Set of Channel Numbers
A	75, 150, 225
D	350
B	475, 550, 625
E	750
F	850
C	975, 1050, 1125

2.1.1.2 Frequency Tolerance

The mobile station shall meet the requirements in Section 4.1.1 of the current version of 3GPP2 C.S0011-0.

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 3GPP2 C.S0011-0.

The mobile station shall be capable of transmitting at the minimum specified power level when commanded to maximum output power when transmitting only on the Access Channel, Enhanced Access Channel, Reverse Common Control Channel, Reverse Dedicated Control Channel, or Reverse Fundamental Channel. 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, or Reverse Supplemental Code 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 3GPP2 C.S0011-0.

2.1.2.2.2 Gated Output Power

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

2.1.2.2.2.1 Gated Output Power During Variable Rate Transmission

When operating with Radio Configuration 1 or 2 in variable data rate transmission mode, the mobile station transmits at nominal controlled power levels only during gated-on periods, which are defined as a power control group (see 2.1.3.1.9.1). Given an ensemble of power control groups for the Reverse Fundamental Channel, 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. During gated-off periods, between the transmissions of power control groups, the mobile station shall reduce its mean output power for the Reverse Fundamental Channel, 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.

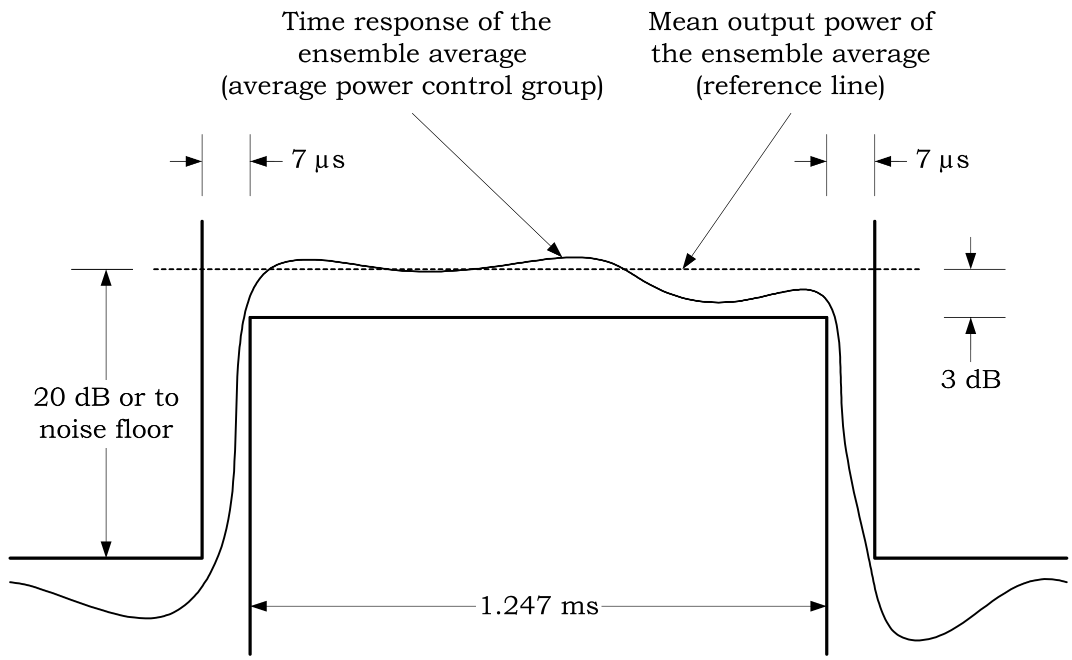


Figure 2.1.2.2.2.1-1. Transmission Envelope Mask (Average Gated-on Power Control Group)

2.1.2.2.2.2 Gated Output Power During Reverse Pilot Gating

If the mobile station is operating with Reverse Pilot Gating, the mobile station shall reduce the mean output power of gated-off power control groups, 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.

2.1.2.2.2.3 Gated Output Power During Preamble Transmission

If the mobile station is transmitting the Enhanced Access Channel preamble or the Reverse Common Control Channel preamble, the mobile station shall reduce the mean output power of gated-off 1.25 ms intervals, either by at least 20 dB with respect to the mean output power of the most recent gated-on 1.25 ms interval or to the transmitter noise floor, whichever is the greater power.

2.1.2.2.2.4 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 supporting Band Class 0 is disabled, the output noise density of the mobile station shall be less than -60 dBm/1.23 MHz for all frequencies within the mobile station's transmit band between 824 and 849 MHz.

When the transmitter of a mobile station supporting Band Class 1 is disabled, the output noise density of the mobile station shall be less than -60 dBm/1.23 MHz for all frequencies within the mobile station's transmit band between 1850 and 1910 MHz.

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 6, 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 the following equations, 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. The offset power is summarized in Table 2.1.2.3.1-1.

Table 2.1.2.3.1-1. Open Loop Power Offsets

Band Class	Spreading Rate	Reverse Channels	Offset Power[2]
0	1	Access Channel Reverse Traffic Channel (RC = 1 or 2)	-73
		Enhanced Access Channel Reverse Common Control Channel Reverse Traffic Channel (RC = 3 or 4)	-81.5
	3	Enhanced Access Channel Reverse Common Control Channel Reverse Traffic Channel (RC = 5 or 6)	-76.5
1	1	Access Channel Reverse Traffic Channel (RC = 1 or 2)	-76
		Enhanced Access Channel Reverse Common Control Channel Reverse Traffic Channel (RC = 3 or 4)	-84.5
	3	Enhanced Access Channel Reverse Common Control Channel Reverse Traffic Channel (RC = 5 or 6)	-79.5

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[3]

mean output power (dBm) =

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[2]For simplicity, the Offset Power constants are expressed without units. For example, -73 is equal to $10 \times \log_{10} (10^{-7.3}\ \mathrm{mW}^2)$.

[3]The purpose of having both an $INIT\_PWR_S$ and a $NOM\_PWR\_EXT_S$ value is to distinguish between their use. If $INIT\_PWR_S$ were 0, then $NOM\_PWR_S - 16 \times NOM\_PWR\_EXT_S$ would be the correction that should provide the correct received power at the base station. $NOM\_PWR_S - 16 \times NOM\_PWR\_EXT_S$ allows the open loop estimation process to be adjusted for different operating environments. $INIT\_PWR_S$ 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.

- mean input power (dBm)
+ offset power (from Table 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s$
+ $INIT\_PWR_s$
+ $PWR\_LVL \times PWR\_STEP_s$,

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.

The total range of the $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s$ correction is -24 to +7 dB. While operating in Band Class 0, $NOM\_PWR\_EXT_s$ is set to 0, making the total range of the correction from -8 to +7 dB. The range of the $INIT\_PWR_s$ parameter is -16 to +15 dB, with a nominal 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 $PWR_LVL \times PWR_STEP_s$of at least ±32 dB for mobile stations operating in Band Class 0, and ±40 dB for mobile stations operating in Band Class 1.

Prior to application of corrections from $PWR\_LVL \times PWR\_STEP_s$, 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s$.

This requirement shall be met over the full range of $NOM\_PWR_s - 16 \times NOM\_PWR\_EXT_s$ (from -8 to +7 dB for Band Class 0, and from -24 to +7 dB for Band Class 1).

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 2.1.3.4.2.3) at a mean output power defined by

mean pilot channel output power (dBm) =
- mean input power (dBm)
+ offset power (from Table 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_EACH_s$
+ $INIT\_PWR\_EACH_s$
+ 6
+ $PWR\_LVL \times PWR\_STEP\_EACH_s$,

where interference correction = $\min(\max(IC\_THRES_s - ECIO, 0), IC\_MAX_s)$, 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. For Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; for Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. For MC 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.

During an 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 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_EACH_s$
+ $INIT\_PWR\_EACH_s$
+ $PWR\_LVL \times PWR\_STEP\_EACH_s$.

If closed loop power control is enabled for the Enhanced Access Channel, then after the first valid power control bit is received, the mobile station shall transmit the Reverse Pilot Channel during the Enhanced Access header and Enhanced Access data transmission at a mean output power defined by

mean pilot channel output power (dBm) =
- mean input power (dBm)
+ offset power (from Table 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_EACH_s$
+ $INIT\_PWR\_EACH_s$
+ $PWR\_LVL \times PWR\_STEP\_EACH_s$
+ the sum of all closed loop power control corrections (dB).

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

The total range of the $NOM\_PWR\_EACH_s$ correction is -16 to +15 dB. The range of the $INIT\_PWR\_EACH_s$ parameter is -16 to +15 dB, with a nominal value of 0 dB. The range of the $PWR\_STEP\_EACH_s$ parameter is 0 to 7 dB. The accuracy of the adjustment to the mean output power due to $NOM\_PWR\_EACH_s$, $INIT\_PWR\_EACH_s$, or a single Enhanced Access probe correction of $PWR\_STEP\_EACH_s$ 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, $NOM\_PWR\_EACH_s$, $INIT\_PWR\_EACH_s$, $PWR\_LVL \times PWR\_STEP\_EACH_s$, and closed loop power control corrections (if applicable) of at least ±32 dB for mobile stations operating in Band Class 0, and of at least ±40 dB for mobile stations operating in Band Class 1.

Prior to application of corrections from $PWR\_LVL \times PWR\_STEP\_EACH_s$, closed loop power control corrections, with $INIT\_PWR\_EACH_s$ 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_EACH_s$.

This requirement shall be met over the full range of $NOM\_PWR\_EACH_s$ (from -16 to +15 dB).

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

The mobile station shall transmit the Reverse Common Channel 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_RCCCH_s$
+ $INIT\_PWR\_RCCCH_s$
+ PREV_CORRECTIONS
+ 6,

where interference correction = min(max(IC_THRES_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. For Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; for Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. For MC 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.

The mobile station shall set PREV_CORRECTIONS to PWR_LVL × $PWR\_STEP\_EACH_s$ + sum of all closed loop power control corrections, if applicable, from operation on the Enhanced Access Channel.

After transmitting the Reverse Common Control Channel preamble 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_RCCCH_s$
+ $INIT\_PWR\_RCCCH_s$
+ PREV_CORRECTIONS,

After the first valid power control bit is received, 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_RCCCH_s$
+ $INIT\_PWR\_RCCCH_s$
+ 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 total range of the $NOM\_PWR\_RCCCH_s$ correction is -16 to +15 dB. The range of the $INIT\_PWR\_RCCCH_s$ 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 $NOM\_PWR\_RCCCH_s$ or $INIT\_PWR\_RCCCH_s$ 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, $NOM\_PWR\_RCCCH_s$, $INIT\_PWR\_RCCCH_s$, and closed loop power control corrections of at least ±32 dB for mobile stations operating in Band Class 0, and ±40 dB for mobile stations operating in Band Class 1.

Prior to application of closed loop power control corrections, with $INIT\_PWR\_RCCCH_s$ 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 2.1.2.3.1-1)
+ interference correction
+ $NOM\_PWR\_RCCCH_s$
+ PREV_CORRECTIONS.

This requirement shall be met over the full range of $NOM\_PWR\_RCCCH_s$ (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 2.1.2.3.1-1)
+ interference correction
+ ACC_CORRECTIONS
+ $RL\_GAIN\_ADJ_s$,

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 $NOM\_PWR\_EACH_s + INIT\_PWR\_EACH_s + PWR\_LVL \times PWR\_STEP\_EACH_s$ + 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 $NOM\_PWR\_RCCCH_s + INIT\_PWR\_RCCCH_s$ + 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 2.1.2.3.1-1)
+ interference correction
+ ACC_CORRECTIONS
+ $RL\_GAIN\_ADJ_s$
+ 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, $RL\_GAIN\_ADJ_s$, and closed loop power control corrections of at least ±32 dB for mobile stations operating in Band Class 0, and ±40 dB for mobile stations operating in Band Class 1.

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

mean output power (dBm) =
- mean input power (dBm)
+ offset power (from Table 2.1.2.3.1-1)
+ interference correction
+ ACC_CORRECTIONS
+ $RL\_GAIN\_ADJ_s$
+ 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 total range of $PUF\_INIT\_PWR_S$ is 0 to 63 dB. The total range of $PUF\_PWR\_STEP_S$ is 0 to 31 dB. The total 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.

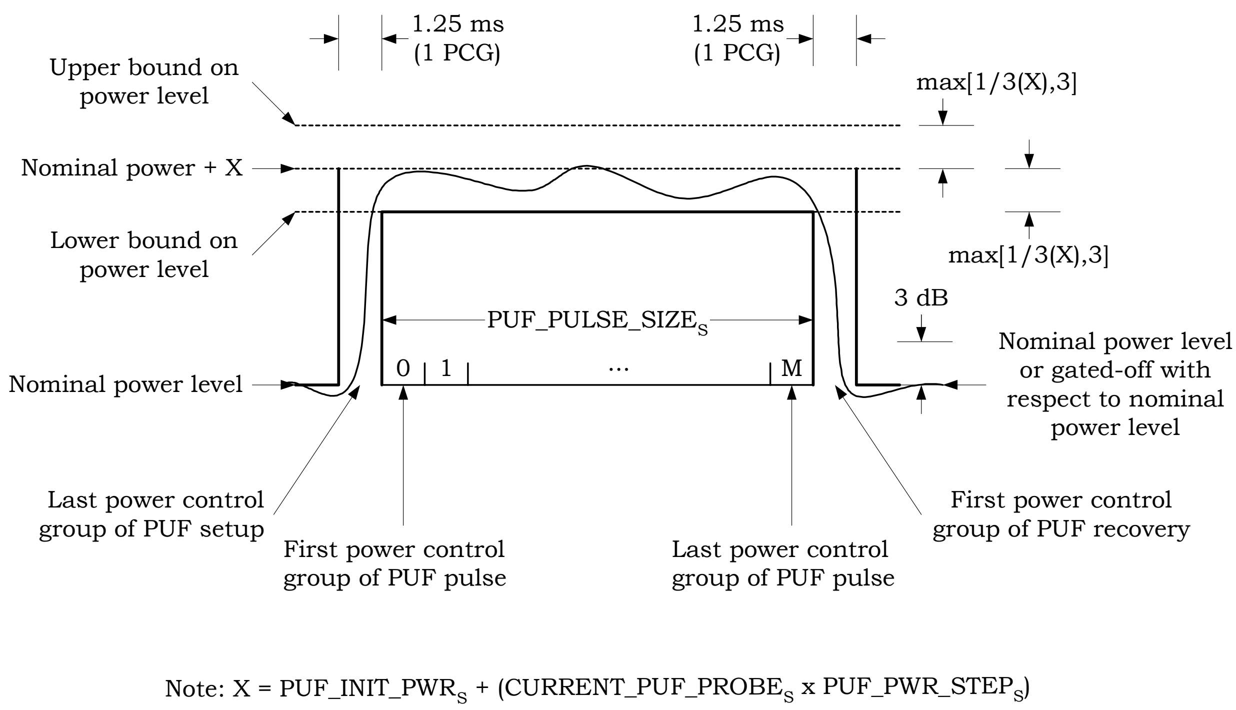


Figure 2.1.2.3.1.4-1. Power Up Function Transmission Envelope Mask

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

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

mean pilot channel output power (dBm) =
- mean input power (dBm)
+ offset power (from Table 2.1.2.3.1-1)
+ interference correction
+ ACC_CORRECTIONS
+ $RL\_GAIN\_ADJ_s$,

where interference correction = min(max(IC_THRES_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. For Spreading Rate 1, the mobile station shall determine the total received power spectral density, I_0, over 1.23 MHz; for Spreading Rate 3, the mobile station shall determine the total received power spectral density, I_0, over 3.69 MHz. For MC 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 $NOM\_PWR\_EACH_s + INIT\_PWR\_EACH_s + PWR\_LVL \times PWR\_STEP_s$ + 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 $NOM\_PWR\_RCCCH_s + INIT\_PWR\_RCCCH_s$ + PREV_CORRECTIONS + sum of all closed loop power control corrections (dB), if applicable.

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 2.1.2.3.1-1)
+ interference correction
+ ACC_CORRECTIONS
+ $RL\_GAIN\_ADJ_s$
+ 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, $RL\_GAIN\_ADJ_S$, and closed loop power control corrections of at least ±32 dB for mobile stations operating in Band Class 0, and ±40 dB for mobile stations operating in Band Class 1.

2.1.2.3.2 Closed Loop Output Power

For closed loop correction on the Reverse Enhanced Access Channel and 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 received on the Forward Common Power Control Channel.

For closed loop correction on the Reverse Traffic 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 3.1.3.1.11) received on the Forward Fundamental Channel or the Forward Dedicated 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 3.1.3.1.11), 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 gated transmission mode 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 was transmitted (see 3.1.3.1.11).

If the mobile station does not support operation on the Reverse Supplemental 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. 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 changed 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

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 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 terminate 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 6, 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 terminate transmission on at least one of the following code channels that are active: the Reverse Fundamental Channel, the Reverse Supplemental Channels, or the Reverse Dedicated Control Channel. 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 terminate 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.

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 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, the 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

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

The mobile station shall maintain a Nominal Reverse Common Channel Attribute Gain Table containing the 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 transmission rate and frame duration supported by the mobile station. The mobile station shall use the values given in Table 2.1.2.3.3.1-1.

Table 2.1.2.3.3.1-1. Nominal Reverse Common Channel Attribute Gain Table

Data Rate (bps)	Frame Length (ms)	Nominal_Reverse _Common_Channel _Attribute_Gain
9600	5 (Header)	50
9600	20	30
19200	10	Not Specified
19200	20	50
38400	5	Not Specified
38400	10	Not Specified
38400	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

$$\begin{aligned} &0.125 \times (\text{Nominal\_Reverse\_Common\_Channel\_Attribute\_Gain} \\ &\quad [\text{Rate, Frame Duration}]) \\ &+ 0.125 \times \text{RLGAIN\_COMMON\_PILOT}_s. \end{aligned}$$

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

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[4]

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × (Nominal_Attribute_Gain[Rate, Frame Duration, Coding]
+ Attribute_Adjustment_Gain[Rate, Frame Duration, Coding]
+ Reverse_Channel_Adjustment_Gain[Channel]
- Multiple_Channel_Adjustment_Gain[Channel]
+ RLGAIN_TRAFFIC_PILOT$_S$
+ RLGAIN_SCH_PILOT[Channel]$_S$).

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 containing the nominal Reverse Fundamental Channel, Reverse Supplemental Channel, or Reverse Dedicated Control Channel power relative to the Reverse Pilot Channel power for each transmission rate, frame duration, and coding rate supported by the mobile station. The mobile station shall use the values given in Table 2.1.2.3.3.2-1.

The mobile station shall maintain a Reverse Link Attribute Adjustment Gain Table containing an offset relative to the Reverse Pilot Channel power for each transmission rate, frame duration, and coding rate supported by the mobile station. The mobile station shall initialize each entry in this table to 0.[5]

The mobile station shall maintain a Reverse Channel Adjustment Gain Table containing an offset relative to the 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 RLGAIN_SCH_PILOT[Channel]$_S$ 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 × RLGAIN_TRAFFIC_PILOT$_S$ (dB).

---

[4] 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[Channel],
RLGAIN_TRAFFIC_PILOT$_S$, and RLGAIN_SCH_PILOT$_S$[Channel])

are integers, specified in units of 1/8 dB.

[5] The format of this table is similar to that of the Reverse Link Nominal Attribute Gain Table.

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

- Let Max_Channel identify the code channel with the highest Pilot_Reference_Level among the code channels on which the mobile station is transmitting.
- Set Multiple_Channel_Adjustment_Gain[Max_Channel] to 0.
- For all other code channels, set Multiple_Channel_Adjustment_Gain [Channel] to Pilot_Reference_Level[Max_Channel] - Pilot_Reference_Level[Channel].

Table 2.1.2.3.3.2-1. Reverse Link Nominal Attribute Gain Table (Part 1 of 2)

Data Rate (bps)	Frame Length (ms)	Coding	Nominal_Attribute _Gain	Pilot_Reference _Level
1,500	20	Convolutional	-47	0
2,700	20	Convolutional	-22	0
4,800	20	Convolutional	-2	0
9,600	20	Convolutional	30	0
9,600 (RC 3 and 5)	5	Convolutional	58	0
1,800	20	Convolutional	-42	3
3,600	20	Convolutional	-13	3
7,200	20	Convolutional	15	3
14,400	20	Convolutional	44	3
9,600 (RC 4 and 6)	5	Convolutional	54	3
19,200	20	Convolutional	50	1
38,400	20	Convolutional	60	11
76,800	20	Convolutional	72	21
153,600	20	Convolutional	84	36
307,200	20	Convolutional	96	54
614,400	20	Convolutional	Not Specified	Not Specified
28,800	20	Convolutional	56	11
57,600	20	Convolutional	72	18
115,200	20	Convolutional	80	32
230,400	20	Convolutional	88	46
460,800	20	Convolutional	Not Specified	Not Specified
1,036,800	20	Convolutional	Not Specified	Not Specified
All	40 or 80	Convolutional	Not Specified	Not Specified

Table 2.1.2.3.3.2-1. Reverse Link Attribute Gain Table (Part 2 of 2)

Data Rate (bps)	Frame Length (ms)	Coding	Nominal_Attribute _Gain	Pilot_Reference _Level
19,200	20	Turbo	44	2
38,400	20	Turbo	56	10
76,800	20	Turbo	68	19
153,600	20	Turbo	76	33
307,200	20	Turbo	88	50
614,400	20	Turbo	Not Specified	Not Specified
28,800	20	Turbo	52	9
57,600	20	Turbo	64	19
115,200	20	Turbo	76	29
230,400	20	Turbo	88	39
460,800	20	Turbo	Not Specified	Not Specified
1,036,800	20	Turbo	Not Specified	Not Specified
All	40 or 80	Turbo	Not Specified	Not Specified

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

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

for every code channel (i.e., the Reverse Fundamental Channel, Reverse Supplemental Channel, or 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

mean code channel output power (dBm) =
mean pilot channel output power (dBm)
+ 0.125 × Nominal_Attribute_Gain[Rate, Frame Duration, Coding].

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[Channel]
+ $\text{RLGAIN\_TRAFFIC\_PILOT}_s$
+ $\text{RLGAIN\_SCH\_PILOT}_s$[Channel]).

The Maximum Pilot Reference Level is the Pilot_Reference_Level given in Table 2.1.2.3.3.2-1 for the highest data rate transmitted by 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:

(a) upper limit:

for $0 < t < 24$ ms: $\max[1.2 \times |\Delta P_{in}| \times (t/24), |\Delta P_{in}| \times (t/24) + 2.0 \text{ dB}] + 1.5 \text{ dB}$,[6]

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

(b) lower limit:

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

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 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.

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

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, 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 6

When operating with Radio Configurations 3 through 6, the mobile station may have transmitted phase discontinuities. The mobile station shall meet the requirements set forth in the current version of 3GPP2 C.S0011-0.

2.1.3 Modulation Characteristics

2.1.3.1 Reverse CDMA Channel Signals

Signals transmitted on the Reverse Traffic Channel (i.e. Reverse Dedicated Control Channel, Reverse Fundamental Channel, Reverse Supplemental Channel, or Reverse Supplemental Code Channel) are specified by radio configurations. There are six 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, or 5. A mobile station may support operation on Radio Configuration 2, 4, or 6. 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 or 4 on the Reverse Traffic Channel.

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

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

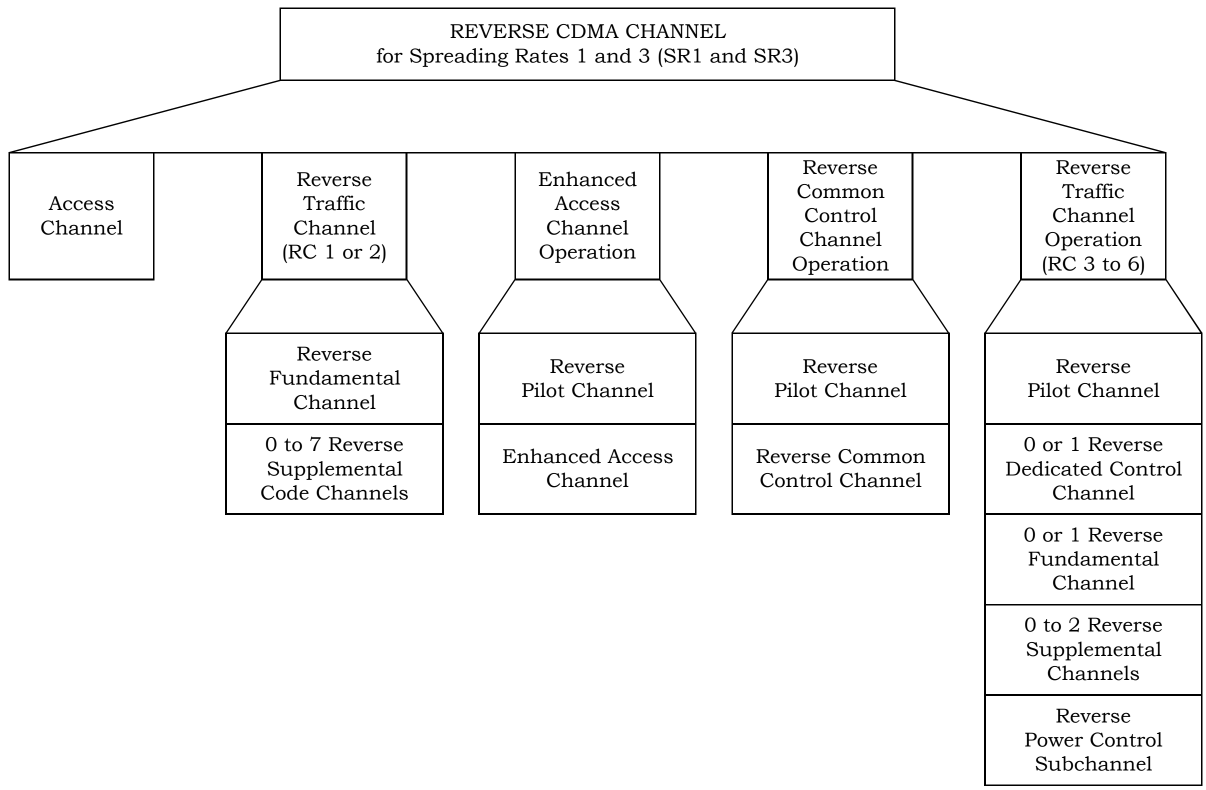


Figure 2.1.3.1.1-1. Reverse CDMA Channels Received at the Base Station

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 on the Reverse CDMA Channel for Spreading Rate 1

Channel Type	Maximum Number
Reverse Pilot Channel	1
Access Channel	1
Enhanced Access Channel	1
Reverse Common Control Channel	1
Reverse Dedicated Control Channel	1
Reverse Fundamental Channel	1
Reverse Supplemental Code Channel (RC 1 and 2 only)	7
Reverse Supplemental Channel (RC 3 and 4 only)	2

The structure of the Access Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-1. The structure of the Enhanced Access Channel for Spreading Rate 1 is shown in Figures 2.1.3.1.1.1-2 and 2.1.3.1.1.1-3. The structure of the Reverse Common Control Channel for Spreading Rate 1 is shown in Figure 2.1.3.1.1.1-3. The structure of the Reverse Dedicated Control Channel for Spreading Rate 1 is shown in Figures 2.1.3.1.1.1-4 and 2.1.3.1.1.1-5.

The Reverse Fundamental Channel and Reverse Supplemental Code Channel for Radio Configuration 1 have the overall structure shown in Figure 2.1.3.1.1.1-6. The Reverse Fundamental Channel and Reverse Supplemental Code Channel for Radio Configuration 2 have the overall structure shown in Figure 2.1.3.1.1.1-7. The Reverse Fundamental Channel and Reverse Supplemental Channel for Radio Configuration 3 have the overall structure shown in Figure 2.1.3.1.1.1-8. The Reverse Fundamental Channel and Reverse Supplemental Channel for Radio Configuration 4 have the overall structure shown in Figure 2.1.3.1.1.1-9.

The Reverse Pilot Channel is shown in Figure 2.1.3.1.10.1-1.

The I and Q mapping for the Enhanced Access Channel, Reverse Common Control Channel, and Reverse Traffic Channel with Radio Configurations 3 and 4 is shown in Figure 2.1.3.1.1.1-10.

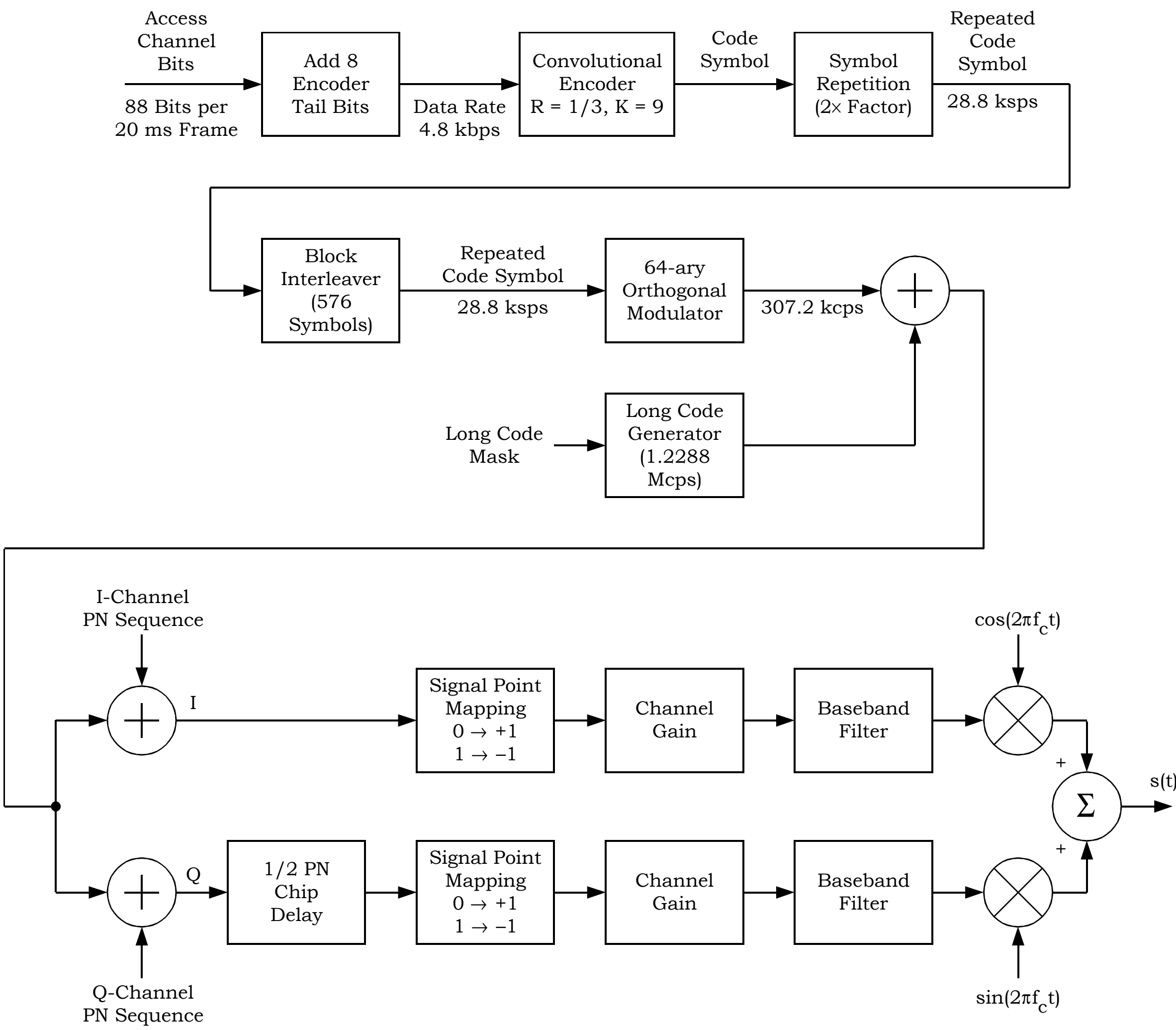


Figure 2.1.3.1.1.1-1. Channel Structure for the Access Channel for Spreading Rate 1

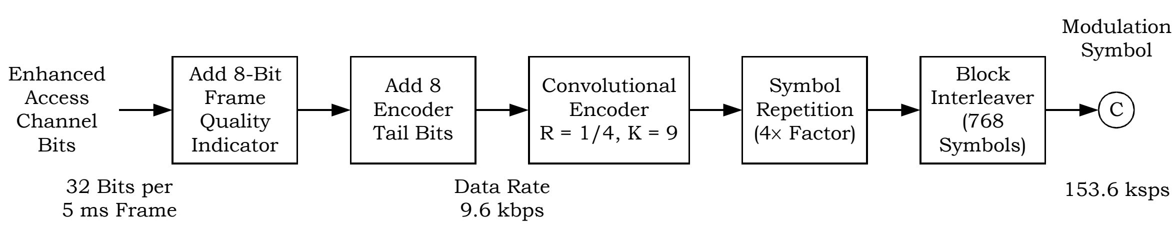
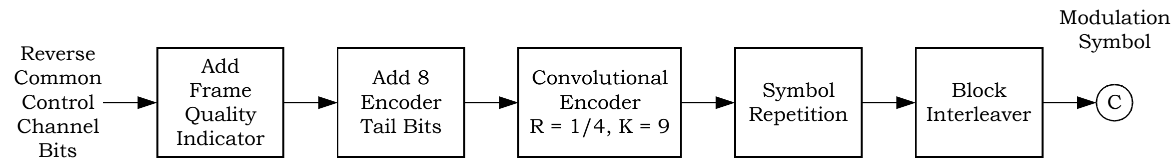
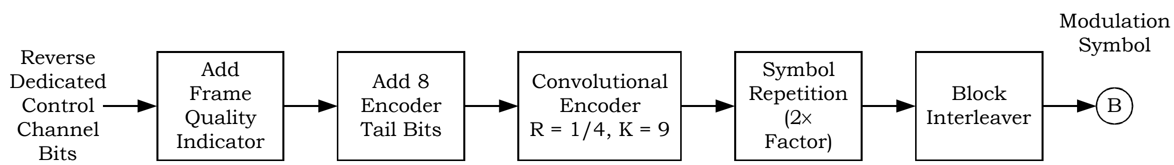


Figure 2.1.3.1.1.1-2. Channel Structure for the Header on the Enhanced Access Channel for Spreading Rate 1



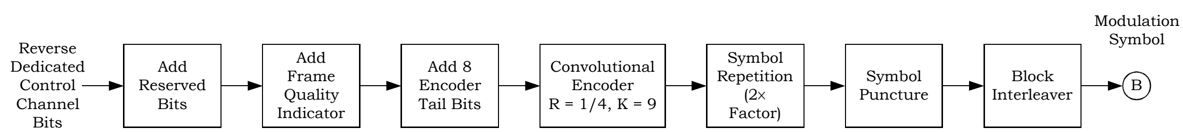
Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
172 Bits/5 ms	12	38.4	1×	768	153.6
360 Bits/10 ms	16	38.4	1×	1,536	153.6
172 Bits/10 ms	12	19.2	2×	1,536	153.6
744 Bits/20 ms	16	38.4	1×	3,072	153.6
360 Bits/20 ms	16	19.2	2×	3,072	153.6
172 Bits/20 ms	12	9.6	4×	3,072	153.6

Figure 2.1.3.1.1.1-3. Channel Structure for the Data on the Enhanced Access Channel and the Reverse Common Control Channel for Spreading Rate 1



Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	384	76.8
172 Bits/20 ms	12	9.6	1,536	76.8

Figure 2.1.3.1.1.1-4. Reverse Dedicated Control Channel Structure for Radio Configuration 3



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

Figure 2.1.3.1.1.1-5. Reverse Dedicated Control Channel Structure for Radio Configuration 4

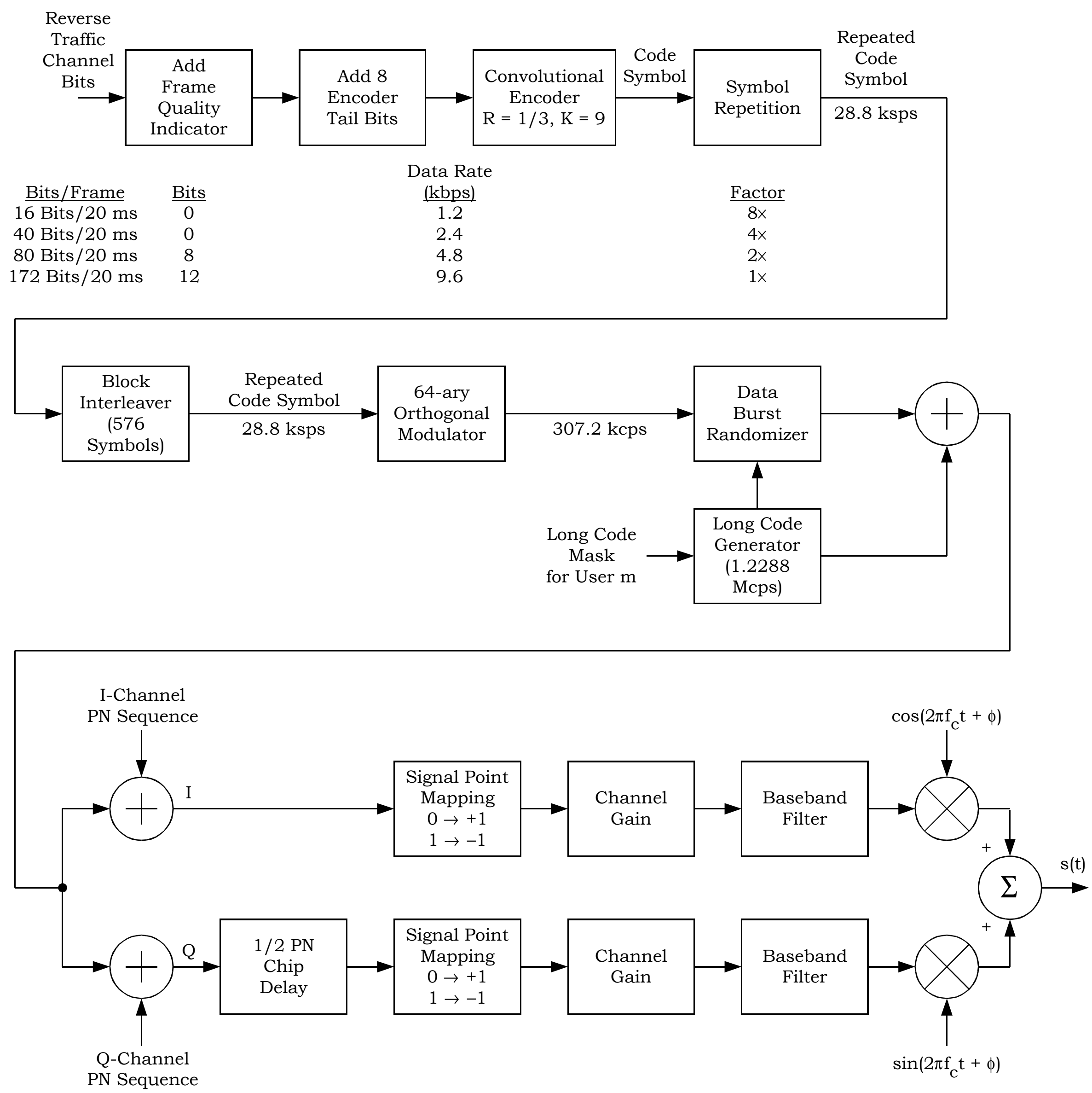


Figure 2.1.3.1.1.1-6. Channel Structure for the Reverse Fundamental Channel and Reverse Supplemental Code Channel with Radio Configuration 1

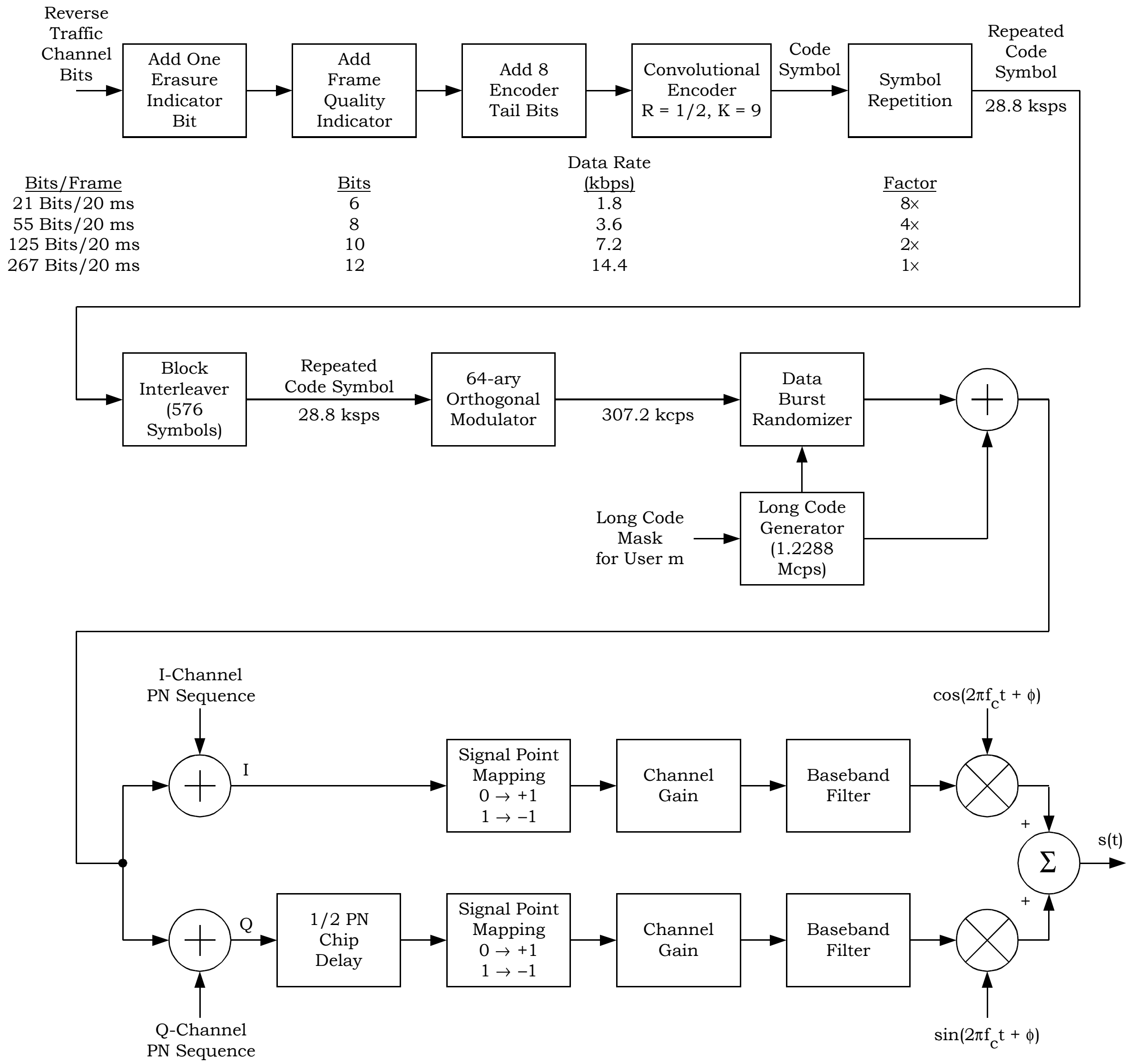
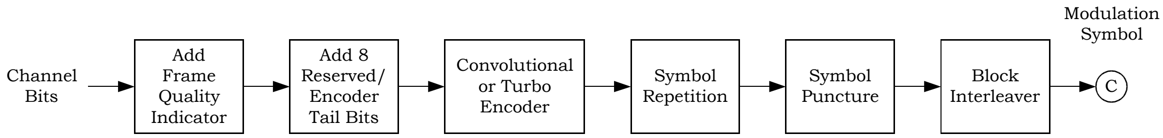


Figure 2.1.3.1.1.1-7. Channel Structure for the Reverse Fundamental Channel and Reverse Supplemental Code Channel with Radio Configuration 2

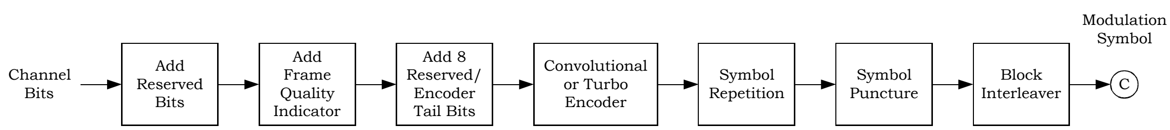


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/4	2×	None	384	76.8
16 Bits/20 ms	6	1.5	1/4	16×	1 of 5	1,536	76.8
40 Bits/20n ms	6	2.7/n	1/4	8×	1 of 9	1,536	76.8/n
80 Bits/20n ms	8	4.8/n	1/4	4×	None	1,536	76.8/n
172 Bits/20n ms	12	9.6/n	1/4	2×	None	1,536	76.8/n
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

Notes:

1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel, and the Reverse Fundamental Channel only uses from 16 to 172 channel bits per frame with n = 1.
3. Turbo coding may be used for the Reverse Supplemental Channels with 360 or more channel 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 2.1.3.1.1.1-8. 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

Notes:

1. n is the length of the frame in multiples of 20 ms. For 55 channel bits per frame, n = 1 or 2. For more than 55 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel, and the Reverse Fundamental Channel only uses from 21 to 267 channel bits per frame with n = 1.
3. Turbo coding may be used for the Reverse Supplemental Channels with 552 or more channel 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 2.1.3.1.1.1-9. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 4

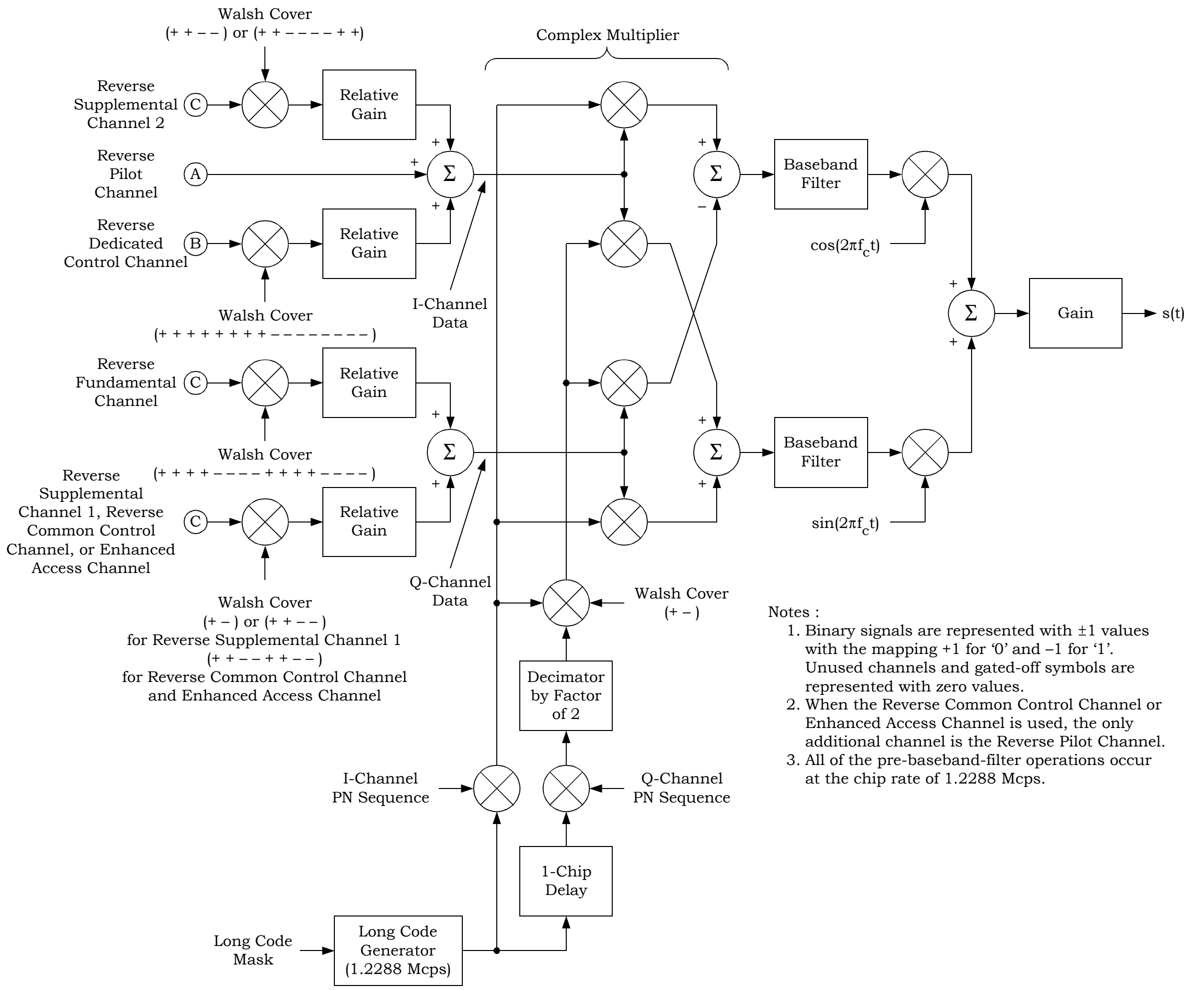


Figure 2.1.3.1.1.1-10. I and Q Mapping for Reverse Pilot Channel, Enhanced Access Channel, Reverse Common Control Channel, and Reverse Traffic Channel with Radio Configurations 3 and 4

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 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 Figures 2.1.3.1.1.2-1 and 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 Figures 2.1.3.1.1.2-3 and 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 is shown in Figure 2.1.3.1.10.1-1.

