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•ALTRAN GROUP

Block Ack mechanism & Qos Control Field

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MAC Frame Format

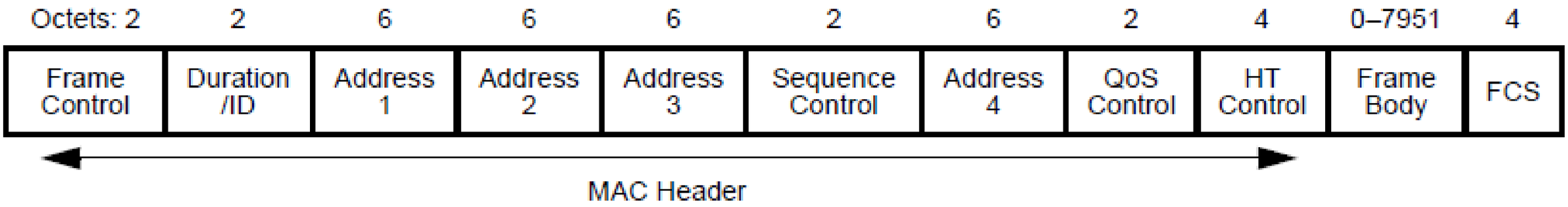


Figure 8-1—MAC frame format

QOS Control Field

TABLE 3.4 QoS Control field

QoS Station	Bits 0-3	Bit 4	Bits 5-6	Bit 7	Bits 8-15
AP	TID/Access Class	EOSP	ACK Policy	Reserved	TXOP Limit
AP	TID/Access Class	EOSP	ACK Policy	Reserved	AP PS Buffer State
Client STA	TID/Access Class	0	ACK Policy	Reserved	TXOP Duration Requested
Client STA	TID/Access Class	1	ACK Policy	Reserved	Queue Size

Cont…

Transmitting station	Receiving station	Data frame subtype used
Non-QoS station	Non-QoS station	Non-QoS frame
Non-QoS station	QoS station	Non-QoS frame
QoS station	QoS station	QoS frame
QoS station	Non-QoS station	Non-QoS frame
All	Broadcast	Non-QoS frame, unless the transmitting station knows that all stations in the BSS are QoS capable, in which case a QoS frame would be used
All	Multicast	Non-QoS frame, unless the transmitting station knows that all stations in the BSS that are members of the multicast group are QoS capable, in which case a QoS frame would be used

Introduction

- Initially defined in 802.11e standard as an optional scheme to improve the MAC efficiency.
- In 802.11n enhances the Block Ack mechanism made it mandatory to support all 802.11n capable devices(HT devices)
- Instead of transmitting individual ACK for every data frame, multiple data frames can be acknowledged together using BA frame.
- The BA mechanism improves the channel efficiency by aggregating several ACKs into one frame.

Block Ack Types

- Immediate Block Ack
- Delayed Block Ack

Different Phases of Block Ack

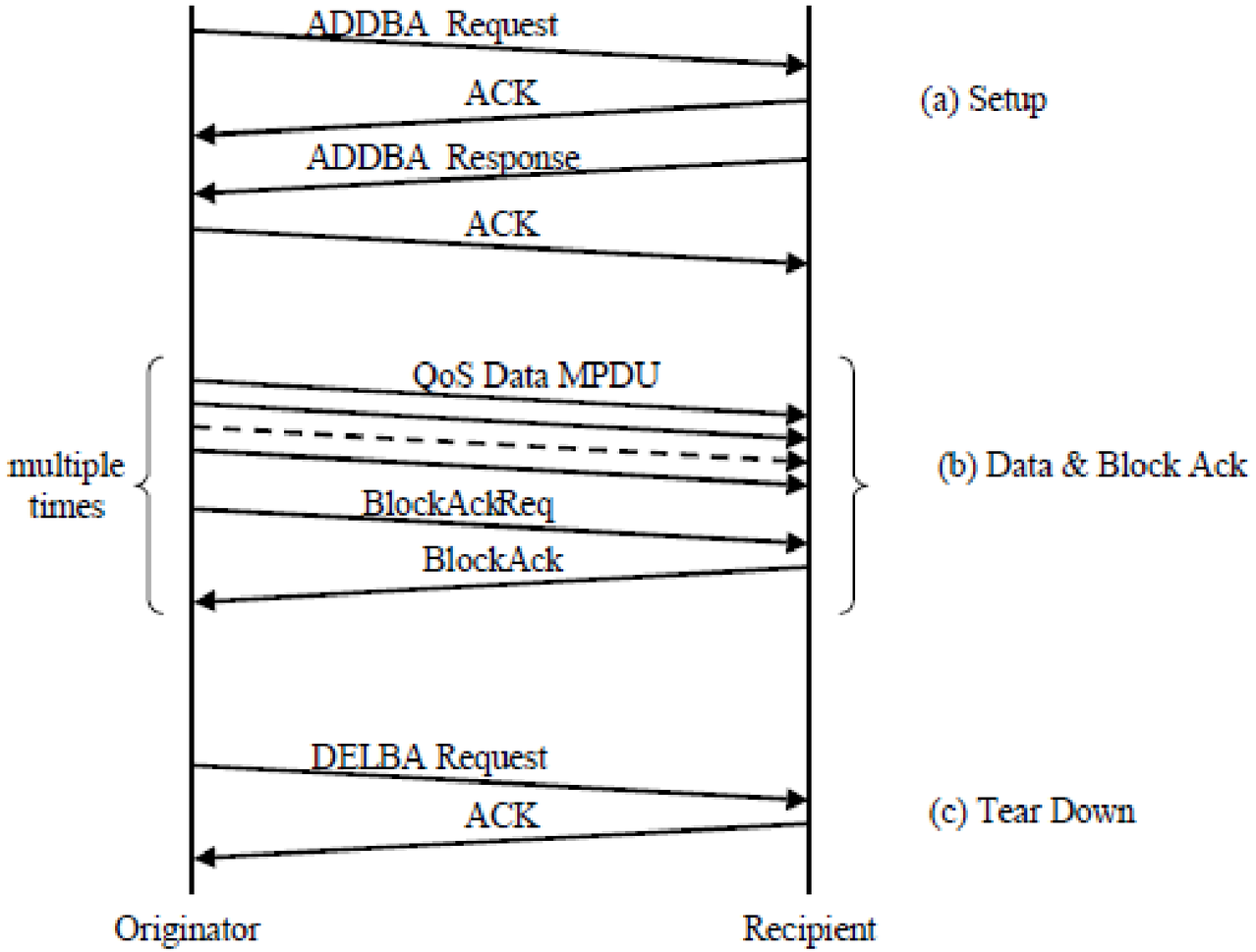


Figure 9-25—Message sequence chart for Block Ack mechanism: (a) setup, (b) data and acknowledgment transfer and (c) tear down

Immediate Block Ack