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

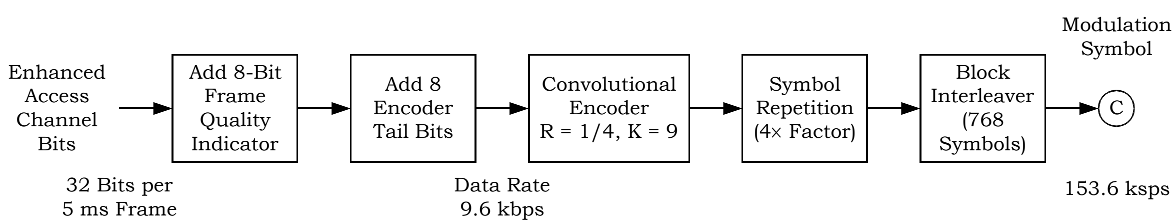
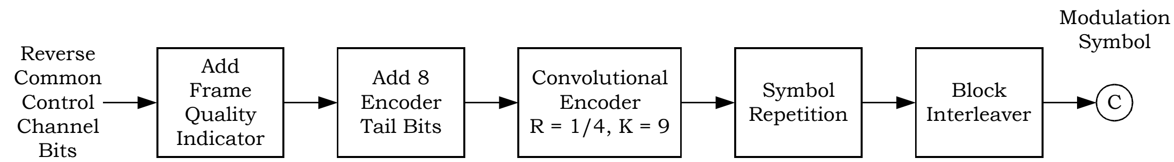
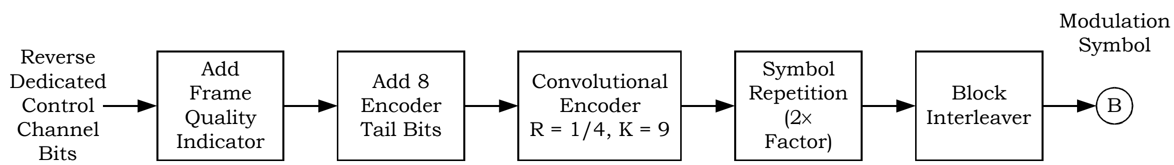


Figure 2.1.3.1.1.2-1. Channel Structure for the Header on the Enhanced Access Channel for Spreading Rate 3



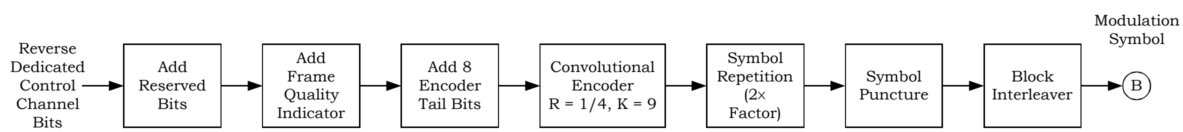
Bits/Frame	Bits	Data Rate (kbps)	Factor	Symbols	Rate (ksps)
172 Bits/5 ms	12	38.4	1×	768	153.6
360 Bits/10 ms	16	38.4	1×	1,536	153.6
172 Bits/10 ms	12	19.2	2×	1,536	153.6
744 Bits/20 ms	16	38.4	1×	3,072	153.6
360 Bits/20 ms	16	19.2	2×	3,072	153.6
172 Bits/20 ms	12	9.6	4×	3,072	153.6

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



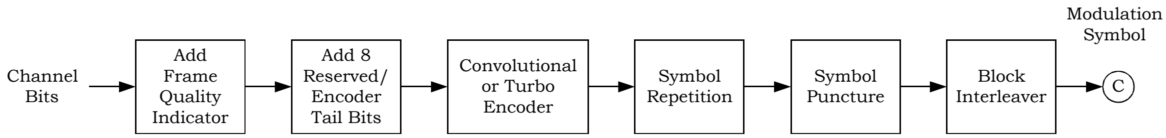
Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	384	76.8
172 Bits/20 ms	12	9.6	1,536	76.8

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



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

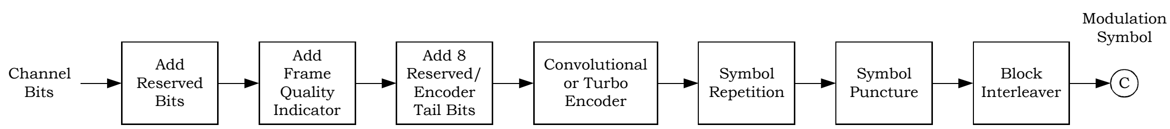
Figure 2.1.3.1.1.2-4. Reverse Dedicated Control Channel Structure for Radio Configuration 6



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

Notes:
1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel, and the Reverse Fundamental Channel only uses from 16 to 172 channel bits per frame with n = 1.
3. Turbo coding may be used for the Reverse Supplemental Channels with 360 or more channel 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 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

Notes:
1. n is the length of the frame in multiples of 20 ms. For 55 channel bits per frame, n = 1 or 2. For more than 55 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Reverse Fundamental Channel, and the Reverse Fundamental Channel only uses from 21 to 267 channel bits per frame with n = 1.
3. Turbo coding may be used for the Reverse Supplemental Channels with 552 or more channel 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 2.1.3.1.1.2-6. Reverse Fundamental Channel and Reverse Supplemental Channel Structure for Radio Configuration 6

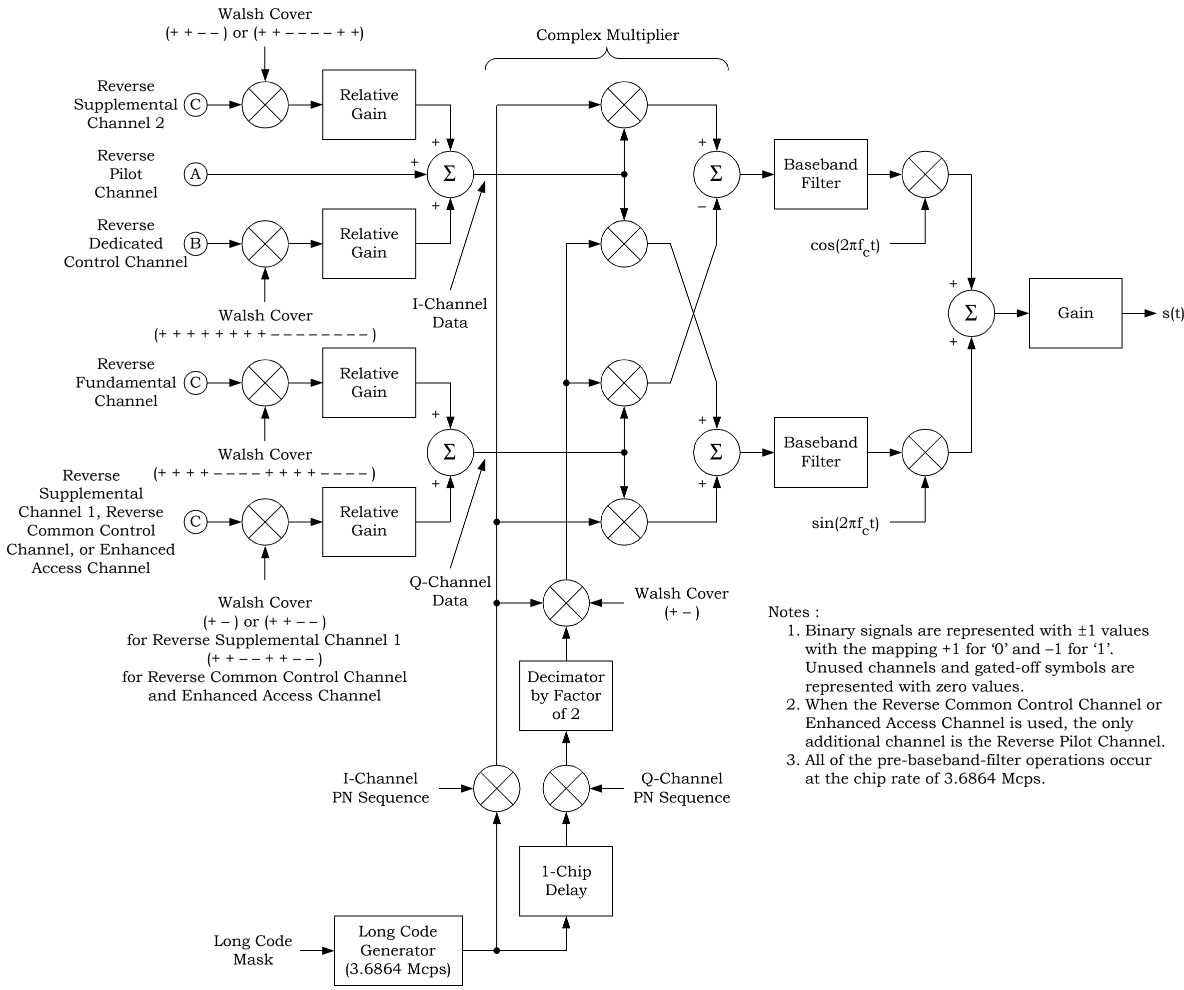


Figure 2.1.3.1.1.2-7. I and Q Mapping for Spreading Rate 3

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 Tables 2.1.3.1.2.1-1 through 2.1.3.1.2.1-14.

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

	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

Table 2.1.3.1.2.1-4. 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

Table 2.1.3.1.2.1-5. 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

Note: The 9600 bps data rate is used for 5 ms frames and the 14400 bps data rate is used for 20 ms frames.

Table 2.1.3.1.2.1-6. 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 2.1.3.1.2.1-7. 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 2.1.3.1.2.1-8. 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	%
Processing Gain	128/N	256	455.1	819.2	PN chips/bit

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

Table 2.1.3.1.2.1-9. 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

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

Table 2.1.3.1.2.1-10. 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

Note: N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.

Table 2.1.3.1.2.1-11. 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	%
Processing Gain	85.33/N	170.67	341.33	682.67	PN chips/bit

Note: N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400 bps, respectively.

Table 2.1.3.1.2.1-12. 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

Note: N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200 bps, respectively.

Table 2.1.3.1.2.1-13. 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

Note: N = 1, 2, or 4, which yields data rates of 14400, 28800, or 57600 bps, respectively.

Table 2.1.3.1.2.1-14. Reverse Fundamental Channel for 5 ms Frames

Parameter	Data Rate (bps) 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 Tables 2.1.3.1.2.2-1 through 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

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.

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 ($N \le 16$) 1/3 ($N \ge 32$)	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 ($N \le 2$) 38,400 × N ($4 \le N \le 16$) 28,800 × N ($N \ge 32$)	76,800	76,800	76,800	sps
Walsh Length	For Reverse Fundamental Channel: 16 For Reverse Supplemental Channel: 8, 4, or 2 ($N \le 4$) 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 ($N \le 2$) 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	%
Processing Gain	384/N	768	1,365.33	2,457.60	PN chips/bit

Note: N = 1, 2, 4, 8, 16, 32, or 64, which yields data rates of 9600, 19200, 38400, 76800, 153600, 307200, or 614400 bps, respectively.

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

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

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 ≤ 4) 1/3 (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) 28,800 × N (N ≥ 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

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

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	%
Processing Gain	256/N	512	1,024	2,048	PN chips/bit

Note: N = 1, 2, 4, 8, 16, 32, or 72, which yields data rates of 14400, 28800, 57600, 115200, 230400, 460800, or 1036800 bps, respectively.

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

Note: N = 1, 2, 4, 8, 16, or 36, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 518400 bps, respectively.

Table 2.1.3.1.2.2-10. Reverse Fundamental Channel and 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

Note: N = 1, 2, 4, 8, or 18, which yields data rates of 14400, 28800, 57600, 115200, or 259200 bps, respectively.

Table 2.1.3.1.2.2-11. Reverse Fundamental Channel 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.

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 Dedicated Control Channel	RC 3	9600
	RC 4	14400 (20 ms frames) or 9600 (5 ms frames)
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)
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)
	RC 4	230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800

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, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800

2.1.3.1.4 Forward Error Correction

The forward error correction types for channels with Spreading Rate 1 shall be as specified in Table 2.1.3.1.4-1. The forward error correction types for channels with Spreading Rate 3 shall be as specified in Table 2.1.3.1.4-2.

Table 2.1.3.1.4-1. 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 Dedicated Control Channel	Convolutional	1/4
Reverse Fundamental Channel	Convolutional	1/3 (RC 1) 1/2 (RC 2) 1/4 (RC 3 and 4)
Reverse Supplemental Code Channel	Convolutional	1/3 (RC 1) 1/2 (RC 2)
Reverse Supplemental Channel	Convolutional or Turbo ($N \geq 360$)	1/4 (RC 3, $N < 6120$) 1/2 (RC 3, $N = 6120$) 1/4 (RC 4)

Note: N is the number of channel bits per frame.

Table 2.1.3.1.4-2. 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 ($N \geq 360$)	1/4 (RC 5, $N < 6120$) 1/3 (RC 5, $N \geq 6120$) 1/4 (RC 6, $N < 20712$) 1/2 (RC 6, $N = 20712$)

Note: N is the number of channel bits per frame.

2.1.3.1.4.1 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.

2.1.3.1.4.1.1 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 2.1.3.1.4.1.1-1.

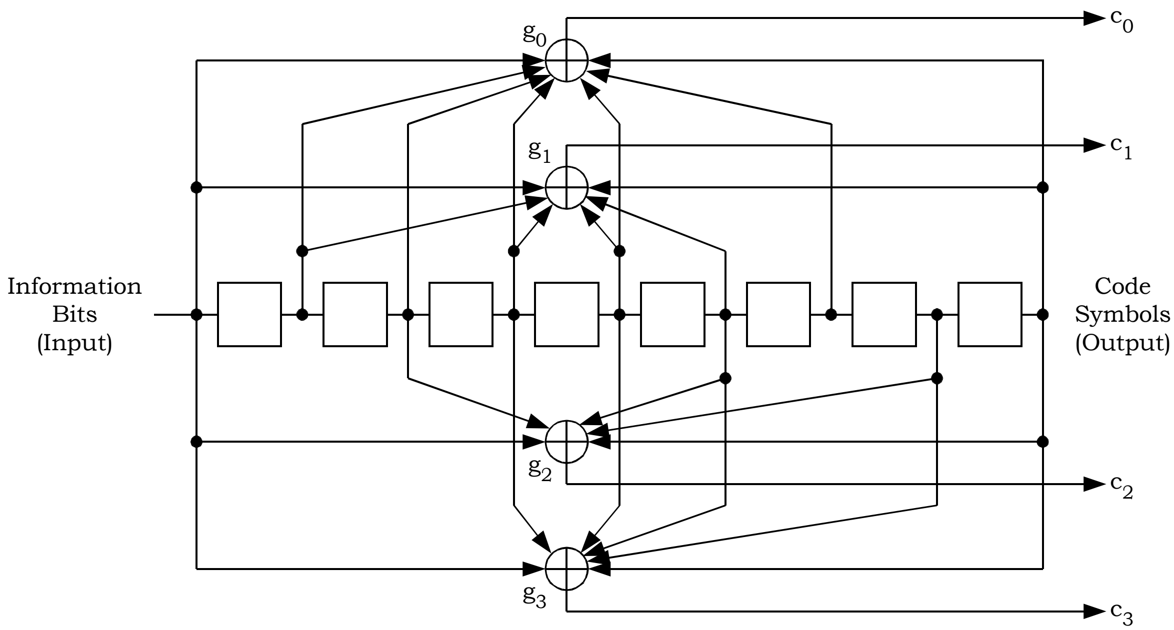


Figure 2.1.3.1.4.1.1-1. K = 9, Rate 1/4 Convolutional Encoder

2.1.3.1.4.1.2 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 2.1.3.1.4.1.2-1.

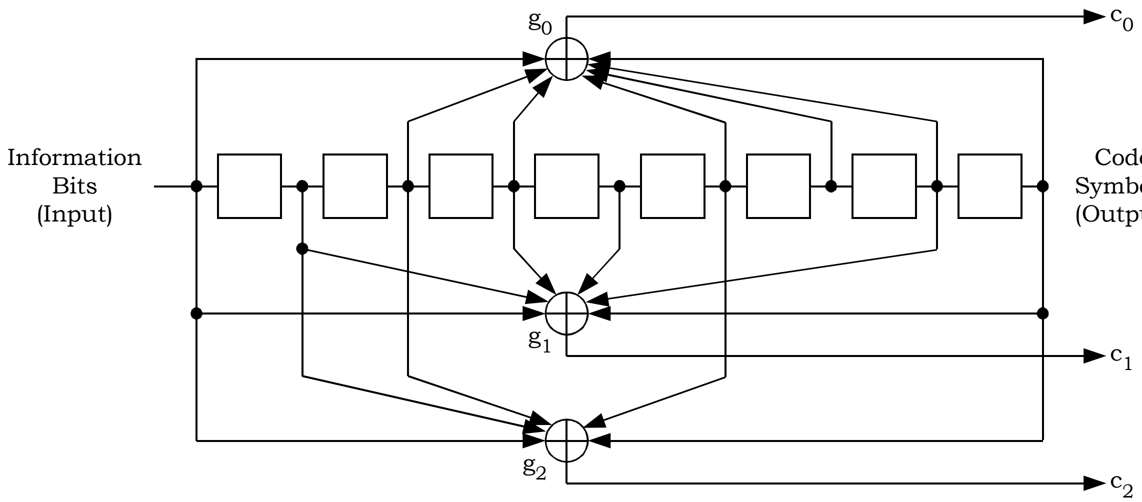


Figure 2.1.3.1.4.1.2-1. K = 9, Rate 1/3 Convolutional Encoder

2.1.3.1.4.1.3 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 2.1.3.1.4.1.3-1.

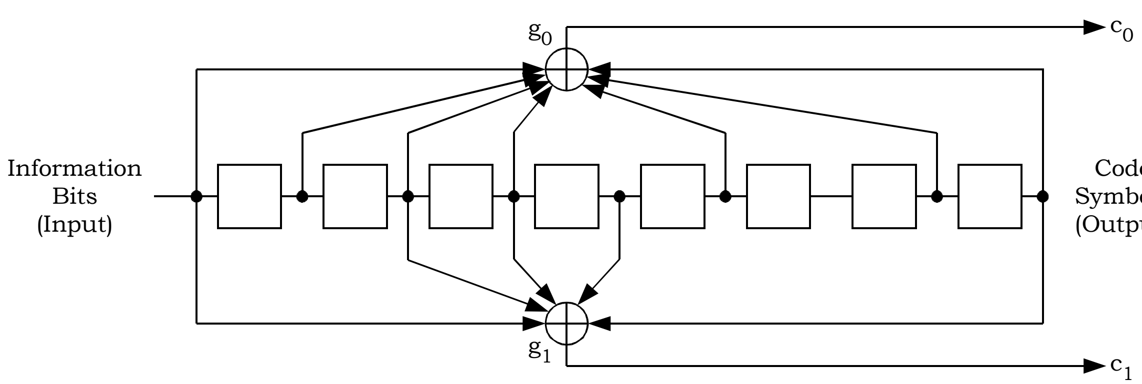


Figure 2.1.3.1.4.1.3-1. K = 9, Rate 1/2 Convolutional Encoder

2.1.3.1.4.2 Turbo Encoding

The turbo encoder encodes the data, frame quality indicator (CRC), and two reserved bits input to the turbo encoder and adds an encoder output tail sequence. If the total number of data, frame quality, and reserved input bits 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, or 1/4. 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.

2.1.3.1.4.2.1 Rate 1/2, 1/3, and 1/4 Turbo Encoders

A common constituent code shall be used for the turbo codes of rate 1/2, 1/3, and 1/4. The transfer function for the constituent code shall be

$$G(D) = \begin{bmatrix} 1 & \dfrac{n_0(D)}{d(D)} & \dfrac{n_1(D)}{d(D)} \end{bmatrix}$$

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 2.1.3.1.4.2.1-1. 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 circuit changes every data bit and tail bit period.

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 2.1.3.1.4.2.1-1. 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.

2.1.3.1.4.2.2 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 2.1.3.1.4.2.1-1. 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 constituent encoder output symbol puncturing and symbol repetition shall be as specified in Table 2.1.3.1.4.2.2-1. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a '1' means that a symbol shall be passed. 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 $X'X'Y'_0Y'_1$.

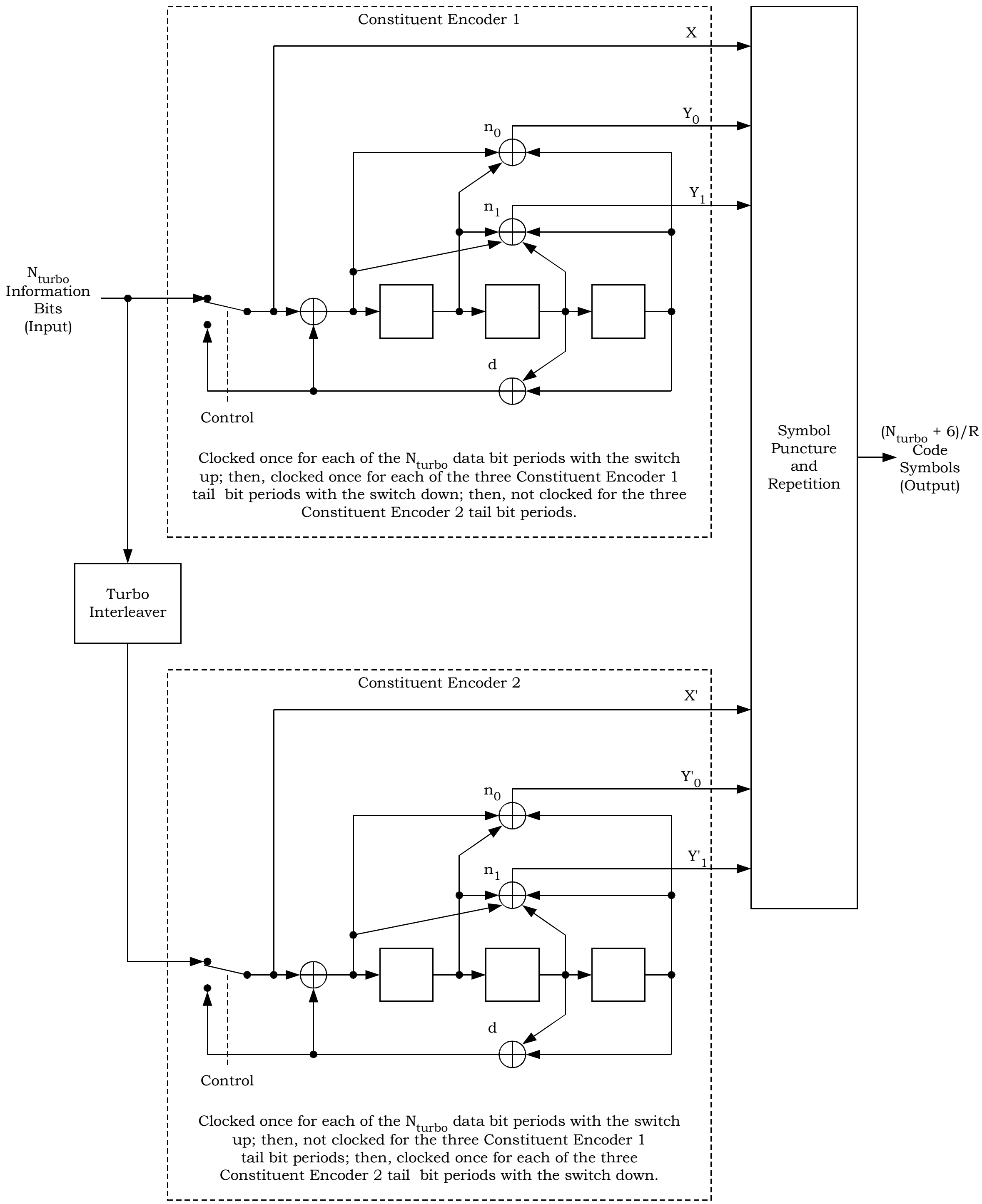


Figure 2.1.3.1.4.2.1-1. Turbo Encoder

Table 2.1.3.1.4.2.1-1. Puncturing Patterns for the Data Bit Periods

	Code Rate		
Output	**1/2**	**1/3**	**1/4**
X	11	11	11
Y_0	10	11	11
Y_1	00	00	10
X’	00	00	00
Y'_0	01	11	01
Y'_1	00	00	11

Note: For each rate, the puncturing table shall be read first from top to bottom and then from left to right.

Table 2.1.3.1.4.2.2-1. Puncturing Patterns for the Tail Bit Periods

	Code Rate		
Output	**1/2**	**1/3**	**1/4**
X	111 000	111 000	111 000
Y_0	111 000	111 000	111 000
Y_1	000 000	000 000	111 000
X’	000 111	000 111	000 111
Y'_0	000 111	000 111	000 111
Y'_1	000 000	000 000	000 111

Note: For rate 1/2 turbo codes, the puncturing table shall be read first from top to bottom and then from left to right. For rate 1/3 and 1/4 turbo codes, the puncturing table shall be read first from top to bottom repeating X and X’, and then from left to right.

2.1.3.1.4.2.3 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 number of symbols in the turbo interleaver. Then, the sequence of interleaver output addresses shall be equivalent to those generated by the procedure illustrated in Figure 2.1.3.1.4.2.3-1 and described below.[7]

1. Determine the turbo interleaver parameter, n, where n is the smallest integer such that $N_{turbo} \le 2^{n+5}$. Table 2.1.3.1.4.2.3-1 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 2.1.3.1.4.2.3-2 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.

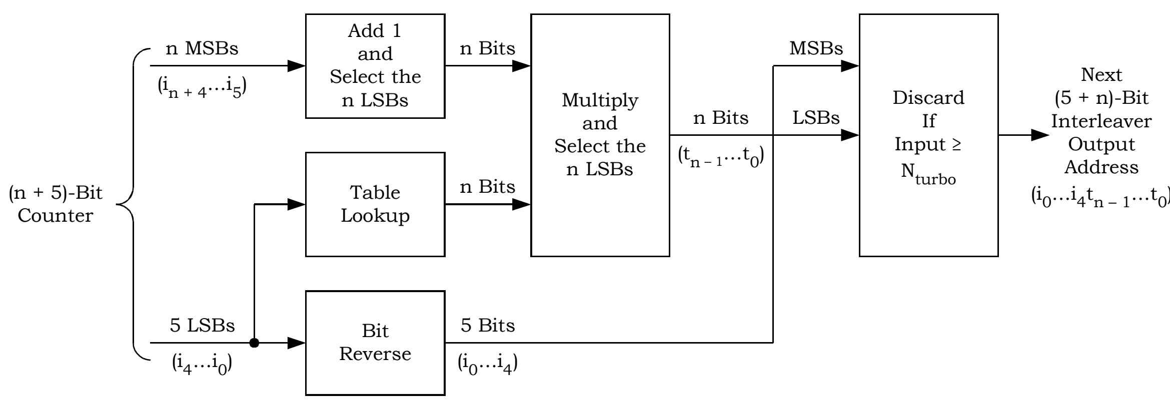


Figure 2.1.3.1.4.2.3-1. Turbo Interleaver Output Address Calculation Procedure

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[7] 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. 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.

Table 2.1.3.1.4.2.3-1. Turbo Interleaver Parameter

Turbo Interleaver Block Size N_{turbo}	Turbo Interleaver Parameter n
378	4
570	5
762	5
1,146	6
1,530	6
2,298	7
3,066	7
4,602	8
6,138	8
9,210	9
12,282	9
20,730	10

Table 2.1.3.1.4.2.3-2. Turbo Interleaver Lookup Table Definition

Table Index	n = 4 Entries	n = 5 Entries	n = 6 Entries	n = 7 Entries	n = 8 Entries	n = 9 Entries	n = 10 Entries
0	5	27	3	15	3	13	1
1	15	3	27	127	1	335	349
2	5	1	15	89	5	87	303
3	15	15	13	1	83	15	721
4	1	13	29	31	19	15	973
5	9	17	5	15	179	1	703
6	9	23	1	61	19	333	761
7	15	13	31	47	99	11	327
8	13	9	3	127	23	13	453
9	15	3	9	17	1	1	95
10	7	15	15	119	3	121	241
11	11	3	31	15	13	155	187
12	15	13	17	57	13	1	497
13	3	1	5	123	3	175	909
14	15	13	39	95	17	421	769
15	5	29	1	5	1	5	349
16	13	21	19	85	63	509	71
17	15	19	27	17	131	215	557
18	9	1	15	55	17	47	197
19	3	3	13	57	131	425	499
20	1	29	45	15	211	295	409
21	3	17	5	41	173	229	259
22	15	25	33	93	231	427	335
23	1	29	15	87	171	83	253
24	13	9	13	63	23	409	677
25	1	13	9	15	147	387	717
26	9	23	15	13	243	193	313
27	15	13	31	15	213	57	757
28	11	13	17	81	189	501	189
29	3	1	5	57	51	313	15
30	15	13	15	31	15	489	75
31	5	13	33	69	67	391	163

2.1.3.1.5 Code Symbol Repetition

Code symbols output from the forward error correction encoder shall be repeated as specified in Table 2.1.3.1.5-1.

Table 2.1.3.1.5-1. 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 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)
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)
	80 ms frames	4 (1200 or 1800 bps) 2 (2400 or 3600 bps) 1 (> 3600 bps)

2.1.3.1.6 Puncturing

2.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 2.1.3.1.6.1-1 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 puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/4	8 of 24	'111010111011 101011101010'	4 and 6
1/4	4 of 12	'110110011011'	4
1/4	1 of 5	'11110'	3 and 5
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.

2.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 2.1.3.1.6.2-1 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 puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.2-1. 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 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, and the Reverse Traffic Channel prior to modulation and transmission.

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

For the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, and the Reverse Traffic Channel with Radio Configurations 3, 4, 5, and 6, 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 a permutated 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 2.1.3.1.7-1.

Table 2.1.3.1.7-1. Interleaver Parameters

Interleaver 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 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 Enhanced Access Channel, the Reverse Common Control Channel, or the Reverse Traffic Channel in Radio Configuration 3 through 6, the mobile station uses orthogonal spreading.

2.1.3.1.8.1 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 2.1.3.1.8.1-

1 and are numbered 0 through 63. The modulation symbols shall be selected according to the following formula:

$$\text{Modulation symbol index} = c_0 + 2c_1 + 4c_2 + 8c_3 + 16c_4 + 32c_5,$$

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 2.1.3.1.8.1-1 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 2.1.3.1.8.1-1. 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

2.1.3.1.8.2 Orthogonal Spreading

When transmitting on the Reverse Pilot Channel, the Enhanced Access Channel, the Reverse Common Control Channel, or the Reverse Traffic Channel with Radio Configuration 3 through 6, the mobile station shall use orthogonal spreading. Table 2.1.3.1.8.2-1 specifies the Walsh functions that are applied to the Reverse CDMA Channels.

Table 2.1.3.1.8.2-1. Walsh Functions for Reverse CDMA Channels

Channel Type	Walsh Function
Reverse Pilot Channel	W_0^{32}
Enhanced Access Channel	W_2^{8}
Reverse Common Control Channel	W_2^{8}
Reverse Dedicated Control Channel	W_8^{16}
Reverse Fundamental Channel	W_4^{16}
Reverse Supplemental Channel 1	W_1^{2} or W_2^{4}
Reverse Supplemental Channel 2	W_2^{4} or W_6^{8}

Walsh function W_n^N represents a Walsh function of length N that is 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.

Tables 2.1.3.1.8.2-2 through 2.1.3.1.8.2-5 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. The Walsh function assignments in Tables 2.1.3.1.8.2-1 and 2.1.3.1.8.2-5 allow the Walsh function of either Reverse Supplemental Channel to be changed among the allowed combinations shown in the rows of the tables without changing the Walsh function assigned to the other Reverse Supplemental Channel.

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 2.1.3.1.8.2-2. Reverse Supplemental Channel Walsh Functions with Spreading Rate 1 when Only One Reverse Supplemental Channel Is Operating

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 2.1.3.1.8.2-3. Reverse Supplemental Channel Walsh Functions with Spreading Rate 1 when Two Reverse Supplemental Channels Are Operating

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 Used		
W_2^4 = (+ + – –)	153.6/M	M = 2, 4, 8, and 16	Not Used		
Not Used			W_2^4 = (+ + – –)	307.2/M	M = 1, 2, 4, 8, and 16
Not Used			W_6^8 = (+ + – – – – + +)	153.6/M	M = 1, 2, 4, and 8
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 = (+ + – –)	153.6/M	M = 2, 4, 8, and 16	W_6^8 = (+ + – – – – + +)	153.6/M	M = 1, 2, 4, and 8

Table 2.1.3.1.8.2-4. Reverse Supplemental Channel Walsh Functions with Spreading Rate 3 when Only One Reverse Supplemental Channel Is Operating

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 2.1.3.1.8.2-5. Reverse Supplemental Channel Walsh Functions with Spreading Rate 3 when Two Reverse Supplemental Channels Are Operating

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 Used		
W_2^4 = (+ + – –)	460.8/M	M = 2, 4, 6, 8, 12, 16, 24, 32, and 48	Not Used		
Not Used			W_2^4 = (+ + – –)	921.6/M	M = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, and 48
Not Used			W_6^8 = (+ + – – – – + +)	460.8/M	M = 1, 2, 3, 4, 6, 8, 12, 16, and 24
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 = (+ + – –)	460.8/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

2.1.3.1.9 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 Enhanced Access Channel preamble.
- Gated operation of the Reverse Common Control Channel preamble.

2.1.3.1.9.1 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 2.1.3.1.9.1-1. 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 2.1.3.1.9.2. 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 2.1.3.1.9.3).

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 2.1.3.1.9.1-2.

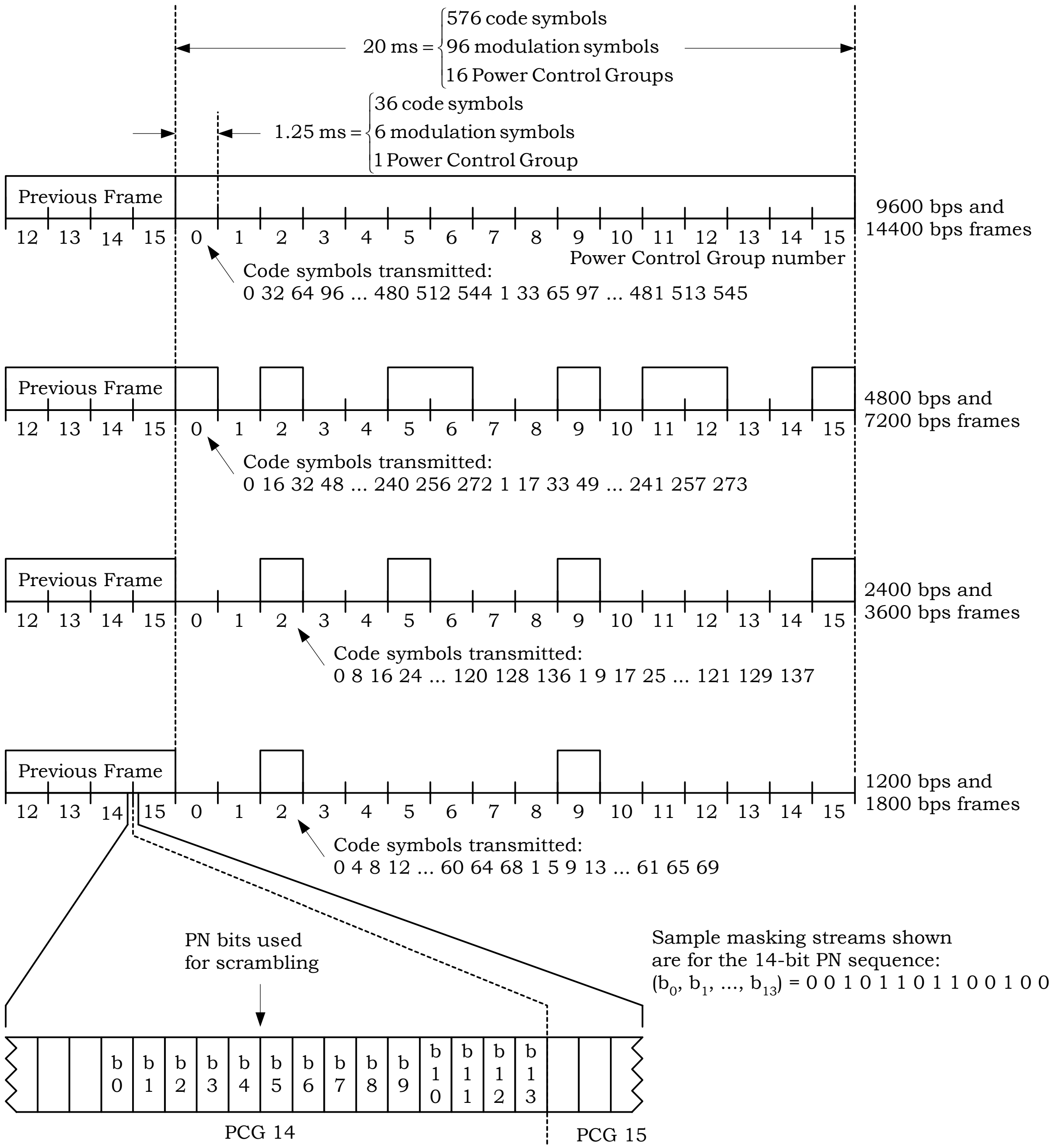

Figure 2.1.3.1.9.1-1. Reverse CDMA Channel Variable Data Rate Transmission for Radio Configurations 1 and 2 Example

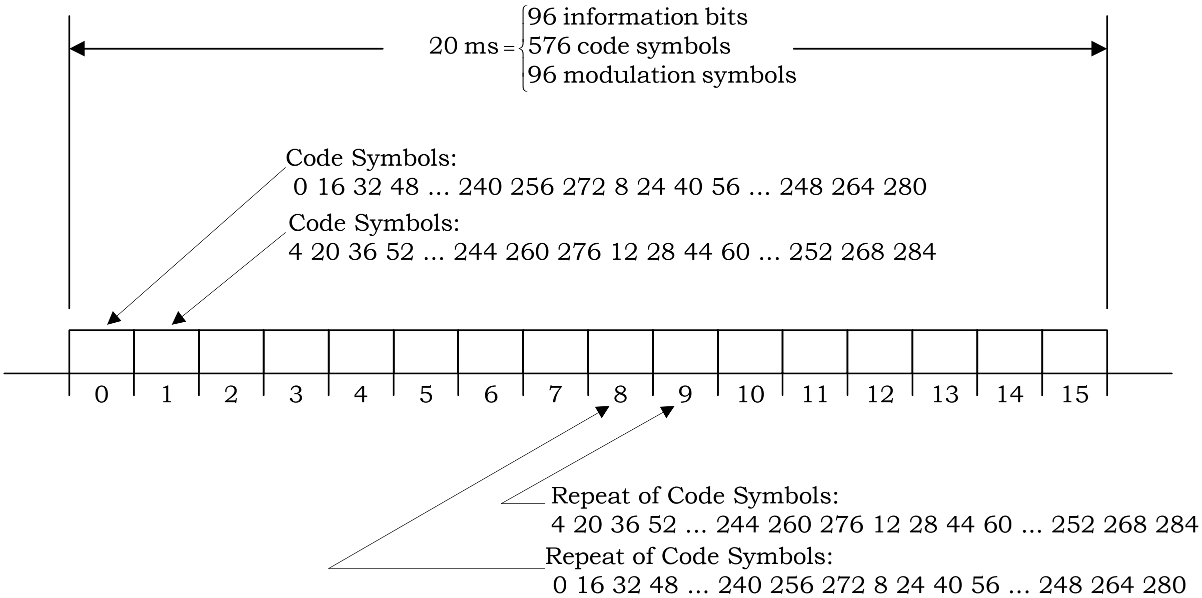

Figure 2.1.3.1.9.1-2. Access Channel Transmission Structure

2.1.3.1.9.2 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 2.1.3.1.9.1-1). In other words, these are the 14 bits which occur exactly one power control group (1.25 ms) before each Reverse Fundamental Channel frame boundary. These 14 bits are denoted as

$$b_0 \quad b_1 \quad b_2 \quad b_3 \quad b_4 \quad b_5 \quad b_6 \quad b_7 \quad b_8 \quad b_9 \quad b_{10} \quad b_{11} \quad b_{12} \quad b_{13},$$

where b_0 represents the oldest bit, and b_{13} represents the latest bit.[8]

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 2.1.3.1.9.1-1. The data burst randomizer algorithm shall be as follows:

Data Rate Selected: 9600 or 14400 bps

[8]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

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.

Data Rate Selected: 4800 or 7200 bps

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').

2.1.3.1.9.3 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.

2.1.3.1.9.4 Reverse Pilot Channel Gating

While operating in Radio Configurations 3 through 6, the mobile station shall perform Reverse Pilot Gating as specified in 2.1.3.2.3.

2.1.3.1.9.5 Enhanced Access Channel Preamble Gating

The mobile station shall perform gating on the Enhanced Access Channel as specified in 2.1.3.4.2.3.

2.1.3.1.9.6 Reverse Common Control Channel Preamble Gating

The mobile station shall perform gating on the Reverse Common Control Channel as specified in 2.1.3.5.2.3.

2.1.3.1.10 Reverse Power Control Subchannel

The Reverse Power Control Subchannel applies to Radio Configurations 3 through 6 only. The mobile station shall support both the inner power control loop and the outer power control loop for Forward Traffic Channel power control.

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. 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 with the corresponding outer power control loop setpoint 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) on the Reverse Power Control Subchannel upon the command of the base station.

2.1.3.1.10.1 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).

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 2.1.3.1.10.1-1).

For FPC_MODE_s = ‘000’, ‘001’, and ‘010’, 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. For FPC_MODE_s = ‘011’, each of the 384 × N PN chips on the Reverse Power Control Subchannel is a repetition of the Erasure Indicator Bit (EIB) generated by the mobile station (see 2.2.2.2).

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 2.1.3.1.10.1-1.

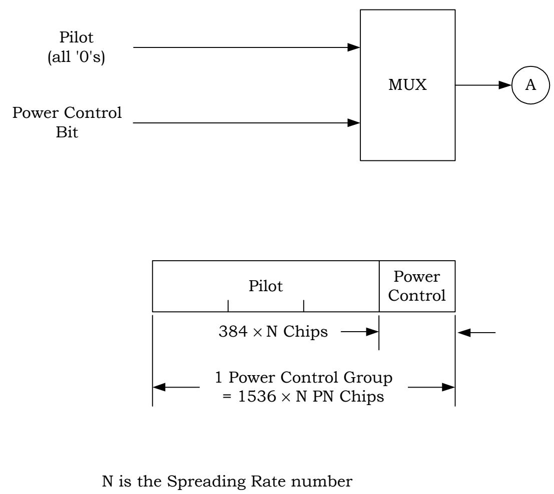

Figure 2.1.3.1.10.1-1. Reverse Power Control Subchannel Structure

The Reverse Pilot Channel can be transmitted with the gated transmission mode enabled or disabled as described in 2.1.3.2.3. When 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 2.1.3.1.10.1-2. When 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 timings of the forward and reverse power control subchannel transmissions when the gated transmission mode is enabled and disabled are depicted in Figure 2.1.3.1.10.1-3.

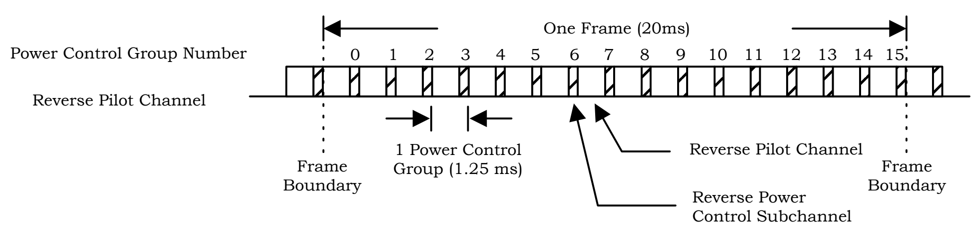

Figure 2.1.3.1.10.1-2. Reverse Power Control Subchannel

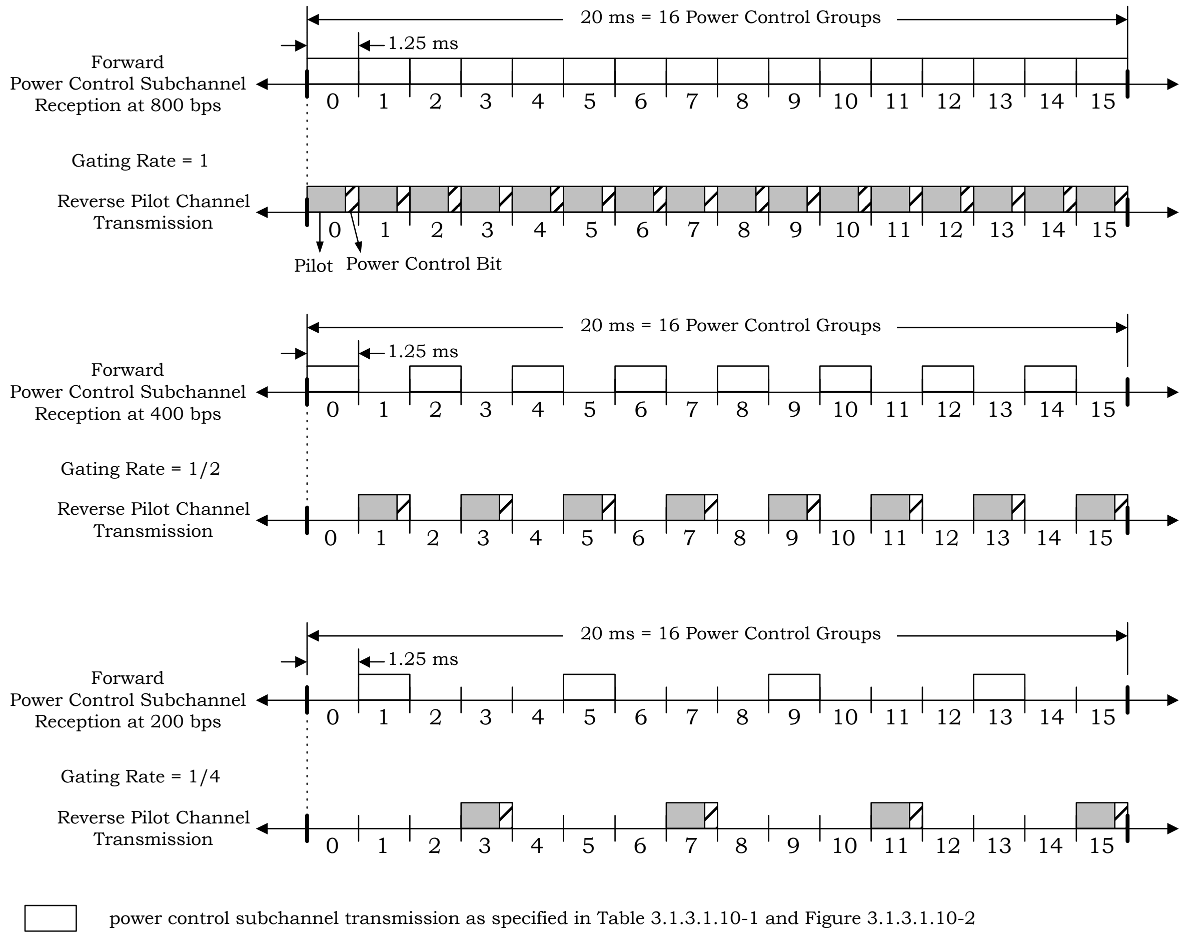

Figure 2.1.3.1.10.1-3. Forward and Reverse Power Control Subchannel Transmission Timing

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’ or ‘011’. If the mobile station supports the Forward Supplemental Channel, the mobile station shall transmit two Reverse Power Control Subchannels when FPC_MODE_S = ‘001’ or ‘010’. 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.

The configurations of the Reverse Power Control Subchannel when the Reverse Pilot Channel is not in gated mode are shown in Table 2.1.3.1.10.1-1 and described as follow:

- When FPC_MODE_S = ‘000’, the mobile station shall transmit the Primary Reverse Power Control Subchannel (see 2.1.3.1.10.3) at an 800 bps data rate.
- When 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 2.1.3.1.10.3) at a 400 bps data rate.

- When 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 at a 600 bps data rate.
- When 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 data frame in which the Erasure Indicator Bit is determined (See 2.2.2.2 and Figure 2.1.3.1.10.1-4).

Table 2.1.3.1.10.1-1. Reverse Power Control Subchannel Configurations

	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
All other values	Reserved	Reserved

Note: When FPC_MODE_s is equal to ‘011’, the 16 power control bits on the Primary Reverse Power Control Subchannel are all set to the Erasure Indicator Bit so the effective feedback is only 50 bps.

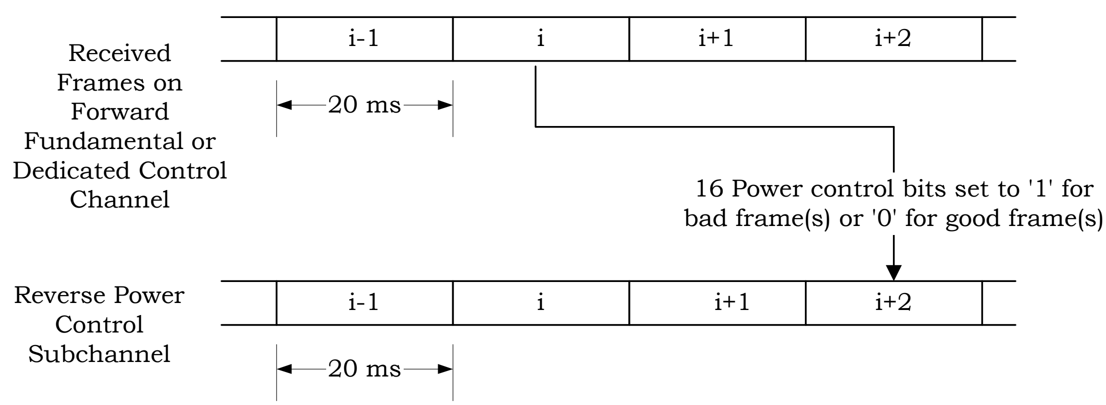

Figure 2.1.3.1.10.1-4. Reverse Power Control Subchannel Transmission Timing for FPC_MODE_S = ‘011’

2.1.3.1.10.2 Outer Power Control Loop

For FPC_MODE_s = '000', '001', and '010', the mobile station shall support an outer power control loop on all Forward Traffic Channels assigned to the mobile station, including the Forward Dedicated Control Channel, the Forward Fundamental Channel, and the Forward Supplemental Channels.

If the mobile station is monitoring the Forward Fundamental Channel, the mobile station shall adjust $FPC\_FCH\_CURR\_SETPT_s$ (E_b/N_t) to achieve the target FER on the Forward Fundamental Channel for 20 ms frames at a 9600 bps or 14400 bps data rate. 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 on the Forward Dedicated Control Channel for 20 ms frames at a 9600 bps or 14400 bps data rate. 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 $FPC\_SCH\_CURR\_SETPT[i]_s$ (E_b/N_t) value to achieve the target FER on the Forward Supplemental Channel i at the assigned data rate. When the value of $FPC\_SCH\_CURR\_SETPT[i]_s$ is greater than $FPC\_SCH\_MAX\_SETPT[i]_s$, the mobile station shall set $FPC\_SCH\_CURR\_SETPT[i]_s$ to $FPC\_SCH\_MAX\_SETPT[i]_s$. When the value of $FPC\_SCH\_CURR\_SETPT[i]_s$ is less than $FPC\_SCH\_MIN\_SETPT[i]_s$, the mobile station shall set $FPC\_SCH\_CURR\_SETPT[i]_s$ to $FPC\_SCH\_MIN\_SETPT[i]_s$.

2.1.3.1.10.3 Inner Power Control Loop

When FPC_MODE_s is set to '000', '001', or '010', 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 $FPC\_SEC\_CHAN_s$.

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.

If $FPC\_PRI\_CHAN_s$ = '0' and 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 the Secondary Reverse Power Control Subchannel is active (see Table 2.1.3.1.10.1-1), the mobile station shall compare the E_b/N_t (dB) value provided by the secondary inner power control loop with FPC_SCH_CURR_SETPT[FPC_SEC_CHAN$_s$]$_s$ to determine the power control bit sent on the Secondary Reverse Power Control Subchannel.

If FPC_PRI_CHAN$_s$ = '1' and 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_DCCH_CURR_SETPT$_s$ to determine the power control bit sent on the Primary Reverse Power Control Subchannel. If the Secondary Reverse Power Control Subchannel is active (see Table 2.1.3.1.10.1-1), the mobile station shall compare the E_b/N_t (dB) value provided by the secondary inner power control loop with FPC_SCH_CURR_SETPT[FPC_SEC_CHAN$_s$]$_s$ 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.

2.1.3.1.11 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 2.1.3.1.11-1. 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 2.1.3.1.11-2.

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 2.1.3.1.11-2).

For the public long code mask, bits M_{31} through M_0 shall be set to a permutation of the mobile station's ESN as follows:

ESN = $(E_{31}, E_{30}, E_{29}, E_{28}, E_{27}, E_{26}, E_{25}, \ldots E_{2}, E_{1}, E_{0})$

Permuted ESN = $(E_{0}, E_{31}, E_{22}, E_{13}, E_{4}, E_{26}, E_{17}, E_{8}, E_{30}, E_{21}, E_{12}, E_{3}, E_{25}, E_{16}, E_{7}, E_{29}, E_{20}, E_{11}, E_{2}, E_{24}, E_{15}, E_{6}, E_{28}, E_{19}, E_{10}, E_{1}, E_{23}, E_{14}, E_{5}, E_{27}, E_{18}, E_{9})$.

Bits M_{41} through M_{32} shall be set to '1100011000'. The resulting public long code mask is shown in Figure 2.1.3.1.11-2.

The private long code mask (See Fig. 2.1.3.1.11-3) shall be as follows: M_{41} through M_{40} shall be set to '01'. M_{39} through M_{0} shall be the 40 least significant bits of the Voice Privacy Mask (VPM) generated by the Key_VPM_Generation procedure. M_{0} of the private long code mask shall be the least significant bit of the VPM. The private long code mask is not to be changed during a call. See *Common Cryptographic Algorithms* for details of the Key_VPM_Generation procedure.

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 unique to the mobile station's ESN or a private long code mask. The Reverse Fundamental Channel shall be assigned the channel number 0. Each of the n - 1 Reverse Supplemental Code Channels shall be assigned the numbers 1 through n - 1. Bits M_{39} through M_{37} of the public or private long code mask for assigned code channel i, $0 \le i \le n - 1 \le \text{NUM\_REV\_CODES}_s$, shall be XORed with the value i.

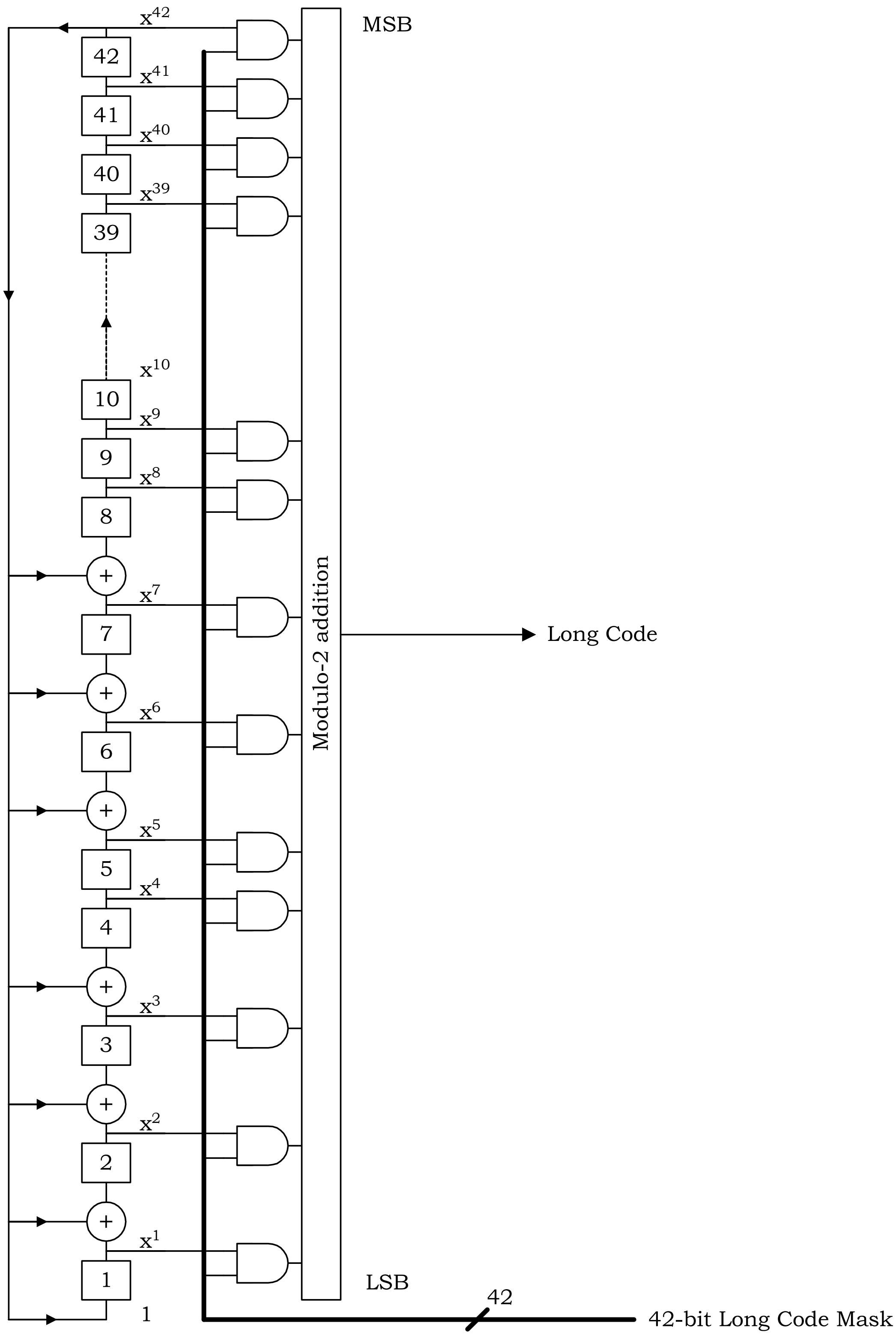

Figure 2.1.3.1.11-1. Long Code Generator

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

a) Access Channel Long Code Mask

41 40	39 ... 37	36 ... 32	31 ... 0
11	Code Channel Index (i)	11000	Permuted ESN

Code Channel Index (i):
‘000’: Reverse Fundamental Channel,
‘001’ - ‘111’: Reverse Supplemental Code Channel i, (i = 1,...,7)

b) Public Long Code Mask for the Reverse Fundamental Channel and the Reverse Supplemental Code Channels with Radio Configurations 1 and 2

Figure 2.1.3.1.11-2. Long Code Mask Format for Direct Sequence Spreading

41 40	39 ... 0
01	40 LSBs of VPM

Figure 2.1.3.1.11-3. Private Long Code Mask

2.1.3.1.12 Quadrature Spreading

The Access Channel and the Reverse Traffic Channel with Radio Configurations 1 and 2 are spread in quadrature as shown in Figures 2.1.3.1.1.1-1, 2.1.3.1.1.1-6, and 2.1.3.1.1.1-7. The direct sequence spreading output (real) is multiplied by a complex spreading sequence. The in-phase and quadrature-phase components of this spreading sequence are specified in 2.1.3.1.12.1. 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 Enhanced Access Channel, the Reverse Common Control Channel, and the Reverse Traffic Channel with Radio Configurations 3 through 6, the I-Channel data and Q-Channel data shall be multiplied by a complex spreading sequence before baseband filtering as shown in Figures 2.1.3.1.1.1-10 and 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 2.1.3.1.11. 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 2.1.3.1.12-1. 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.

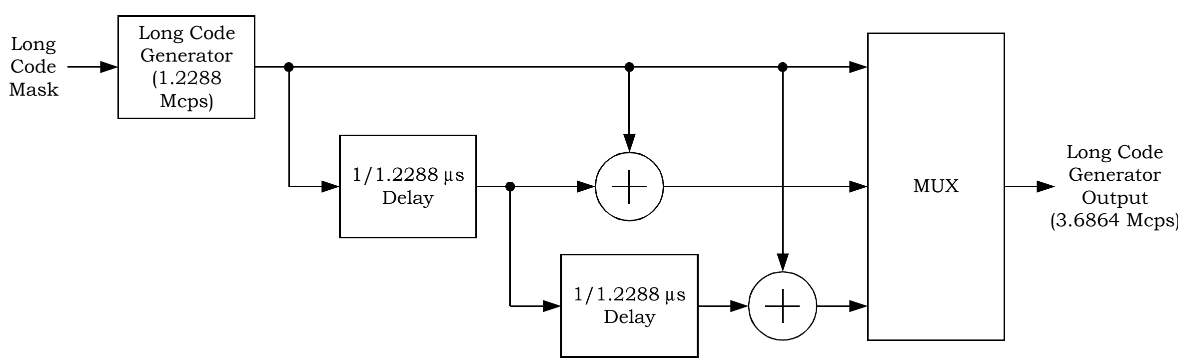

Figure 2.1.3.1.12-1. Long Code Generator for Spreading Rate 3

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 2.1.3.1.12-2.

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 2.1.3.1.12-2).

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 2.1.3.1.12-2).

When transmitting on the Reverse Traffic Channel or the Reverse Common Control Channel in Designated Access Mode, the mobile station shall use one of the following two long code masks: A public long code mask unique to the mobile station's ESN (see Figure 2.1.3.1.12-1) or a private long code mask (see Figure 2.1.3.1.11-3). The public and private long code masks shall be as specified in 2.1.3.1.11.

41 … 33	32 … 28	27 … 25	24 … 9	8 … 0
110001110	EACN	FCCCN	BASE_ID	SLOT_OFFSET

EACN - Enhanced Access Channel Number
FCCCN - 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	RCCCN	FCCCN	BASE_ID	PILOT_PN

RCCCN - Reverse Common Control Channel Number
FCCCN - 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

41 40	39 … 37	36 … 32	31 … 0
11	000	11000	Permuted ESN

c) Public Long Code Mask for the Reverse Fundamental Channel with Radio Configurations 3, 4, 5, and 6, the Reverse Supplemental Channels, the Reverse Dedicated Control Channel, and the Reverse Common Control Channel in the Designated Mode

Figure 2.1.3.1.12-2. Long Code Mask Format for Quadrature Spreading

The I and Q PN sequences used for spreading shall be as specified in 2.1.3.1.12.1 and 2.1.3.1.12.2. 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.

2.1.3.1.12.1 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.

2.1.3.1.12.2 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 chip is the '1' after the 19 consecutive '0's. The starting position of the Q PN sequence is the starting position of the I PN sequence delayed by 2^{19} chips. The mobile station shall align the I and Q PN sequences such that the first chip of the I PN sequence on every even second mark as referenced to the transmit time reference (see 2.1.5) is the '1' after the 19 consecutive '0's (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.

2.1.3.1.13 Baseband Filtering

2.1.3.1.13.1 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 2.1.3.1.13.1-1. 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.

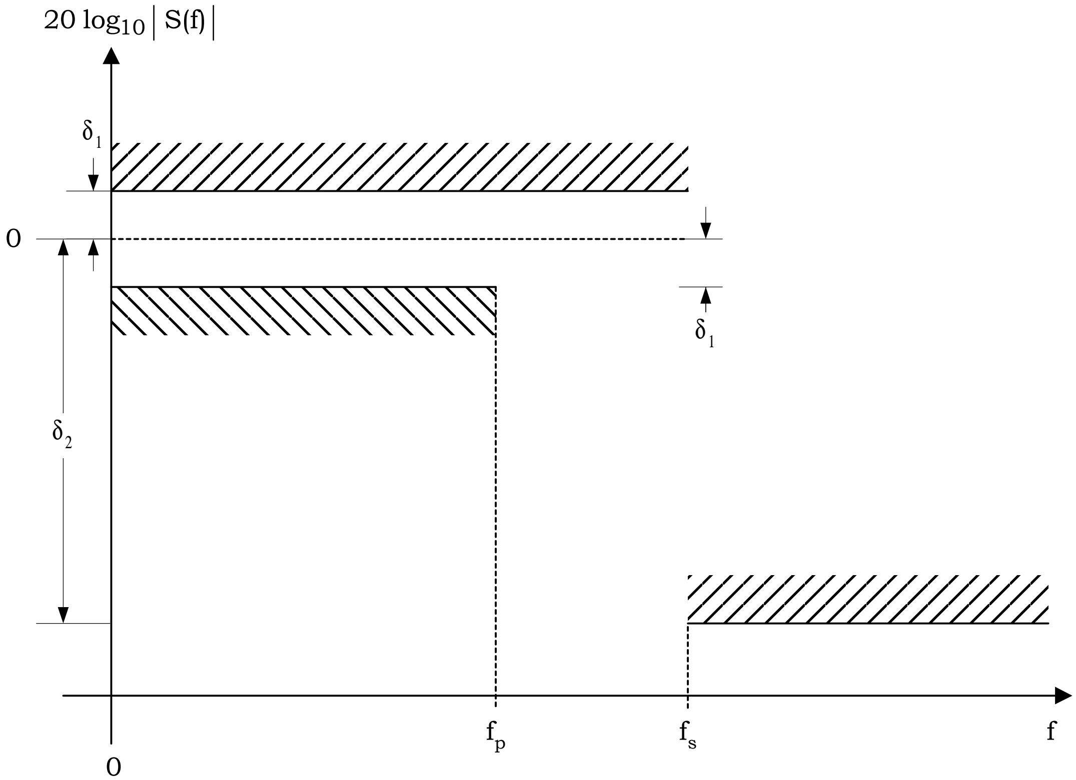

Figure 2.1.3.1.13.1-1. Baseband Filters Frequency Response Limits

Let s(t) be the impulse response of the baseband filter. Then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty} \left[\alpha s(kT_s - \tau) - h(k)\right]^2 \le 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_s is equal to 203.451... 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 Table 2.1.3.1.13.1-1; $h(k) = 0$ for $k \geq 48$. Note that h(k) equals h(47 - k).

Table 2.1.3.1.13.1-1. 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

2.1.3.1.13.2 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 2.1.3.1.1.1. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 2.1.3.1.13.1-1. 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:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty} \left[\alpha s(kT_s - \tau) - h(k)\right]^2 \le 0.03,$$

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 2.1.3.1.13.2-1; h(k) = 0 for k ≥ 108. Note that h(k) equals h(107 - k).

Table 2.1.3.1.13.2-1. 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

2.1.3.1.14 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 Figures 2.1.3.1.1.1-6 and 2.1.3.1.1.1-7. The phase offset ϕ_i of Reverse Supplemental Code Channel *i* shall take on the values given in Table 2.1.3.1.14-1.

Table 2.1.3.1.14-1. 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.

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 6 is enabled. The Reverse Pilot Channel is also 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 2.1.3.1.10 when operating on the Reverse Traffic Channel with Radio Configurations 3 through 6.

2.1.3.2.2 Reverse Pilot Channel Spreading

The Reverse Pilot Channel data shall be spread with W_0^{32} as specified in 2.1.3.1.8.

2.1.3.2.3 Reverse Pilot Channel Gating

When transmitting only 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 only when none of the following channels is assigned: the

Forward Fundamental Channel, the Forward Supplemental Channel, the Reverse Fundamental Channel, and the Reverse Supplemental Channel.

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 power control groups within a 20 ms frame are numbered from 0 to 15. The gated-on and gated-off periods are arranged so that the gated-on period always comes immediately before the 5 ms frame boundary.

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 Figures 2.1.3.2.3-2 and 2.1.3.2.3-3.

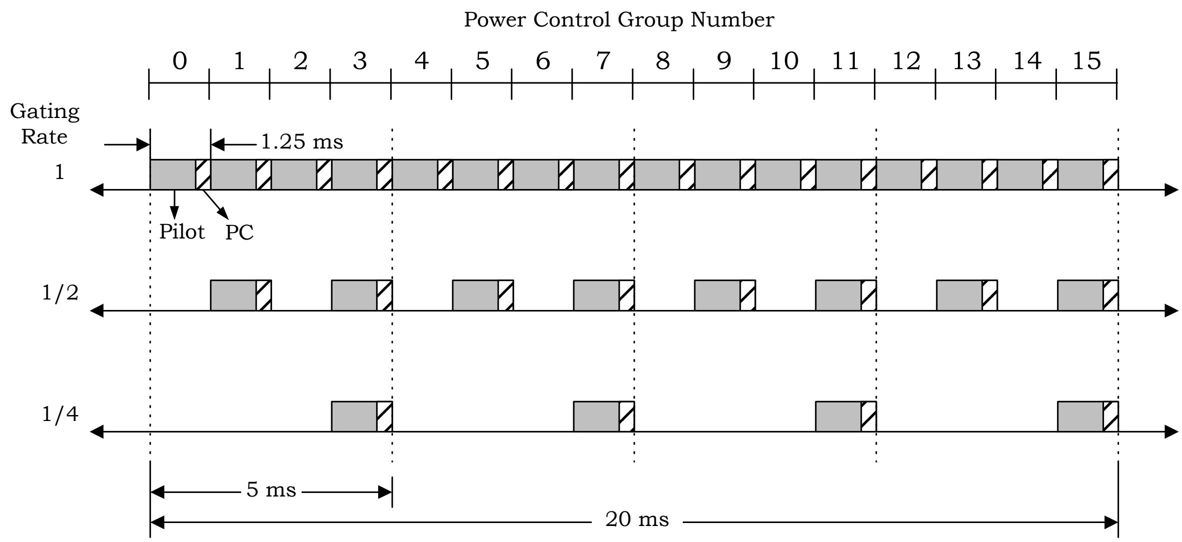

Figure 2.1.3.2.3-1. Reverse Pilot Gating

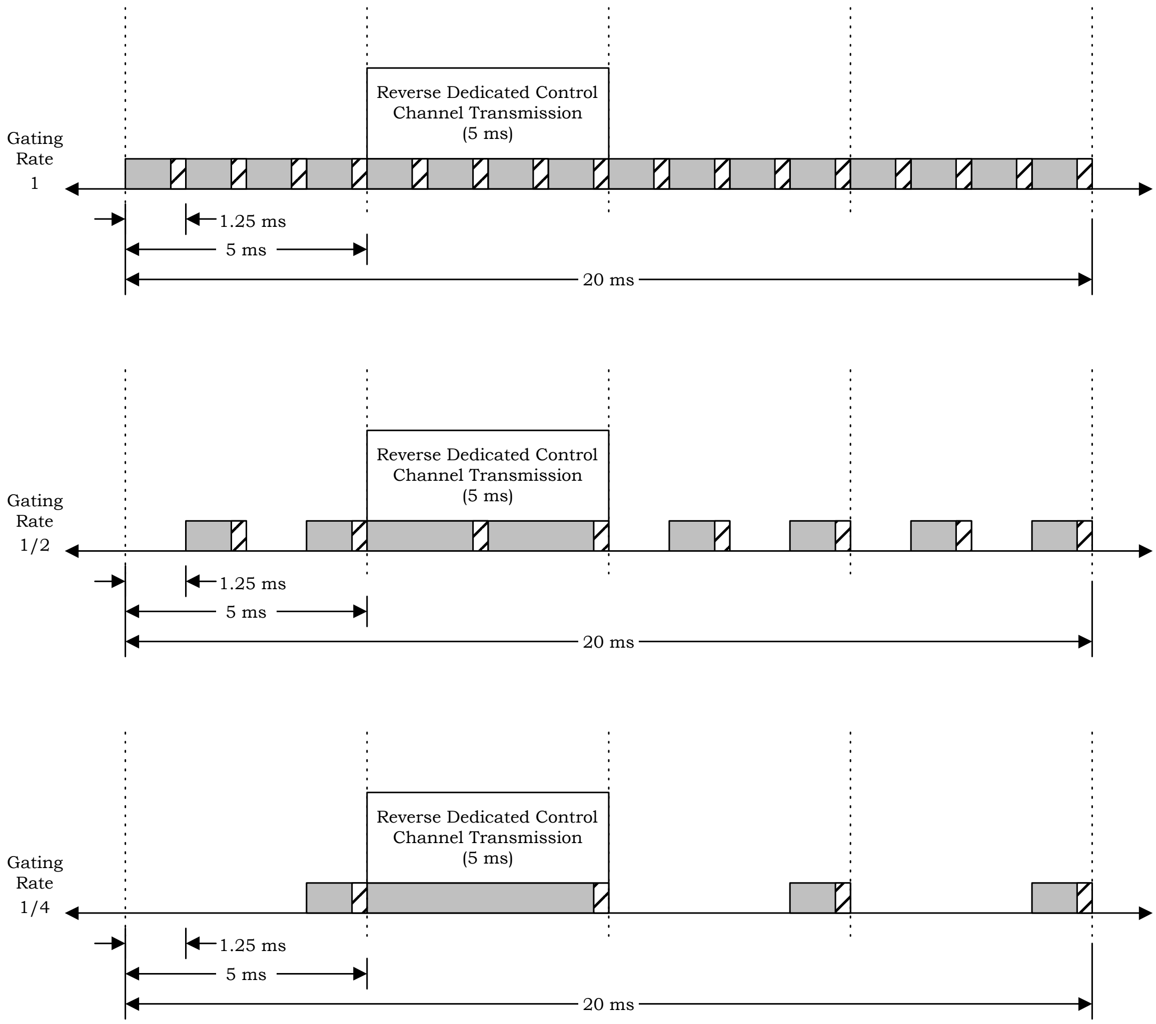

Figure 2.1.3.2.3-2. Reverse Pilot Gating during Reverse Dedicated Control Channel Transmission with 5 ms Frame Duration

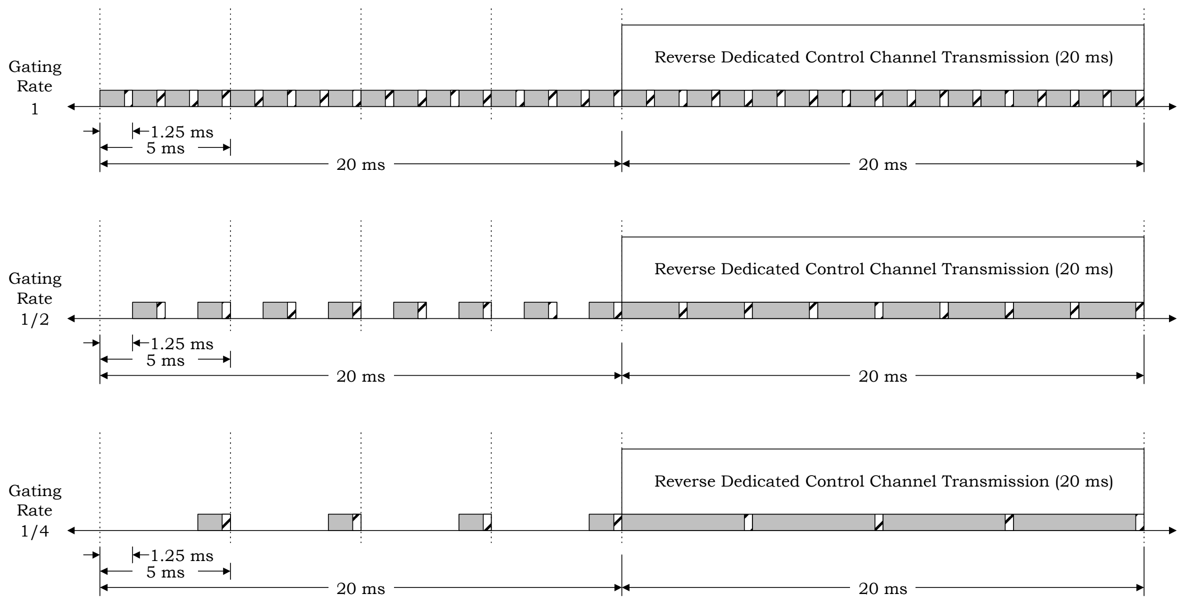

Figure 2.1.3.2.3-3. Reverse Pilot Gating during Reverse Dedicated Control Channel Transmission with 20 ms Frame Duration

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 through 6.

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 a 20 ms frame as is 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 20 ms frame as is shown in Figure 2.1.3.2.4-1.

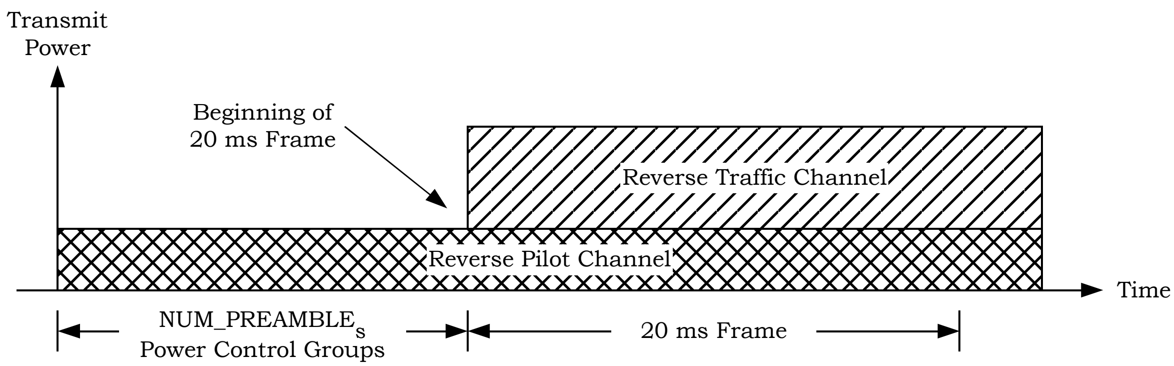

Figure 2.1.3.2.4-1. Reverse Traffic Channel Preamble during Hard Handoff for the Reverse Dedicated Control Channel and the Reverse Fundamental Channel with Radio Configurations 3 through 6

2.1.3.2.5 Reverse Pilot Channel Quadrature Spreading

The Reverse Pilot Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.2.6 Reverse Pilot Channel Baseband Filtering

The Reverse Pilot Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.3 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 2.1.3.1.11).

An Access probe shall consist of an Access preamble, followed by a series of Access Channel frames, with each carrying an SDU.

2.1.3.3.1 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.[9]

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.

2.1.3.3.2 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 2.1.3.3.2-1).

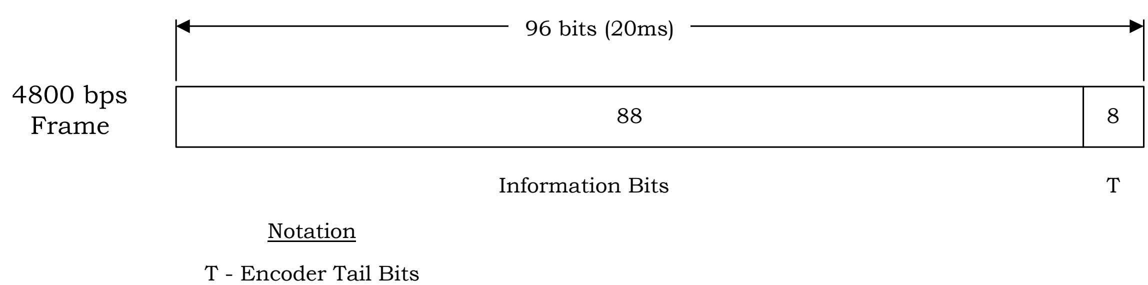

Figure 2.1.3.3.2-1. Access Channel Frame Structure

2.1.3.3.2.1 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.

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[9] 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.

2.1.3.3.3 Access Channel Convolutional Encoding

The Access Channel data shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Access Channel data, the encoder shall be initialized at the end of each 20 ms frame.

2.1.3.3.4 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 2.1.3.1.5.

2.1.3.3.5 Access Channel Interleaving

The repeated code symbols on the Access Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.3.6 Access Channel Modulation

The Access Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.3.7 Access Channel Gating

The mobile station shall not gate off any power control group while transmitting on the Access Channel as specified in 2.1.3.1.9.1.

2.1.3.3.8 Access Channel Direct Sequence Spreading

The Access Channel shall be spread by the long code as specified in 2.1.3.1.11.

2.1.3.3.9 Access Channel Quadrature Spreading

The Access Channel shall be quadrature spread by the pilot PN sequences as specified in 2.1.3.1.12.

2.1.3.3.10 Access Channel Baseband Filtering

The Access Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.3.11 Access Channel Transmission Processing

When the Physical Layer receives a *Transmit R-ACH Preamble Request* 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 *Transmit R-ACH Frame Request* from the MAC Layer, the mobile station shall:

- Store the arguments RA, PWR_LVL, RN, and SDU.
- Set the information bits (see Figure 2.1.3.3.2-1) to SDU.
- Transmit an Access Channel frame.

2.1.3.4 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 three possible modes: Basic Access Mode, Power Controlled Access Mode, and Reservation Access Mode. Power Controlled Access Mode and Reservation Access Mode may operate on the same Enhanced Access Channel. Basic Access Mode must operate on a separate Enhanced Access Channel.

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 Power Controlled Access Mode, the Enhanced Access probe shall consist of an Enhanced Access Channel preamble, followed by an Enhanced Access header and 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 codes (see 2.1.3.1.12). The Enhanced Access probe structure is shown in Figure 2.1.3.4-1.

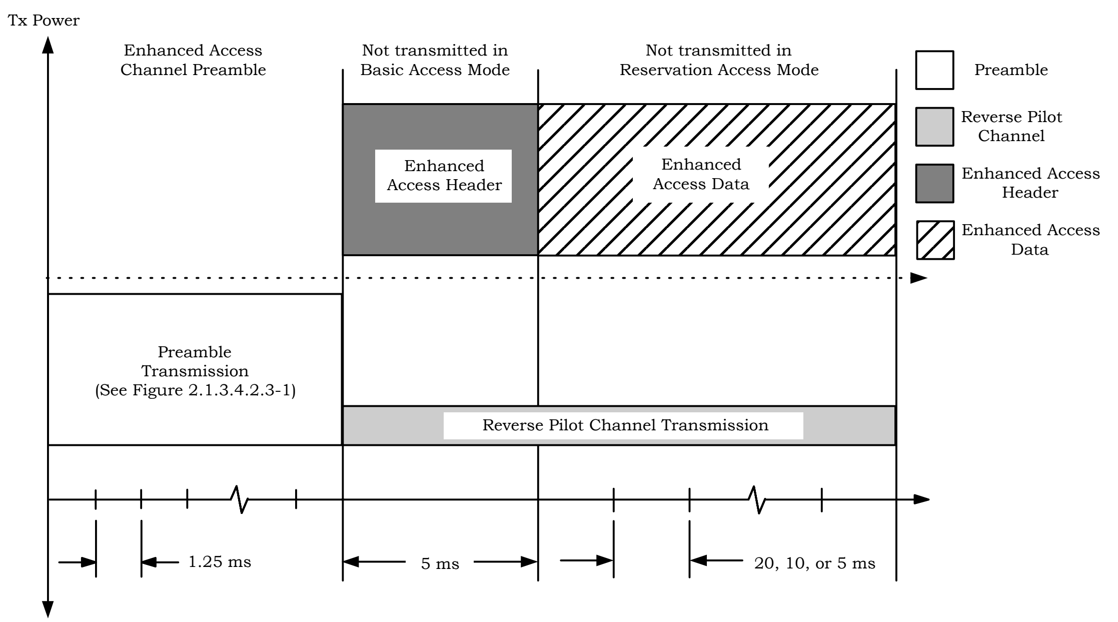

Figure 2.1.3.4-1. Enhanced Access Channel Probe Structure

2.1.3.4.1 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 in duration. The frame duration for the Enhanced Access data on the Enhanced Access Channel shall be 20, 10, or 5 ms in duration. 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 Power Controlled Access Mode or the Reservation Access Mode.

The mobile station shall always initiate transmission of an Enhanced Access probe on an Enhanced Access Channel slot boundary. Each Enhanced Access Channel is slotted, with the slot duration given by the parameter EACH_SLOT. The number of slots associated with an Enhanced Access Channel shall be 512. The mobile station shall use a different long code sequence in each of the 512 slots. The mobile procedure for generating the time-dependent field of the long code mask is specified in 2.1.3.1.12.

2.1.3.4.2 Enhanced Access Channel Frame Structure

Table 2.1.3.4.2-1 summarizes the Enhanced Access Channel bit allocations. The order of the bits is shown in Figure 2.1.3.4.2-1.

Table 2.1.3.4.2-1. Enhanced Access Channel Frame Structure Summary

Frame Length (ms)	Frame Type	Transmission Rate (bps)	Number of Bits per Frame			
			Total Bits	**Information Bits**	**Frame Quality Indicator**	**Encoder Tail Bits**
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 2.1.3.4.2-1. Enhanced Access Channel Frame Structure

2.1.3.4.2.1 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.

When transmitting Enhanced Access data, the 20 ms Enhanced Access Channel shall use a 12-bit frame quality indicator for the 9600 bps frame and a 16-bit frame quality indicator for the 38400 and 19200 bps frames. When transmitting Enhanced Access data, the 10 ms Enhanced Access Channel shall use a 12-bit frame quality indicator for the 19200 bps frame and a 16-bit frame quality indicator for the 38400 frame. When transmitting Enhanced Access data, the 5 ms Enhanced Access Channel shall use a 12-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^{6} + x^{5} + x^{2} + x + 1$ for the 16-bit frame quality indicator,

$g(x) = x^{12} + x^{11} + x^{10} + x^{9} + x^{8} + x^{4} + x + 1$ for the 12-bit frame quality indicator, and

$g(x) = x^{8} + x^{7} + x^{4} + x^{3} + x + 1$ for the 8-bit frame quality indicator.

The frame quality indicators shall be computed according to the following procedure as shown in Figures 2.1.3.4.2.1-1 through 2.1.3.4.2.1-3:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16, 12, or 8).
- These additional bits shall be the frame quality indicator bits.

- The bits shall be transmitted in the order calculated.

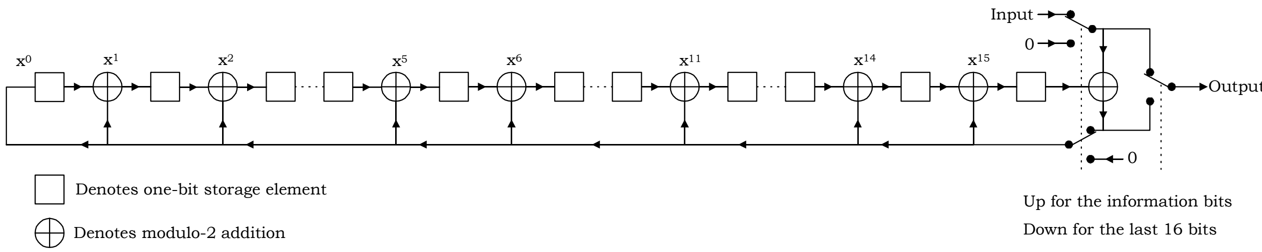

Figure 2.1.3.4.2.1-1. Enhanced Access Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

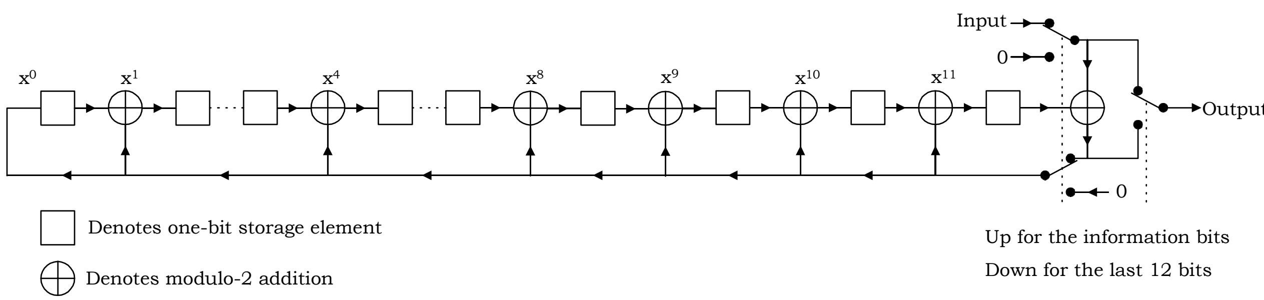

Figure 2.1.3.4.2.1-2. Enhanced Access Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

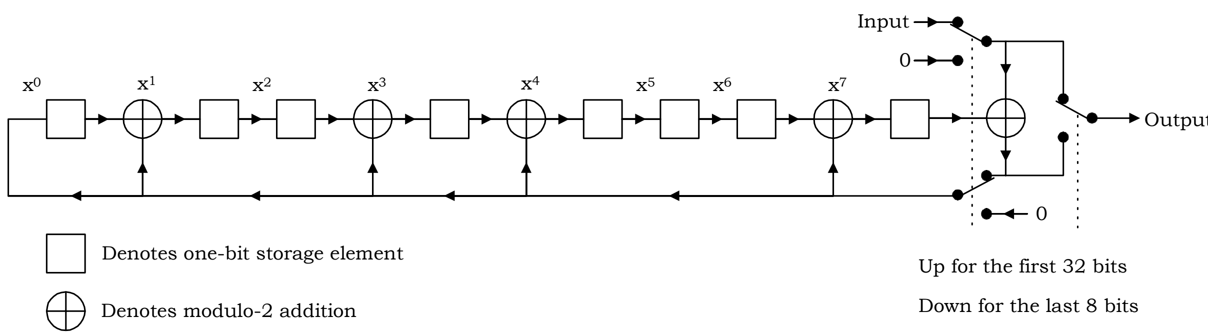

Figure 2.1.3.4.2.1-3. Enhanced Access Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

2.1.3.4.2.2 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'.

2.1.3.4.2.3 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 2.1.3.4.2.3-1. 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 EACH_PREAMBLE_ENABLED = '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, 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 duration 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 duration 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 Power Controlled Access Mode or Reservation Access Mode, the additional preamble with a duration 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.

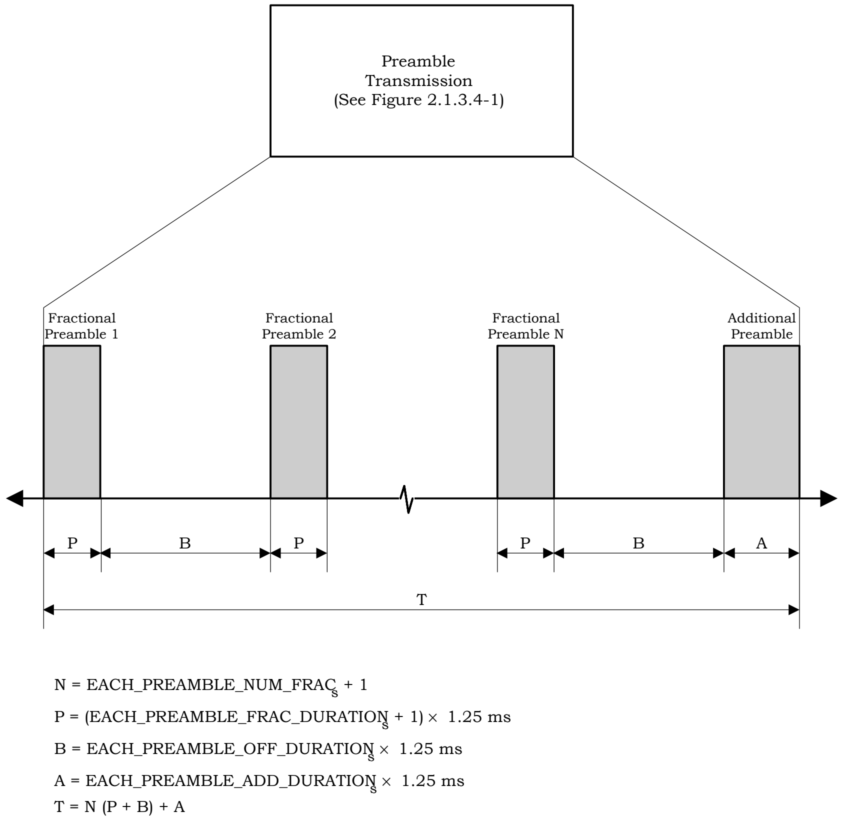

Figure 2.1.3.4.2.3-1 Preamble for the Enhanced Access Channel

2.1.3.4.3 Enhanced Access Channel Convolutional Encoding

The Enhanced Access Channel data shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Enhanced Access Channel data, the encoder shall be initialized at the end of each 20, 10, or 5 ms frame.

2.1.3.4.4 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 2.1.3.1.5.

2.1.3.4.5 Enhanced Access Channel Interleaving

The repeated code symbols on the Enhanced Access Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.4.6 Enhanced Access Channel Modulation

The Access Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.4.7 Enhanced Access Channel Quadrature Spreading

The Enhanced Access Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.4.8 Enhanced Access Channel Baseband Filtering

The Enhanced Access Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.4.9 Enhanced Access Channel Transmission Processing

Not specified.

2.1.3.5 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 can be used in one of two possible modes: Reservation Access Mode and Designated 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 2.1.3.1.12). The Reverse Common Control Channel preamble and data transmission structure is shown in Figure 2.1.3.5-1.

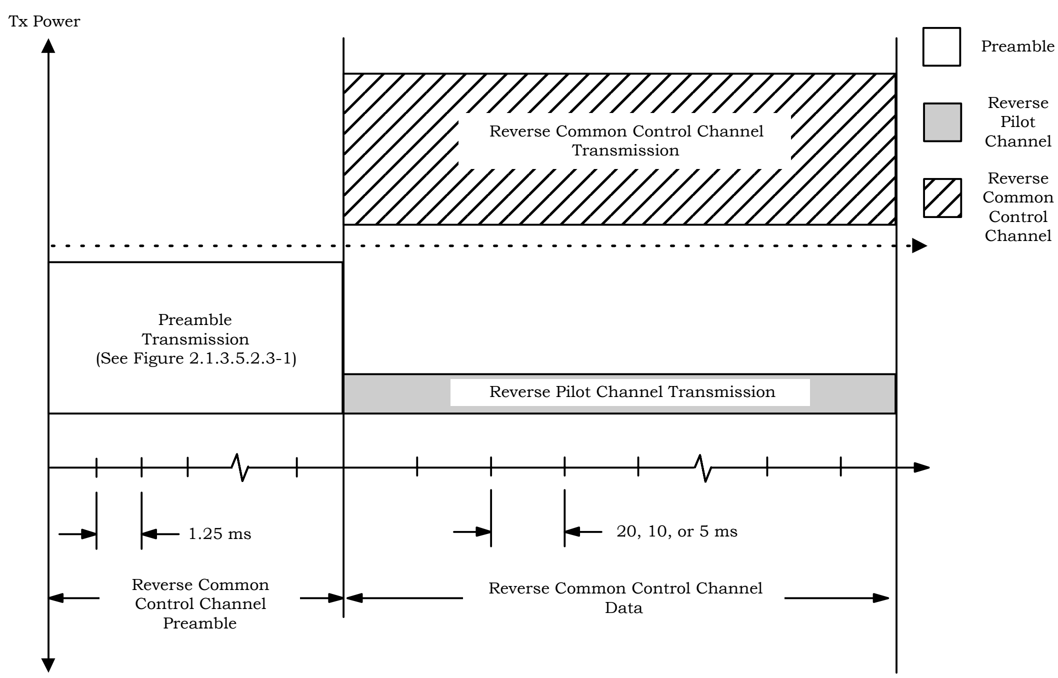

Figure 2.1.3.5-1. Preamble and Data Transmission for the Reverse Common Control Channel

2.1.3.5.1 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.

2.1.3.5.2 Reverse Common Control Channel Frame Structure

Table 2.1.3.5.2-1 summarizes the Reverse Common Control Channel bit allocations. The order of the bits is shown in Figure 2.1.3.5.2-1.

All frames shall consist of the information bits, followed by a frame quality indicator (CRC) and eight Encoder Tail Bits.

Table 2.1.3.5.2-1. 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 Bits
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 2.1.3.5.2-1. Reverse Common Control Channel Frame Structure

2.1.3.5.2.1 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 for the 9600 bps frame and a 16-bit frame quality indicator for the 38400 and 19200 bps frames. The 10 ms Reverse Common Control Channel shall use a 12-bit frame quality indicator for the 19200 bps frame and a 16-bit frame quality indicator for the 38400 frame. The 5 ms Reverse Common Control Channel shall use a 12-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1$ for the 16-bit frame quality indicator and

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1$ for the 12-bit frame quality indicator.

The frame quality indicators shall be computed according to the following procedure as shown in Figures 2.1.3.5.2.1-1 through 2.1.3.5.2.1-2:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16 or 12).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

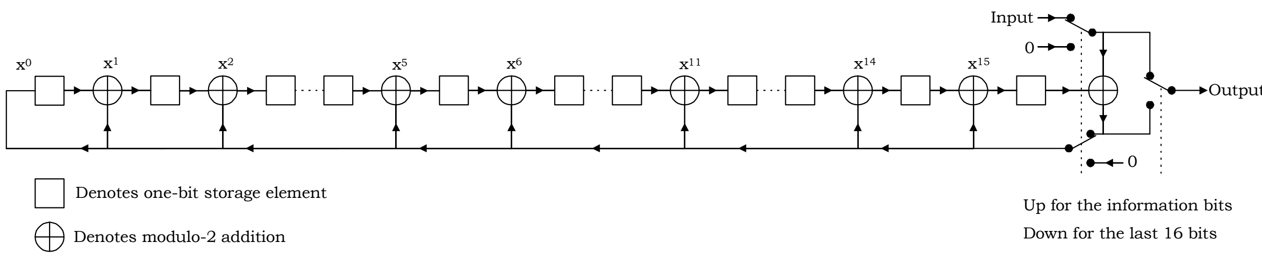

Figure 2.1.3.5.2.1-1. Reverse Common Control Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

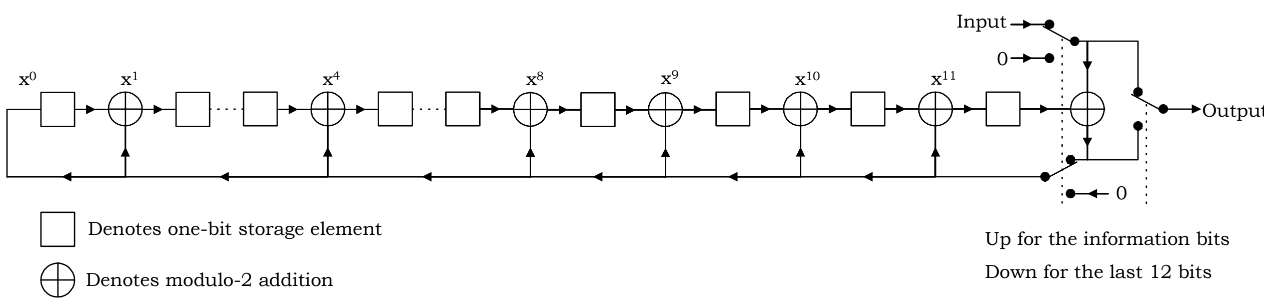

Figure 2.1.3.5.2.1-2. Reverse Common Control Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

2.1.3.5.2.2 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 be set to '0'.

2.1.3.5.2.3 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 2.1.3.5.2.3-1. 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 RCCCH_PREAMBLE_ENABLED = '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.

The sequence of fractional preambles shall include $RCCCH\_PREAMBLE\_NUM\_FRAC_S + 1$ fractional preambles, each with a duration of $(RCCCH\_PREAMBLE\_FRAC\_DURATION_S + 1) \times 1.25$ ms. The transmission of the Reverse Common Control Channel preamble shall be gated-off for a duration of $RCCCH\_PREAMBLE\_OFF\_DURATION_S \times 1.25$ ms after the transmission of each fractional preamble.

The additional preamble with a duration of $RCCCH\_PREAMBLE\_ADD\_DURATION_S \times 1.25$ ms shall be transmitted just prior to the Reverse Common Control Channel data. The additional preamble assists the base station in channel estimation.

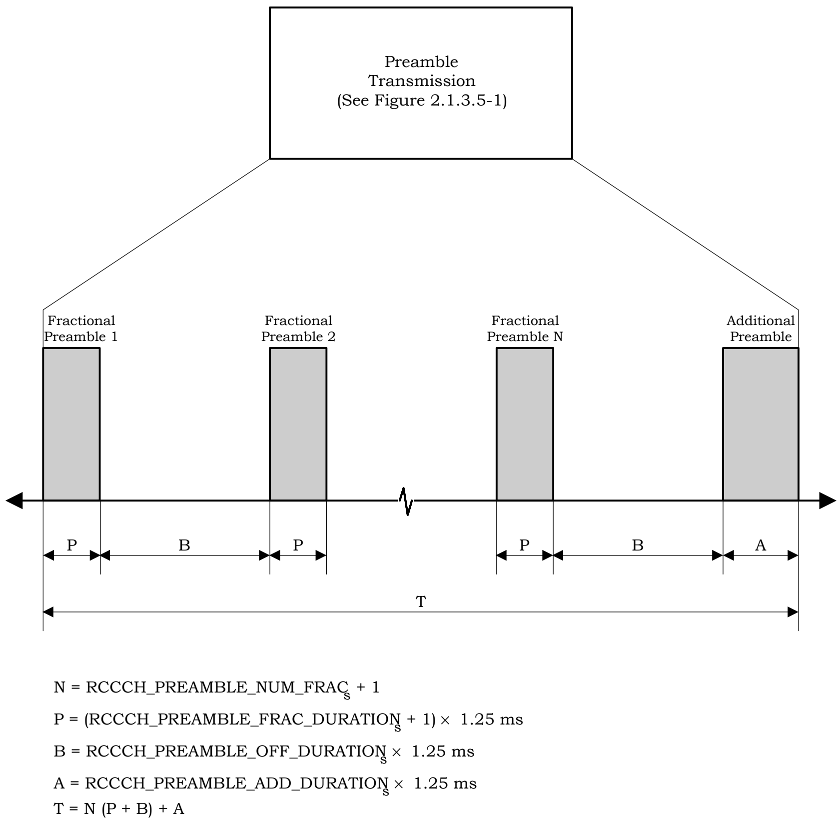

Figure 2.1.3.5.2.3-1. Preamble for the Reverse Common Control Channel

2.1.3.5.2.4 Reverse Common Control Channel Data

When operating in the Reservation Access Mode, the Reverse Common Control Channel data shall consist of Enhanced Access data. When operating in the Designated Access Mode, the Reverse Common Control Channel data shall consist of Designated Access data.

2.1.3.5.3 Reverse Common Control Channel Convolutional Encoding

The Reverse Common Control Channel data shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Reverse Common Control Channel data, the encoder shall be initialized at the end of each 20, 10, or 5 ms frame.

2.1.3.5.4 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 2.1.3.1.5.

2.1.3.5.5 Reverse Common Control Channel Interleaving

The encoded code symbols on the Reverse Common Control Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.5.6 Reverse Common Control Channel Modulation

The Reverse Common Control Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.5.7 Reverse Common Control Channel Quadrature Spreading

The Reverse Common Control Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.5.8 Reverse Common Control Channel Baseband Filtering

The Reverse Common Control Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.5.9 Reverse Common Control Channel Transmission Processing

Not specified.

2.1.3.6 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.

2.1.3.6.1 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 or 14400 bps using 20 ms frames or 9600 bps using 5 ms frames.

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.

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.

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.

A mobile station shall support Reverse Dedicated Control Channel frames which are offset. The amount of 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 $1.25 \times FRAME\_OFFSET_S$ ms later than the zero-offset Reverse Dedicated Control Channel frame. An offset 5 ms Reverse Dedicated Control Channel frame shall begin $1.25 \times (FRAME\_OFFSET_S \bmod 4)$ 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.

2.1.3.6.2 Reverse Dedicated Control Channel Frame Structure

Table 2.1.3.6.2-1 summarizes the Reverse Dedicated Control Channel bit allocations. The order of the bits is shown in Figure 2.1.3.6.2-1.

All 9600 bps frames shall consist of the information bits, followed by a frame quality indicator (CRC) and eight Encoder Tail Bits.

All 14400 bps frames shall consist of a Reserved Bit, followed by the information bits, frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.6.2-1. Reverse Dedicated Control Channel Frame Structure Summary

Frame Length (ms)	Transmission Rate (bps)	Number of Bits per Frame				
		Total	**Reserved**	**Information**	**Frame Quality Indicator**	**Encoder Tail Bits**
20	9600	192	0	172	12	8
20	14400	288	1	267	12	8
5	9600	48	0	24	16	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.6.2-1. Reverse Dedicated Control Channel Frame Structure

2.1.3.6.2.1 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. The 5 ms Reverse Dedicated Control Channel shall use a 16-bit frame quality indicator

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1$ for the 16-bit frame quality indicator and $g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1$ for the 12-bit frame quality indicator.

The frame quality indicators shall be computed according to the following procedure as shown in Figures 2.1.3.6.2.1-1 through 2.1.3.6.2.1-2:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of Reserved Bits and information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16 or 12).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

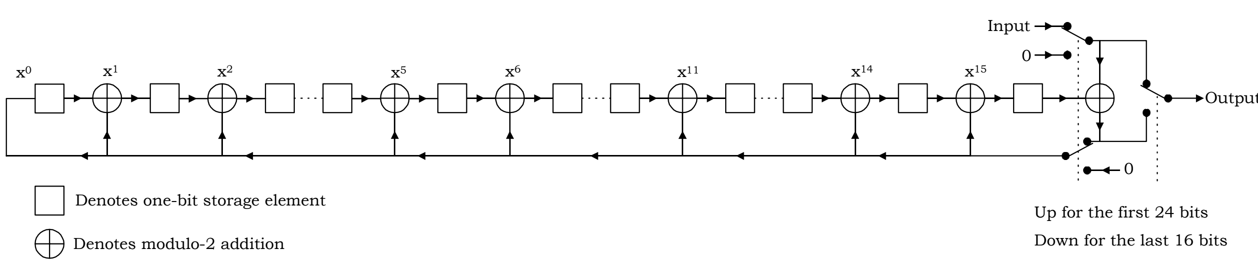

Figure 2.1.3.6.2.1-1. Reverse Dedicated Control Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

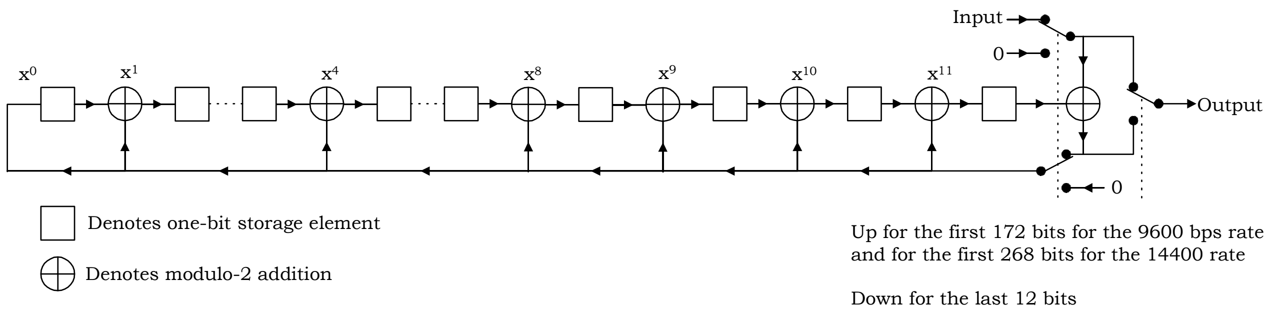

Figure 2.1.3.6.2.1-2. Reverse Dedicated Control Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

2.1.3.6.2.2 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 be set to ‘0’.

2.1.3.6.2.3 Reverse Traffic Channel Preamble

The Reverse Traffic Channel preamble is transmitted on the Reverse Pilot Channel as specified in 2.1.3.2.4.

2.1.3.6.3 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.

2.1.3.6.4 Reverse Dedicated Control Channel Code Symbol Repetition

Reverse Dedicated Control Channel code symbol repetition shall be as specified in 2.1.3.1.5.

2.1.3.6.5 Reverse Dedicated Control Channel Code Symbol Puncturing

Reverse Dedicated Control Channel code symbol puncturing shall be as specified in 2.1.3.1.6.

2.1.3.6.6 Reverse Dedicated Control Channel Interleaving

The modulation symbols shall be interleaved as specified in 2.1.3.1.7.

2.1.3.6.7 Reverse Dedicated Control Channel Modulation

The Reverse Dedicated Control Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.6.8 Reverse Dedicated Control Channel Quadrature Spreading

The Reverse Dedicated Control Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.6.9 Reverse Dedicated Control Channel Baseband Filtering

Filtering for the Reverse Dedicated Control Channel shall be as specified in 2.1.3.1.13.

2.1.3.6.10 Reverse Dedicated Control Channel Processing

When the Physical Layer receives a *Transmit DCCH Request* from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Reverse Dedicated Control Channel frame of duration FRAME_DURATION (5 ms or 20 ms) at a data rate of FRAME_RATE. If a *Transmit DCCH Request* for a 5 ms frame is received coincident with a *Transmit DCCH Request* 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.

2.1.3.7 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.

2.1.3.7.1 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 Configurations 2, 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. 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.

Reverse Fundamental Channel frames with Radio Configurations 1 and 2 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 for data rates of 7200 bps or less.

A mobile station shall support Reverse Fundamental Channel frames which are offset. The amount of time offset is specified by $\mathrm{FRAME\_OFFSET_S}$. 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 $1.25 \times \mathrm{FRAME\_OFFSET_S}$ ms later than the zero-offset Reverse Fundamental Channel frame. An offset 5 ms Reverse Fundamental Channel frame shall begin $1.25 \times (\mathrm{FRAME\_OFFSET_S} \bmod 4)$ 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.

2.1.3.7.2 Reverse Fundamental Channel Frame Structure

Table 2.1.3.7.2-1 summarizes the Reverse Fundamental Channel bit allocations. The order of the bits is shown in Figure 2.1.3.7.2-1.

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 and 5, 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 a Reserved/Erasure Indicator Bit, followed by the information bits, frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.7.2-1. Reverse Fundamental Channel Frame Structure Summary

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	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

R/E	Information Bits	F	T

Notation

R/E - Reserved/Erasure Indicator Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 2.1.3.7.2-1. Reverse Fundamental Channel Frame Structure

2.1.3.7.2.1 Reverse Fundamental Channel Frame Quality Indicator

Each frame with Radio Configurations 2 through 6, and the 9600 and 4800 bps frames of Radio Configuration 1 shall include a frame quality indicator. This frame quality indicator is a CRC.[10] No frame quality indicator is used for the 2400 and 1200 bps transmission 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.

The 9600 bps transmissions with Radio Configuration 1; the 14400 bps transmissions with Radio Configurations 2, 4, and 6; and the 9600 bps transmissions of 20 ms frames with Radio Configurations 3 and 5 shall use a 12-bit frame quality indicator.

The 7200 bps transmissions with Radio Configurations 2, 4, and 6 shall use a 10-bit frame quality indicator.

The 4800 bps transmissions with Radio Configurations 1, 3, and 5, and the 3600 bps transmissions with Radio Configurations 2, 4, or 6 shall use an 8-bit frame quality indicator.

The 2700 and 1500 bps transmissions with Radio Configurations 3 and 5, and the 1800 bps transmissions with Radio Configurations 2, 4, and 6 shall use a 6-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1 \text{ for the 16-bit frame quality indicator,}$$

$$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1 \text{ for the 12-bit frame quality indicator,}$$

$$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1 \text{ for the 10-bit frame quality indicator,}$$

$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1 \text{ for the 8-bit frame quality indicator,}$$

$$g(x) = x^6 + x^2 + x + 1 \text{ for the 6-bit frame quality indicator (RC = 2), and}$$

$$g(x) = x^6 + x^5 + x^2 + x + 1 \text{ for the 6-bit frame quality indicator } (3 \le RC \le 6).$$

The frame quality indicators shall be computed according to the following procedure as shown in Figures 2.1.3.7.2.1-1 through 2.1.3.7.2.1-6:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.

---

[10]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 register shall be clocked a number of times equal to the number of Reserved/Erasure Indicator Bits and information 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’.
- 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.

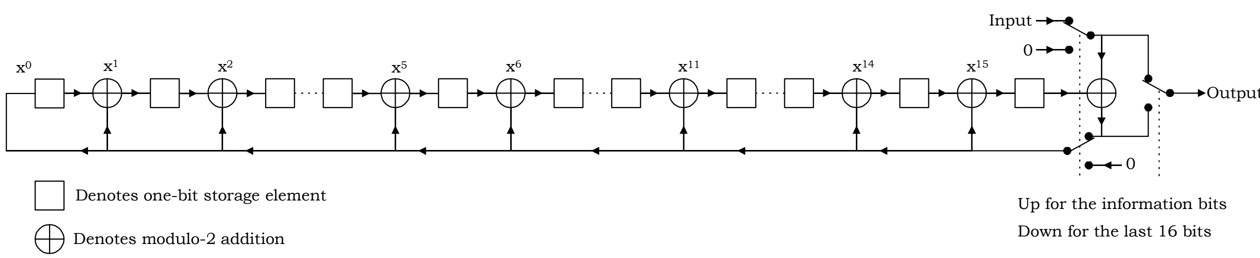

Figure 2.1.3.7.2.1-1. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

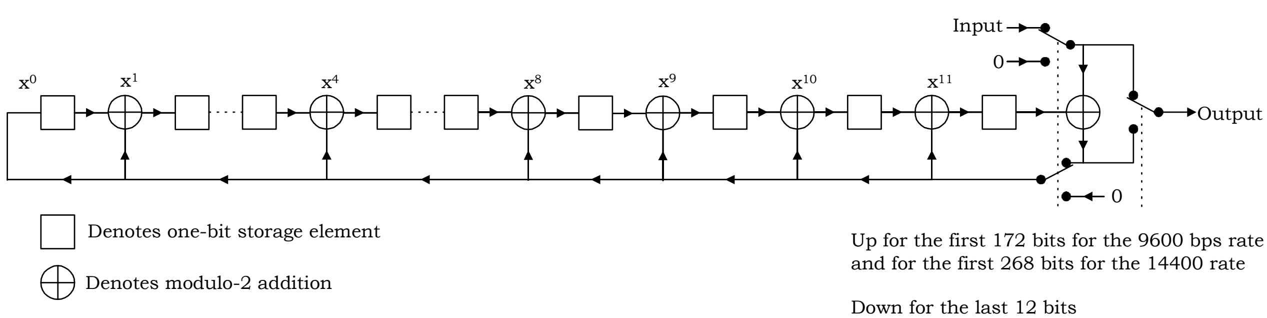

Figure 2.1.3.7.2.1-2. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

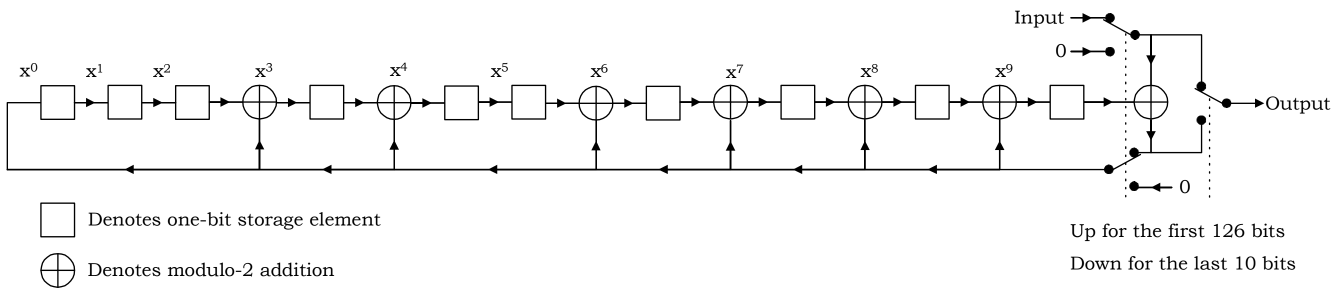

Figure 2.1.3.7.2.1-3. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

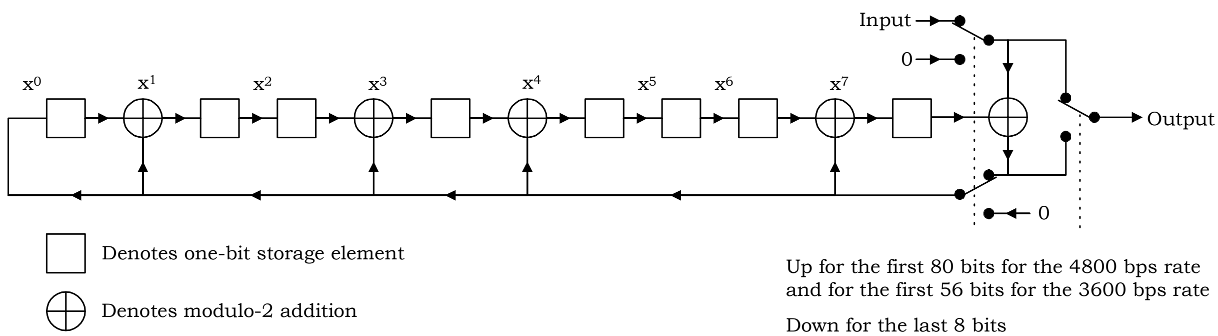

Figure 2.1.3.7.2.1-4. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

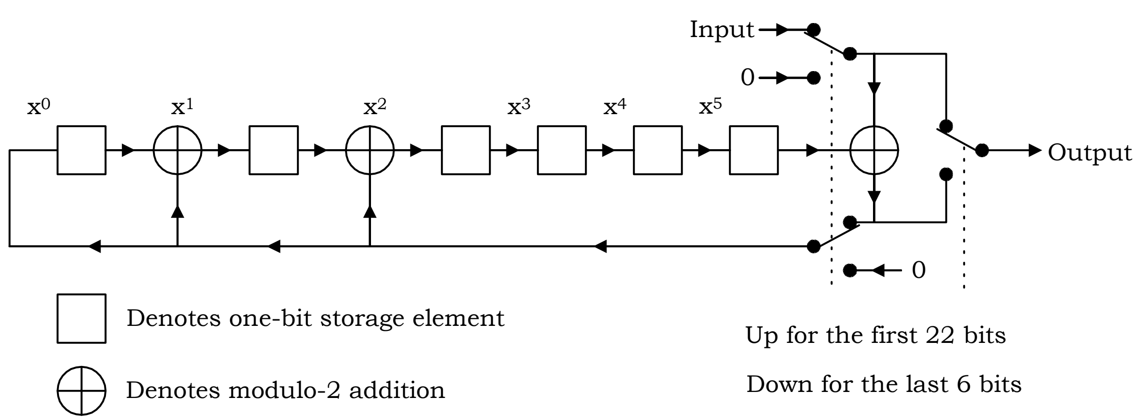

Figure 2.1.3.7.2.1-5. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator for Radio Configuration 2

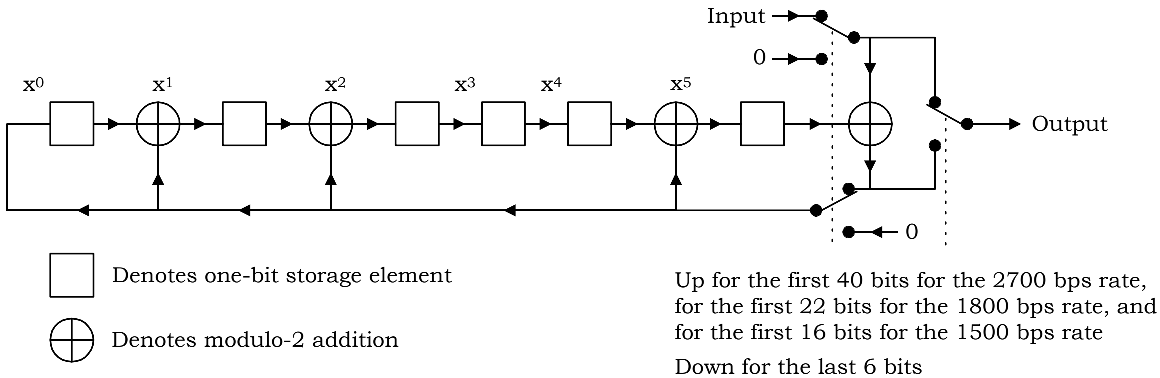

Figure 2.1.3.7.2.1-6. Reverse Fundamental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator for Radio Configurations 3 through 6

2.1.3.7.2.2 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 be set to '0'.

2.1.3.7.2.3 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.

2.1.3.7.2.3.1 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.

2.1.3.7.2.3.2 Radio Configurations 3 through 6

The Reverse Traffic Channel preamble is transmitted on the Reverse Pilot Channel as specified in 2.1.3.2.4.

2.1.3.7.3 Reverse Fundamental Channel Convolutional Encoding

The Reverse Fundamental Channel shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Reverse Fundamental Channel data, the encoder shall be initialized at the end of each 5 or 20 ms frame.

2.1.3.7.4 Reverse Fundamental Channel Code Symbol Repetition

Reverse Fundamental Channel code symbol repetition shall be as specified in 2.1.3.1.5.

2.1.3.7.5 Reverse Fundamental Channel Code Symbol Puncturing

Reverse Fundamental Channel code symbol puncturing shall be as specified in 2.1.3.1.6.

2.1.3.7.6 Reverse Fundamental Channel Interleaving

The Reverse Fundamental Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.7.7 Reverse Fundamental Channel Modulation

The Reverse Fundamental Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.7.8 Reverse Fundamental Channel Gating

The mobile station shall perform the data burst randomizing function as specified in 2.1.3.1.9 while transmitting on the Reverse Fundamental Channel.

2.1.3.7.9 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 2.1.3.1.11.

2.1.3.7.10 Reverse Fundamental Channel Quadrature Spreading

The Reverse Fundamental Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.7.11 Reverse Fundamental Channel Baseband Filtering

The Reverse Fundamental Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.7.12 Reverse Fundamental Channel Transmission Processing

When the Physical Layer receives a *Transmit FCH Request* from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- Set the information bits to SDU.

- Transmit a Reverse Fundamental Channel frame of duration FRAME_DURATION (5 ms or 20 ms) at a data rate of FRAME_RATE. If a *Transmit FCH Request* for a 5 ms frame is received coincident with a *Transmit FCH Request* 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.

2.1.3.8 Reverse Supplemental Channel

The Reverse Supplemental Channel applies to Radio Configurations 3 through 6 only.

The Reverse Supplemental Channel is used for the transmission of user information to the base station during a call. The Reverse Traffic Channel contains up to two Reverse Supplemental Channels.

2.1.3.8.1 Reverse Supplemental Channel Time Alignment and Modulation Rates

When transmitting on the Reverse Supplemental Channel with 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. When transmitting on the Reverse Supplemental Channel with Radio Configuration 4, the mobile station shall transmit information at fixed data rates of 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps. When transmitting on the Reverse Supplemental Channel with Radio Configuration 5, the mobile station shall transmit information at fixed data rates of 614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps. When transmitting on the Reverse Supplemental Channel with Radio Configuration 6, the mobile station shall transmit information at fixed data rates of 1036800, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

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.

A mobile station shall support Reverse Supplemental Channel frames which are offset by multiples of 1.25 ms as specified by $\mathrm{FRAME\_OFFSET_S}$. A mobile station may support frames which are offset by multiple of 20 ms on Reverse Supplemental Channel i as specified by $\mathrm{REV\_SCH\_FRAME\_OFFSET[i]_S}$.

The amount of time offset is specified by $\mathrm{FRAME\_OFFSET_S}$ and $\mathrm{REV\_SCH\_FRAME\_OFFSET[i]_S}$. A zero-offset Reverse Supplemental Channel frame shall begin only when System Time is an integral multiple of 20 ms (see Figure 1.3-1). An offset frame shall begin $1.25 \times \mathrm{FRAME\_OFFSET_S} + 20 \times \mathrm{REV\_SCH\_FRAME\_OFFSET[i]_S}$ ms later than the zero-offset Reverse Supplemental Channel frame. The interleaver block for the

Reverse Supplemental Channels shall be aligned with the Reverse Supplemental Channel frame.

2.1.3.8.2 Reverse Supplemental Channel Frame Structure

Tables 2.1.3.8.2-1 through 2.1.3.8.2-3 summarize the Reverse Supplemental Channel bit allocations. 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 2.1.3.8.2-1.

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 a Reserved Bit, followed by the information bits, frame quality indicator (CRC), and eight Encoder Tail Bits.

Table 2.1.3.8.2-1. Reverse Supplemental Channel Frame Structure Summary for 20 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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

Note: The 614400 bps data rate applies to Radio Configuration 5. The 1036800 and 460800 bps data rates apply to Radio Configuration 6 only.

Table 2.1.3.8.2-2. Reverse Supplemental Channel Frame Structure Summary for 40 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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 and 230400 bps data rates apply to Radio Configuration 6 only.

Table 2.1.3.8.2-3. Reverse Supplemental Channel Frame Structure Summary for 80 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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 and 115200 bps data rates apply to Radio Configuration 6 only.

R	Information Bits	F	R/T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
R/T - Reserved/Encoder Tail Bits

Figure 2.1.3.8.2-1. Reverse Supplemental Channel Frame Structure

2.1.3.8.2.1 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 Encoder Tail Bits.

Frames with more than 267 information bits shall use a 16-bit frame quality indicator.

Frames with 172 and 267 information bits shall use a 12-bit frame quality indicator.

Frames with 125 information bits shall use a 10-bit frame quality indicator.

Frames with 80 and 55 information bits shall use an 8-bit frame quality indicator.

Frames with 16, 21, and 40 information bits shall use a 6-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1 \text{ for the 16-bit frame quality indicator,}$$

$$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1 \text{ for the 12-bit frame quality indicator,}$$

$$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1 \text{ for the 10-bit frame quality indicator,}$$

$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1 \text{ for the 8-bit frame quality indicator, and}$$

$$g(x) = x^6 + x^5 + x^2 + x + 1 \text{ for the 6-bit frame quality indicator.}$$

The frame quality indicators shall be computed according to the following procedure as shown in Figures 2.1.3.8.2.1-1 through 2.1.3.8.2.1-5:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of Reserved Bits and information 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’.
- 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.

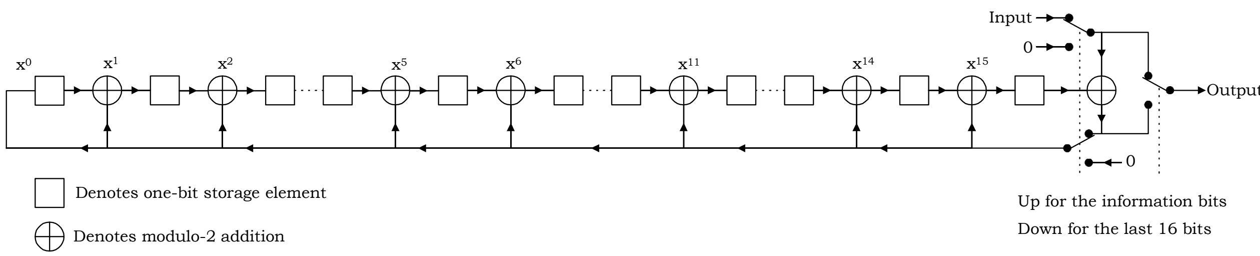

Figure 2.1.3.8.2.1-1. Reverse Supplemental Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

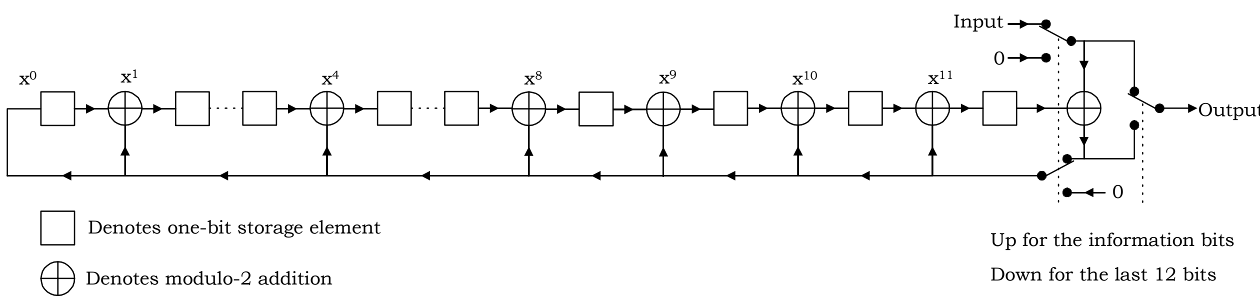

Figure 2.1.3.8.2.1-2. Reverse Supplemental Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

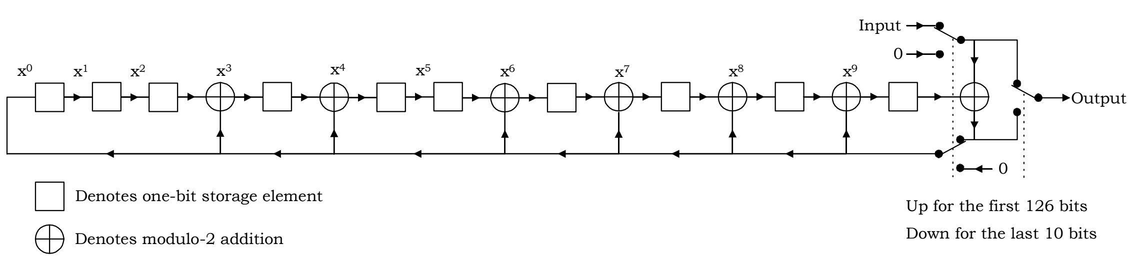

Figure 2.1.3.8.2.1-3. Reverse Supplemental Channel Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

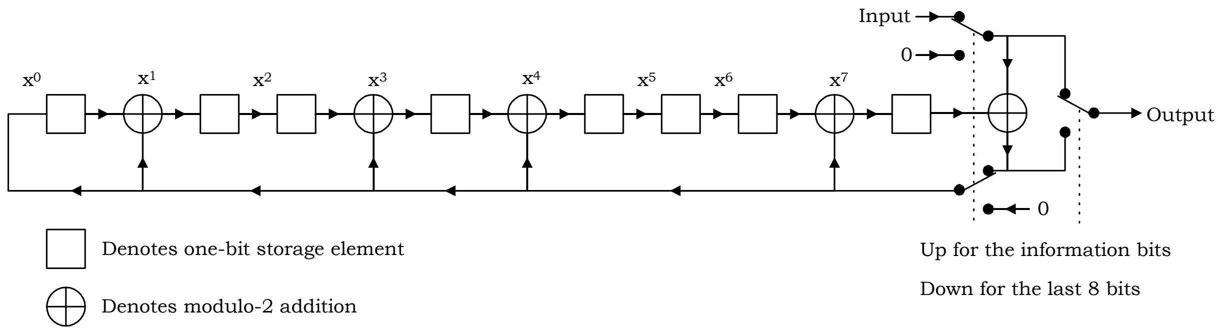

Figure 2.1.3.8.2.1-4. Reverse Supplemental Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

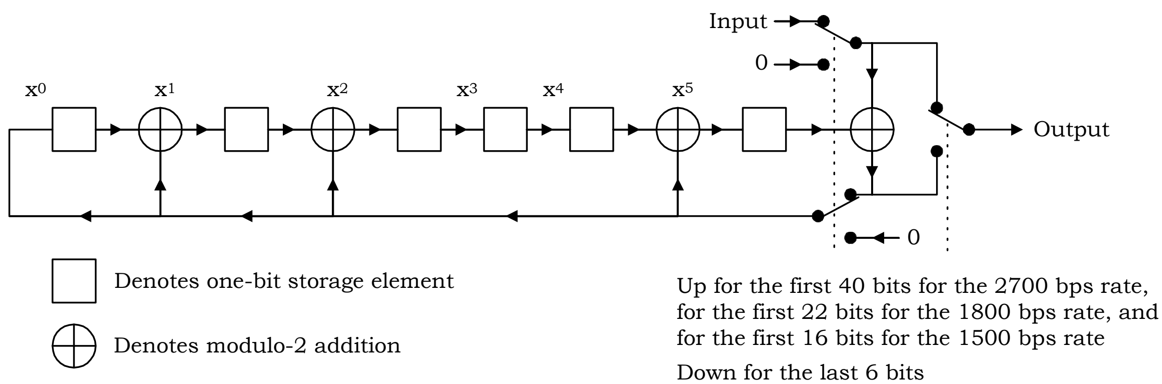

Figure 2.1.3.8.2.1-5. Reverse Supplemental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator

2.1.3.8.2.2 Reverse Supplemental Channel Encoder Tail Bits

The last eight bits of each Reverse Supplemental Channel frame are called the Encoder Tail Bits. These eight bits shall be set to ‘0’.

2.1.3.8.3 Reverse Supplemental Channel Forward Error Correction Encoding

The Reverse Supplemental Channel shall be convolutionally or turbo encoded as specified in 2.1.3.1.4.

When generating Reverse Supplemental Channel data, the encoder shall be initialized at the end of each frame.

2.1.3.8.4 Reverse Supplemental Channel Code Symbol Repetition

Reverse Supplemental Channel code symbol repetition shall be as specified in 2.1.3.1.5.

2.1.3.8.5 Reverse Supplemental Channel Code Symbol Puncturing

Reverse Supplemental Channel code symbol puncturing shall be as specified in 2.1.3.1.6.

2.1.3.8.6 Reverse Supplemental Channel Interleaving

The Reverse Supplemental Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.8.7 Reverse Supplemental Channel Modulation

The Reverse Supplemental Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.8.8 Reverse Supplemental Channel Quadrature Spreading

The Reverse Supplemental Channel shall be quadrature spread as specified in 2.1.3.1.12.

2.1.3.8.9 Reverse Supplemental Channel Baseband Filtering

The Reverse Supplemental Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.8.10 Reverse Supplemental Channel Transmission Processing

When the Physical Layer receives a *Transmit SCH Request* from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Reverse Supplemental Channel frame of duration FRAME_DURATION (20, 40, or 80 ms) at a data rate of FRAME_RATE.

2.1.3.9 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 user information to the base station during a call. The Reverse Traffic Channel contains up to seven Reverse Supplemental Code Channels.

2.1.3.9.1 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.

A mobile station shall support Reverse Supplemental Code Channel frames which are offset. The amount of time offset is specified by the $\text{FRAME\_OFFSET}_{\text{S}}$ parameter. 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 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 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.

2.1.3.9.2 Reverse Supplemental Code Channel Frame Structure

Table 2.1.3.9.2-1 summarizes the Reverse Supplemental Code Channel bit allocations. The order of the bits is shown in Figure 2.1.3.9.2-1.

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 2.1.3.9.2-1. Reverse Supplemental Code Channel Frame Structure Summary

Radio Config.	Transmission Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Encoder Tail Bits
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 2.1.3.9.2-1. Reverse Supplemental Code Channel Frame Structure

2.1.3.9.2.1 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. This frame quality indicator is a CRC.

The generator polynomial for the frame quality indicator shall be as follows:

$$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$$

The frame quality indicator shall be computed according to the following procedure as shown in Figure 2.1.3.9.2.1-1:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of Reserved Bits and information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (12).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

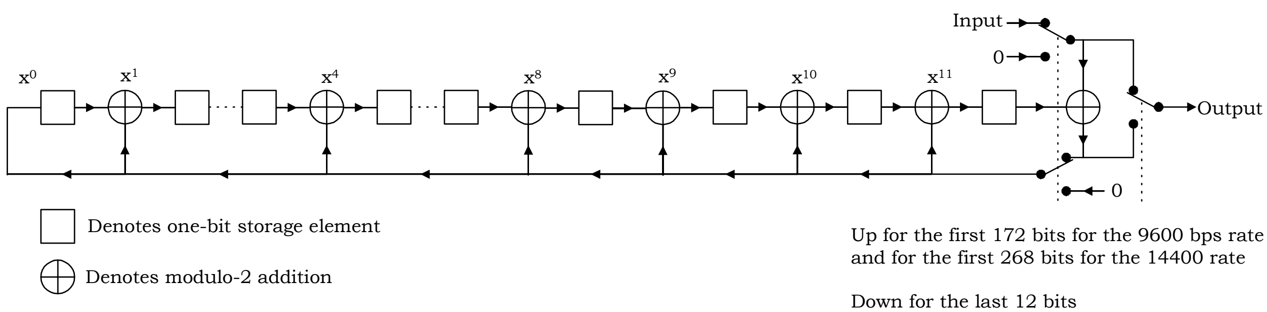

Figure 2.1.3.9.2.1-1. Reverse Supplemental Code Channel Frame Quality Indicator Calculation

2.1.3.9.2.2 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 be set to ‘0’.

2.1.3.9.2.3 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.

2.1.3.9.2.3.1 Reverse Supplemental Code Channel Preamble

The Reverse Supplemental Code Channel preamble shall consist of BEGIN_PREAMBLE_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.

2.1.3.9.2.3.2 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 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.

2.1.3.9.3 Reverse Supplemental Code Channel Convolutional Encoding

The Reverse Supplemental Channel shall be convolutionally encoded as specified in 2.1.3.1.4.

When generating Reverse Supplemental Code Channel data, the encoder shall be initialized at the end of each 20 ms frame.

2.1.3.9.4 Reverse Supplemental Code Channel Code Symbol Repetition

Reverse Supplemental Code Channel code symbol repetition shall be as specified in 2.1.3.1.5.

2.1.3.9.5 Reverse Supplemental Code Channel Interleaving

The Reverse Supplemental Code Channel shall be interleaved as specified in 2.1.3.1.7.

2.1.3.9.6 Reverse Supplemental Code Channel Modulation

The Reverse Supplemental Code Channel data shall be modulated as specified in 2.1.3.1.8.

2.1.3.9.7 Reverse Supplemental Code Channel Direct Sequence Spreading

The Reverse Supplemental Code Channel shall be spread by the long code as specified in 2.1.3.1.11.

2.1.3.9.8 Reverse Supplemental Code Channel Quadrature Spreading

The Reverse Supplemental Code Channel shall be quadrature spread by the pilot PN sequences as specified in 2.1.3.1.12.

2.1.3.9.9 Reverse Supplemental Code Channel Baseband Filtering

The Reverse Supplemental Code Channel shall be filtered as specified in 2.1.3.1.13.

2.1.3.9.10 Reverse Supplemental Code Channel Transmission Processing

When the Physical Layer receives a *Transmit R-SCCH Preamble Request* 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 *Transmit SCCH Request* from the MAC Layer, the mobile station shall perform the following:

- Store the arguments SDU and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Reverse Supplemental Code Channel frame at a data rate of FRAME_RATE.

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 3GPP2 C.S0011-0.

2.1.4.2 Radiated Spurious Emissions

The mobile station shall meet the requirements in Section 4.5.2 of the current version of 3GPP2 C.S0011-0.

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 which 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 through 9.

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 3GPP2 C.S0011-0.

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 3GPP2 C.S0011-0.

2.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in the current version of 3GPP2 C.S0011-0.

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).

The mobile station shall support Walsh and quasi-orthogonal functions (see 3.1.3.1.13).

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 3.1.3.11.2.3). 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 which is received at the beginning of the mobile station's assigned Paging Channel slot.[11]

2.2.2.2 Erasure 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 2.1.3.7.2-1) 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.

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[11] 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.

- The mobile station shall set the Reserved/Erasure Indicator Bit (see Figure 2.1.3.7.2-1) 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, or 6 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[12] 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.

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 Bit as follows:

- In the first two frames after the mobile station re-enables its transmitter, the mobile station shall send Reserved/Erasure Indicator Bits corresponding to the two most recently received frames. One or both of these Reserved/Erasure 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 Bit to '0', until it receives two frames on the Forward Traffic Channel.
- The mobile station shall then set subsequent Reserved/Erasure Indicator Bits as described above for continuous operation.

[12] A frame is considered to be detected if the mobile station determines that the base station transmitted a frame containing data.

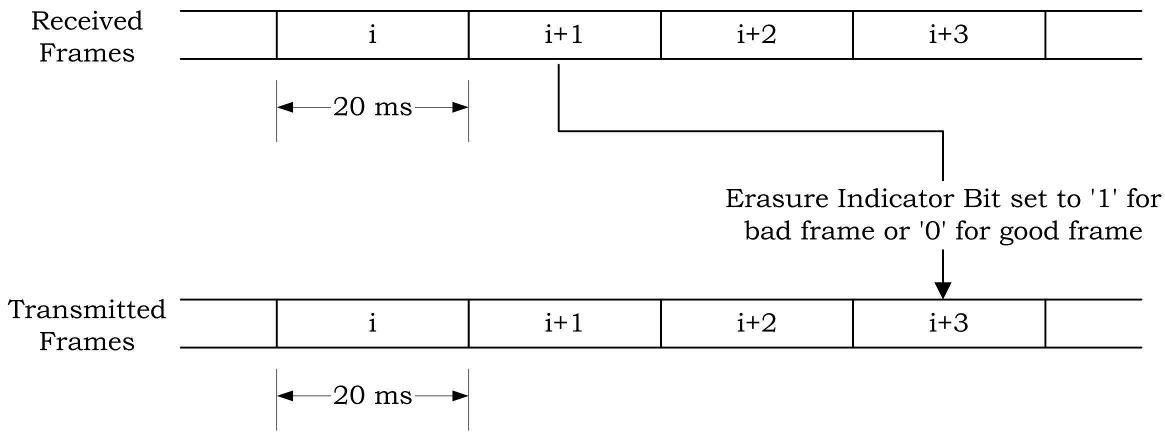


Figure 2.2.2.2-1. Erasure Indicator Bit Timing

2.2.2.3 Forward Traffic Channel Time Alignment

The Forward Traffic Channel frame time alignment is specified in 3.1.3.10.1, 3.1.3.11.1, 3.1.3.12.1, and 3.1.3.13.1. 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 Sync Channel Reception Processing

When the mobile station receives a Sync Channel frame, the Physical Layer shall send a *Receive F-SYNC Indication* to the MAC Layer, after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Pass the SDU as an argument.

2.2.2.4.2 Paging Channel Reception Processing

When the mobile station receives a Paging Channel frame, the Physical Layer shall send a *Receive F-PCH Indication* to the MAC Layer, after the mobile station performs the following actions:

- Set the SDU to the received information bits.
- Pass the SDU as an argument.

2.2.2.4.3 Broadcast Channel Reception Processing

Not specified.

2.2.2.4.4 Quick Paging Channel Reception Processing

Not specified.

2.2.2.4.5 Common Power Control Channel Reception Processing

Not specified.

2.2.2.4.6 Common Assignment Channel Reception Processing

Not specified.

2.2.2.4.7 Forward Dedicated Control Channel Reception Processing

When the mobile station receives a Forward Dedicated Control Channel frame, the Physical Layer shall send a *Receive DCCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

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 *Receive DCCH Indication* to the MAC Layer, after the mobile station performs the following actions:

- Set the SDU to NULL.
- Pass the SDU as an argument.

2.2.2.4.8 Forward Fundamental Channel Reception Processing

When the mobile station receives a Forward Fundamental Channel frame, the Physical Layer shall send a *Receive FCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

2.2.2.4.9 Forward Supplemental Channel Reception Processing

When the mobile station receives a Forward Supplemental Channel frame, the Physical Layer shall send a *Receive SCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to "sufficient" if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to "insufficient."
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

2.2.2.4.10 Forward Supplemental Code Channel Reception Processing

When the mobile station receives a Forward Supplemental Code Channel frame, the Physical Layer shall send a *Receive SCCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to "sufficient" if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to "insufficient."
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

2.2.3 Limitations on Emissions

The mobile station shall meet the requirements in Section 3.5.1 of the current version of 3GPP2 C.S0011-0.

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 3GPP2 C.S0011-0.

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.

3 REQUIREMENTS FOR BASE STATION CDMA OPERATION

This section defines requirements that are specific to CDMA base station equipment and operation.

3.1 Transmitter

3.1.1 Frequency Parameters

3.1.1.1 Channel Spacing and Designation

3.1.1.1.1 Cellular Band

The Band Class 0 system designators for base station transmissions shall be as specified in Table 2.1.1.1.1-1. Base stations supporting Band Class 0 shall support CDMA operations on CDMA Channels as calculated in Table 2.1.1.1.1-2 and as described in Tables 2.1.1.1.1-3 and 2.1.1.1.1-4.

The preferred set of CDMA frequency assignments for Band Class 0 is given in Table 2.1.1.1.1-5.

If a Band Class 0 carrier operates with Spreading Rate 3 in multi-carrier (MC) mode, then all three carriers shall be separated by 41 CDMA Channels (1.23 MHz separation).

3.1.1.1.2 PCS Band

The Band Class 1 block designators for base station transmissions shall be as specified in Table 2.1.1.1.2-1. Base stations supporting Band Class 1 shall support CDMA operations on CDMA Channels as calculated in Table 2.1.1.1.2-2 and as described in Tables 2.1.1.1.2-3 and 2.1.1.1.2-4.

The preferred set of CDMA frequency assignments for Band Class 1 is given in Table 2.1.1.1.2-5.

If a Band Class 1 carrier operates with Spreading Rate 3 in MC mode, then all three carriers shall be separated by 25 CDMA Channels (1.25 MHz separation).

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

3.1.2.1 Cellular Band

The base station shall not transmit more than 500 watts of effective radiated power (ERP) in any direction in a 1.25 MHz band of the base station's transmit band between 869 and 894 MHz. Maximum ERP and antenna height above average terrain (HAAT) shall be coordinated locally on an ongoing basis.

Current FCC rules shall also apply.

3.1.2.2 PCS Band

The base station shall not transmit more than 1640 watts of effective isotropic radiated power (EIRP) in any direction in a 1.25 MHz band of the base station's transmit band between 1930 and 1990 MHz for antenna heights above average terrain (HAAT) less than 300 meters. The base station antenna height may exceed 300 meters with a reduction in EIRP according to current FCC rules.

The transmitter output power of the base station in any 1.25 MHz band of the base station's transmit band between 1930 and 1990 MHz and in any direction shall not exceed 100 watts.

Current FCC rules shall also apply.

3.1.3 Modulation Characteristics

3.1.3.1 Forward CDMA Channel Signals

Signals transmitted on the Forward Traffic Channel (i.e. Forward Dedicated Control Channel, Forward Fundamental Channel, Forward Supplemental Channel, or Forward Supplemental Code Channel sent to a specific mobile station) are specified by radio configurations. There are nine 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, or 7. A base station may support operation in Radio Configurations 2, 4, 5, 6, 8, or 9. 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, or 5 on a Forward Traffic 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	1500, 2700, 4800, 9600, 19200, 38400, 76800, and 153600 bps data rates with R = 1/4, QPSK pre-spreading symbols, OTD allowed
4	1	1500, 2700, 4800, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/2, QPSK pre-spreading symbols, OTD allowed
5	1	1800, 3600, 7200, 14400, 28800, 57600, 115200, and 230400 bps data rates with R = 1/4, QPSK pre-spreading symbols, OTD allowed
6	3	1500, 2700, 4800, 9600, 19200, 38400, 76800, 153600, and 307200 bps data rates with R = 1/6, QPSK pre-spreading symbols, DS non-OTD, DS OTD, or MC modes.
7	3	1500, 2700, 4800, 9600, 19200, 38400, 76800, 153600, 307200, and 614400 bps data rates with R = 1/3, QPSK pre-spreading symbols, DS non-OTD, DS OTD, or MC modes.
8	3	1800, 3600, 7200, 14400, 28800, 57600, 115200, 230400, and 460800 data rates with R = 1/4 (20 ms) or 1/3 (5 ms), QPSK pre-spreading symbols, DS non-OTD, DS OTD, or MC modes.
9	3	1800, 3600, 7200, 14400, 28800, 57600, 115200, 230400, 460800, and 1036800 bps data rates with R = 1/2 (20 ms) or 1/3 (5 ms), QPSK pre-spreading symbols, DS non-OTD, DS OTD, or MC modes.

Note: For Radio Configurations 3 through 9, the Forward Dedicated Control Channel and Forward Fundamental Channel also allow a 9600 bps, 5 ms format.

3.1.3.1.1 Channel Structures

The assignment of the code channels transmitted by a base station is shown in Figure 3.1.3.1.1-1.

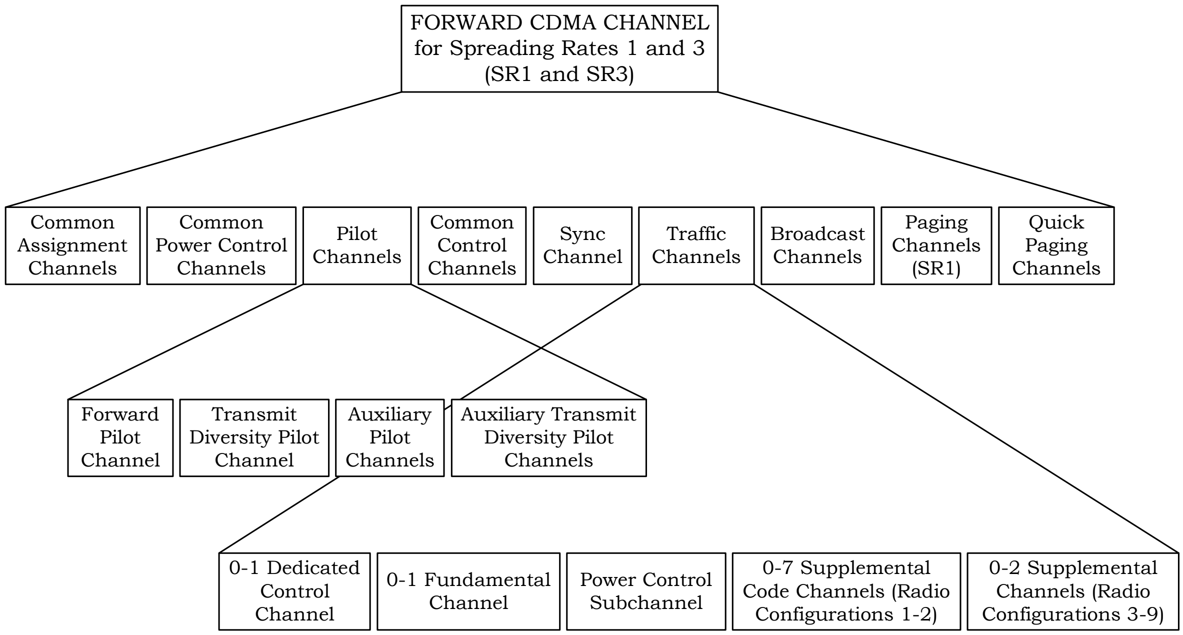


Figure 3.1.3.1.1-1. Forward CDMA Channel Transmitted by a Base Station

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 Channel	Not specified
Quick Paging Channel	3
Common Power Control Channel	Not specified
Common Assignment Channel	Not specified
Forward Common Control Channel	Not specified
Forward Dedicated Control Channel	1*
Forward Fundamental Channel	1*
Forward Supplemental Code Channel (RC 1 and 2 only)	7*
Forward Supplemental Channel (RC 3 through 5 only)	2*

* per Forward Traffic Channel

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.

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 Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-2. The structure of the Quick Paging Channel for Spreading Rate 1 is shown in Figure 3.1.3.1.1.1-3. The structure of the Common Power Control 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. The structure of the Forward Common Control Channel for Spreading Rate 1 is shown in Figures 3.1.3.1.1.1-6 and 3.1.3.1.1.1-7. The structure of the Forward Dedicated Control Channel for Spreading Rate 1 is shown in Figures 3.1.3.1.1.1-8 through 3.1.3.1.1.1-10.

The Forward Fundamental Channel and Forward Supplemental Code Channel for Radio Configuration 1 have the overall structure shown in Figure 3.1.3.1.1.1-11. The Forward Fundamental Channel and Forward Supplemental Code Channel for Radio Configuration 2 have the overall structure shown in Figure 3.1.3.1.1.1-12. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 3 have the overall structure shown in Figure 3.1.3.1.1.1-13. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 4 have the overall structure shown in Figure 3.1.3.1.1.1-14. The Forward Fundamental Channel and Forward Supplemental Channel for Radio Configuration 5 have the overall structure shown in Figure 3.1.3.1.1.1-15.

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 3.1.3.1.1.1-16.

The symbol demultiplexing and I and Q mappings are shown in Figures 3.1.3.1.1.1-17, 3.1.3.1.1.1-18, and 3.1.3.1.1.1-19.

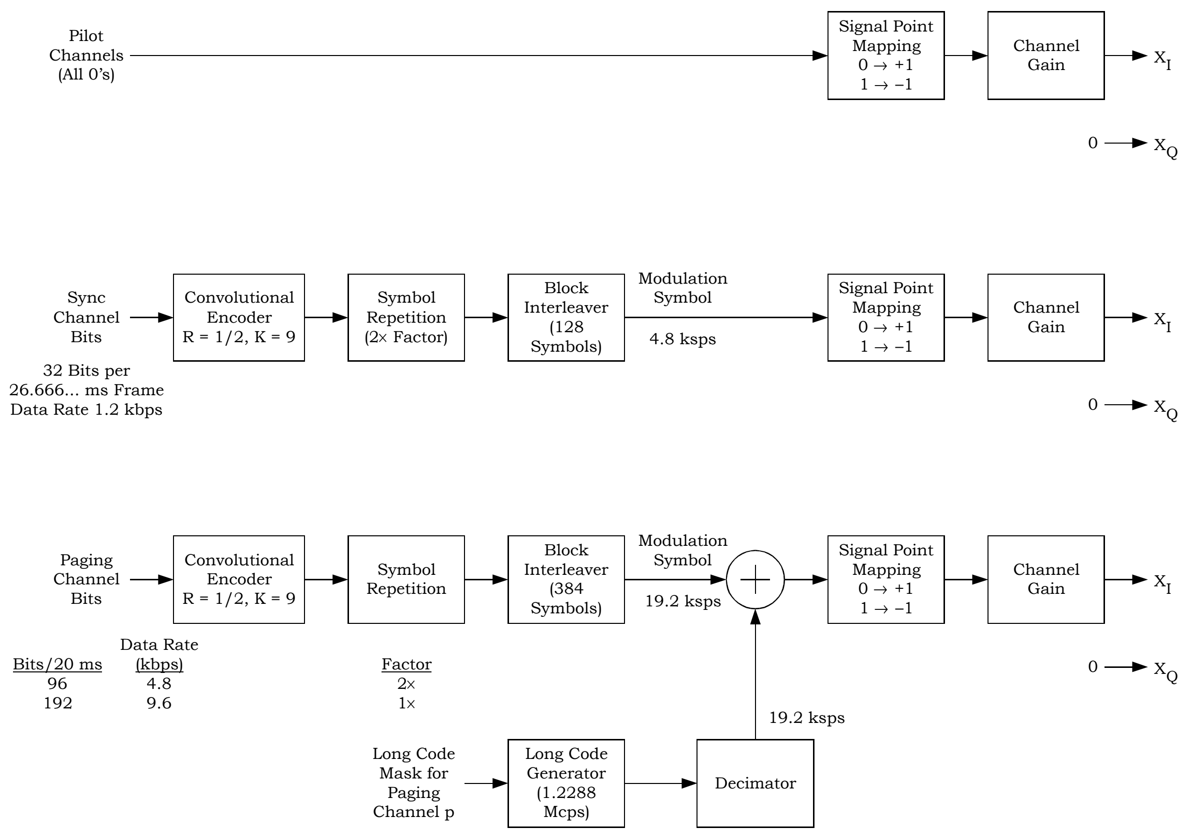


Figure 3.1.3.1.1.1-1. Pilot Channels, Sync Channel, and Paging Channels for Spreading Rate 1

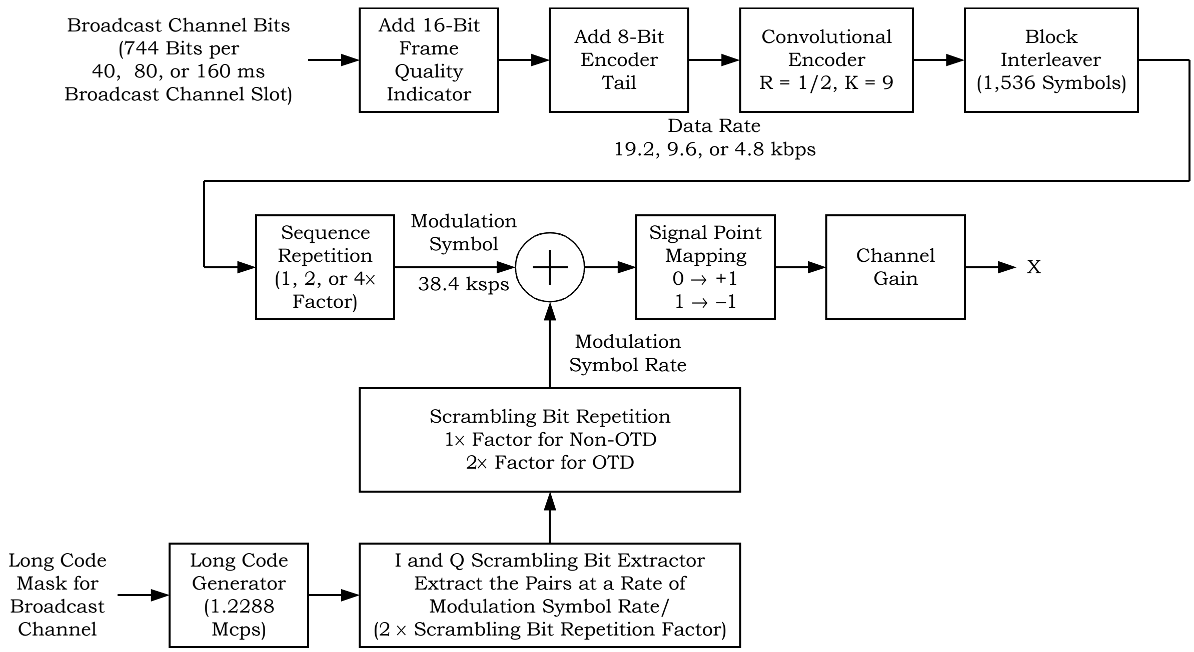


Figure 3.1.3.1.1.1-2. Broadcast Channel Structure for Spreading Rate 1

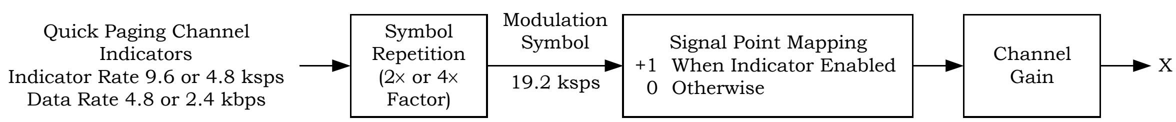


Figure 3.1.3.1.1.1-3. Quick Paging Channel Structure for Spreading Rate 1

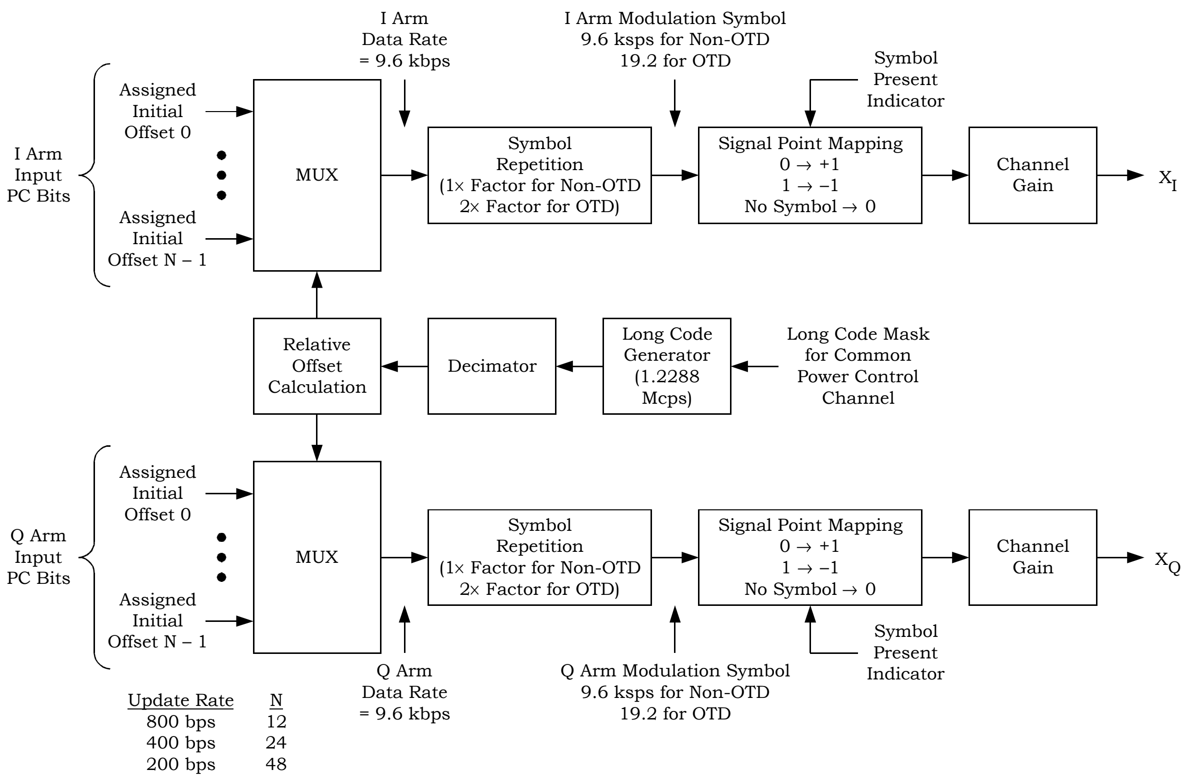


Figure 3.1.3.1.1.1-4. Common Power Control Channel Structure for Spreading Rate 1

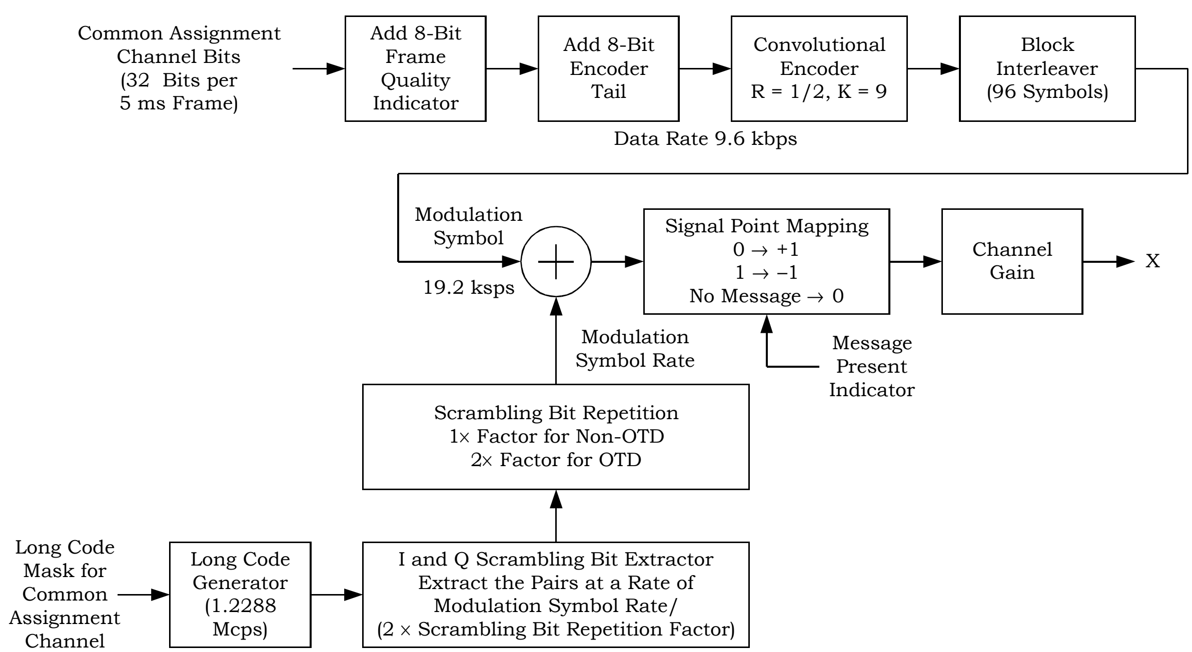


Figure 3.1.3.1.1.1-5. Common Assignment Channel Structure for Spreading Rate 1

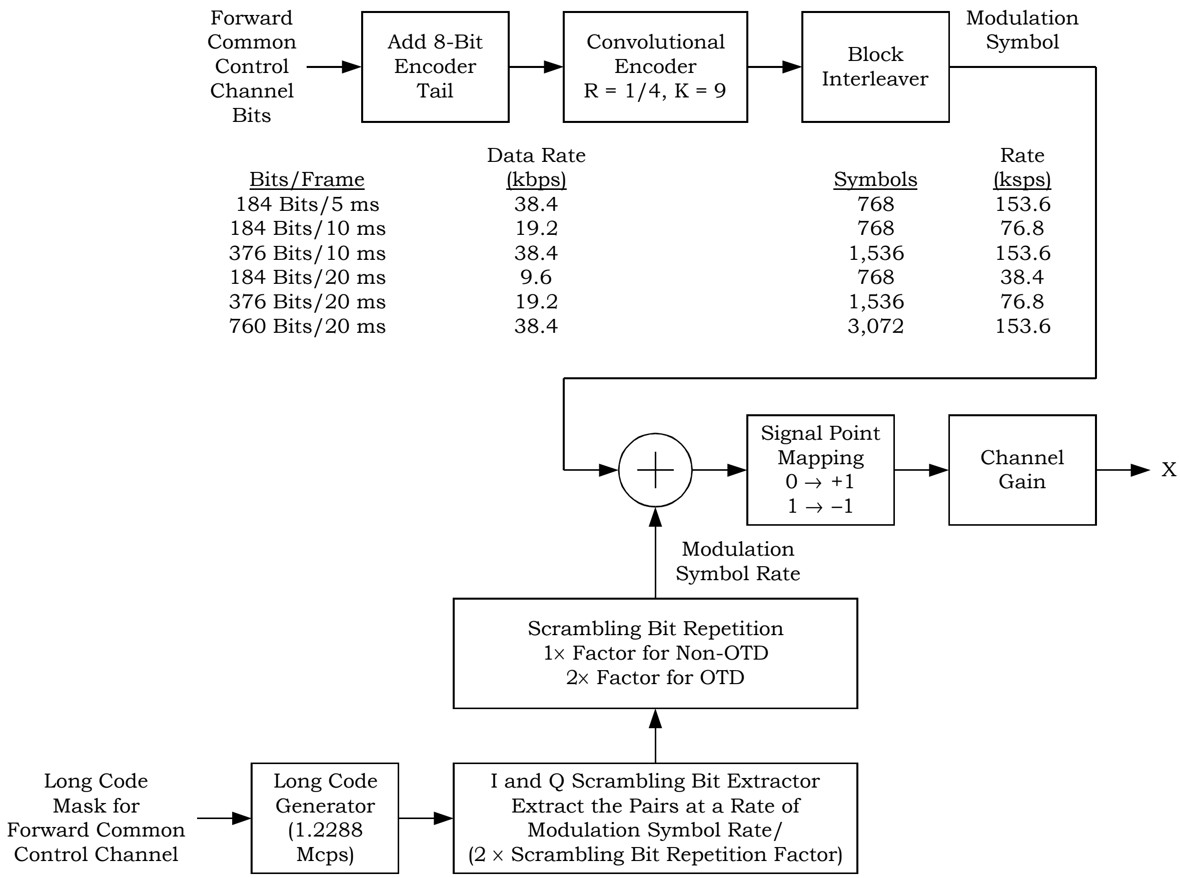


Figure 3.1.3.1.1.1-6. Forward Common Control Channel Structure for Spreading Rate 1 with R = 1/4 Mode

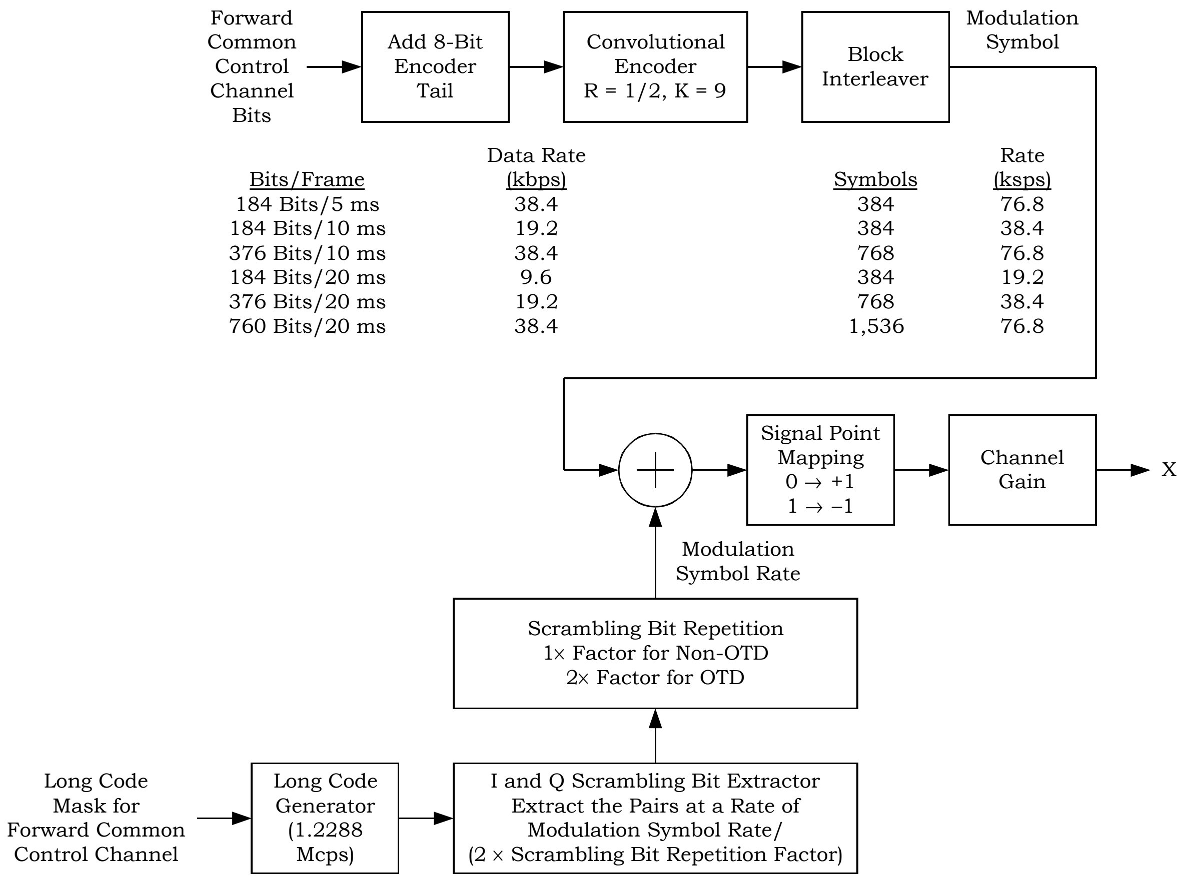


Figure 3.1.3.1.1.1-7. Forward Common Control Channel Structure for Spreading Rate 1 with R = 1/2 Mode

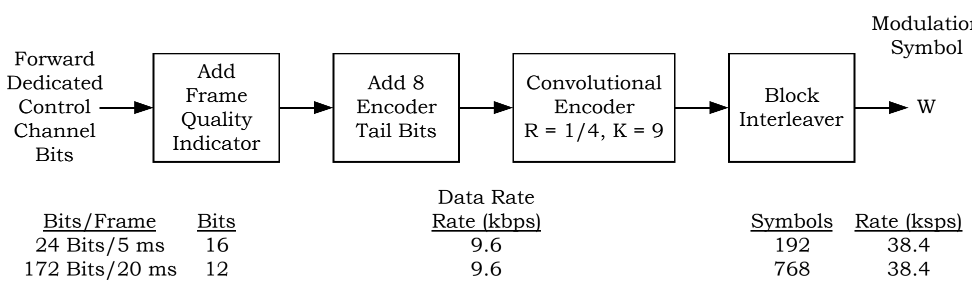
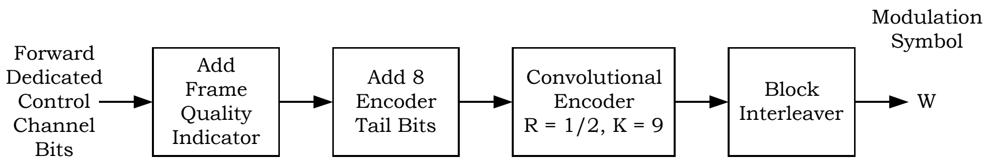
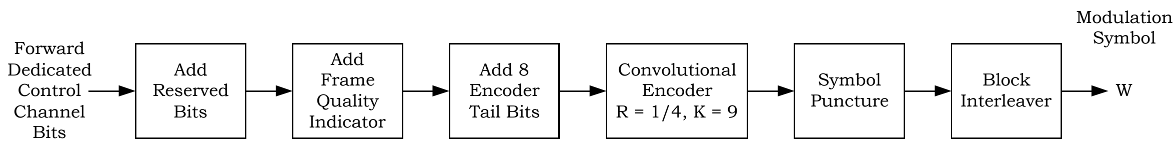


Figure 3.1.3.1.1.1-8. Forward Dedicated Control Channel Structure for Radio Configuration 3



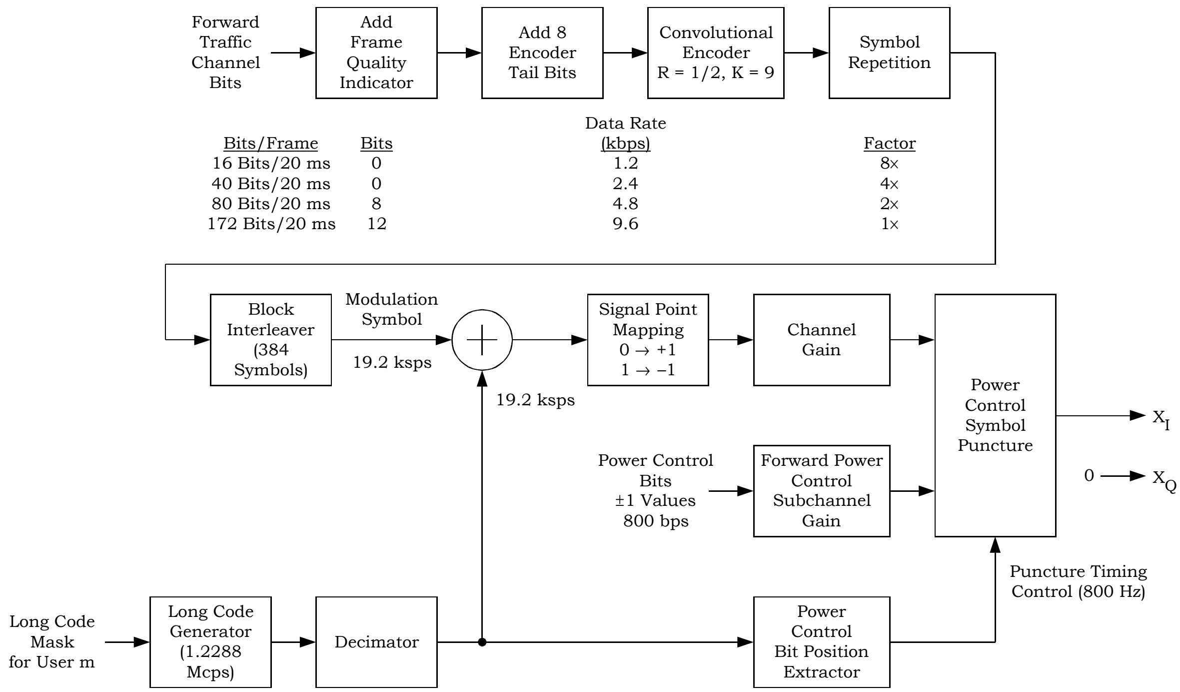
Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	96	19.2
172 Bits/20 ms	12	9.6	384	19.2

Figure 3.1.3.1.1.1-9. Forward Dedicated Control Channel Structure for Radio Configuration 4



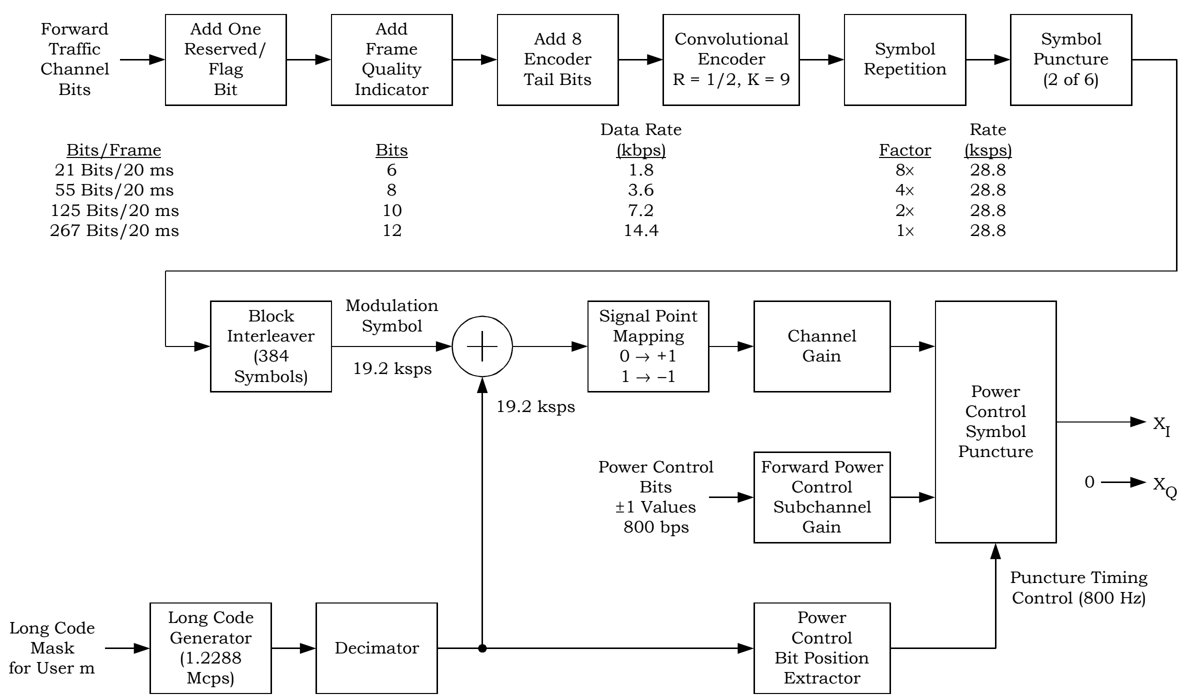
Bits/Frame	Bits	Bits	Data Rate (kbps)	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	None	192	38.4
267 Bits/20 ms	1	12	14.4	4 of 12	768	38.4

Figure 3.1.3.1.1.1-10. Forward Dedicated Control Channel Structure for Radio Configuration 5



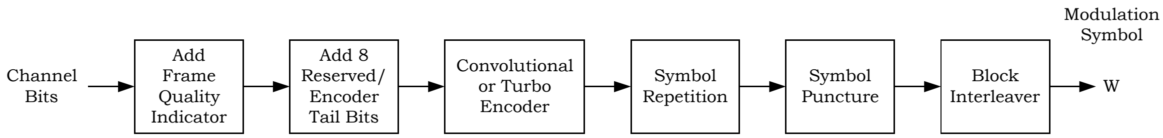
Power control bits are not punctured in for Forward Supplemental Code Channels of the Forward Traffic Channels.

Figure 3.1.3.1.1.1-11. 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.

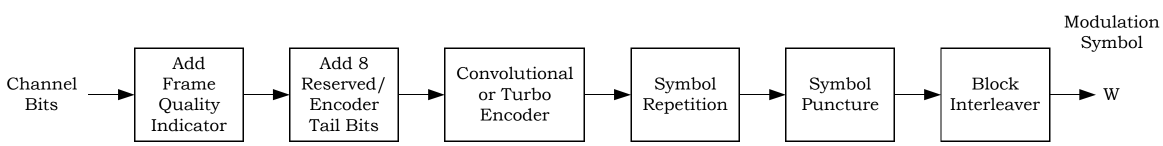
Figure 3.1.3.1.1.1-12. Forward Traffic Channel Structure for Radio Configuration 2



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

Notes:
1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel 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 16 to 172 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 360 or more channel 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.

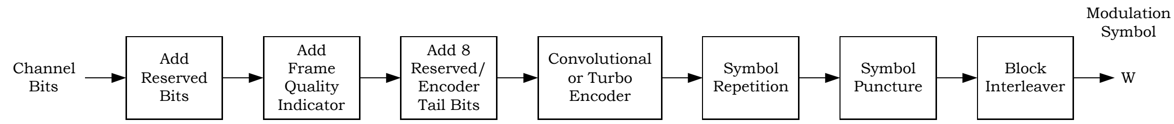
Figure 3.1.3.1.1.1-13. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 3



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

Notes:
1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel 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 16 to 172 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 360 or more channel 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.

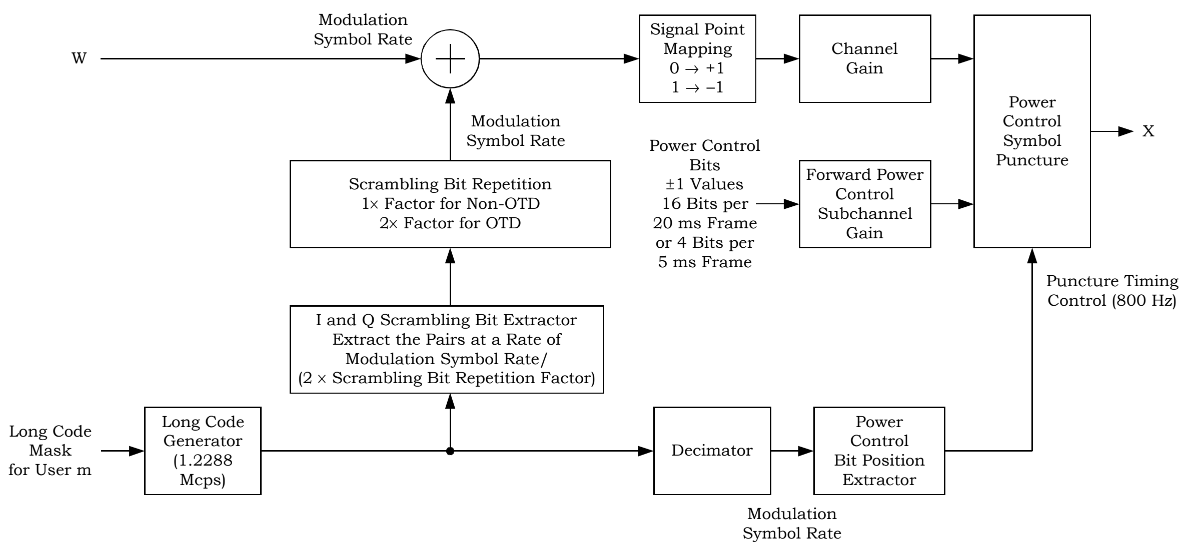
Figure 3.1.3.1.1.1-14. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 4



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

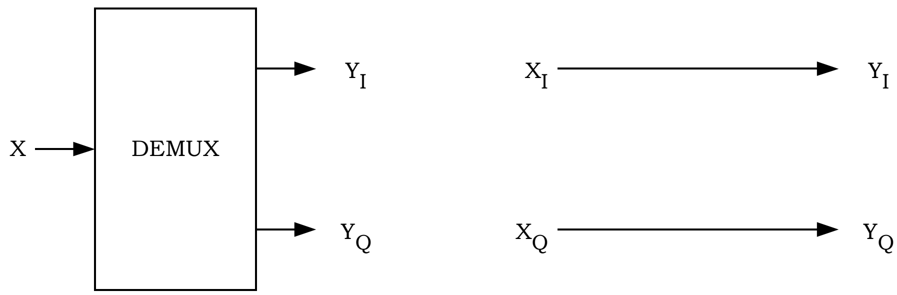
Notes:
1. n is the length of the frame in multiples of 20 ms. For 55 channel bits per frame, n = 1 or 2. For more than 55 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 21 to 267 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 552 or more channel 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 3.1.3.1.1.1-15. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 5

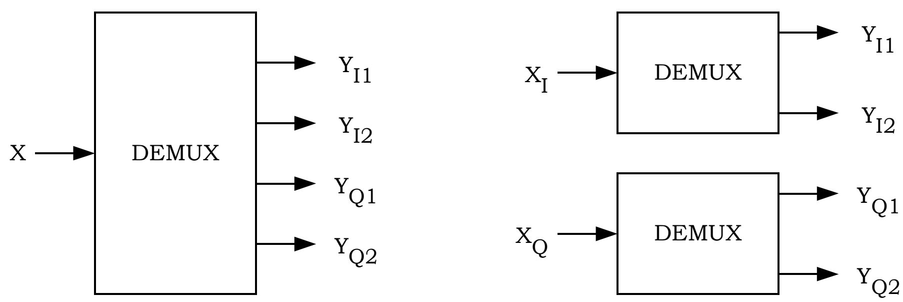


Power control symbol puncturing is on the Forward Fundamental Channels and Forward Dedicated Control Channels only.

Figure 3.1.3.1.1.1-16. Long Code Scrambling, Power Control, and Signal Point Mapping for Forward Traffic Channels with Radio Configurations 3, 4, and 5



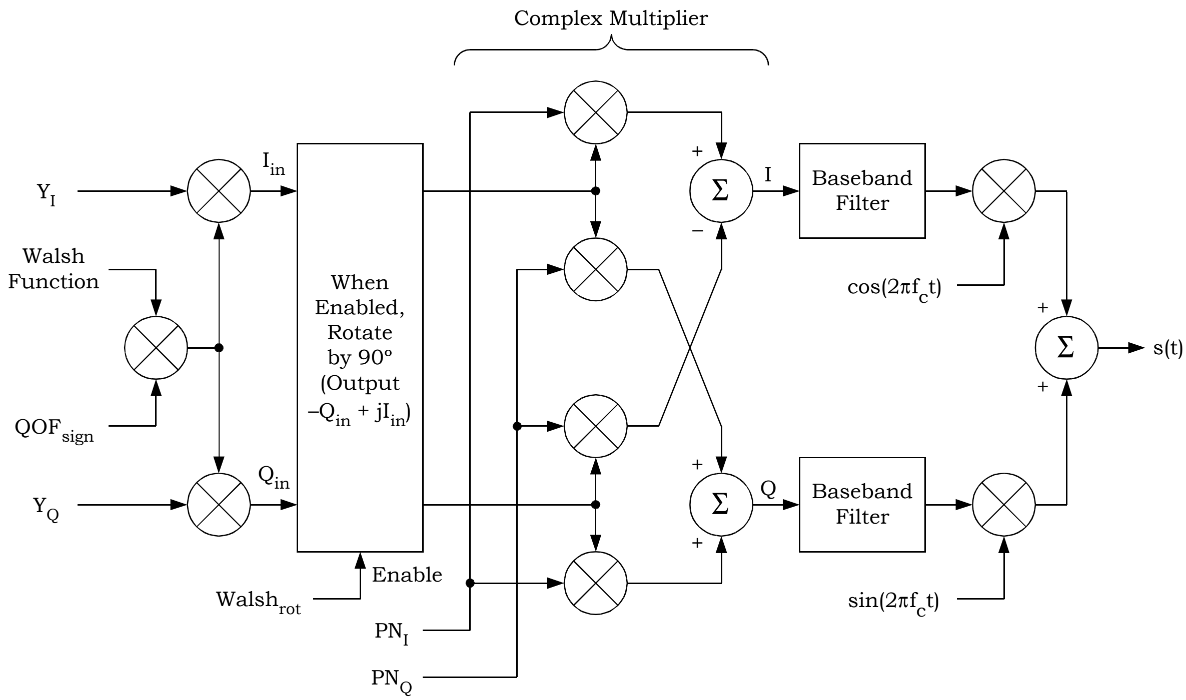
a) Non-OTD Mode



b) OTD Mode

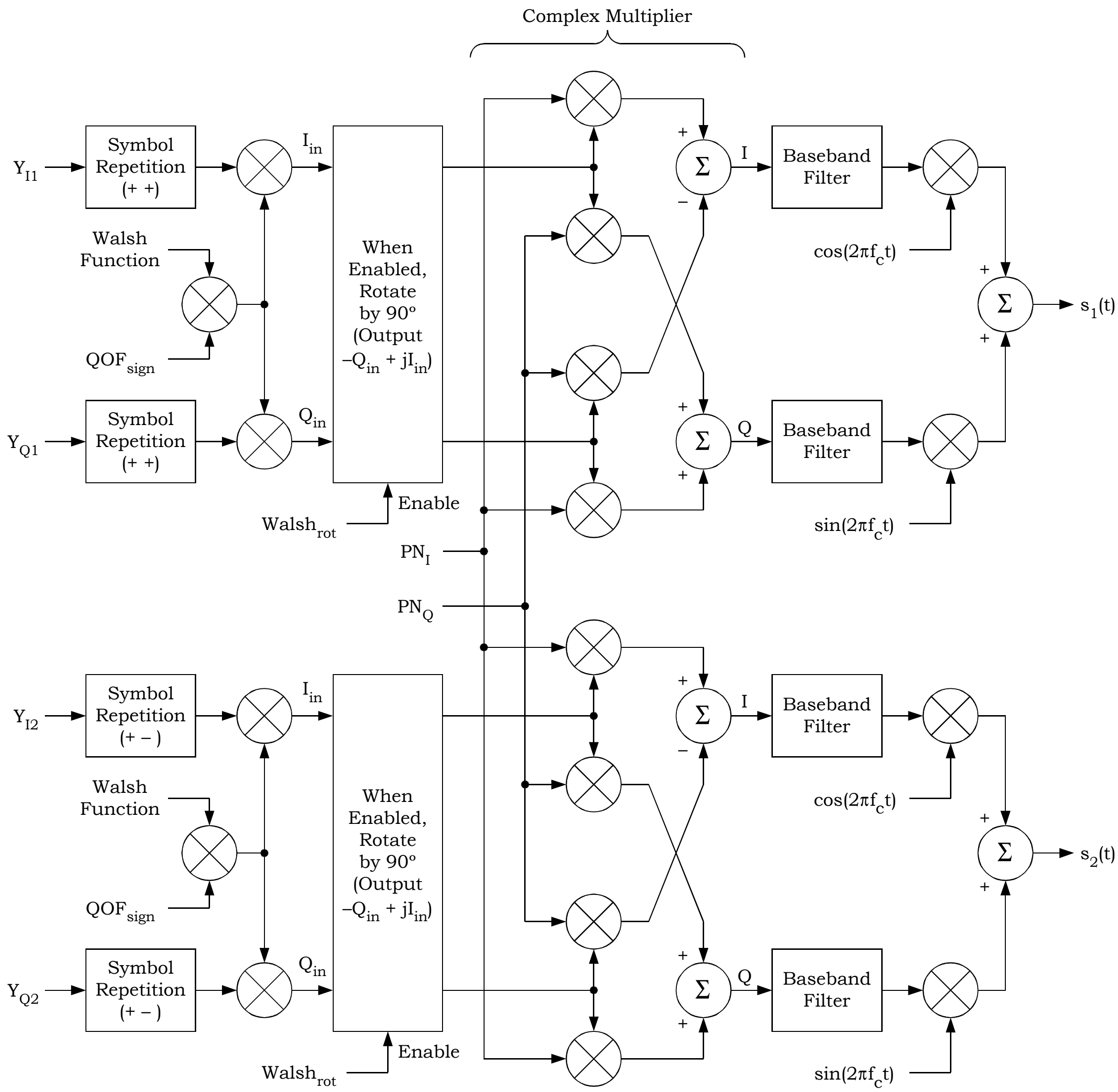
The DEMUX functions distribute input symbols sequentially from the top to the bottom output paths.

Figure 3.1.3.1.1.1-17. Demultiplexer Structure for Spreading Rate 1



Walsh Function = ±1 (Mapping: ‘0’ → +1, ‘1’ → –1)
QOF$_{sign}$ = ±1 Sign Multiplier QOF Mask (Mapping: ‘0’ → +1, ‘1’ → –1)
Walsh$_{rot}$ = ‘0’ or ‘1’ 90°-Rotation-Enable Walsh Function
Walsh$_{rot}$ = ‘0’ means no rotation
Walsh$_{rot}$ = ‘1’ means rotate by 90°
The NULL QOF has QOF$_{sign}$ = +1 and Walsh$_{rot}$ = ‘0’.
PN_I and PN_Q = ±1 I-Channel and Q-Channel PN sequences

Figure 3.1.3.1.1.1-18. I and Q Mapping (Non-OTD Mode) for Spreading Rate 1



Walsh Function = ±1 (Mapping: '0' → +1, '1' → –1)
QOF_{sign} = ±1 Sign Multiplier QOF Mask (Mapping: '0' → +1, '1' → –1)
$Walsh_{rot}$ = '0' or '1' 90°-Rotation-Enable Walsh Function
$Walsh_{rot}$ = '0' means no rotation
$Walsh_{rot}$ = '1' means rotate by 90°
The NULL QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = '0'.
PN_I and PN_Q = ±1 I-Channel and Q-Channel PN sequences

Figure 3.1.3.1.1.1-19. I and Q Mapping (OTD 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
Transmit Diversity Pilot Channel	1
Auxiliary Pilot Channel	Not specified
Auxiliary Transmit Diversity Pilot Channel	Not specified
Sync Channel	1
Broadcast Channel	Not specified
Quick Paging Channel	Not specified
Common Power Control Channel	Not specified
Common Assignment Channel	Not specified
Forward Common Control Channel	Not specified
Forward Dedicated Control Channel	1*
Forward Fundamental Channel	1*
Forward Supplemental Channel	2*

* per Forward Traffic Channel

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 3.6864 Mcps for DS operation or 1.2288 Mcps for MC operation. Multiple Forward CDMA Channels may be used within a base station in a frequency division multiplexed manner.

The structures of the Forward Pilot Channel, Transmit Diversity Pilot Channel, Auxiliary Pilot Channels, Auxiliary Transmit Diversity 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 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 Common Power 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 Figures 3.1.3.1.1.2-7 through 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 are shown in Figure 3.1.3.1.1.2-15.

The symbol demultiplexing and I and Q mappings are shown in Figures 3.1.3.1.1.2-16, 3.1.3.1.1.2-17, 3.1.3.1.1.2-18, and 3.1.3.1.1.2-19.

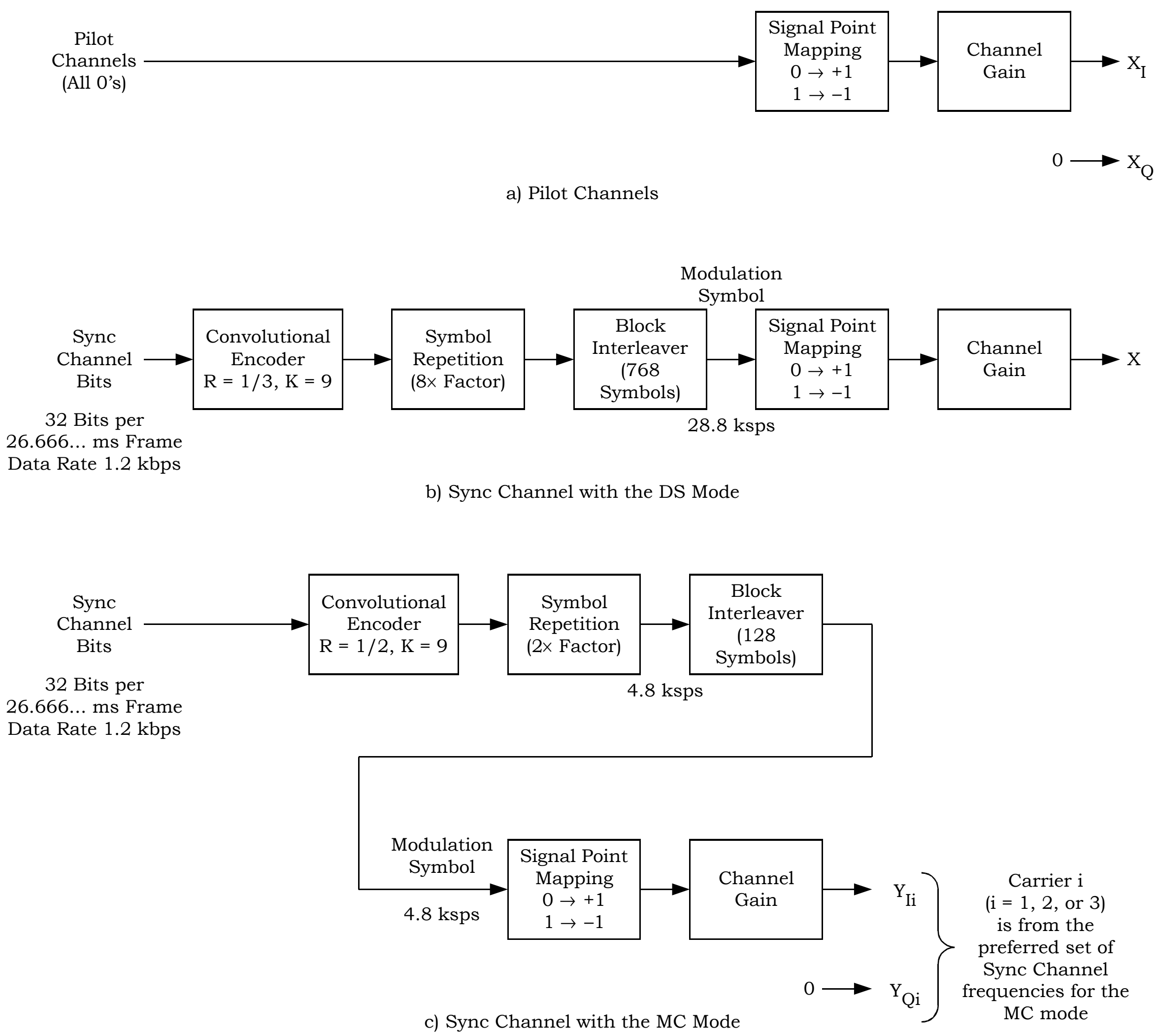


Figure 3.1.3.1.1.2-1. Forward Pilot Channel, Auxiliary Pilot Channels, and Sync Channel for Spreading Rate 3

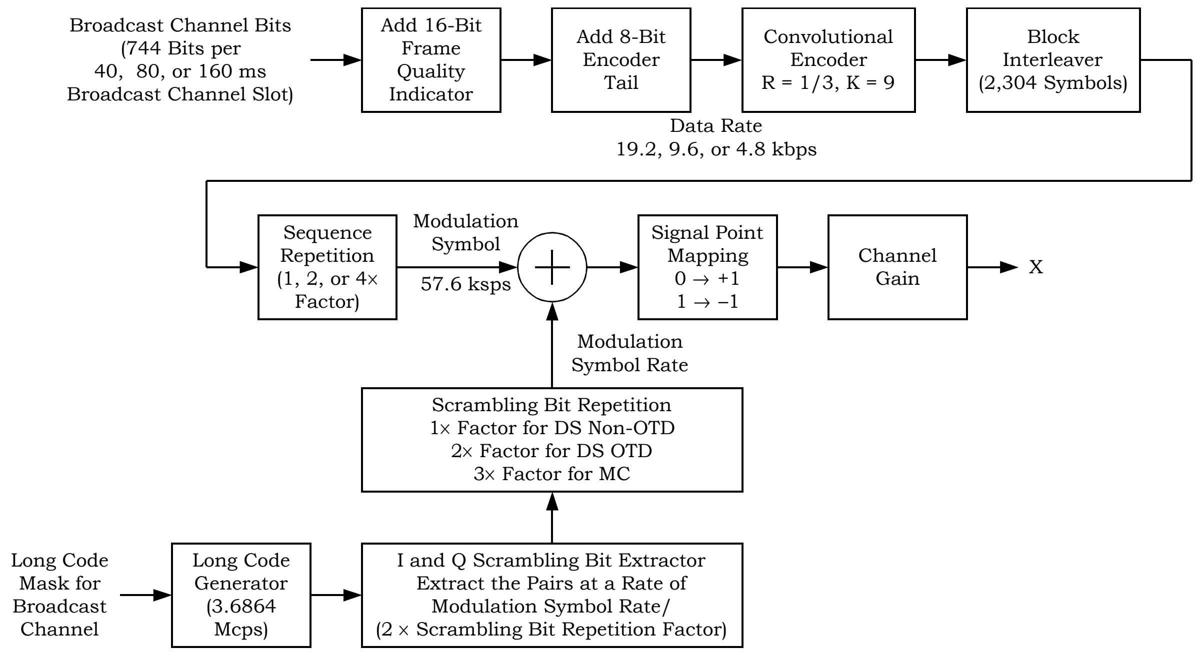


Figure 3.1.3.1.1.2-2. Broadcast Channel Structure for Spreading Rate 3

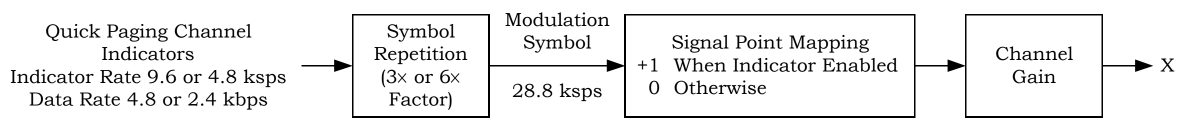


Figure 3.1.3.1.1.2-3. Quick Paging Channel Structure for Spreading Rate 3

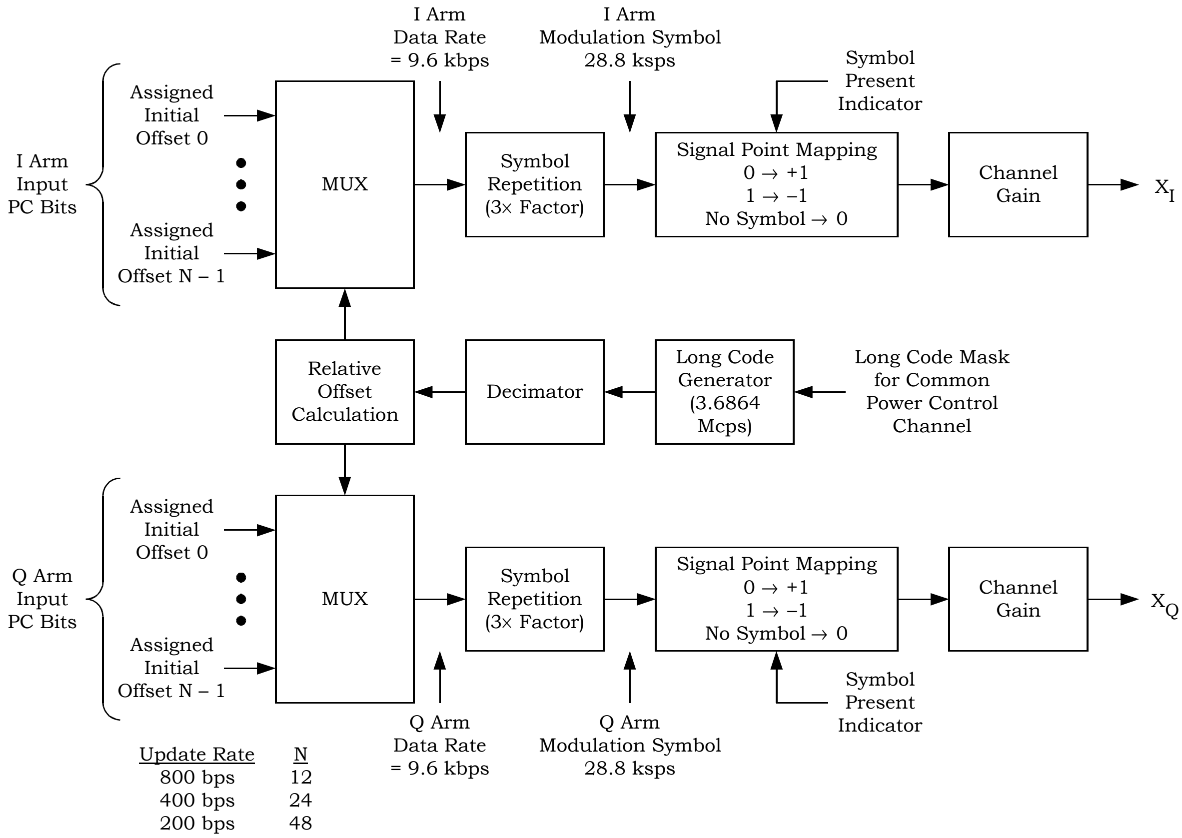


Figure 3.1.3.1.1.2-4. Common Power Control Channel Structure for Spreading Rate 3

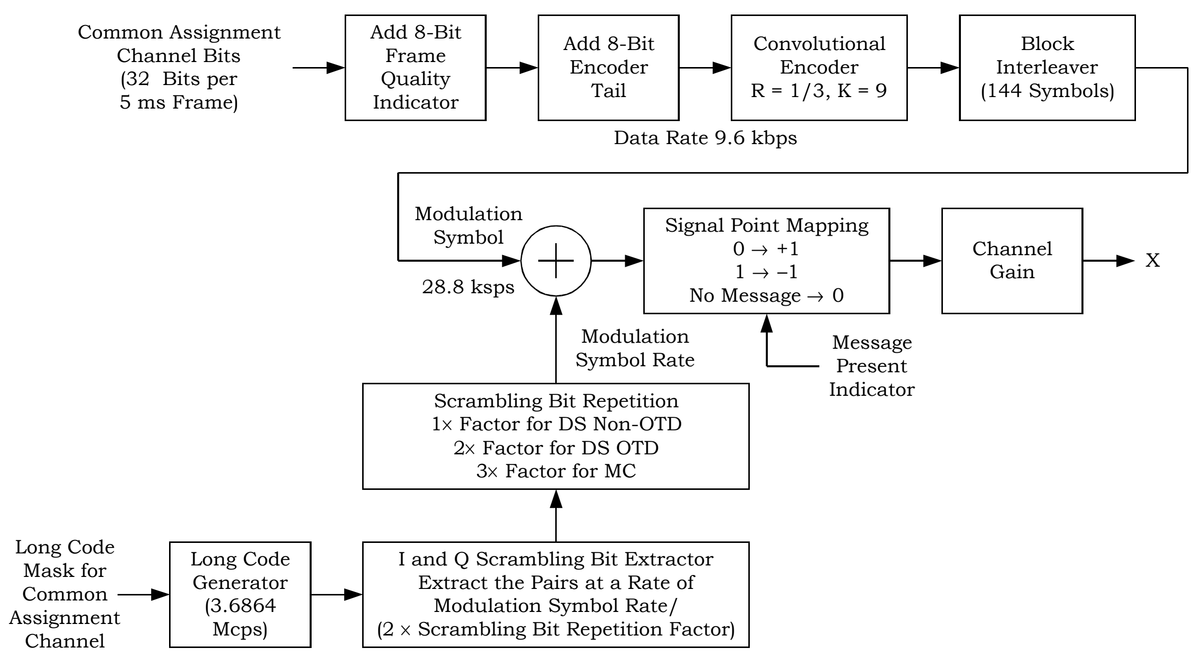
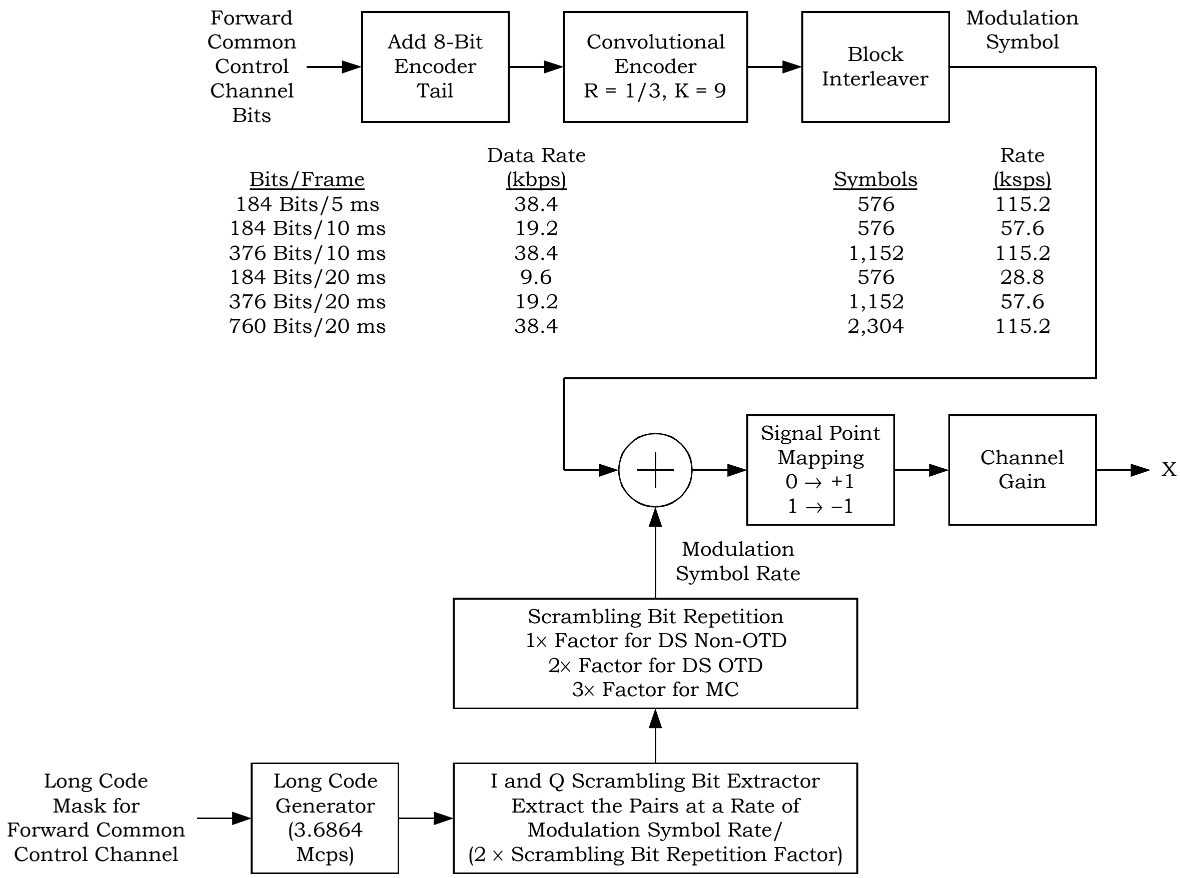
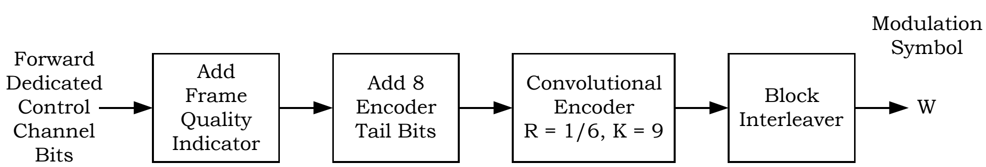


Figure 3.1.3.1.1.2-5. Common Assignment Channel Structure for Spreading Rate 3



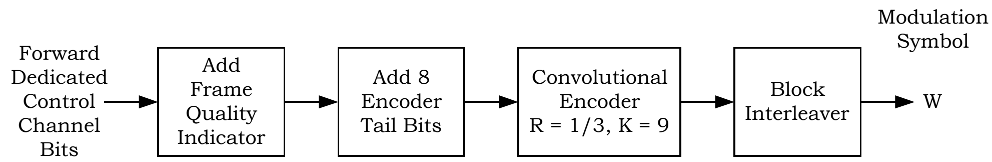
Bits/Frame	Data Rate (kbps)	Symbols	Rate (ksps)
184 Bits/5 ms	38.4	576	115.2
184 Bits/10 ms	19.2	576	57.6
376 Bits/10 ms	38.4	1,152	115.2
184 Bits/20 ms	9.6	576	28.8
376 Bits/20 ms	19.2	1,152	57.6
760 Bits/20 ms	38.4	2,304	115.2

Figure 3.1.3.1.1.2-6. Forward Common Control Channel Structure for Spreading Rate 3



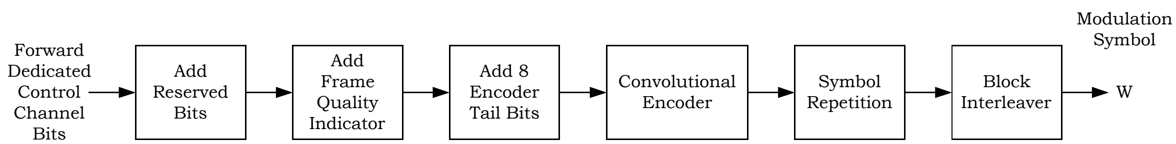
Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	288	57.6
172 Bits/20 ms	12	9.6	1,152	57.6

Figure 3.1.3.1.1.2-7. Forward Dedicated Control Channel Structure for Radio Configuration 6



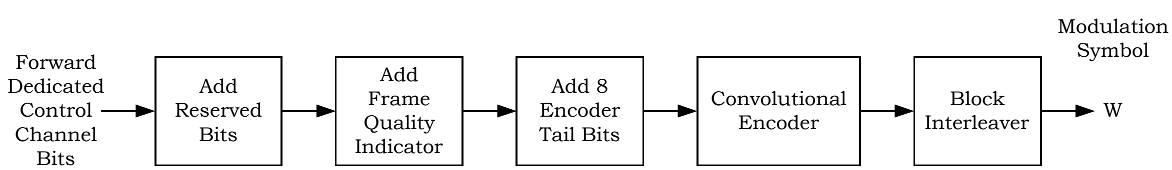
Bits/Frame	Bits	Data Rate (kbps)	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	144	28.8
172 Bits/20 ms	12	9.6	576	28.8

Figure 3.1.3.1.1.2-8. Forward Dedicated Control Channel Structure for Radio Configuration 7



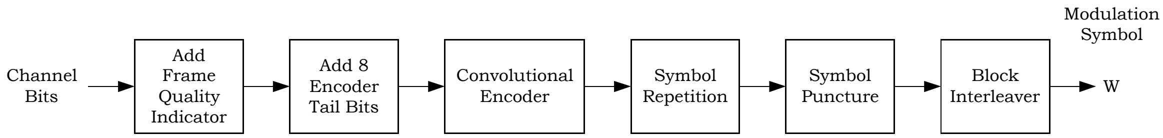
Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	2×	288	57.6
267 Bits/20 ms	1	12	14.4	1/4	1×	1,152	57.6

Figure 3.1.3.1.1.2-9. Forward Dedicated Control Channel Structure for Radio Configuration 8



Bits/Frame	Bits	Bits	Data Rtae (kbps)	R	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	144	28.8
267 Bits/20 ms	1	12	14.4	1/2	576	28.8

Figure 3.1.3.1.1.2-10. Forward Dedicated Control Channel Structure for Radio Configuration 9

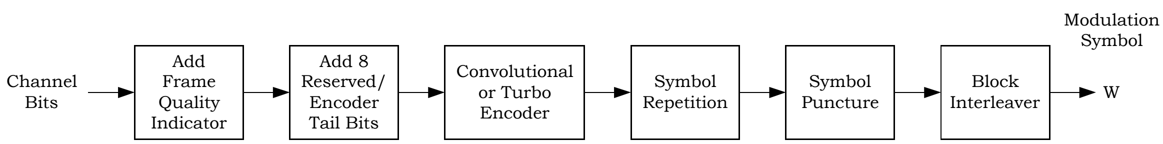


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/6	1×	None	288	57.6
16 Bits/20 ms	6	1.5	1/6	8×	1 of 5	1,152	57.6
40 Bits/20n ms	6	2.7/n	1/6	4×	1 of 9	1,152	57.6/n
80 Bits/20n ms	8	4.8/n	1/6	2×	None	1,152	57.6/n
172 Bits/20n ms	12	9.6/n	1/6	1×	None	1,152	57.6/n
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

Notes:

1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel 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 16 to 172 channel bits per frame with n = 1.

Figure 3.1.3.1.1.2-11. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 6

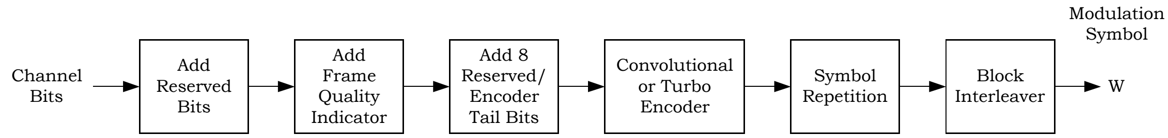


Bits/Frame	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	16	9.6	1/3	1×	None	144	28.8
16 Bits/20 ms	6	1.5	1/3	8×	1 of 5	576	28.8
40 Bits/20n ms	6	2.7/n	1/3	4×	1 of 9	576	28.8/n
80 Bits/20n ms	8	4.8/n	1/3	2×	None	576	28.8/n
172 Bits/20n ms	12	9.6/n	1/3	1×	None	576	28.8/n
360 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

Notes:

1. n is the length of the frame in multiples of 20 ms. For 40 channel bits per frame, n = 1 or 2. For more than 40 channel 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 16 to 172 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 360 or more channel 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 3.1.3.1.1.2-12. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 7

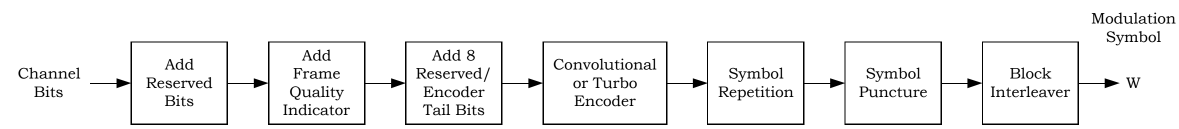


Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	2×	288	57.6
21 Bits/20 ms	1	6	1.8	1/4	8×	1,152	57.6
55 Bits/20n ms	1	8	3.6/n	1/4	4×	1,152	57.6/n
125 Bits/20n ms	1	10	7.2/n	1/4	2×	1,152	57.6/n
267 Bits/20n ms	1	12	14.4/n	1/4	1×	1,152	57.6/n
552 Bits/20n ms	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

Notes:

1. n is the length of the frame in multiples of 20 ms. For 55 channel bits per frame, n = 1 or 2. For more than 55 channel 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 21 to 267 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 552 or more channel 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 3.1.3.1.1.2-13. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 8

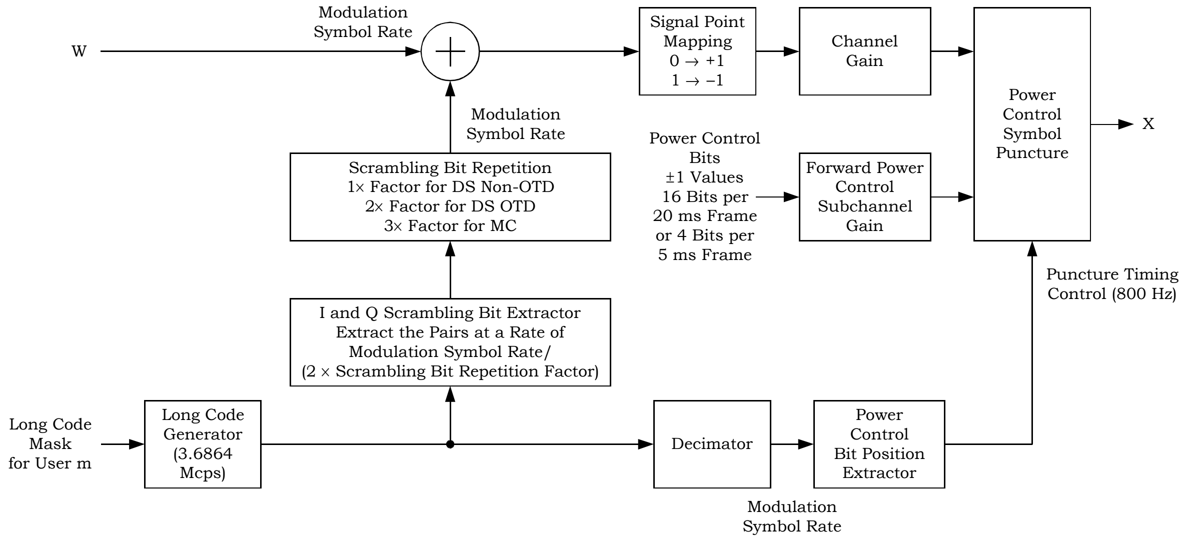


Bits/Frame	Bits	Bits	Data Rate (kbps)	R	Factor	Deletion	Symbols	Rate (ksps)
24 Bits/5 ms	0	16	9.6	1/3	1×	None	144	28.8
21 Bits/20 ms	1	6	1.8	1/2	8×	None	576	28.8
55 Bits/20n ms	1	8	3.6/n	1/2	4×	None	576	28.8/n
125 Bits/20n ms	1	10	7.2/n	1/2	2×	None	576	28.8/n
267 Bits/20n ms	1	12	14.4/n	1/2	1×	None	576	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

Notes:

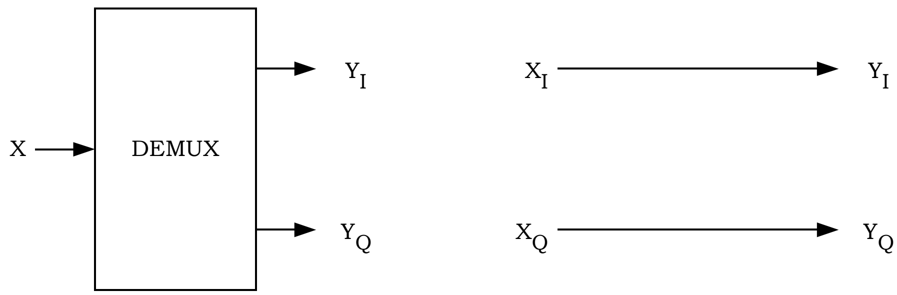
1. n is the length of the frame in multiples of 20 ms. For 55 channel bits per frame, n = 1 or 2. For more than 55 channel bits per frame, n = 1, 2, or 4.
2. The 5 ms frame is only used for the Forward Fundamental Channel, and the Forward Fundamental Channel only uses from 21 to 267 channel bits per frame with n = 1.
3. Turbo coding may be used for the Forward Supplemental Channels with 552 or more channel 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 3.1.3.1.1.2-14. Forward Fundamental Channel and Forward Supplemental Channel Structure for Radio Configuration 9

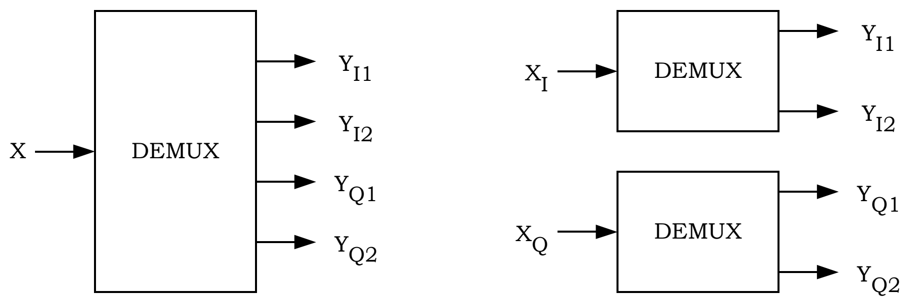


Power control symbol puncturing is on the Forward Fundamental Channels and Forward Dedicated Control Channels only.

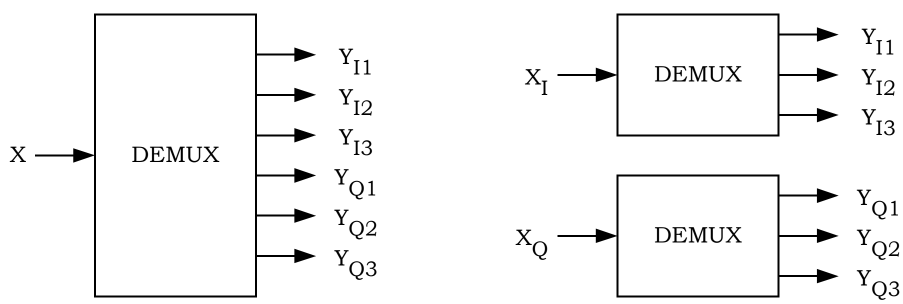
Figure 3.1.3.1.1.2-15. Long Code Scrambling, Power Control, and Signal Point Mapping for Forward Traffic Channels with Radio Configurations 6 through 9



a) DS Non-OTD Mode



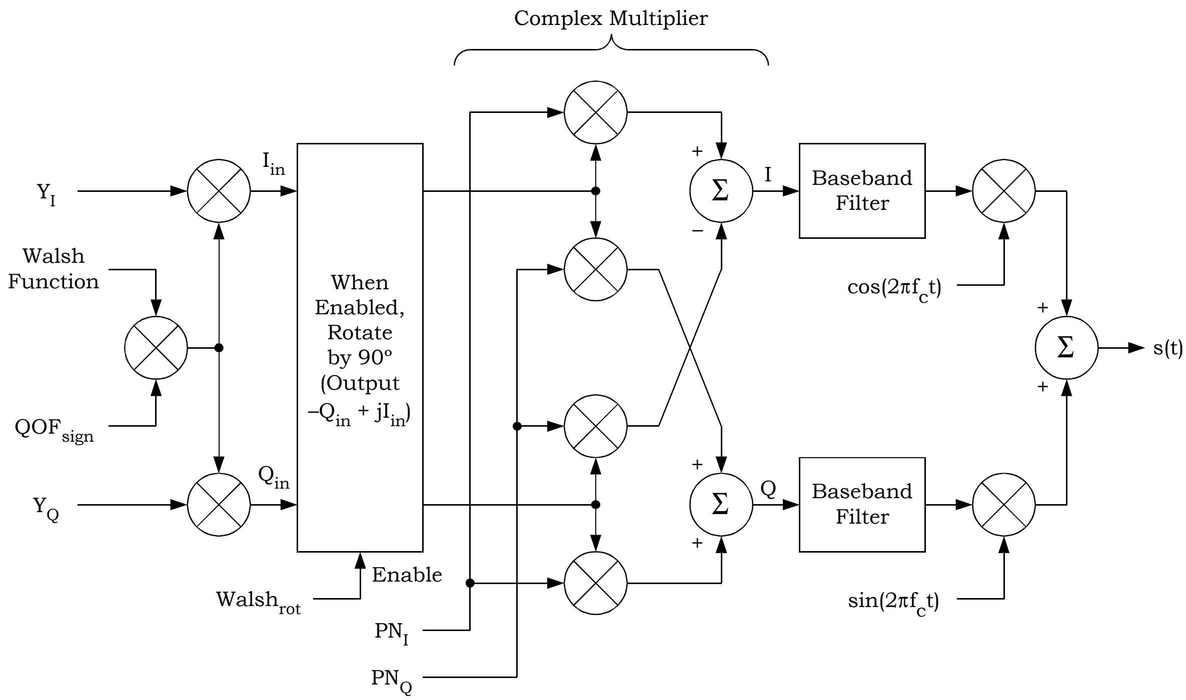
b) DS OTD Mode



c) MC Mode

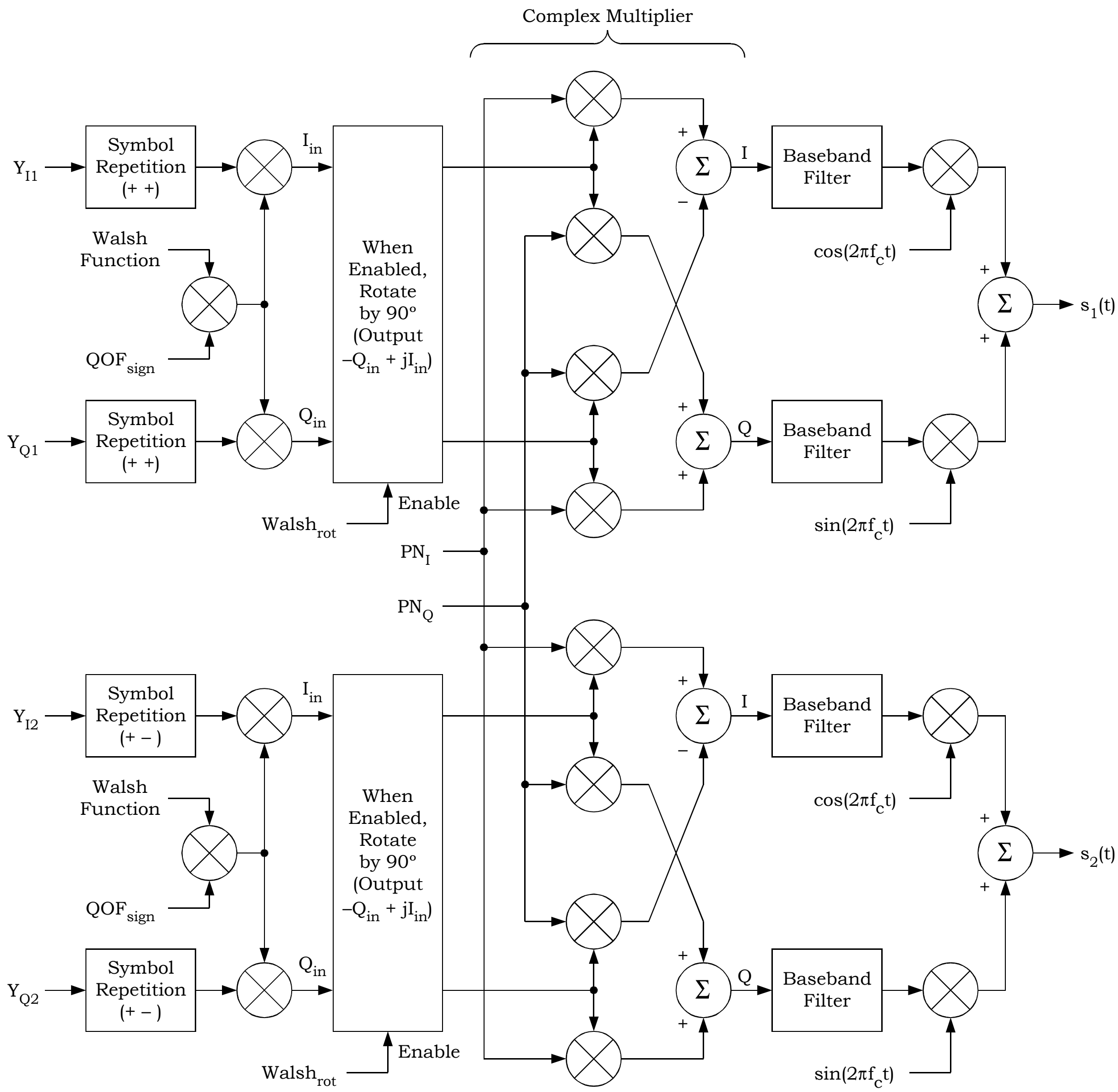
The DEMUX functions distribute input symbols sequentially from the top to the bottom output paths.

Figure 3.1.3.1.1.2-16. Demultiplexer Structure for Spreading Rate 3



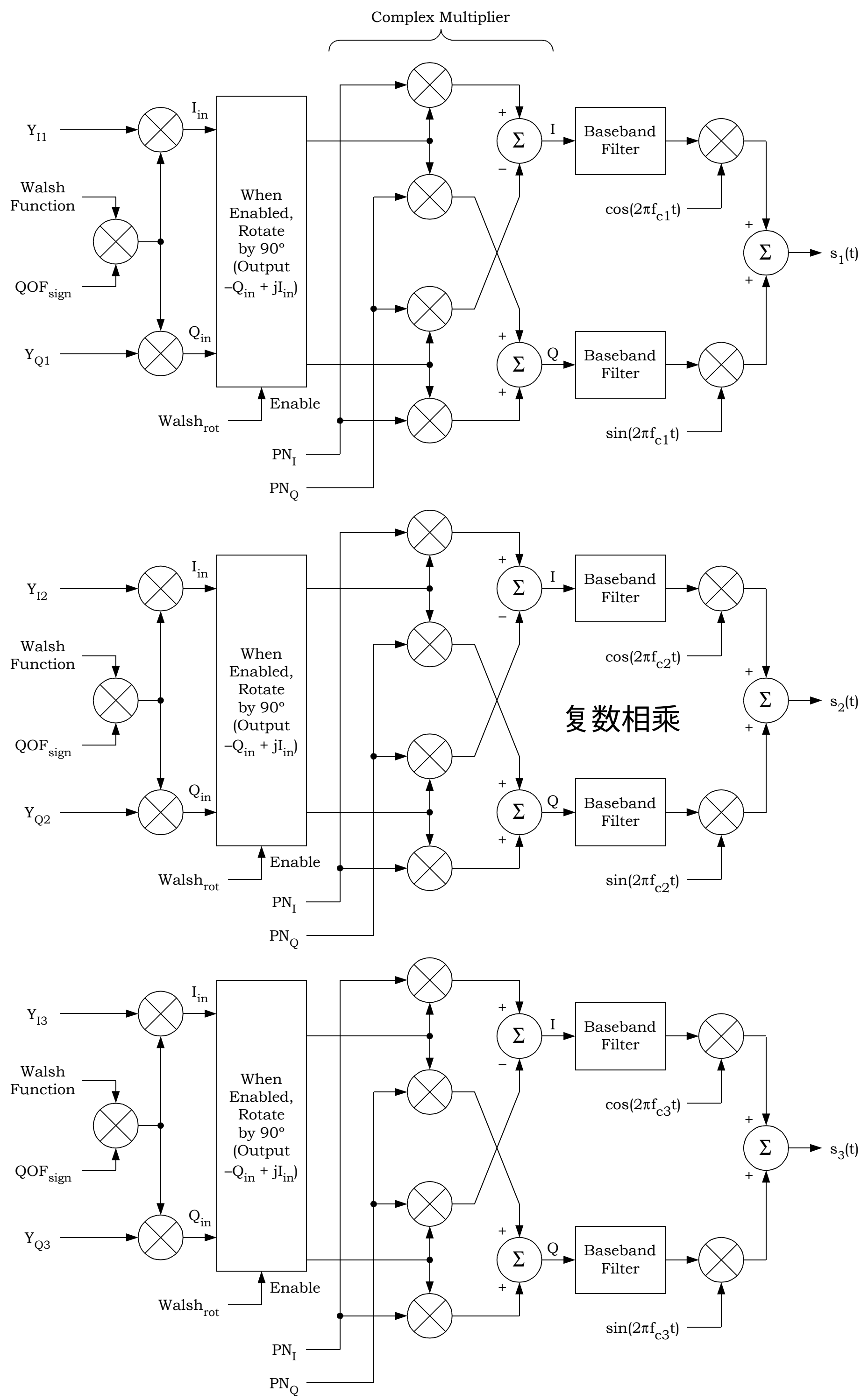
Walsh Function = ±1 (Mapping: '0' → +1, '1' → −1)
QOF_{sign} = ±1 Sign Multiplier QOF Mask (Mapping: '0' → +1, '1' → −1)
$Walsh_{rot}$ = '0' or '1' 90°-Rotation-Enable Walsh Function
$Walsh_{rot}$ = '0' means no rotation
$Walsh_{rot}$ = '1' means rotate by 90°
The NULL QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = '0'.
PN_I and PN_Q = ±1 I-Channel and Q-Channel PN sequences

Figure 3.1.3.1.1.2-17. I and Q Mapping (DS Non-OTD Mode) for Spreading Rate 3



Walsh Function = ±1 (Mapping: '0' → +1, '1' → –1)
QOF_{sign} = ±1 Sign Multiplier QOF Mask (Mapping: '0' → +1, '1' → –1)
$Walsh_{rot}$ = '0' or '1' 90°-Rotation-Enable Walsh Function
$Walsh_{rot}$ = '0' means no rotation
$Walsh_{rot}$ = '1' means rotate by 90°
The NULL QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = '0'.
PN_I and PN_Q = ±1 I-Channel and Q-Channel PN sequences

Figure 3.1.3.1.1.2-18. I and Q Mapping (DS OTD Mode) for Spreading Rate 3



Walsh Function = ±1 (Mapping: ‘0’ → +1, ‘1’ → –1)
QOF_{sign} = ±1 Sign Multiplier QOF Mask (Mapping: ‘0’ → +1, ‘1’ → –1)
$Walsh_{rot}$ = ‘0’ or ‘1’ 90°-Rotation-Enable Walsh Function
$Walsh_{rot}$ = ‘0’ means no rotation
$Walsh_{rot}$ = ‘1’ means rotate by 90°
The NULL QOF has QOF_{sign} = +1 and $Walsh_{rot}$ = ‘0’.
PN_I and PN_Q = ±1 I-Channel and Q-Channel PN sequences

Figure 3.1.3.1.1.2-19. I and Q Mapping (MC Mode) 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 Tables 3.1.3.1.2.1-1 through 3.1.3.1.2.1-23.

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 Channel Modulation Parameters for Spreading Rate 1

	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 3.1.3.1.2.1-4. 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 Paging Indicators/80 ms Quick Paging Channel Slot	768	384	paging indicators/slot
Number of Paging Indicators/Slot/ Mobile Station	2	2	paging indicators/mobile station
Paging Indicator Rate	9,600	4,800	bps
Paging Indicator Repetition Factor	2	4	modulation symbols/ paging 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 3.1.3.1.2.1-5. Common Power Control 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 (non-OTD) 2 (OTD)	modulation symbols /bit
Modulation Symbol Rate	9,600 (non-OTD) 19,200 (OTD)	sps on I and Q
Walsh Length	128 (non-OTD) 64 (OTD)	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

	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 3.1.3.1.2.1-7. 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 3.1.3.1.2.1-8. 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 3.1.3.1.2.1-9. Forward 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	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 3.1.3.1.2.1-10. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 4

	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 3.1.3.1.2.1-11. 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

Note: The 9600 bps data rate is used for 5 ms frames and the 14400 bps data rate is used for 20 ms frames.

Table 3.1.3.1.2.1-12. 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 3.1.3.1.2.1-13. 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/repeated 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 3.1.3.1.2.1-14. 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

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

Table 3.1.3.1.2.1-15. 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

Note: N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.

Table 3.1.3.1.2.1-16. 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

Note: N = 1, 2, or 4, which yields data rates of 9600, 19200, or 38400 bps, respectively.

Table 3.1.3.1.2.1-17. Forward Fundamental Channel and Forward Supplemental Channel Modulation Parameters for 5 or 20 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

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

Table 3.1.3.1.2.1-18. 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

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

Table 3.1.3.1.2.1-19. 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

Note: N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.

Table 3.1.3.1.2.1-20. 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

Note: N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400 bps, respectively.

Table 3.1.3.1.2.1-21. 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

Note: N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200 bps, respectively.

Table 3.1.3.1.2.1-22. 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

Note: N = 1, 2, or 4, which yields data rates of 14400, 28800, or 57600 bps, respectively.

Table 3.1.3.1.2.1-23. 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

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 Tables 3.1.3.1.2.2-1 through 3.1.3.1.2.2-23.

Table 3.1.3.1.2.2-1. Sync Channel Modulation Parameters for Spreading Rate 3

Parameter	Data Rate (bps) 1,200	Units
PN Chip Rate	3.6864	Mcps
Code Rate	1/3	bits/code symbol
Code Symbol Repetition	8	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	3,072	PN chips/bit

Note: For the MC mode, a Spreading Rate 1 Sync Channel is transmitted on one of the three carriers.

Table 3.1.3.1.2.2-2. Broadcast Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)			
Parameter	**19,200**	**9,600**	**4,800**	**Units**
PN Chip Rate	3.6864	3.6864	3.6864	Mcps
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	3.6864	3.6864	Mcps
Number of Paging Indicators/80 ms Quick Paging Channel Slot	768	384	paging indicators/slot
Number of Paging Indicators/Slot/ Mobile Station	2	2	paging indicators/mobile station
Paging Indicator Rate	9,600	4,800	bps
Paging Indicator Repetition Factor	3	6	modulation symbols/ paging 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. Common Power Control Channel Modulation Parameters for Spreading Rate 3

	Data Rate (bps)	
Parameter	**19,200**	**Units**
PN Chip Rate	3.6864	Mcps
PC Bit Repetition Factor	3	modulation symbols /bit
Modulation Symbol Rate	28,800	sps on I and Q
Walsh Length	128	PN chips
Number of Walsh Function Repetitions per QPSK Symbol	1	Walsh functions/QPSK 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	3.6864	Mcps
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	3.6864	3.6864	3.6864	Mcps
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	3.6864	Mcps
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

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	3.6864	Mcps
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 3.1.3.1.2.2-9. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 8

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	3.6864	3.6864	Mcps
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

Note: The 9600 bps data rate is for 5 ms frames and the 14400 bps data rate is for 20 ms frames.

Table 3.1.3.1.2.2-10. Forward Dedicated Control Channel Modulation Parameters for Radio Configuration 9

	Data Rate (bps)		
Parameter	**9,600**	**14,400**	**Units**
PN Chip Rate	3.6864	3.6864	Mcps
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

Note: The 9600 bps data rate is for 5 ms frames and the 14400 bps data rate is for 20 ms frames.

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	3.6864	3.6864	3.6864	3.6864	Mcps
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

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

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	3.6864	3.6864	3.6864	3.6864	Mcps
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

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

Table 3.1.3.1.2.2-12. 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	3.6864	3.6864	3.6864	3.6864	Mcps
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

Note: N = 1, 2, 4, or 8, which yields data rates of 9600, 19200, 38400, or 76800 bps, respectively.

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	3.6864	3.6864	3.6864	3.6864	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
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

Note: N = 1, 2, 4, 8, 16, 32, or 64, which yields data rates of 9600, 19200, 38400, 76800, 153600, 307200, or 614400 bps, respectively.

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	3.6864	3.6864	3.6864	3.6864	Mcps
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

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

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	3.6864	3.6864	3.6864	3.6864	Mcps
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

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

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	3.6864	3.6864	3.6864	3.6864	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
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

Note: N = 1, 2, 4, 8, 16, or 32, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 460800, respectively.

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	3.6864	3.6864	3.6864	3.6864	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
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

Note: N = 1, 2, 4, 8, or 16, which yields data rates of 14400, 28800, 57600, 115200, or 230400, respectively.

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	3.6864	3.6864	3.6864	3.6864	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	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

Note: N = 1, 2, 4, or 8, which yields data rates of 14400, 28800, 57600, or 115200, respectively.

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	3.6864	3.6864	3.6864	3.6864	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 (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

Note: N = 1, 2, 4, 8, 16, 32, or 72, which yields data rates of 14400, 28800, 57600, 115200, 230400, 460800, or 1036800 bps, respectively.

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	3.6864	3.6864	3.6864	3.6864	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 (N ≤ 16) 16/18 (N = 36)	1	1	1	interleaver symbols/ repeated code symbol
Modulation Symbol Rate	28,800 × N (N ≤ 16) 921,600 (N = 36)	14,400	14,400	14,400	sps
QPSK Symbol Rate	14,400 × N (N ≤ 16) 460,800 (N = 36)	7,200	7,200	7,200	sps
Walsh Length	256/N (N ≤ 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

Note: N = 1, 2, 4, 8, 16, or 36, which yields data rates of 14400, 28800, 57600, 115200, 230400, or 518400 bps, respectively.

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	3.6864	3.6864	3.6864	3.6864	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
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

Note: N = 1, 2, 4, 8, or 18, which yields data rates of 14400, 28800, 57600, 115200, or 259200 bps, respectively.

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	3.6864	Mcps
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. The data rates for channels operating with Spreading Rate 3 shall be as specified in Table 3.1.3.1.3-2.

Table 3.1.3.1.3-1. Data Rates for Spreading Rate 1

Channel Type		Data Rates (bps)
Sync Channel		1200
Paging Channel		9600 or 4800
Broadcast Channel		19200 (40 ms slots), 9600 (80 ms slots), or 4800 (160 ms slots)
Quick Paging Channel		4800 or 2400
Common Power Control Channel		19200 (9600 bps 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 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)
Forward Supplemental Code Channel	RC 1	9600
	RC 2	14400
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

Table 3.1.3.1.3-2. Data Rates for Spreading Rate 3

Channel Type		Data Rates (bps)
Sync Channel		1200
Broadcast Channel		19200 (40 ms slots), 9600 (80 ms slots), or 4800 (160 ms slots)
Quick Paging Channel		4800 or 2400
Common Power 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)
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
	RC 9	1036800, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800

3.1.3.1.4 Forward Error Correction

The forward error correction types for channels with Spreading Rate 1 shall be as specified in Table 3.1.3.1.4-1. The forward error correction types for channels with Spreading Rate 3 shall be as specified in Table 3.1.3.1.4-2.

Table 3.1.3.1.4-1. Forward Error Correction for Spreading Rate 1

Channel Type	Forward Error Correction	R
Sync Channel	Convolutional	1/2
Paging Channel	Convolutional	1/2
Broadcast Channel	Convolutional	1/2
Quick Paging Channel	None	-
Common Power Control Channel	None	-
Common Assignment Channel	Convolutional	1/2
Forward Common Control Channel	Convolutional	1/4 or 1/2
Forward Dedicated Control Channel	Convolutional	1/4 (RC 3 or 5) 1/2 (RC 4)
Forward Fundamental Channel	Convolutional	1/2 (RC 1, 2, or 4) 1/4 (RC 3 or 5)
Forward Supplemental Code Channel	Convolutional	1/2 (RC 1 or 2)
Forward Supplemental Channel	Convolutional or Turbo ($N \geq 360$)	1/2 (RC 4) 1/4 (RC 3 or 5)

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.

Table 3.1.3.1.4-2. Forward Error Correction for Spreading Rate 3

Channel Type	Forward Error Correction	R
Sync Channel	Convolutional	1/3
Broadcast Channel	Convolutional	1/3
Quick Paging Channel	None	-
Common Power 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 ($N \geq 360$)	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.

3.1.3.1.4.1 Convolutional Encoding

All convolutional codes shall have a constraint length of 9.

3.1.3.1.4.1.1 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 3.1.3.1.4.1.1-1 illustrates the specific K equals 9, rate 1/6 convolutional encoder that is used for these channels.

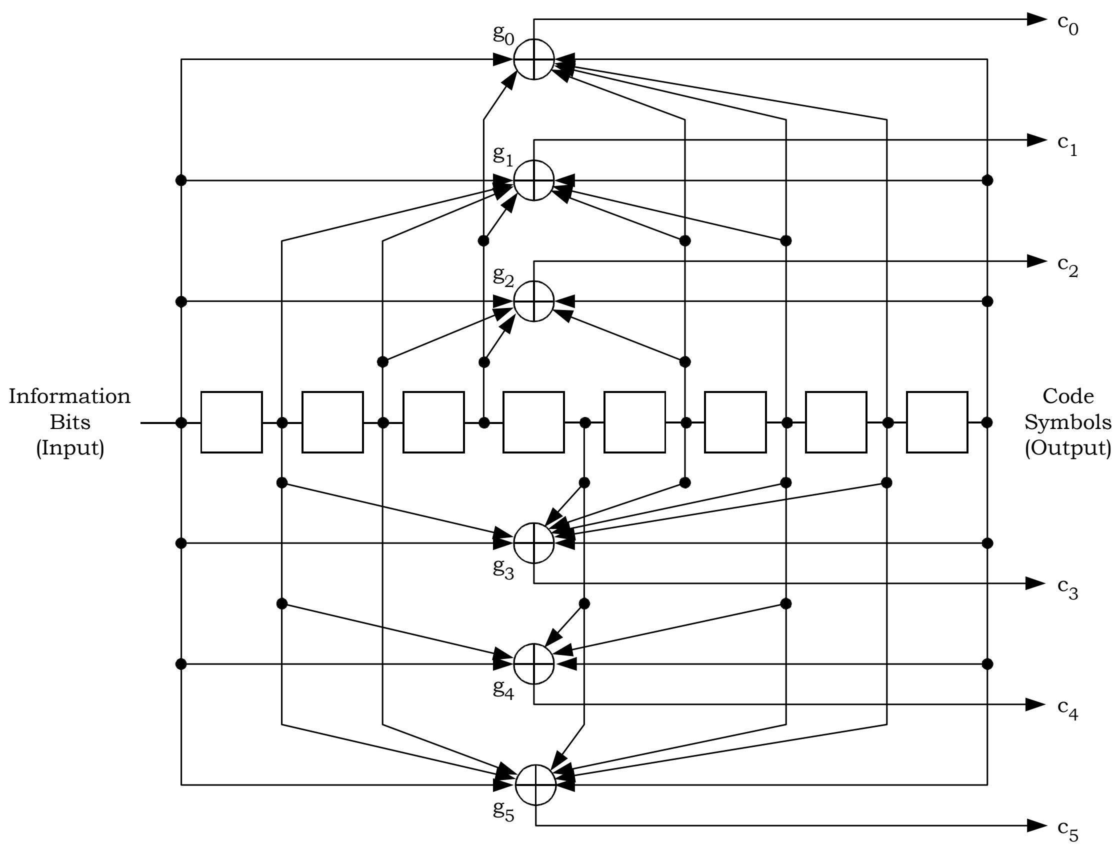


Figure 3.1.3.1.4.1.1-1. K = 9, Rate 1/6 Convolutional Encoder

3.1.3.1.4.1.2 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 3.1.3.1.4.1.2-1 illustrates the specific K equals 9, rate 1/4 convolutional encoder that is used for these channels.

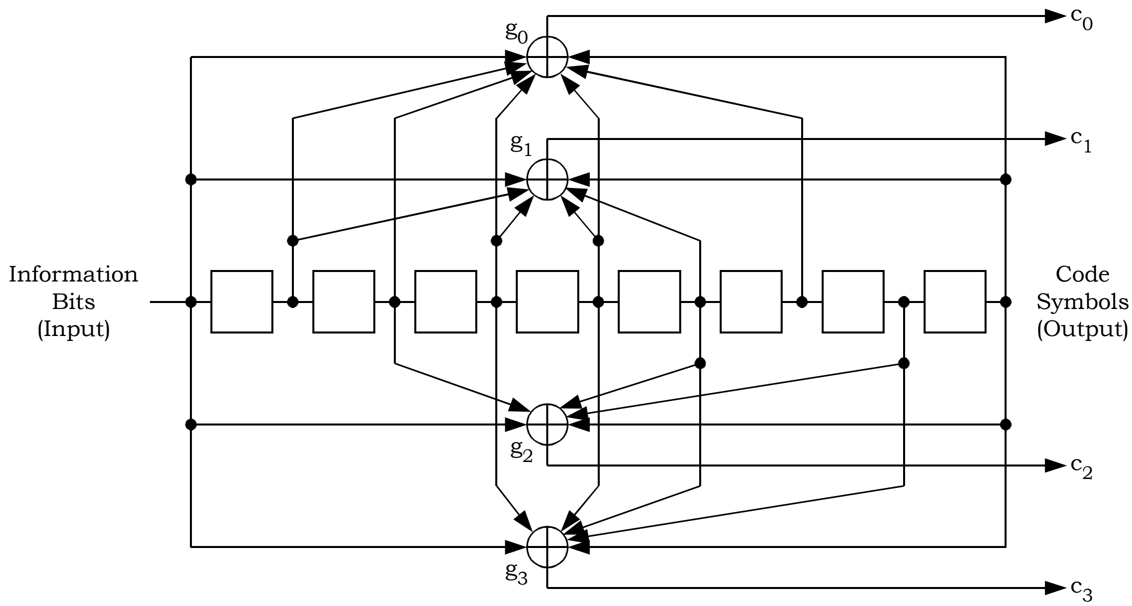


Figure 3.1.3.1.4.1.2-1. K = 9, Rate 1/4 Convolutional Encoder

3.1.3.1.4.1.3 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 3.1.3.1.4.1.3-1 illustrates the specific K equals 9, rate 1/3 convolutional encoder that is used for these channels.

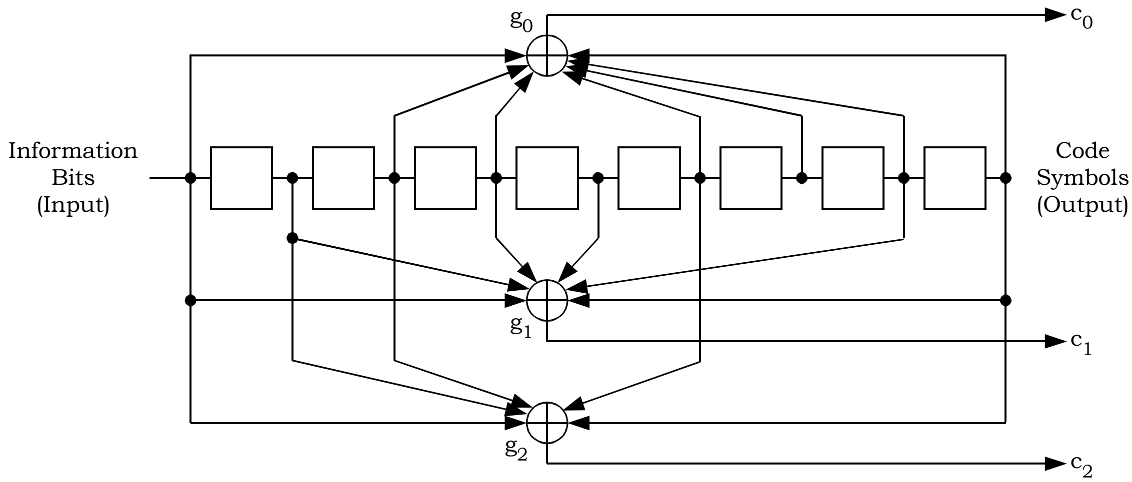


Figure 3.1.3.1.4.1.3-1. K = 9, Rate 1/3 Convolutional Encoder

3.1.3.1.4.1.4 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 3.1.3.1.4.1.4-1 illustrates the specific K equals 9, rate 1/2 convolutional encoder that is used for these channels.

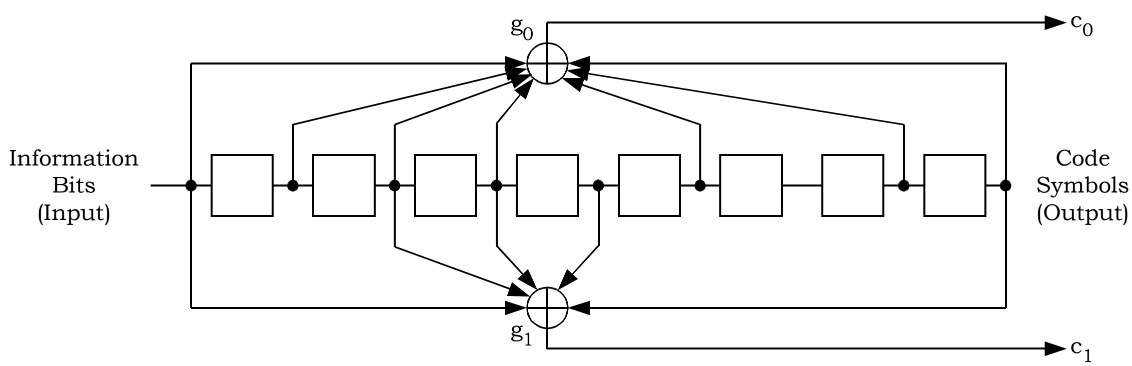


Figure 3.1.3.1.4.1.4-1. K = 9, Rate 1/2 Convolutional Encoder

3.1.3.1.4.2 Turbo Encoding

The turbo encoder encodes the data, frame quality indicator (CRC), and two reserved bits input to the turbo encoder and adds an encoder output tail sequence. If the total number of data, frame quality, and reserved input bits 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, or 1/4. 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.

3.1.3.1.4.2.1 Rate 1/2, 1/3, and 1/4 Turbo Encoders

A common constituent code shall be used for the turbo codes of rate 1/2, 1/3, and 1/4. 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 3.1.3.1.4.2.1-1. 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 circuit changes every data bit and tail bit period.

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 3.1.3.1.4.2.1-1. 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.

3.1.3.1.4.2.2 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 3.1.3.1.4.2.1-1. 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 constituent encoder output symbol puncturing and symbol repetition shall be as specified in Table 3.1.3.1.4.2.2-1. Within a puncturing pattern, a ‘0’ means that the symbol shall be deleted and a ‘1’ means that a symbol shall be passed. 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 $X'X'Y'_0Y'_1$.

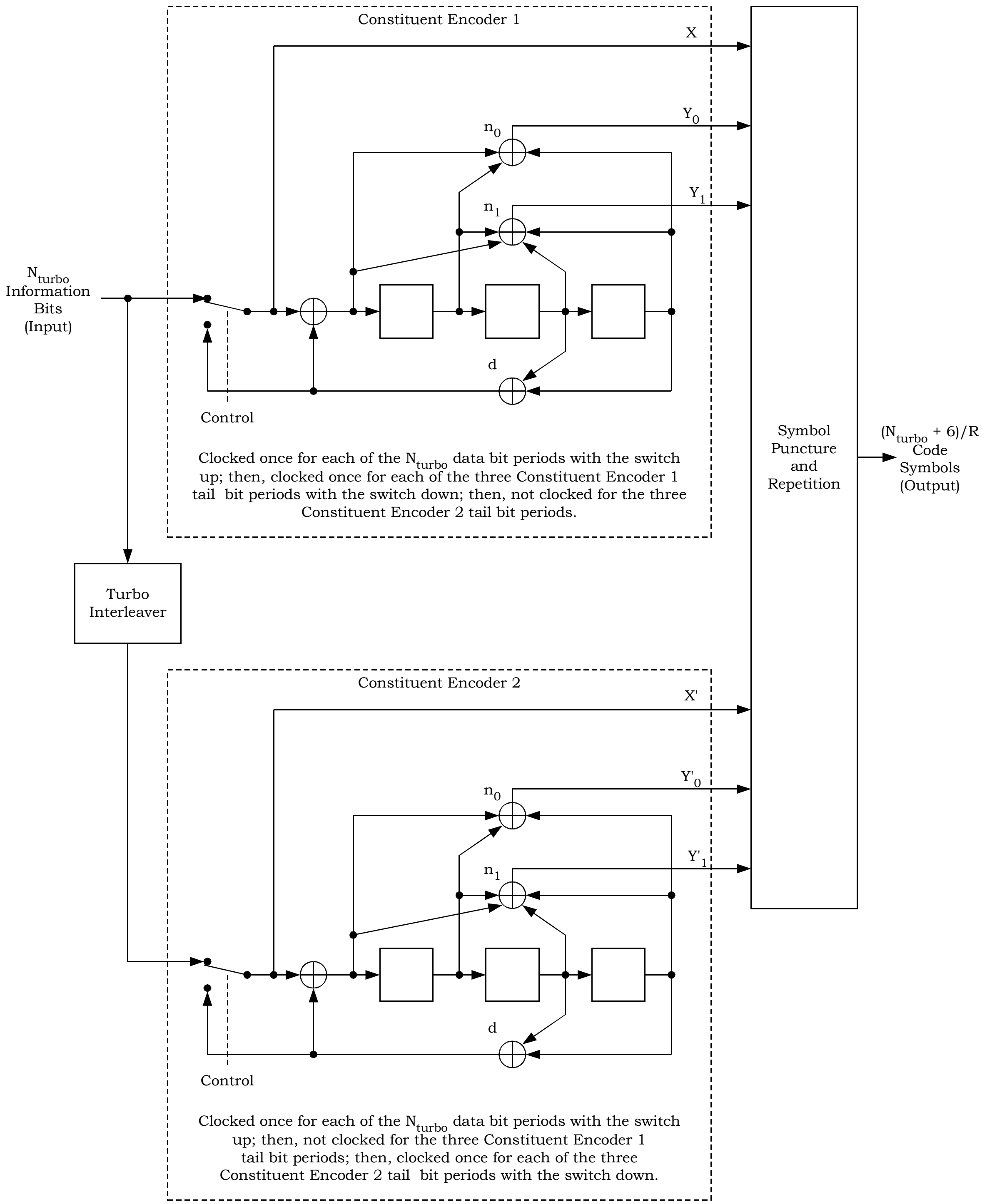


Figure 3.1.3.1.4.2.1-1. Turbo Encoder

Table 3.1.3.1.4.2.1-1. Puncturing Patterns for the Data Bit Periods

	Code Rate		
Output	**1/2**	**1/3**	**1/4**
X	11	11	11
Y_0	10	11	11
Y_1	00	00	10
X’	00	00	00
Y'_0	01	11	01
Y'_1	00	00	11

Note: For each rate, the puncturing table shall be read first from top to bottom and then from left to right.

Table 3.1.3.1.4.2.2-1. Puncturing Patterns for the Tail Bit Periods

	Code Rate		
Output	**1/2**	**1/3**	**1/4**
X	111 000	111 000	111 000
Y_0	111 000	111 000	111 000
Y_1	000 000	000 000	111 000
X’	000 111	000 111	000 111
Y'_0	000 111	000 111	000 111
Y'_1	000 000	000 000	000 111

Note: For rate 1/2 turbo codes, the puncturing table shall be read first from top to bottom and then from left to right. For rate 1/3 and 1/4 turbo codes, the puncturing table shall be read first from top to bottom repeating X and X’, and then from left to right.

3.1.3.1.4.2.3 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 number of symbols in the turbo interleaver. Then, the sequence of interleaver output addresses shall be equivalent to those generated by the procedure illustrated in Figure 3.1.3.1.4.2.3-1 and described below:[13]

1. Determine the turbo interleaver parameter, n, where n is the smallest integer such that $N_{turbo} \le 2^{n + 5}$. Table 3.1.3.1.4.2.3-1 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 3.1.3.1.4.2.3-2 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.

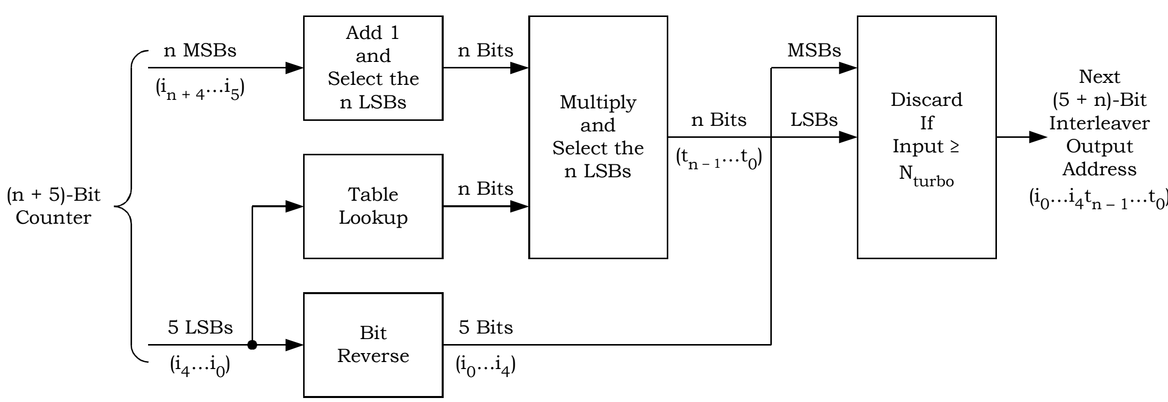


Figure 3.1.3.1.4.2.3-1. Turbo Interleaver Output Address Calculation Procedure

[13] 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. 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.

Table 3.1.3.1.4.2.3-1. Turbo Interleaver Parameter

Turbo Interleaver Block Size N_{turbo}	Turbo Interleaver Parameter n
378	4
570	5
762	5
1,146	6
1,530	6
2,298	7
3,066	7
4,602	8
6,138	8
9,210	9
12,282	9
20,730	10

Table 3.1.3.1.4.2.3-2. Turbo Interleaver Lookup Table Definition

Table Index	n = 4 Entries	n = 5 Entries	n = 6 Entries	n = 7 Entries	n = 8 Entries	n = 9 Entries	n = 10 Entries
0	5	27	3	15	3	13	1
1	15	3	27	127	1	335	349
2	5	1	15	89	5	87	303
3	15	15	13	1	83	15	721
4	1	13	29	31	19	15	973
5	9	17	5	15	179	1	703
6	9	23	1	61	19	333	761
7	15	13	31	47	99	11	327
8	13	9	3	127	23	13	453
9	15	3	9	17	1	1	95
10	7	15	15	119	3	121	241
11	11	3	31	15	13	155	187
12	15	13	17	57	13	1	497
13	3	1	5	123	3	175	909
14	15	13	39	95	17	421	769
15	5	29	1	5	1	5	349
16	13	21	19	85	63	509	71
17	15	19	27	17	131	215	557
18	9	1	15	55	17	47	197
19	3	3	13	57	131	425	499
20	1	29	45	15	211	295	409
21	3	17	5	41	173	229	259
22	15	25	33	93	231	427	335
23	1	29	15	87	171	83	253
24	13	9	13	63	23	409	677
25	1	13	9	15	147	387	717
26	9	23	15	13	243	193	313
27	15	13	31	15	213	57	757
28	11	13	17	81	189	501	189
29	3	1	5	57	51	313	15
30	15	13	15	31	15	489	75
31	5	13	33	69	67	391	163

3.1.3.1.5 Code Symbol Repetition

Code symbols output from the forward error correction encoder shall be repeated as specified in Table 3.1.3.1.5-1. Since the Quick Paging Channel is not coded, the term code symbol repetition refers to symbol repetition for the Quick Paging Channel Indicators.

Table 3.1.3.1.5-1. Code Symbol Repetition

Channel Type		Number of Repeated Code Symbols/Code Symbol
Sync Channel		2 (SR 1) 4 (SR 3)
Paging Channel		2 (4800 bps) 1 (9600 bps)
Broadcast 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 Control Channel		1
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		8 (1200, 1500, or 1800 bps) 4 (2400, 2700, or 3600 bps) 2 (4800 or 7200 bps) 1 (9600 or 14400 bps, 20 ms) 2 (9600 bps, 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)

3.1.3.1.6 Puncturing

3.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 3.1.3.1.6.1-1 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 puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.1-1. 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	1 of 5	‘11110’	4
1/2	1 of 9	‘111111110’	4
1/2	2 of 18	‘111011111 111111110’	9
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.

3.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 3.1.3.1.6.2-1 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 puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.2-1. 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

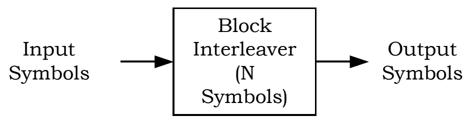
3.1.3.1.7 Block Interleaving

For the Sync Channel, the Paging Channels, the Broadcast Channels, the Common Assignment Channel, the Forward Common Control Channel, and the Forward Traffic Channels, all the symbols after symbol repetition and subsequent puncturing, if used, shall be block interleaved.

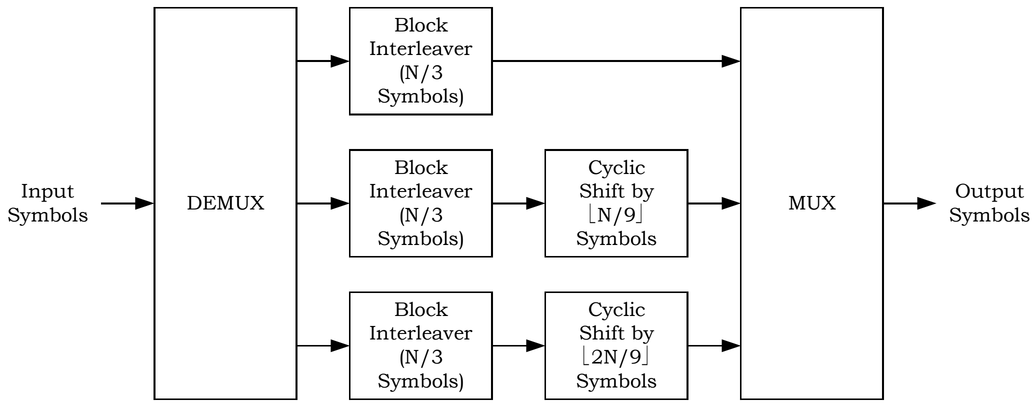
The interleaver parameters m and J are specified in Table 3.1.3.1.7-1. Figure 3.1.3.1.7-1 shows the configuration of the interleaver for DS and MC modes.

Table 3.1.3.1.7-1. Interleaver Parameters

Interleaver 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



a) DS Non-OTD and OTD Modes



b) MC Mode

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 3.1.3.1.7-1. Structure for the N-Symbol Block Interleavers

3.1.3.1.7.1 DS Interleaving

For the DS mode, the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one.

3.1.3.1.7.1.1 BRO Interleaver

When operating on the Sync Channel, the Paging 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 permutated order from address A_i, as follows:

$$A_i = 2^m (i \bmod J) + \mathrm{BRO}_m(\lfloor i / J \rfloor)$$

where

$i = 0$ to $N - 1$

$\lfloor x \rfloor$ indicates the largest integer less than or equal to x, and

$\mathrm{BRO}_m(y)$ indicates the bit-reversed m-bit value of y (i.e., $\mathrm{BRO}_3(6) = 3$).

The DS block interleaving procedure is diagrammed in Figure 3.1.3.1.7-1.

3.1.3.1.7.1.2 Forward-Backwards BRO Interleaver

When operating on the Broadcast Channel, Common Assignment Channel, Forward Common Control Channel, or the Forward Traffic Channel with Radio Configuration 3 through 9, the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one.

The even interleaved symbols (i is even) are read out in permutated 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

$i = 0, 2, \ldots, N - 2$

$\lfloor x \rfloor$ 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 odd interleaved symbols (i is odd) are read out in permutated 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

$i = 1, 3, \ldots, N - 1.$

The DS block interleaving procedure is diagrammed in Figure 3.1.3.1.7-1.

3.1.3.1.7.2 MC Interleaving

For the MC mode, 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 permutated order, with the i-th address being read from address A_i, as follows:

$$A_i = 2^m \left((i + \lfloor kN/9 \rfloor) \bmod J \right) + BRO_m\left(\lfloor (i + \lfloor kN/9 \rfloor)/J \rfloor \right)$$

where

$i = 0$ to $N/3 - 1$,

$\lfloor x \rfloor$ 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 three interleaved block outputs shall then be multiplexed together.

The MC block interleaving procedure is diagrammed in Figure 3.1.3.1.7-1. Note that the equation describes the operation performed by both the interleaver block and cyclic shift block in Figure 3.1.3.1.7-1.

3.1.3.1.8 Sequence Repetition

Sequence repetition applies to the Broadcast Channel.

When operating at 4800 bps, the encoded and interleaved sequence of symbols of the first Broadcast Channel frame (40 ms) of a Broadcast Channel slot (160 ms) shall be repeated in the next three Broadcast Channel frames. When operating at 9600 bps, the encoded and interleaved sequence of symbols of the first Broadcast Channel frame of a Broadcast Channel slot (80 ms) shall be repeated in the next Broadcast Channel frame. When operating at 19,200 bps, the encoded and interleaved sequence of symbols of the first Broadcast Channel frame of a Broadcast Channel slot (40 ms) shall not be repeated.

3.1.3.1.9 Data Scrambling

Data scrambling applies to the Paging Channels, Broadcast Channels, Common Assignment Channels, Forward Common Control Channels, and Forward Traffic Channels.

Data scrambling for the Paging Channels, Common Assignment Channel, Forward Common Control Channels, and Forward Traffic Channels, is performed on the modulation symbols output from the block interleaver at the modulation symbol rate. Data scrambling for the Broadcast 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 Figures 3.1.3.1.1.1-1, 3.1.3.1.1.1-11, and 3.1.3.1.1.1-12. 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 Channel, Common Assignment Channel, Forward Common Control Channel, and the Forward Traffic Channel with Radio Configurations 3 through 9, the data scrambling shall be accomplished by operating on groups of 2M modulation symbols, where M is 1 for non-OTD modes, 2 for OTD mode, and 3 for MC 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 2M modulation symbol transmission period for that symbol as shown in Figures 3.1.3.1.1.1-2, 3.1.3.1.1.1-5, 3.1.3.1.1.1-6, 3.1.3.1.1.1-7, 3.1.3.1.1.1-16, 3.1.3.1.1.2-2, 3.1.3.1.1.2-5, 3.1.3.1.1.2-6, and 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 2M modulation symbol transmission period for that symbol. This PN sequence shall be the equivalent of the long code operating at 1.2288 × N MHz clock rate, where N is the chip rate/1.2288 Mcps.

The long code shall be generated as described in 2.1.3.1.12. The long code masks to be used for the Paging Channels, Broadcast Control Channel, Common Assignment Channels, Forward Common Control Channels, and 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, 3.1.3.10.6, 3.1.3.11.7, 3.1.3.12.7, and 3.1.3.13.7 respectively.

3.1.3.1.10 Forward Power Control Subchannel

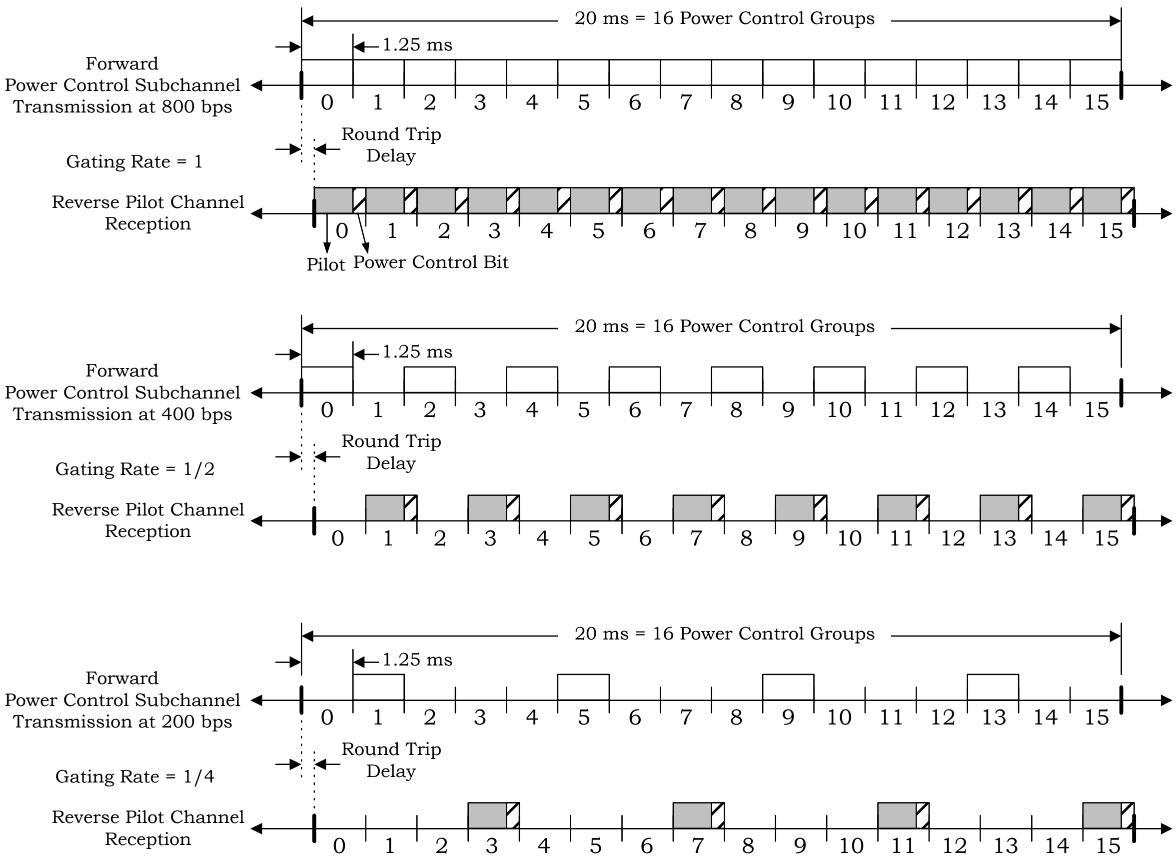
A Forward Power Control Subchannel is transmitted only on the Forward Fundamental Channel or on the Forward Dedicated Control Channel.

When the mobile station is not operating in the gated transmission mode, 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 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 3.1.3.1.10-1.

The power control groups within a 20 ms frame are numbered from 0 to 15. When operating with 1/2 rate gating, the Forward Power Control Subchannel shall be transmitted only in the even numbered power control groups. When operating with 1/4 rate gating, the Forward Power Control Subchannel shall be transmitted only in power control groups 1, 5, 9, and 13.

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.



power control subchannel transmission as specified in Table 3.1.3.1.10-1 and Figure 3.1.3.1.10-2

Figure 3.1.3.1.10-1. Forward and Reverse Power Control Subchannel Transmission Timing

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’). 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[14].

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

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[14] 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.

(as specified by $FPC\_PRI\_CHAN_s$) in all of the power control groups. In the case of 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 3.1.3.1.10-1.

The duration and power level of power control bits for each radio configuration are specified in Table 3.1.3.1.10-1. Each power control bit shall replace the number of modulation symbols specified in Table 3.1.3.1.10-1. Each power control bit shall be transmitted with minimum energy as specified in Table 3.1.3.1.10-1. 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 3.1.3.1.10-1 shall be used to determine the power control bit starting position by indexing the list in Table 3.1.3.1.10-1. For example, if the values of decimated bits for Radio Configuration 7 (DS) are '110' (6 decimal), the power control bit starting position is 12 as shown in Figure 3.1.3.1.10-7.

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.

Table 3.1.3.1.10-1. 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-OTD)	4	E_b	0, 2,..., 30	47, 46, 45, 44
3 (OTD)	4	E_b	0, 4,..., 28	47, 46, 45
4	2	E_b	0, 2,..., 14	23, 22, 21
5 (non-OTD)	4	E_b	0, 2,..., 30	47, 46, 45, 44
5 (OTD)	4	E_b	0, 4,..., 28	47, 46, 45
6 (DS, non-OTD)	4	E_b	0, 2,..., 30	71, 70, 69, 68
6 (DS, OTD)	4	E_b	0, 4,..., 28	71, 70, 69
6 (MC)	6	E_b	0, 6,..., 42	71, 70, 69
7 (DS)	2	E_b	0, 2,..., 14	35, 34, 33
7 (MC)	3	E_b	0, 3,..., 21	35, 34, 33
8 (DS, non-OTD)	4	E_b	0, 2,..., 30	71, 70, 69, 68
8 (DS, OTD)	4	E_b	0, 4,..., 28	71, 70, 69
8 (MC)	6	E_b	0, 6,..., 42	71, 70, 69
9 (DS)	2	E_b	0, 2,..., 14	35, 34, 33
9 (MC)	3	E_b	0, 3,..., 21	35, 34, 33

Note: E_b is the energy per bit of the Forward Fundamental Channel or Forward Dedicated Control Channel (RC 3, 4, 5, 6, 7, 8, and 9) being punctured.

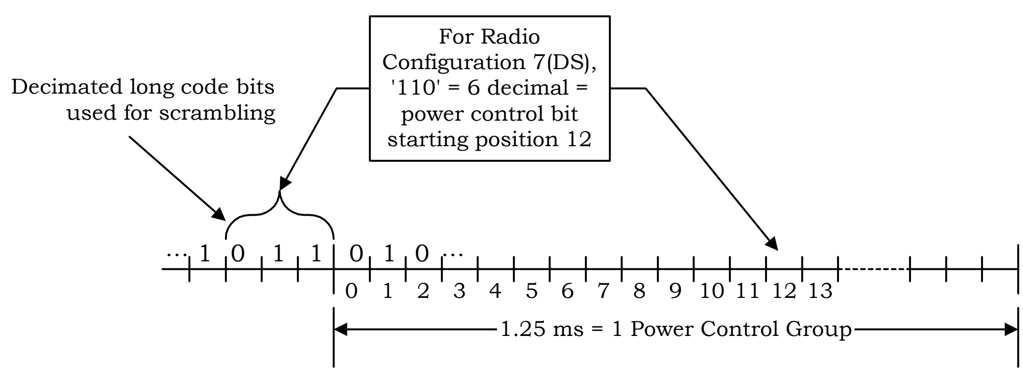


Figure 3.1.3.1.10-2. Randomization of Power Control Bit Starting Positions

3.1.3.1.11 Symbol Demultiplexing

Symbol demultiplexing is performed on every code channel in the Forward CDMA Channel as shown in Figures 3.1.3.1.1.1-17 and 3.1.3.1.1.2-16.

The scalar input non-OTD demultiplexer 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 scalar input OTD demultiplexer 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 complex input OTD 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_{I1} and Y_{Q1}, … outputs.

The scalar input MC 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 complex input MC 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, the Transmit Diversity Pilot Channel, the Auxiliary Pilot Channels, and the Auxiliary Transmit Diversity Pilot Channels shall be demultiplexed using the non-OTD or MC demultiplexer (i.e., the OTD demultiplexer is not allowed).

The Sync Channel, Paging Channels, and the Forward Traffic Channels with Radio Configurations 1 and 2 shall be demultiplexed using the non-OTD demultiplexer only (i.e., the OTD and MC demultiplexers are not allowed).

The Broadcast Channels, the Common Power Control Channels, the Common Assignment Channels, the Forward Common Control Channels, and Forward Traffic Channels with Radio Configurations 3 through 9 shall be demultiplexed using either the non-OTD, OTD, or MC demultiplexers.

The Quick Paging Channel, when used in conjunction with the Paging Channel, shall be demultiplexed using the non-OTD demultiplexer (see Figure 3.1.3.1.1.1-17). Otherwise, the Quick Paging Channel may be demultiplexed using the non-OTD, OTD, or MC demultiplexers.

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.

3.1.3.1.12 Orthogonal and Quasi-Orthogonal Spreading

Walsh functions are used with Radio Configurations 1 and 2. Walsh functions or quasi-orthogonal functions are used with Radio Configurations 3 through 9.

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 for

Spreading Rate 1 and Spreading Rate 3 MC and 3.6864 Mcps for Spreading Rate 3 DS to provide channelization among all code channels on a given Forward CDMA Channel.

The maximum length of the Walsh functions (N_{max}) for code channels, except the Auxiliary Pilot Channels and the Auxiliary Transmit Diversity Pilot Channels, transmitted on the Forward CDMA Channel is given in Table 3.1.3.1.12-1. One of N-ary ($N \le N_{max}$) time-orthogonal Walsh functions, generated as described in 2.1.3.1.9.2, shall be used. 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 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 for Spreading Rate 1 and Spreading Rate 3 MC and with a period of (N/3.6864) μs for Spreading Rate 3 DS which is equal to the duration of one Forward Traffic Channel modulation symbol.

Table 3.1.3.1.12-1. Maximum Walsh Function Length for Code Channels on the Forward CDMA Channel Except the Auxiliary Pilot Channel and Auxiliary Transmit Diversity Pilot Channel

Spreading Rate	Maximum Walsh Length
1	128
3	256

Quasi-orthogonal functions (QOF's) shall be created using a non-zero sign multiplier QOF mask and a non-zero rotate enable Walsh function as specified in Tables 3.1.3.1.12-2 and 3.1.3.1.12-3. 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 1's and j's (j is the complex number representing a 90° phase shift) which correspond to the rotate enable Walsh function values of 0 or 1, respectively. The sign multiplier QOF masks (QOF_{sign}) and the rotate enable Walsh functions ($Walsh_{rot}$) given in Tables 3.1.3.1.12-2 and 3.1.3.1.12-3 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 3.1.3.1.12-2. Masking Functions for Quasi-Orthogonal Functions with Length 256 for Spreading Rate 1 and Spreading Rate 3 MC Mode

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}

Table 3.1.3.1.12-3. Masking Functions for Quasi-Orthogonal Functions with Length 512 for Spreading Rate 3 DS Mode

Function	Masking Function	
	Hexadecimal Representation of QOF_{sign}	$Walsh_{rot}$
0	00000000000000000000000000000000 00000000000000000000000000000000 00000000000000000000000000000000 00000000000000000000000000000000	W_0^{512}
1	4ddbdbb2244d4ddb244d4ddbb224244d 244d4ddbb224244db224244ddbb2b224 4ddbdbb2244d4ddb244d4ddbb224244d 244d4ddbb224244db224244ddbb2b224	W_{511}^{512}
2	114b78221e44772d44e12d88b411dd78 7822eeb488d21e44d27744e1dd784bee 1e4488d2eeb47822b4112287bb1e2d88 772d1e447822114b22874beed277bb1e	W_{222}^{512}
3	7412de472e48841de284b72e4721128b de4774127be2d1b748d11d7b128b4721 47deed8be27b482ed14884e28b12deb8 1274b821482ee27b84e2d148214774ed	W_{289}^{512}

The code channel W_0^{64} shall be assigned to the Forward Pilot Channel when operating in Spreading Rate 1 and Spreading Rate 3 MC. The code channel W_{64}^{128} shall not be used when operating in Spreading Rate 1. The code channels W_{64}^{128}, W_{64}^{256}, W_{128}^{256}, and W_{192}^{256} shall not be used when operating in Spreading Rate 3 MC. The code channel

W_0^{256} shall be assigned to the Forward Pilot Channel when operating in Spreading Rate 3 DS.

If the Transmit Diversity Pilot Channel is present, it shall be assigned code channel W_{16}^{128}.

If the Sync Channel is present, it shall be assigned code channel W_{32}^{64} when operating in Spreading Rate 1 and a code channel of length 256 when operating in Spreading Rate 3. If Paging Channels are present, they shall be assigned to code channels W_1^{64} to W_7^{64}, consecutively.

If the Quick Paging Channels 1, 2, or 3 are present in Spreading Rate 1, they shall be assigned to code channels W_{80}^{128}, W_{48}^{128}, and W_{112}^{128}, respectively.

Other code channels of varying Walsh lengths are usable for Auxiliary Pilot Channels, Common Control Channels, and Forward Traffic Channels, provided that they are chosen to be orthogonal or quasi-orthogonal to all other code channels in use.

3.1.3.1.13 Quadrature Spreading

Following the orthogonal spreading, each code channel is spread in quadrature as shown in Figures 3.1.3.1.1.1-18, 3.1.3.1.1.1-19, 3.1.3.1.1.2-17, 3.1.3.1.1.2-18, and 3.1.3.1.1.2-19. 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 the MC Mode of Spreading Rate 3, and of length 3×2^{15} for the DS Mode of Spreading Rate 3. This sequence is called the pilot PN sequence.

3.1.3.1.13.1 Spreading Rate 1 and MC Mode of Spreading Rate 3

For Spreading Rate 1 and each carrier of the MC Mode 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 the MC Mode 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.

3.1.3.1.13.2 DS Mode of Spreading Rate 3

For the DS Mode of Spreading Rate 3, the pilot PN sequence shall be truncated sequences of a maximum length linear feedback shift register sequence based on the following characteristic polynomial:

$$P(x) = x^{20} + x^{9} + x^{5} + x^{3} + 1$$

The maximum length linear feedback shift register sequence based on 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 pilot 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 pilot PN sequence is such that the first chip is the '1' after the 19 consecutive '0's. The starting position of the Q pilot PN sequence is the starting position of the I pilot PN sequence delayed by 2^{19} chips.

The chip rate for the DS Mode of Spreading Rate 3 shall be 3.6864 Mcps. The pilot PN sequence period is $3 \times 32768/3686400$ = 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.

3.1.3.1.14 Filtering

3.1.3.1.14.1 Spreading Rate 1 and Spreading Rate 3 MC

3.1.3.1.14.1.1 Baseband Filtering

Following the spreading operation when operating in Spreading Rate 1 and Spreading Rate 3 MC, 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. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 3.1.3.1.14.1.1-1. 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.

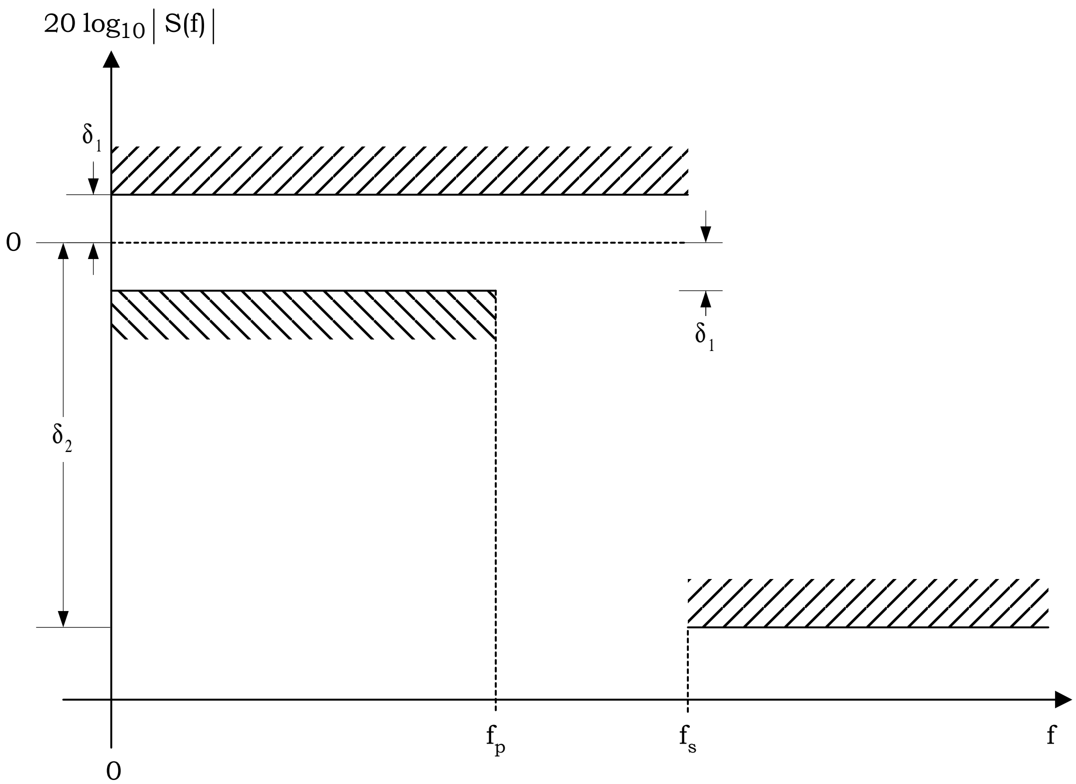


Figure 3.1.3.1.14.1.1-1. Baseband Filters Frequency Response Limits

If s(t) is the impulse response of the baseband filter, then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty} \left[\alpha s\left(kT_S - \tau\right) - h\left(k\right)\right]^2 \leq 0.03,$$

where the constants α and τ are used to minimize the mean squared error. The constant T_S is equal to 203.51... ns. T_S equals one quarter of a PN chip. The values of the coefficients h(k), for k < 48, are given in Table 3.1.3.1.14.1.1-1; h(k) = 0 for k ≥ 48. Note that h(k) equals h(47 - k).

Table 3.1.3.1.14.1.1-1. Coefficients of h(k) for Spreading Rate 1 and Spreading Rate 3 MC

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

3.1.3.1.14.1.2 Phase Characteristics

The base station shall provide phase equalization for the transmit signal path.[15] The equalizing filter shall be designed to provide the equivalent baseband transfer function

[15]This equalization simplifies the design of the mobile station receive filters.

$$H(\omega) = K\frac{\omega^2 + j\alpha\omega\omega_0 - \omega_0^2}{\omega^2 - j\alpha\omega\omega_0 - \omega_0^2},$$

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 3.1.3.1.14.1.1) to the RF output of the transmitter.

3.1.3.1.14.2 Spreading Rate 3 DS

3.1.3.1.14.2.1 Baseband Filtering

Following the spreading operation when operating in Spreading Rate 3 DS, 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. The baseband filters shall have a frequency response S(f) that satisfies the limits given in Figure 3.1.3.1.14.1.1-1. 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 = 1.0 dB, δ_2 = 40 dB, f_p = 1.7164 MHz, and f_s = 1.97 MHz.

If s(t) is the impulse response of the baseband filter, then s(t) should satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{\infty}\left[\alpha s(kT_s - \tau) - h(k)\right]^2 \le 0.03,$$

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 3.1.3.1.14.2.1-1; h(k) = 0 for k $\ge$ 108. Note that h(k) equals h(107 - k).

Table 3.1.3.1.14.2.1-1. Coefficients of h(k) for Spreading Rate 3 DS

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

3.1.3.1.14.2.2 Phase Characteristics

The base station shall provide phase equalization for the transmit signal path. 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 1.62, ω_0 equals $2\pi \times 9.3 \times 10^5$, 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 0.06 squared radians when integrated over the frequency range 1 kHz $\le |f - f_c| \le$ 1860 kHz. For purposes of this requirement, "overall" shall mean from the I and Q baseband filter inputs (see 3.1.3.1.14.1.1) to the RF output of the transmitter.

3.1.3.2 Pilot Channels

The Forward Pilot Channel, Transmit Diversity Pilot, Auxiliary Pilot Channels, and Auxiliary Transmit Diversity Pilots 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 OTD is supported on the base station, then a Transmit Diversity Pilot is transmitted at all times on each active Forward CDMA Channel.

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.

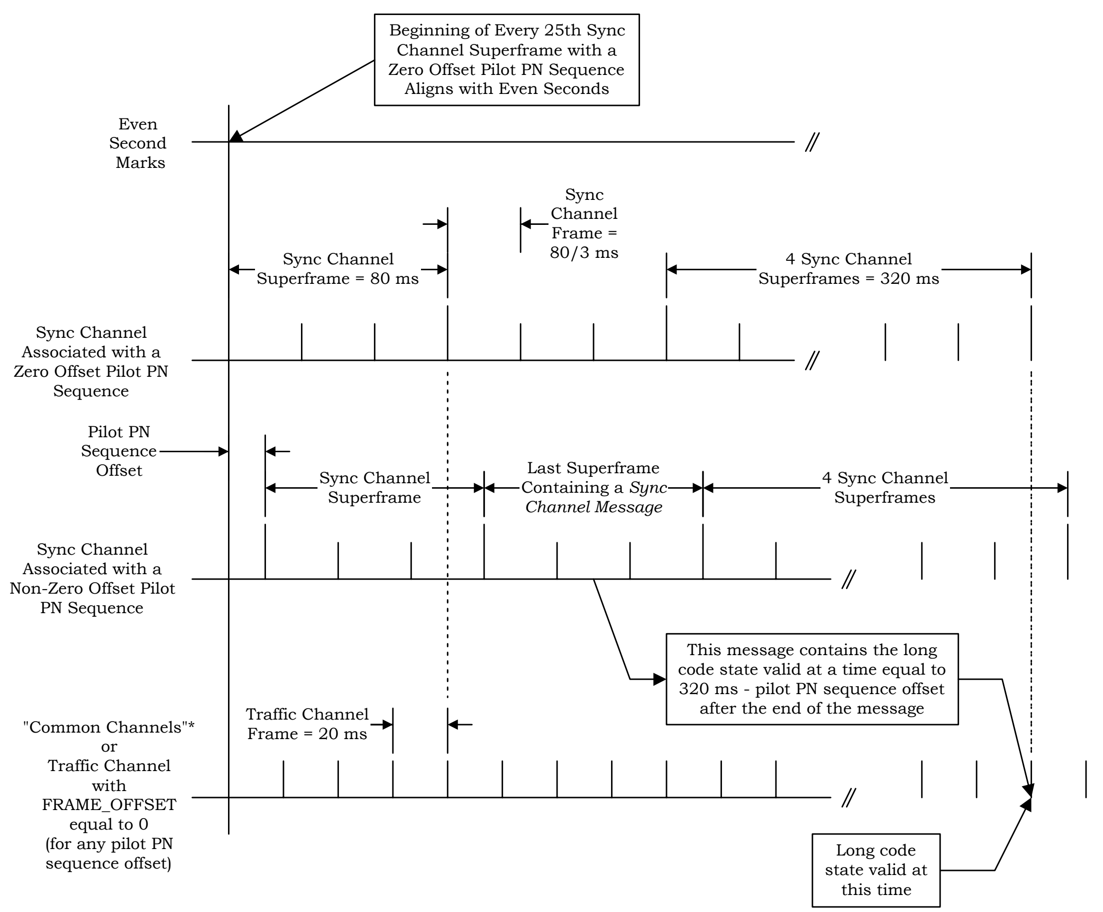
Zero or more Auxiliary Pilot Channels can be transmitted by the base station on an active Forward CDMA Channel. If OTD is supported on the Forward CDMA Channel associated with an Auxiliary Pilot Channel, then the base station shall transmit an Auxiliary Transmit Diversity Pilot.

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 for Spreading Rate 1 and Spreading Rate 3 MC and in multiples of 192 chips for Spreading Rate 3 DS. 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 the MC Mode 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). For the DS Mode of Spreading Rate 3, the start of the zero offset I pilot PN sequence shall be defined as the state of the sequence for which the previous 19 outputs were '0's. For the DS Mode of Spreading Rate 3, the start of the zero offset Q pilot PN sequence shall be defined as the state of the sequence for which the previous 20 outputs were '0010 0101 1100 1001 0111'.

Five-hundred-twelve unique values 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 Spreading Rate 1 or Spreading Rate 3 MC or 192 for Spreading Rate 3 DS; for example, if the pilot PN sequence offset index is 15 for Spreading Rate 1, the pilot PN sequence offset will be 15 × 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" consists of the Paging Channel, Broadcast Channel, Quick Paging Channel, Common Power Control Channel, Common Assignment Channel, and Forward Common Control Channel.

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 with W_0 as specified in 3.1.3.1.12.

3.1.3.2.2.2 Forward Transmit Diversity Pilot Channel

If OTD is supported on the Forward CDMA Channel, then the Transmit Diversity Pilot Channel shall be spread with W_{16}^{128} as specified in 3.1.3.1.12 and shall be transmitted at power levels 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 128 for Spreading Rate 1 and 256 for Spreading Rate 3) may be used to generate N Walsh functions of order $N \times m$, where N is a non-negative integer power of 2 ($N = 2^n$). A Walsh function of order $N \times m$ 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 integrations of the Forward Pilot Channel. Additionally, concatenation of W_{64}^{128} shall not be allowed for Spreading Rate 1 and concatenation of W_{64}^{256}, W_{128}^{256}, and W_{192}^{256} shall not be allowed for Spreading Rate 3 MC. 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 $(N \times m)/1.2288$ μs for Spreading Rate 1 and Spreading Rate 3 MC and $(N \times m)/3.6864$ μs for Spreading Rate 3 DS. These periods are equal to the duration of one Forward Traffic Channel modulation symbol.

The sequence of polarities must be selected to generate N additional Walsh functions of order $N \times m$. For example, in the case of N = 4, the following four Walsh functions of order $4 \times m$ from W_i^m can be built:

$$W_i^m W_i^m W_i^m W_i^m,\ \ W_i^m \overline{W_i^m} W_i^m \overline{W_i^m},\ \ W_i^m W_i^m \overline{W_i^m W_i^m},\ \ W_i^m \overline{W_i^m W_i^m} W_i^m,$$

where the overbar denotes a polarity change.

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 as indicated in Table 3.1.3.2.2.3-1.

Table 3.1.3.2.2.3-1. Maximum Walsh Function Length for Auxiliary Pilots

Spreading Rate	Maximum Walsh Function Length for Auxiliary Pilots
1	512
3 (MC)	512
3 (DS)	2048

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 OTD 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 3.1.3.1.13.

3.1.3.2.4 Pilot Channel Filtering

For each pilot channel, the filtering shall be as specified in 3.1.3.1.14.

3.1.3.2.5 Hopping Pilot Beacon Timing

Each hopping pilot beacon shall use three parameters to control the timing of the transmit window. These are NGHBR_TX_OFFSET, NGHBR_TX_DURATION, and NGHBR_TX_PERIOD. These parameters are shown in Figure 3.1.3.2.5-1. The value of NGHBR_TX_DURATION in multiples of 80 ms is the time that the pilot beacon is transmitting. The values of NGHBR_TX_OFFSET and NGHBR_TX_PERIOD, in multiples of 80 ms, are used to determine the starting position of the transmission relative to the first transmit window.

The first transmit window shall be NGHBR_TX_DURATION in duration and shall start when

$$(\lfloor t/4 \rfloor - \text{NGHBR\_TX\_OFFSET}) \bmod (16384) = 0,$$

where t is the System Time in 20 ms frames and NGHBR_TX_OFFSET is the offset time.

Subsequent transmit windows shall start at multiples of NGHBR_TX_PERIOD after the first transmit window starts.

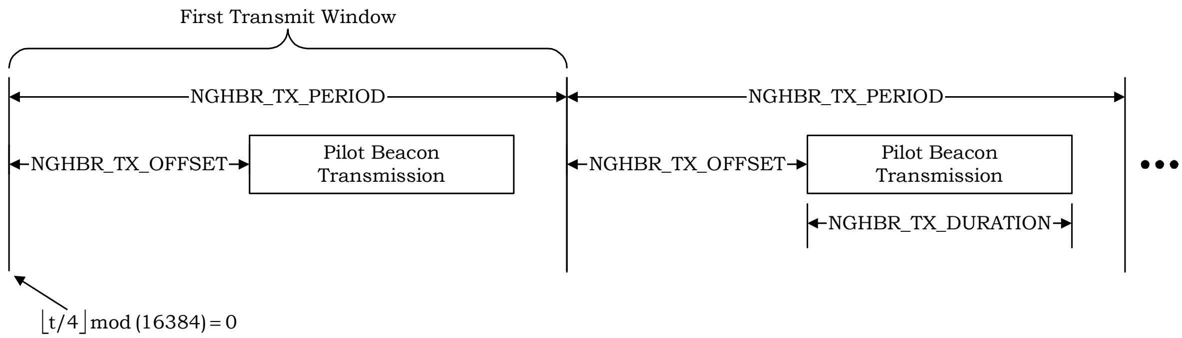


Figure 3.1.3.2.5-1. Hopping Pilot Beacon Timing

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 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 Figures 3.1.3.1.1.1-1 and 3.1.3.1.1.2-1). See Tables 3.1.3.1.2.1-1 and 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 3.1.3.1.4. 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 3.1.3.1.5.

3.1.3.3.5 Sync Channel Interleaving

The modulation symbols on the Sync Channel shall be interleaved as specified in 3.1.3.1.7.

3.1.3.3.6 Sync Channel Orthogonal Spreading

When operating in Spreading Rate 1, the Sync Channel shall be spread with W_{32}^{64} as specified in 3.1.3.1.12. When operating in Spreading Rate 3 with the MC mode, the Sync Channel shall be transmitted on a MC frequency from the preferred set of Sync Channel frequencies for the MC mode, and the Sync Channel shall be spread with W_{32}^{64} as specified in 3.1.3.1.12.

When operating in Spreading Rate 3, the Sync Channel shall be spread with a Walsh function of length 256 as specified in 3.1.3.1.12.

3.1.3.3.7 Sync Channel Quadrature Spreading

The Sync Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.13.

3.1.3.3.8 Sync Channel Filtering

Filtering for the Sync Channel shall be as specified in 3.1.3.1.14.

3.1.3.3.9 Sync Channel Transmission Processing

When the Physical Layer receives a *Transmit F-SYNC Request* 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 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 ($t \bmod 100 = 0$, 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 3.1.3.1.4. 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 3.1.3.1.5.

3.1.3.4.5 Paging Channel Interleaving

The modulation symbols on the Paging Channel shall be interleaved, as specified in 3.1.3.1.7. 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 3.1.3.1.9, 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 3.1.3.1.12.

3.1.3.4.8 Paging Channel Quadrature Spreading

The Paging Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.13.

3.1.3.4.9 Paging Channel Filtering

Filtering for the Paging Channel shall be as specified in 3.1.3.1.14.

3.1.3.4.10 Paging Channel Transmission Processing

When the Physical Layer receives a *Transmit F-PCH Request* 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 Channel

The Broadcast 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 Channel Time Alignment and Modulation Rates

The Broadcast Channel shall transmit information at a data rate of 38400, 19200, or 9600 bps. The Broadcast Channel shall transmit 744 information bits per Broadcast Channel slot. The Broadcast Channel slots shall be 40, 80, or 160 ms in duration.

For a given base station, the I and Q channel pilot PN sequences for the Broadcast Channel use the same pilot PN sequence offset as for the Pilot Channel.

The start of the Broadcast 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 Channel slot shall begin at the start of base station transmission time (see 3.1.5).

3.1.3.5.2 Broadcast Channel Structure

The Broadcast Channel shall be divided into Broadcast Channel slots that are 40, 80, or 160 ms in duration. For the 80 ms Broadcast Channel slot case, each Broadcast Channel slot shall consist of two Broadcast Channel frames that are each 40 ms in duration. For the 160 ms Broadcast Channel slot case, each Broadcast Channel slot shall consist of four Broadcast Channel frames that are each 40 ms in duration.

The first Broadcast Channel frame of a Broadcast Channel slot shall consist of a sequence of encoded and interleaved symbols. The following Broadcast Channel frames of a Broadcast Channel slot shall consist of the same sequence of encoded and interleaved symbols that were used on the first Broadcast Channel frame.

The first Broadcast Channel frame of a Broadcast Channel slot shall consist of 768 bits. These shall be composed of 744 information bits followed by 16 Broadcast 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 Channel Frame Structure

3.1.3.5.2.1 Broadcast 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 Channel shall use a 16-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^{6} + x^{5} + x^{2} + x + 1$$

The frame quality indicator shall be computed according to the following procedure as shown in Figure 3.1.3.5.2.1-1:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of information bits in the Broadcast Channel frame (i.e., 744) 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'.

- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (i.e., 16).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

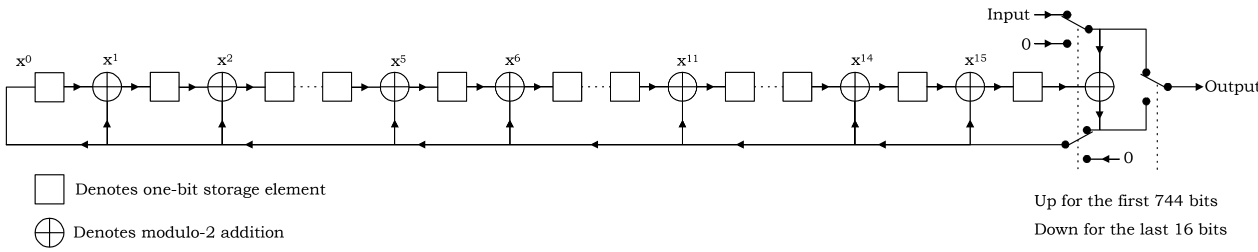


Figure 3.1.3.5.2.1-1. Broadcast Channel Frame Quality Indicator Calculation

3.1.3.5.2.2 Broadcast Channel Encoder Tail Bits

The last eight bits of each Broadcast Channel frame are called the Encoder Tail Bits. These eight bits shall be set to ‘0’.

3.1.3.5.3 Broadcast Channel Convolutional Encoding

The Broadcast Channel data shall be convolutionally encoded as specified in 3.1.3.1.4.

When generating Broadcast Channel data, the encoder shall be initialized to the all-zero state at the end of each Broadcast Channel frame.

3.1.3.5.4 Broadcast Channel Interleaving

The modulation symbols on the Broadcast Channel shall be interleaved, as specified in 3.1.3.1.7. The interleaver block shall align with the Broadcast Channel frame.

3.1.3.5.5 Broadcast Channel Sequence Repetition

When operating at 4800 and 9600 bps, the sequence shall be repeated as specified in 3.1.3.1.8

3.1.3.5.6 Broadcast Channel Data Scrambling

The Broadcast Channel data shall be scrambled as specified in 3.1.3.1.9 utilizing the Broadcast 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 Channel Number
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.5.6-1. Broadcast Channel Long Code Mask

3.1.3.5.7 Broadcast Channel Orthogonal and Quasi-Orthogonal Spreading

The Broadcast Channel shall be spread by a Walsh or quasi-orthogonal function, with the index equal to the Broadcast Channel number, as specified in 3.1.3.1.12.

3.1.3.5.8 Broadcast Channel Quadrature Spreading

The Broadcast Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.13.

3.1.3.5.9 Broadcast Channel Filtering

Filtering for the Broadcast Channel shall be as specified in 3.1.3.1.14.

3.1.3.5.10 Broadcast Channel Transmission Processing

Not specified.

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 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 and Configuration Change 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 Paging Indicator / Configuration Change Indicator Repetition

For Spreading Rate 1, each Paging Indicator / Configuration Change 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 3.1.3.1.2.1-4.

For Spreading Rate 3, each Paging Indicator / Configuration Change 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.

3.1.3.6.6 Quick Paging Channel Orthogonal and Quasi-Orthogonal Spreading

The Quick Paging Channel shall be spread by a Walsh function or quasi-orthogonal function, as specified in 3.1.3.1.12.

For Spreading Rate 1, the Quick Paging Channels with indexes 1, 2, and 3 shall be spread by W_{80}^{128}, W_{48}^{128}, and W_{112}^{128}, respectively, as specified in 3.1.3.1.12.

3.1.3.6.7 Quick Paging Channel Quadrature Spreading

The Quick Paging Channel shall be PN spread using the PN sequence specified in 3.1.3.1.13.

3.1.3.6.8 Quick Paging Channel Filtering

Filtering for the Quick Paging Channel shall be as specified in 3.1.3.1.14.

3.1.3.6.9 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 in 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 in QPCH_POWER_LEVEL_CONFIG.

3.1.3.6.10 Quick Paging Channel Transmission Processing

Not specified.

3.1.3.7 Common Power Control Channel

The base station may support operation on one or more Common Power Control Channels.

The Common Power Control Channel is used by the base station for transmitting common power control subchannels (one bit per subchannel) for the power control of multiple Reverse Common Control Channels and Enhanced Access Channels. The common power control subchannels are time multiplexed on the Common Power Control Channel. Each common power control subchannel controls a Reverse Common Control Channel or an Enhanced Access Channel.

The common power control subchannel may be used with the Enhanced Access Channel or the Reverse Common Control Channel, depending upon the operating mode. While operating in the Power Controlled Access Mode, the mobile station shall use the common power control subchannel transmitted by the base station on the assigned Common Power Control Channel to adjust the transmit power of the Enhanced Access Channel. While operating in the Reservation Access Mode, the mobile station shall use the common power control subchannel transmitted by the base station on the assigned Common Power Control Channel to adjust the transmit power of the Reverse Common Control Channel.

3.1.3.7.1 Common Power Control Channel Time Alignment and Modulation Rates

The common power control subchannels are multiplexed into separate data streams on the I and Q arms of the Common Power Control Channels. The data rate on both the I arm and Q arm is 9600 bps. In a 20 ms frame, there are 16 common power control groups for an 800 bps power control update rate, 8 common power control groups for a 400 bps power control update rate, and 4 common power control groups for a 200 bps power control update rate. The start of the first power control bit in the first common power control group aligns with the beginning of the 20 ms frame. The first Common Power Control Channel frame shall begin at the start of the base station transmission time.

For Spreading Rate 1, the power control bits on each of the I and Q arms are not repeated (1 symbol/bit) for the non-OTD mode, and repeated once (2 symbols/bit) for the OTD mode. For Spreading Rate 3, the power control bits on each of the I and Q arms are repeated twice (3 symbols/bit) for the OTD mode, non-OTD mode and the MC mode.

For a given base station, the I and Q channel pilot PN sequences for the Common Power Control Channel use the same pilot PN sequence offset as for the Pilot Channel.

3.1.3.7.2 Common Power Control Channel Structure

The channel structure for the Common Power Control Channel is shown in Figures 3.1.3.1.1.1-4 and 3.1.3.1.1.2-4.

There are 2N common power control subchannels, numbered from 0 through 2N - 1, in one common power control group of the Common Power Control Channel. These are divided equally between the in-phase and the quadrature-phase arms of the Common Power Control Channel. Table 3.1.3.7.2-1 gives the number of common power control subchannels for power control update rates of 800, 400 and 200 bps per subchannel.

Table 3.1.3.7.2-1 Common Power Control Subchannels for Spreading Rate 1

Rate (bps)	Duration (ms)	Power Control Subchannels (N) per I and Q Arms	Power Control Subchannels (2N)
800	1.25	12	24
400	2.5	24	48
200	5.0	48	96

The common power control subchannels numbered 0 through N - 1 shall correspond to the in-phase arm and those numbered N through 2N - 1 shall correspond to the quadrature-phase arm.

3.1.3.7.3 Pseudo-Randomization of Power Control Bit Positions

There are N bit positions or “offsets” numbered 0 through N-1, on both the in-phase arm and the quadrature-phase arm in one common power control group. In each common power control group, the randomization process shall add a “relative offset” to an “initial offset”, modulo N, to determine the “effective offset” to be used by the multiplexer.

The common power control subchannels shall be assigned initial offsets according to the following rule:

- For the in-phase arm, the initial offset value is the same as the common power control subchannel index, i.e., the common power control subchannel index 0 shall correspond to initial offset 0, and the common power control subchannel index N-1 shall correspond to initial offset N-1.
- For the quadrature-phase arm, the common power control subchannel index N shall correspond to initial offset 0, and the index 2N-1 shall correspond to initial offset N-1.

Offset 0 corresponds to the first bit position in the common power control group, and offset N-1 shall correspond to the last bit position. In-phase power control bits shall remain on the in-phase arm after each modulo operation and the same shall be true for the quadrature-phase arm. When there is no data to be sent on any common power control subchannel, the power at the corresponding bit position shall be gated off.

The Forward Common Power Control Channel shall use the decimated output of the long code generator specified in 2.1.3.1.12 with the long code mask shown in Figure 3.1.3.7.3-1 to randomize the power control bit position as shown in Figure 3.1.3.1.1.1-4 and 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. The decimated output of the long code generator shall not be used to scramble the multiplexer output data stream.

41 … 29	28 … 24	23 … 21	20 … 9	8 … 0
1100011001101	100YY	CACN	000000000000	PILOT_PN

CACN - Common Assignment Channel Number
YY - Common Power Control Channel Number
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.7.3-1 Power Control 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 common power control group. During the common 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 common 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
2.5	7	3	4	0 to 22
5.0	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 3.1.3.7.3-1.

3.1.3.7.4 Common Power Control Channel Orthogonal and Quasi-Orthogonal Spreading

The Common Power Control Channel shall be spread by a Walsh function or quasi-orthogonal function, as specified in 3.1.3.1.12.

When operating in Spreading Rate 1, the Common Power Control Channel symbols shall be spread with a Walsh or quasi-orthogonal function of length 128 for the non-OTD mode, and shall be spread with a Walsh or quasi-orthogonal function of length 64 for the OTD mode. When operating in Spreading Rate 3, Common Power Control Channel symbols shall be spread by a Walsh or quasi-orthogonal function of length 128 for the OTD mode, the non-OTD mode and the MC mode. The Walsh or quasi-orthogonal functions shall be pre-assigned by the base station.

3.1.3.7.5 Common Power Control Channel Quadrature Spreading

The Common Power Control Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.13.

3.1.3.7.6 Common Power Control Channel Filtering

Filtering for the Common Power Control Channel shall be as specified in 3.1.3.1.14.

3.1.3.7.7 Common Power Control Channel Transmission Processing

Not specified.

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 Mode and provides a fast acknowledgement in the Power Controlled 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 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 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 generator polynomial for the frame quality indicator shall be as follows:

$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$$

The frame quality indicators shall be computed according to the following procedure as shown in Figure 3.1.3.8.2.1-1:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (8).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

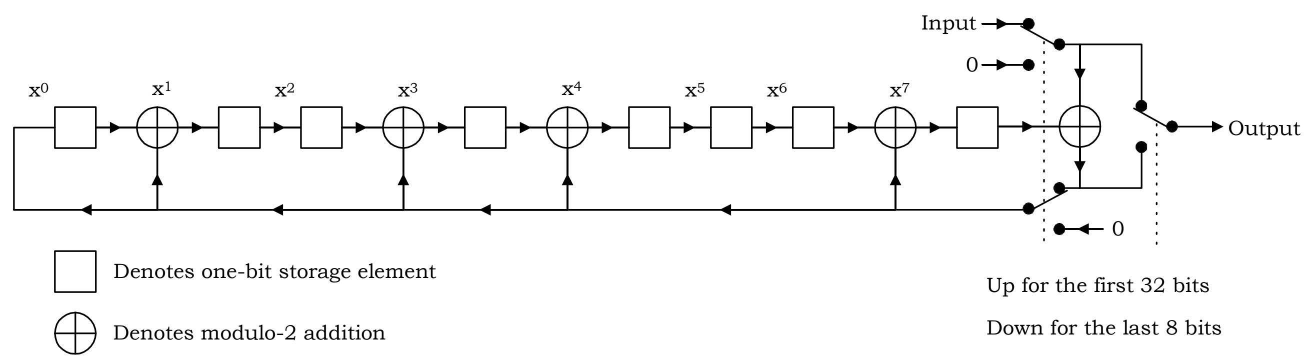


Figure 3.1.3.8.2.1-1. Common Assignment Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

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 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 3.1.3.1.4. 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 3.1.3.1.7.

3.1.3.8.5 Common Assignment Channel Data Scrambling

The Common Assignment Channel shall be scrambled as specified in 3.1.3.1.9, 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	CACN	000000000000	PILOT_PN

CACN - Common Assignment Channel Number
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 and Quasi-Orthogonal Spreading

When operating in Spreading Rate 1, the Common Assignment Channel shall be spread with a Walsh function or quasi-orthogonal function of length 128 and for Spreading Rate 3, it shall be spread with a Walsh function or quasi-orthogonal function of length 256 as specified in 3.1.3.1.12. The Walsh functions shall be pre-assigned by the system.

3.1.3.8.7 Common Assignment Channel Quadrature Spreading

The Power Control Channel shall be PN spread, using the PN sequence specified in 3.1.3.1.13.

3.1.3.8.8 Common Assignment Channel Filtering

Filtering for the Common Power Control Channel shall be as specified in 3.1.3.1.14.

3.1.3.8.9 Common Assignment Channel Transmission Processing

Not specified.

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 system overhead information and 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 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.

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)	Transmission Rate (bps)	Number of Bits per Frame			
		Total	Information Bits	Frame Quality Indicator	Encoder Tail Bits
20	9600	192	184	0	8
20	19200	384	376	0	8
20	38400	768	760	0	8
10	19200	192	184	0	8
10	38400	384	376	0	8
5	38400	192	184	0	8

Information Bits	T

Notation

T - Encoder Tail Bits

Figure 3.1.3.9.2-1. Forward Common Control Channel Frame Structure

The last eight bits of each Forward Common Control Channel frame are called the Encoder Tail Bits. These eight bits shall 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 3.1.3.1.4.

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 3.1.3.1.7. 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 3.1.3.1.9 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	FCCN	000000000000	PILOT_PN

FCCN - Forward Common Control Channel Number
PILOT_PN - Pilot PN sequence offset index for the Forward CDMA Channel

Figure 3.1.3.9.5-1. Forward Common Control Channel Long Code Mask

3.1.3.9.6 Forward Common Control Channel Orthogonal and Quasi-Orthogonal Spreading.

The Forward Common Control Channel shall be spread by a Walsh or quasi-orthogonal function, as specified in 3.1.3.1.12.

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 3.1.3.1.13.

3.1.3.9.8 Forward Common Control Channel Filtering

Filtering for the Forward Common Control Channel shall be as specified in 3.1.3.1.14.

3.1.3.9.9 Forward Common Control Channel Transmission Processing

Not specified.

3.1.3.10 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.

3.1.3.10.1 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 of 9600 or 14400 bps.

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 data rate of 9600 bps for Radio Configurations 3, 4, 6, and 7.

The base station shall transmit information on the Forward Dedicated Control Channel at a data rate of 14400 bps for 20 ms frames and 9600 bps for 5 ms frames for 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 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 Forward Power Control Subchannel shall continue to be transmitted.

A base station may implement Forward Dedicated Control Channel frames which are offset. The amount of time offset is specified by the FRAME_OFFSET parameter. A zero-offset 20 ms Forward Dedicated Control Channel frame shall be such that every 100th frame shall align with the even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) referenced to the base station transmission time (see 3.1.5). A zero-offset 5 ms Forward Dedicated Control Channel frame shall be such that every 400th frame shall align with the even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) referenced to the base station transmission time. 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. An offset 5 ms Forward Dedicated Control Channel frame shall begin 1.25 × (FRAME_OFFSET mod 4) ms later than the 5 ms zero-offset Forward Dedicated Control Channel frame. The Forward Dedicated Control Channel block interleaver shall always be aligned with the Forward Dedicated Control Channel frame.

3.1.3.10.2 Forward Dedicated Control Channel Frame Structure

Table 3.1.3.10.2-1 specifies the Forward Dedicated Control Channel bit allocations. 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 3.1.3.10.2-1. When channel transmission is withheld due to lack of data, the frame may include only the power control bits.

Table 3.1.3.10.2-1. Forward Dedicated Control Channel Frame Structure Summary

Frame Length (ms)	Transmission Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Encoder Tail Bits
20	9600	192	0	172	12	8
20	14400	288	1	267	12	8
5	9600	48	0	24	16	8

R	Information Bits	F	T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.10.2-1. Forward Dedicated Control Channel Frame Structure

3.1.3.10.2.1 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. The 5 ms Forward Dedicated Control Channel shall use a 16-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1$ for the 16-bit frame quality indicator and

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1$ for the 12-bit frame quality indicator.

The frame quality indicators shall be computed according to the following procedure as shown in Figures 3.1.3.10.2.1-1 through 3.1.3.10.2.1-2:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of reserved and information 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’.

- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (16 or 12).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

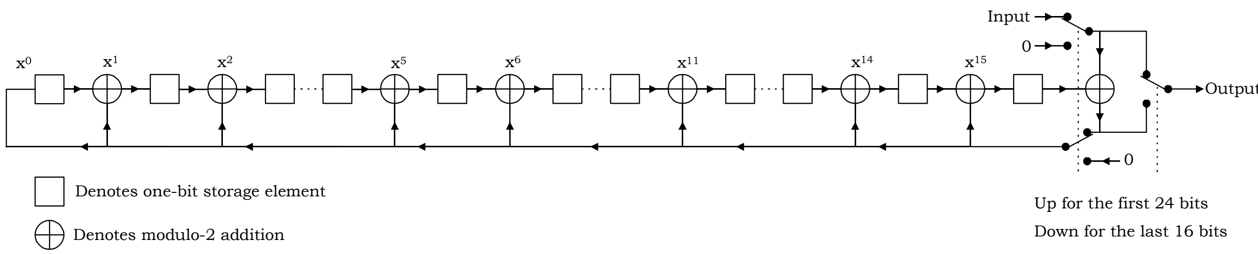


Figure 3.1.3.10.2.1-1. Forward Dedicated Control Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

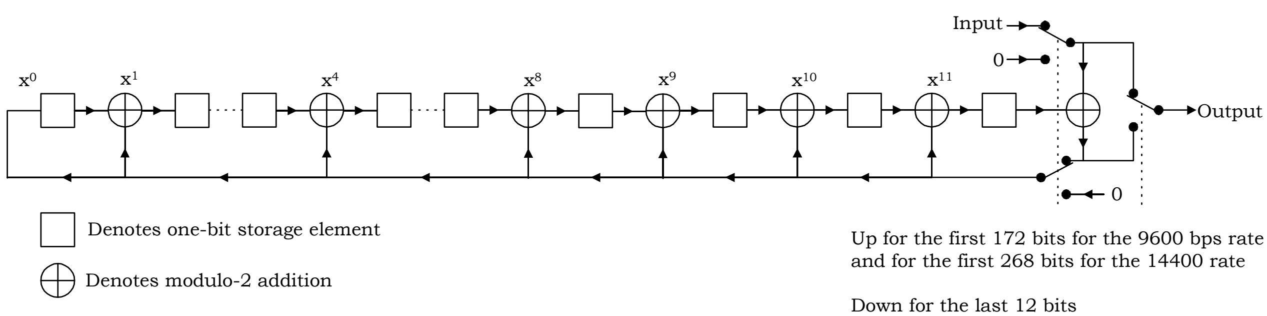


Figure 3.1.3.10.2.1-2. Forward Dedicated Control Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

3.1.3.10.2.2 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 be set to ‘0’.

3.1.3.10.2.3 Forward Dedicated Control Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.10.3 Forward Dedicated Control Channel Convolutional Encoding

The Forward Dedicated Control Channel shall be convolutionally encoded as specified in 3.1.3.1.4.

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.

3.1.3.10.4 Forward Dedicated Channel Code Symbol Repetition

Forward Dedicated Control Channel code symbol repetition shall be as specified in 3.1.3.1.5.

3.1.3.10.5 Forward Dedicated Control Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.6.

3.1.3.10.6 Forward Dedicated Control Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.7.

3.1.3.10.7 Forward Dedicated Control Channel Data Scrambling

The Forward Dedicated Control Channel shall be scrambled as specified in 3.1.3.1.9. The public long code mask shall be as shown in Figure 3.1.3.10.7-1. The permutation of the ESN bits in the public long code mask shall be as specified in 2.1.3.1.12. The generation of the private long code mask shall be as specified in 2.1.3.1.12.

41 … 32	31 … 0
1100011000	Permuted ESN

Figure 3.1.3.10.7-1. Forward Dedicated Control Channel Public Long Code Mask

3.1.3.10.8 Forward Dedicated Control Channel Power Control Subchannel

If the Forward Power Control Subchannel is enabled on the Forward Dedicated Control Channel (FPC_PRI_CHANNEL = '1'), the base station shall insert a Forward Power Control Subchannel on the Forward Dedicated Control Channel as specified in 3.1.3.1.10.

3.1.3.10.9 Forward Dedicated Control Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Dedicated Control Channel shall be spread with a Walsh function or quasi-orthogonal function as specified in 3.1.3.1.12.

3.1.3.10.10 Forward Dedicated Control Channel Quadrature Spreading

The Forward Dedicated Control Channel shall be PN spread as specified in 3.1.3.1.13.

3.1.3.10.11 Forward Dedicated Control Channel Filtering

Filtering for the Forward Dedicated Control Channel shall be as specified in 3.1.3.1.14.

3.1.3.10.12 Forward Dedicated Control Channel Transmission Processing

When the Physical Layer receives a *Transmit DCCH Request* from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Forward Dedicated Control Channel frame of duration FRAME_DURATION (5 ms or 20 ms) at a data rate of FRAME_RATE. If a *Transmit DCCH Request* for a 5 ms frame is received coincident with a *Transmit DCCH Request* 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.

3.1.3.11 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.

3.1.3.11.1 Forward Fundamental Channel Time Alignment and Modulation Rates

When operating with 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 Configurations 2, 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. When operating with 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.

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. 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 of 7200 bps or less.

For a given base station, the I and Q channel pilot PN sequences for the Forward Fundamental Channel 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 (i.e., when transmitting a Radio Configuration 1 frame at 4800 bps, the symbols should have 1/2 the power of the symbols in a 9600 bps frame).

A base station may implement Forward Fundamental Channel frames which are offset. The amount of time offset is specified by the FRAME_OFFSET parameter. A zero-offset 20 ms Forward Fundamental Channel frame shall be such that every 100^{th} frame shall align with the even-second time mark ($t \bmod 100 = 0$, where t is the System Time in 20 ms frames) referenced to the base station transmission time (see 3.1.5). A zero-offset 5 ms Forward Fundamental Channel frame shall be such that every 400^{th} frame shall align with the even-second time mark ($t \bmod 100 = 0$, where t is the System Time in 20 ms frames) referenced to the base station transmission time. An offset 20 ms Forward Fundamental Channel frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset 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 Forward Fundamental Channel block interleaver shall always be aligned with the Forward Fundamental Channel frame.

3.1.3.11.2 Forward Fundamental Channel Frame Structure

Table 3.1.3.11.2-1 summarizes the Forward Fundamental Channel bit allocations. The order of the bits is shown in Figure 3.1.3.11.2-1.

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 a Reserved/Flag Bit followed by the information bits, a frame quality indicator (CRC), and 8 Encoder Tail Bits.

Table 3.1.3.11.2-1. Forward Fundamental Channel Frame Structure Summary

Radio Config.	Transmission Rate (bps)	Number of Bits per Frame				
		Total	Reserved/ Flag	Informa-tion	Frame Quality Indicator	Encoder Tail Bits
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

R/F	Information Bits	F	T

Notation

R/F - Reserved/Flag Bit
F - Frame Quality Indicator (CRC)
T - Encoder Tail Bits

Figure 3.1.3.11.2-1. Forward Fundamental Channel Frame Structure

3.1.3.11.2.1 Forward Fundamental Channel Frame Quality Indicator

Each frame with Radio Configurations 2 through 9, and the 9600 and 4800 bps frames of Radio Configuration 1 shall include a frame quality indicator. This frame quality indicator is a CRC.[16] No frame quality indicator is used for the 2400 and 1200 bps transmission 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.

The 9600 bps transmissions with Radio Configuration 1; the 14400 bps transmissions with Radio Configurations 2, 5, 8, and 9; and the 9600 bps transmissions of 20 ms frames with Radio Configurations 3, 4, 6, and 7 shall use a 12-bit frame quality indicator.

The 7200 bps transmissions with Radio Configurations 2, 5, 8 and 9 shall use a 10-bit frame quality indicator.

The 4800 bps transmissions with Radio Configurations 1, 3, 4, 6, and 7 and the 3600 bps transmissions with Radio Configurations 2, 5, 8, and 9 shall use an 8-bit frame quality indicator.

The 2700 and 1500 bps transmissions with Radio Configurations 3, 4, 6, and 7 and the 1800 bps transmissions with Radio Configurations 2, 5, 8, and 9 shall use a 6-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1$ for the 16-bit frame quality indicator,

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1$ for the 12-bit frame quality indicator,

---

[16]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.

$$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1 \text{ for the 10-bit frame quality indicator,}$$

$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1 \text{ for the 8-bit frame quality indicator,}$$

$$g(x) = x^6 + x^2 + x + 1 \text{ for the 6-bit frame quality indicator (RC = 2), and}$$

$$g(x) = x^6 + x^5 + x^2 + x + 1 \text{ for the 6-bit frame quality indicator } (3 \le RC \le 9).$$

The frame quality indicators shall be computed according to the following procedure as shown in Figures 3.1.3.11.2.1-1 through 3.1.3.11.2.1-6:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of Reserved/Flag Bits and information 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’.
- 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.

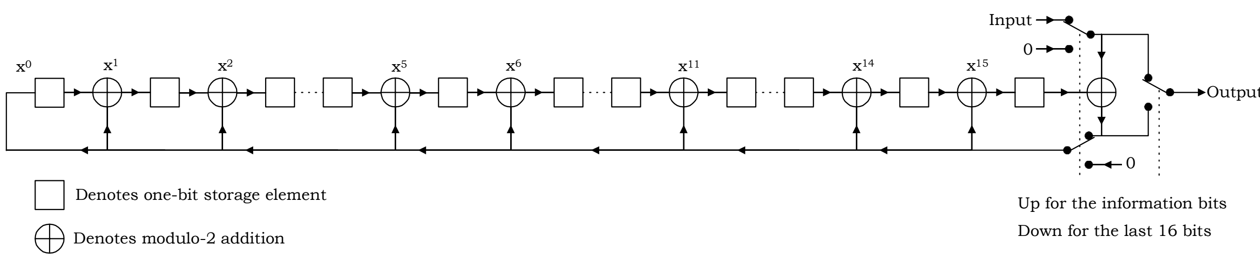


Figure 3.1.3.11.2.1-1. Forward Fundamental Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

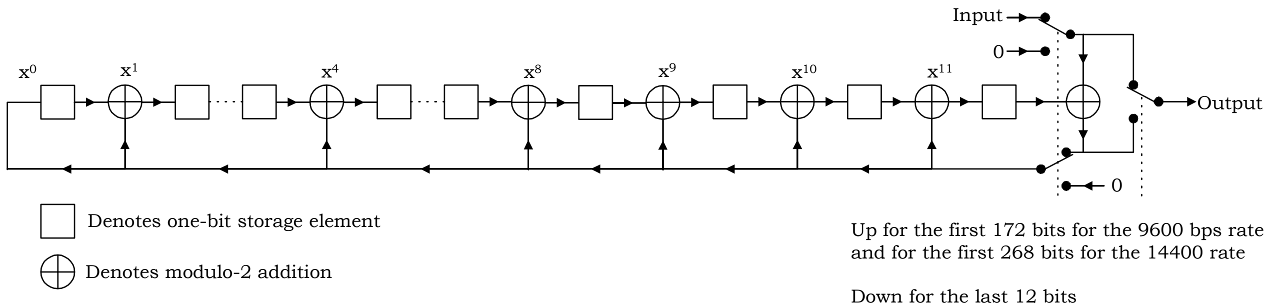


Figure 3.1.3.11.2.1-2. Forward Fundamental Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

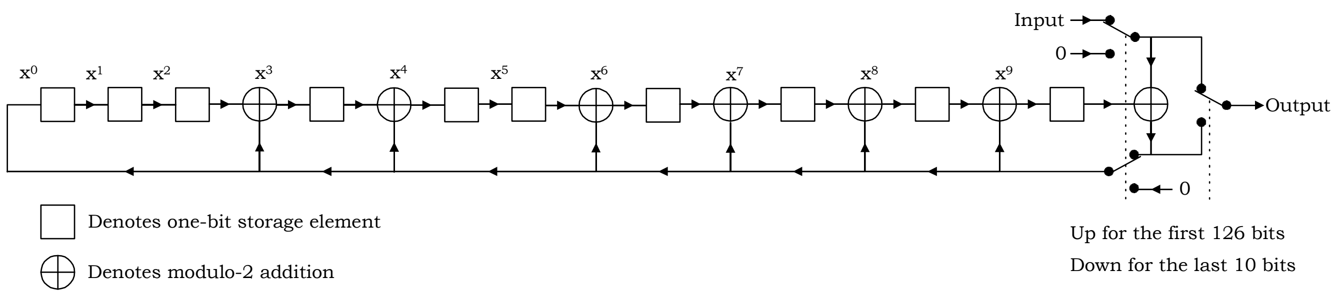


Figure 3.1.3.11.2.1-3. Forward Fundamental Channel Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

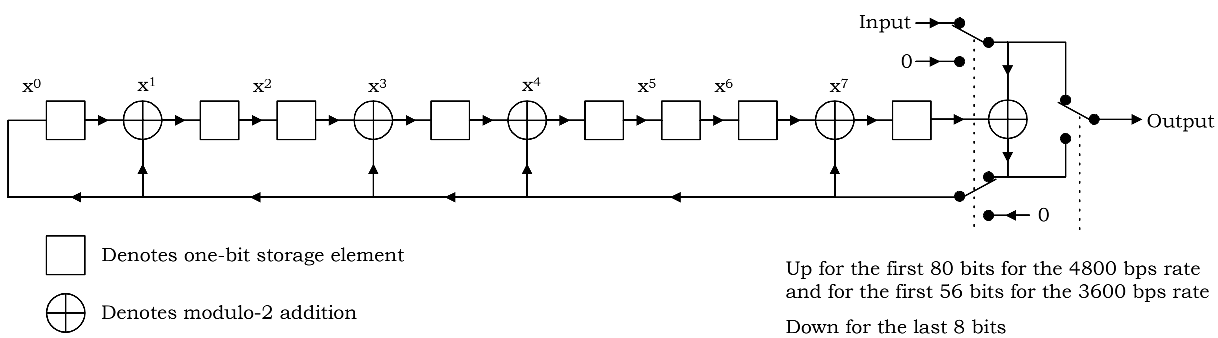


Figure 3.1.3.11.2.1-4. Forward Fundamental Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

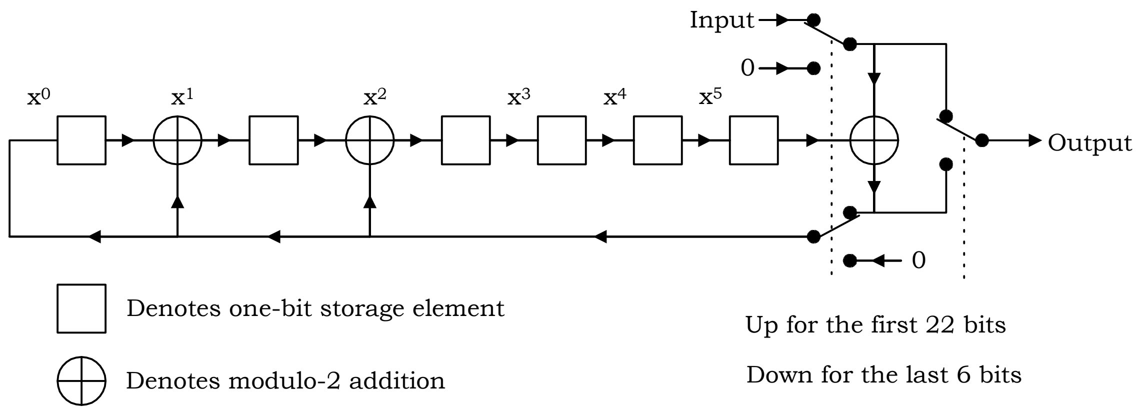


Figure 3.1.3.11.2.1-5. Forward Fundamental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator for Radio Configuration 2

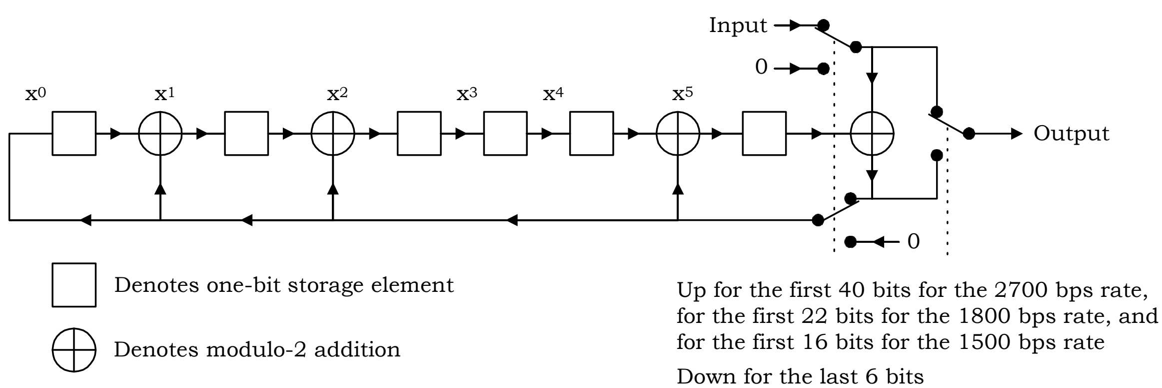


Figure 3.1.3.11.2.1-6. Forward Fundamental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator for Radio Configurations 3 through 9

3.1.3.11.2.2 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 be set to ‘0’.

3.1.3.11.2.3 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.

3.1.3.11.3 Forward Fundamental Channel Convolutional Encoding

The Forward Fundamental Channel data shall be convolutionally encoded as specified in 3.1.3.1.4. 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.

3.1.3.11.4 Forward Fundamental Channel Code Symbol Repetition

Forward Fundamental Channel code symbol repetition shall be as specified in 3.1.3.1.5.

3.1.3.11.5 Forward Fundamental Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.6.

3.1.3.11.6 Forward Fundamental Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.7.

3.1.3.11.7 Forward Fundamental Channel Data Scrambling

The Forward Fundamental Channel data shall be scrambled as specified in 3.1.3.1.9. The public long code mask shall be as shown in Figure 3.1.3.11.7-1. The permutation of the ESN bits in the public long code mask shall be as specified in 2.1.3.1.12. The generation of the private long code mask shall be as specified in 2.1.3.1.12.

41 … 32	31 … 0
1100011000	Permuted ESN

Figure 3.1.3.11.7-1. Forward Fundamental Channel Public Long Code Mask

3.1.3.11.8 Forward Fundamental Channel Power Control Subchannel

If the Forward Power Control Subchannel is enabled on the Forward Fundamental Channel (FPC_PRI_CHANNEL = ‘0’), the base station shall insert a Forward Power Control Subchannel on the Forward Fundamental Channel as specified in 3.1.3.1.10.

3.1.3.11.9 Forward Fundamental Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Fundamental Channel shall be spread with a Walsh function or quasi-orthogonal function (only Radio Configurations 3 through 9) as specified in 3.1.3.1.12.

3.1.3.11.10 Forward Fundamental Channel Quadrature Spreading

The Forward Fundamental Channel shall be PN spread as specified in 3.1.3.1.13.

3.1.3.11.11 Forward Fundamental Channel Filtering

Filtering for the Forward Fundamental Channel shall be as specified in 3.1.3.1.14.

3.1.3.11.12 Forward Fundamental Channel Transmission Processing

When the Physical Layer receives a *Transmit FCH Request* from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- Set the information bits to SDU.
- Transmit a Forward Fundamental Channel frame of duration FRAME_DURATION (5 ms or 20 ms) at a data rate of FRAME_RATE. If a *Transmit FCH Request* for a 5 ms frame is received coincident with a *Transmit FCH Request* 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.

3.1.3.12 Forward Supplemental Channel

The Forward Supplemental Channel applies to Radio Configurations 3 through 9 only.

The Forward Supplemental Channel is used for the transmission of user information to a specific mobile station during a call. Each Forward Traffic Channel contains up to two Forward Supplemental Channels.

3.1.3.12.1 Forward Supplemental Channel Time Alignment and Modulation Rates

When transmitting on the Forward Supplemental Channel with Radio Configuration 3, the base station shall transmit information at a fixed rate of 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 4, the base station shall transmit information at a fixed rate of 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 5, the base station shall transmit information at a fixed rate of 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 6, the base station shall transmit information at a fixed rate of 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 7, the base station shall transmit information at a fixed rate of 614400, 307200, 153600, 76800, 38400, 19200, 9600, 4800, 2700, 2400, 1500, 1350, or 1200 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 8, the base station shall transmit information at a fixed rate of 460800, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps. When transmitting on the Forward Supplemental Channel with Radio Configuration 9, the base station shall transmit information at a fixed rate of 1036800, 518400, 460800, 259200, 230400, 115200, 57600, 28800, 14400, 7200, 3600, or 1800 bps.

Forward Supplemental Channel frames shall be 20, 40, or 80 ms in duration.

For a given base station, the I and Q channel pilot PN sequences for the Forward Supplemental Channel use the same pilot PN sequence offset as for the Forward Pilot Channel.

A base station shall support Forward Supplemental Channel frames which are offset by multiples of 1.25 ms as specified by FRAME_OFFSET. A base station may support frames which are offset by multiples of 20 ms on Forward Supplemental Channel i as specified by FOR_SCH_FRAME_OFFSET[i].

The amount of time offset is specified by FRAME_OFFSET and FOR_SCH_FRAME_OFFSET[i]. A zero-offset Forward Supplemental Channel frame shall be such that every 100th frame shall align with the even-second time mark ($t \bmod 100 = 0$, where t is the System Time in 20 ms frames) referenced to the base station transmission time (see 3.1.5). An offset frame shall begin $1.25 \times$ FRAME_OFFSET + $20 \times$ FOR_SCH_FRAME_OFFSET[i] ms later than the zero-offset Forward Supplemental Channel frame. The Forward Supplemental Channel block interleaver shall always be aligned with the Forward Supplemental Channel frame.

3.1.3.12.2 Forward Supplemental Channel Frame Structure

Tables 3.1.3.12.2-1 through 2.1.3.12.2-3 specify the Forward Supplemental Channel bit allocations. 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 3.1.3.12.2-1.

Table 3.1.3.12.2-1. Forward Supplemental Channel Frame Structure Summary for 20 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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

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.

Table 3.1.3.12.2-2. Forward Supplemental Channel Frame Structure Summary for 40 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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 3.1.3.12.2-3. Forward Supplemental Channel Frame Structure Summary for 80 ms Frames

Radio Config.	Data Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Information	Frame Quality Indicator	Reserved/ Encoder Tail Bits
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
	1350	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.

R	Information Bits	F	R/T

Notation

R - Reserved Bit
F - Frame Quality Indicator (CRC)
R/T - Reserved/Encoder Tail Bits

Figure 3.1.3.12.2-1. Forward Supplemental Channel Frame Structure

3.1.3.12.2.1 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 Encoder Tail Bits.

Frames with more than 267 information bits shall use a 16-bit frame quality indicator.

Frames with 172 and 267 information bits shall use a 12-bit frame quality indicator.

Frames with 125 information bits shall use a 10-bit frame quality indicator.

Frames with 80 and 55 information bits shall use an 8-bit frame quality indicator.

Frames with 16, 21, and 40 information bits shall use a 6-bit frame quality indicator.

The generator polynomials for the frame quality indicator shall be as follows:

$g(x) = x^{16} + x^{15} + x^{14} + x^{11} + x^6 + x^5 + x^2 + x + 1$ for the 16-bit frame quality indicator,

$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1$ for the 12-bit frame quality indicator,

$g(x) = x^{10} + x^9 + x^8 + x^7 + x^6 + x^4 + x^3 + 1$ for the 10-bit frame quality indicator,

$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1$ for the 8-bit frame quality indicator, and

$g(x) = x^6 + x^5 + x^2 + x + 1$ for the 6-bit frame quality indicator.

The frame quality indicators shall be computed according to the following procedure as shown in Figures 3.1.3.12.2.1-1 through 3.1.3.12.2.1-5:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of reserved and information 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'.

- 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.

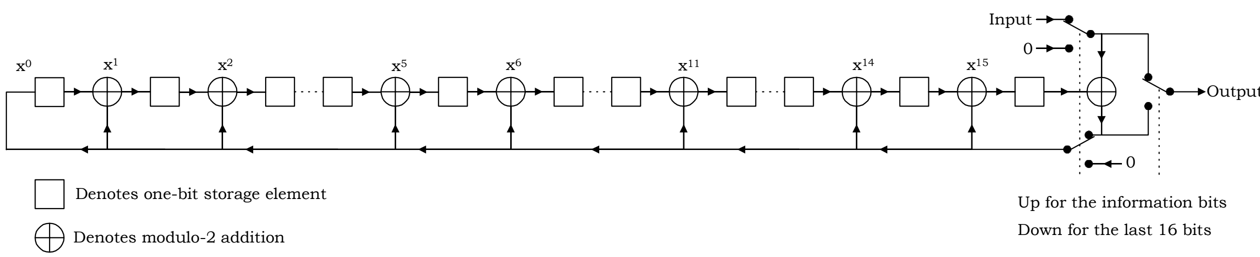


Figure 3.1.3.12.2.1-1. Forward Supplemental Channel Frame Quality Indicator Calculation for the 16-Bit Frame Quality Indicator

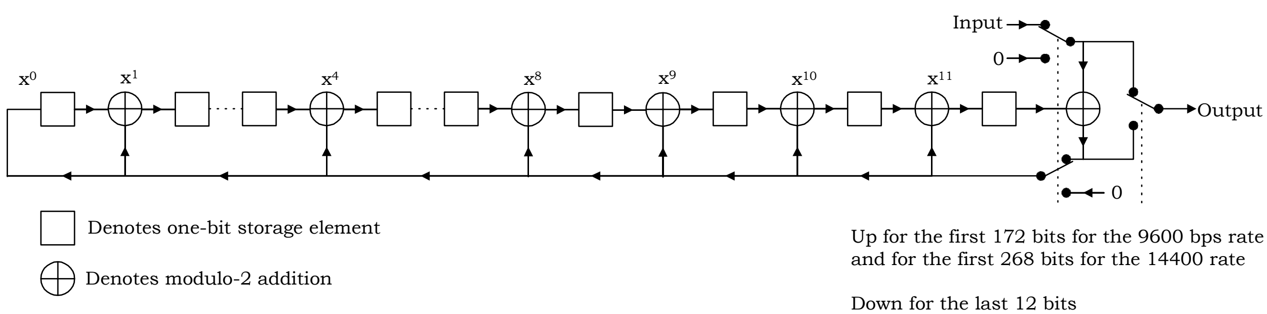


Figure 3.1.3.12.2.1-2. Forward Supplemental Channel Frame Quality Indicator Calculation for the 12-Bit Frame Quality Indicator

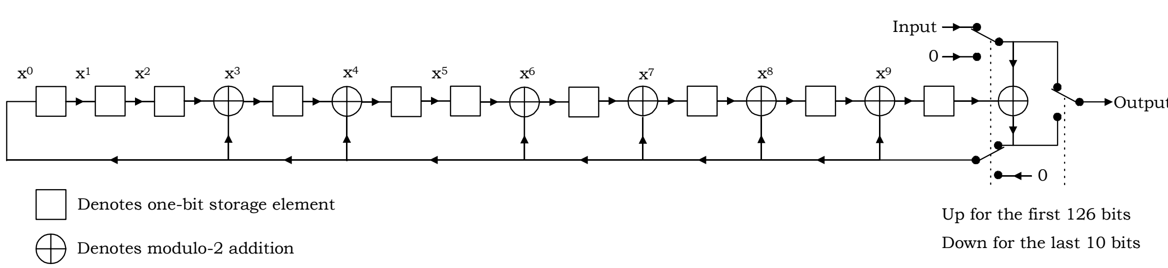


Figure 3.1.3.12.2.1-3. Forward Supplemental Channel Frame Quality Indicator Calculation for the 10-Bit Frame Quality Indicator

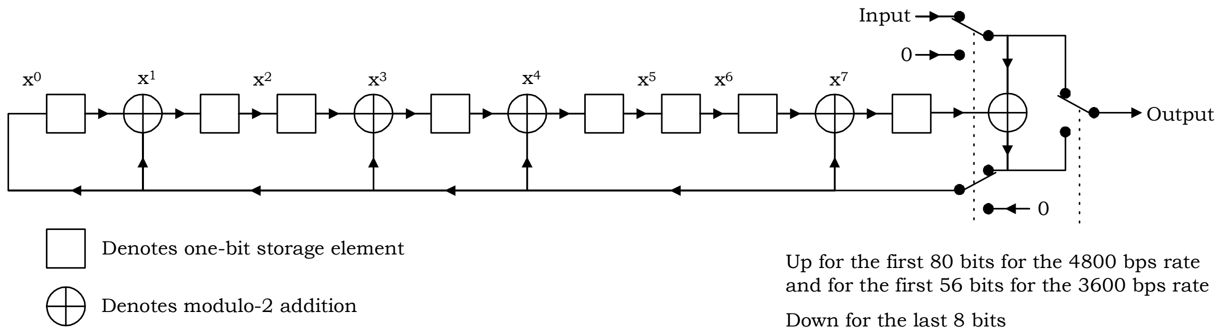


Figure 3.1.3.12.2.1-4. Forward Supplemental Channel Frame Quality Indicator Calculation for the 8-Bit Frame Quality Indicator

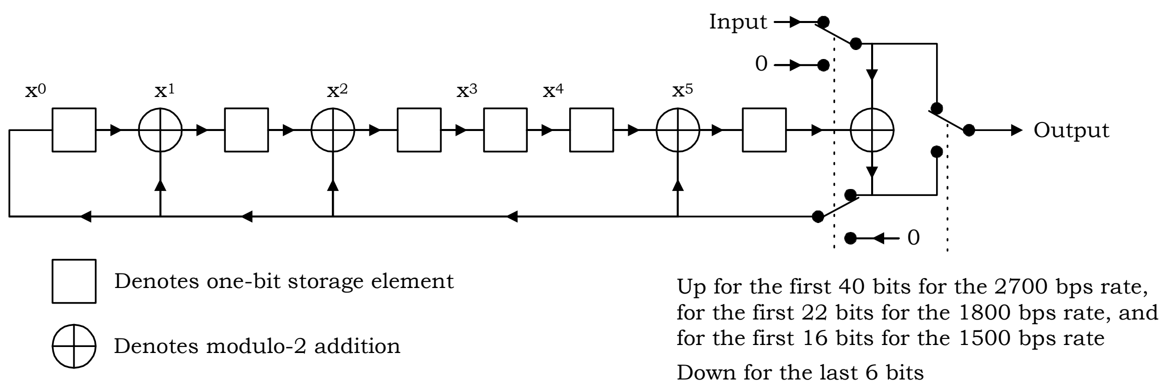


Figure 3.1.3.12.2.1-5. Forward Supplemental Channel Frame Quality Indicator Calculation for the 6-Bit Frame Quality Indicator

3.1.3.12.2.2 Forward Supplemental Channel Encoder Tail Bits

The last eight bits of each Forward Supplemental Channel frame are called the Encoder Tail Bits. These eight bits shall be set to ‘0’.

3.1.3.12.2.3 Forward Supplemental Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.12.3 Forward Supplemental Channel Forward Error Correction Encoding

The data for Forward Supplemental Channels shall be convolutionally or turbo encoded as specified in 3.1.3.1.4.

3.1.3.12.4 Forward Supplemental Channel Code Symbol Repetition

Forward Supplemental Channel code symbol repetition shall be as specified in 3.1.3.1.5.

3.1.3.12.5 Forward Supplemental Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.6.

3.1.3.12.6 Forward Supplemental Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.7.

3.1.3.12.7 Forward Supplemental Channel Data Scrambling

The data for Forward Supplemental Channels shall be scrambled as specified in 3.1.3.1.9. The same long code mask is used for all code channels of the Forward Traffic Channel. The public long code mask shall be as shown in Figure 3.1.3.12.7-1. The permutation of the ESN bits in the public long code mask shall be as specified in 2.1.3.1.12. The generation of the private long code mask shall be as specified in 2.1.3.1.12.

41 … 32	31 … 0
1100011000	Permuted ESN

Figure 3.1.3.12.7-1. Forward Supplemental Channel Public Long Code Mask

3.1.3.12.8 Forward Supplemental Channel Orthogonal and Quasi-Orthogonal Spreading

The Forward Supplemental Channels shall be spread with a Walsh function or quasi-orthogonal function as specified in 3.1.3.1.12.

3.1.3.12.9 Forward Supplemental Channel Quadrature Spreading

The Forward Supplemental Channels shall be PN spread as specified in 3.1.3.1.13.

3.1.3.12.10 Forward Supplemental Channel Filtering

Filtering for the Forward Supplemental Channels shall be as specified in 3.1.3.1.14.

3.1.3.12.11 Forward Supplemental Channel Transmission Processing

When the Physical Layer receives a *Transmit SCH Request* from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU, FRAME_DURATION, and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Forward Supplemental Channel frame of duration FRAME_DURATION at a data rate of FRAME_RATE.

3.1.3.13 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 user information to a specific mobile station during a call. Each Forward Traffic Channel contains up to seven Forward Supplemental Code Channels.

3.1.3.13.1 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 use the same pilot PN sequence offset as for the Forward Pilot Channel.

A base station may implement Forward Supplemental Code Channel frames which are offset. The amount of time offset is specified by the FRAME_OFFSET parameter. A zero-offset Forward Supplemental Code Channel frame shall be such that every 100th frame shall align with the even-second time mark (t mod 100 = 0, where t is the System Time in 20 ms frames) referenced to the base station transmission time (see 3.1.5). An offset frame shall begin 1.25 × FRAME_OFFSET ms later than the zero-offset Forward Supplemental Code Channel frame. The Forward Supplemental Code Channel block interleaver shall always be aligned with the Forward Supplemental Code Channel frame.

3.1.3.13.2 Forward Supplemental Code Channel Frame Structure

Table 3.1.3.13.2-1 specifies the Forward Supplemental Code Channel bit allocations. All frames shall consist of the zero or one Reserved Bits and information bits followed by a frame quality indicator (CRC) and eight Encoder Tail Bits, as shown in Figure 3.1.3.13.2-1.

Table 3.1.3.13.2-1. Forward Supplemental Code Channel Frame Structure Summary

Radio Config.	Transmission Rate (bps)	Number of Bits per Frame				
		Total	Reserved	Informa-tion	Frame Quality Indicator	Encoder Tail Bits
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 3.1.3.13.2-1. Forward Supplemental Code Channel Frame Structure

3.1.3.13.2.1 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. This frame quality indicator is a CRC.

The generator polynomial for the frame quality indicator shall be as follows:

$$g(x) = x^{12} + x^{11} + x^{10} + x^{9} + x^{8} + x^{4} + x + 1.$$

The frame quality indicators shall be computed according to the following procedure as shown in Figure 3.1.3.13.2.1-1:

- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked a number of times equal to the number of reserved and information 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’.
- The register shall be clocked an additional number of times equal to the number of bits in the frame quality indicator (12).
- These additional bits shall be the frame quality indicator bits.
- The bits shall be transmitted in the order calculated.

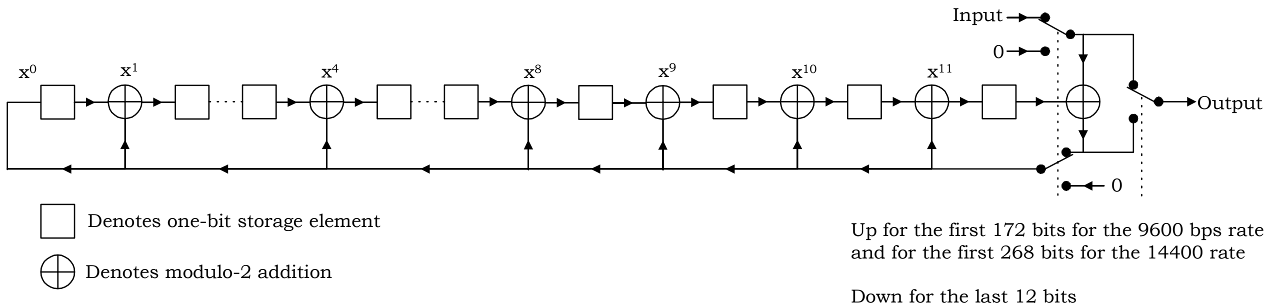


Figure 3.1.3.13.2.1-1. Forward Supplemental Code Channel Frame Quality Indicator Calculation

3.1.3.13.2.2 Forward Supplemental Code Channel Encoder Tail Bits

The last eight bits of each Forward Supplemental Code Channel frame are called the Encoder Tail Bits. These eight bits shall be set to ‘0’.

3.1.3.13.2.3 Forward Supplemental Code Channel Reserved Bit

This bit is reserved and shall be set to ‘0’.

3.1.3.13.3 Forward Supplemental Code Channel Convolutional Encoding

The data for Forward Supplemental Code Channels shall be convolutionally encoded as specified in 3.1.3.1.4.

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.

3.1.3.13.4 Forward Supplemental Code Channel Code Symbol Repetition

Forward Supplemental Code Channel code symbol repetition shall be as specified in 3.1.3.1.5.

3.1.3.13.5 Forward Supplemental Code Channel Puncturing

Code symbols resulting from the symbol repetition shall be punctured as specified in 3.1.3.1.6.

3.1.3.13.6 Forward Supplemental Code Channel Interleaving

The modulation symbols shall be interleaved as specified in 3.1.3.1.7.

3.1.3.13.7 Forward Supplemental Code Channel Data Scrambling

The data for Forward Supplemental Code Channels shall be scrambled as specified in 3.1.3.1.9. The same long code mask is used for all code channels of the Forward Traffic Channel. The public long code mask shall be as shown in Figure 3.1.3.13.7-1. The permutation of the ESN bits in the public long code mask shall be as specified in 2.1.3.1.12. The generation of the private long code mask shall be as specified in 2.1.3.1.12.

41 … 32	31 … 0
1100011000	Permuted ESN

Figure 3.1.3.13.7-1. Forward Supplemental Code Channel Public Long Code Mask

3.1.3.13.8 Forward Supplemental Code Channel Orthogonal Spreading

The Forward Supplemental Code Channels shall be spread with a Walsh function as specified in 3.1.3.1.12.

3.1.3.13.9 Forward Supplemental Code Channel Quadrature Spreading

The Forward Supplemental Code Channels shall be PN spread as specified in 3.1.3.1.13.

3.1.3.13.10 Forward Supplemental Code Channel Filtering

Filtering for the Forward Supplemental Code Channels shall be as specified in 3.1.3.1.14.

3.1.3.13.11 Forward Supplemental Code Channel Transmission Processing

When the Physical Layer receives a *Transmit SCCH Request* from the MAC Layer, the base station shall perform the following:

- Store the arguments SDU and FRAME_RATE.
- If SDU is not equal to NULL, set the information bits to SDU.
- If SDU is not equal to NULL, transmit a Forward Supplemental Code Channel frame at a data rate of FRAME_RATE.

3.1.4 Limitations on Emissions

3.1.4.1 Conducted Spurious Emissions

The base station shall meet the requirements in Section 4.5.1 of the current version of 3GPP2 C.S0010-0.

3.1.4.2 Radiated Spurious Emissions

The base station shall meet the requirements in Section 4.5.2 of the current version of 3GPP2 C.S0010-0.

3.1.4.3 Intermodulation Products

Radiated products from co-located transmitters shall not exceed FCC spurious and harmonic level requirements that would apply to any of the transmitters operated separately.

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,[17] 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 3GPP2 C.S0010-0.

3.1.5.2 Base Station Transmission Time

The base station shall meet the requirements in Section 4.3.1.1 of the current version of 3GPP2 C.S0010-0.

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 4.3.1.2 of the current version of 3GPP2 C.S0010-0.

3.1.5.4 Pilot to Walsh Cover Phase Tolerance

The base station shall meet the requirements in Section 4.3.1.3 of the current version of 3GPP2 C.S0010-0.

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[17]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 for Spreading Rate 1 or Spreading Rate 3 MC or 192 chip time shifts of a 98304 chip sequence for Spreading Rate 3 DS. In a very extreme case where the maximum number of 512 sequences were assigned to base stations, these address sequences would be 64 or 192 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.

3.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in the current version of 3GPP2 C.S0010-0.

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.

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).

The base station receiver shall support the closed loop power control sub-channel as specified in 3.1.3.1.10.

The Reverse Traffic Channel frame is described in 2.1.3.6.2, 2.1.3.7.2, 2.1.3.8.2, and 2.1.3.9.2. A base station may implement offset Reverse Traffic Channel frames as described in 2.1.3.6.1, 2.1.3.7.1, 2.1.3.8.1, and 2.1.3.9.1.

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 Access Channel Reception Processing

When the base station receives an Access Channel frame, the Physical Layer shall send a *Receive R-ACH Indication* to the MAC Layer, after the base station performs the following actions:

- Set the SDU to the received information bits.
- Pass the SDU as an argument.

3.2.2.1.2 Enhanced Access Channel Reception Processing

Not specified.

3.2.2.1.3 Reverse Common Control Channel Reception Processing

Not specified.

3.2.2.1.4 Reverse Dedicated Control Channel Reception Processing

When the base station receives a Reverse Dedicated Control Channel frame, the Physical Layer shall send a *Receive DCCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

If the base 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 *Receive DCCH Indication* to the MAC Layer, after the base station performs the following actions:

- Set the SDU to NULL.
- Pass the SDU as an argument.

3.2.2.1.5 Reverse Fundamental Channel Reception Processing

When the base station receives a Reverse Fundamental Channel frame, the Physical Layer shall send a *Receive FCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”

Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

3.2.2.1.6 Reverse Supplemental Channel Reception Processing

When the base station receives a Reverse Supplemental Channel frame, the Physical Layer shall send a *Receive SCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to “sufficient” if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to “insufficient.”
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

3.2.2.1.7 Reverse Supplemental Code Channel Reception Processing

When the base station receives a Reverse Supplemental Code Channel frame, the Physical Layer shall send a *Receive SCCH Indication* 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 FRAME_RATE to the data rate of the received frame.
- Set FRAME_QUALITY to "sufficient" if the received frame has sufficient frame quality; otherwise, set FRAME_QUALITY to "insufficient."
- Pass the SDU, FRAME_DURATION, FRAME_RATE, and FRAME_QUALITY as an argument.

3.2.3 Limitations on Emissions

The base station shall meet the requirements in Section 3.5.1 of the current version of 3GPP2 C.S0010-0.

3.2.4 Receiver Performance Requirements

System performance is predicated on receivers meeting the requirements set forth in the current version of 3GPP2 C.S0010-0.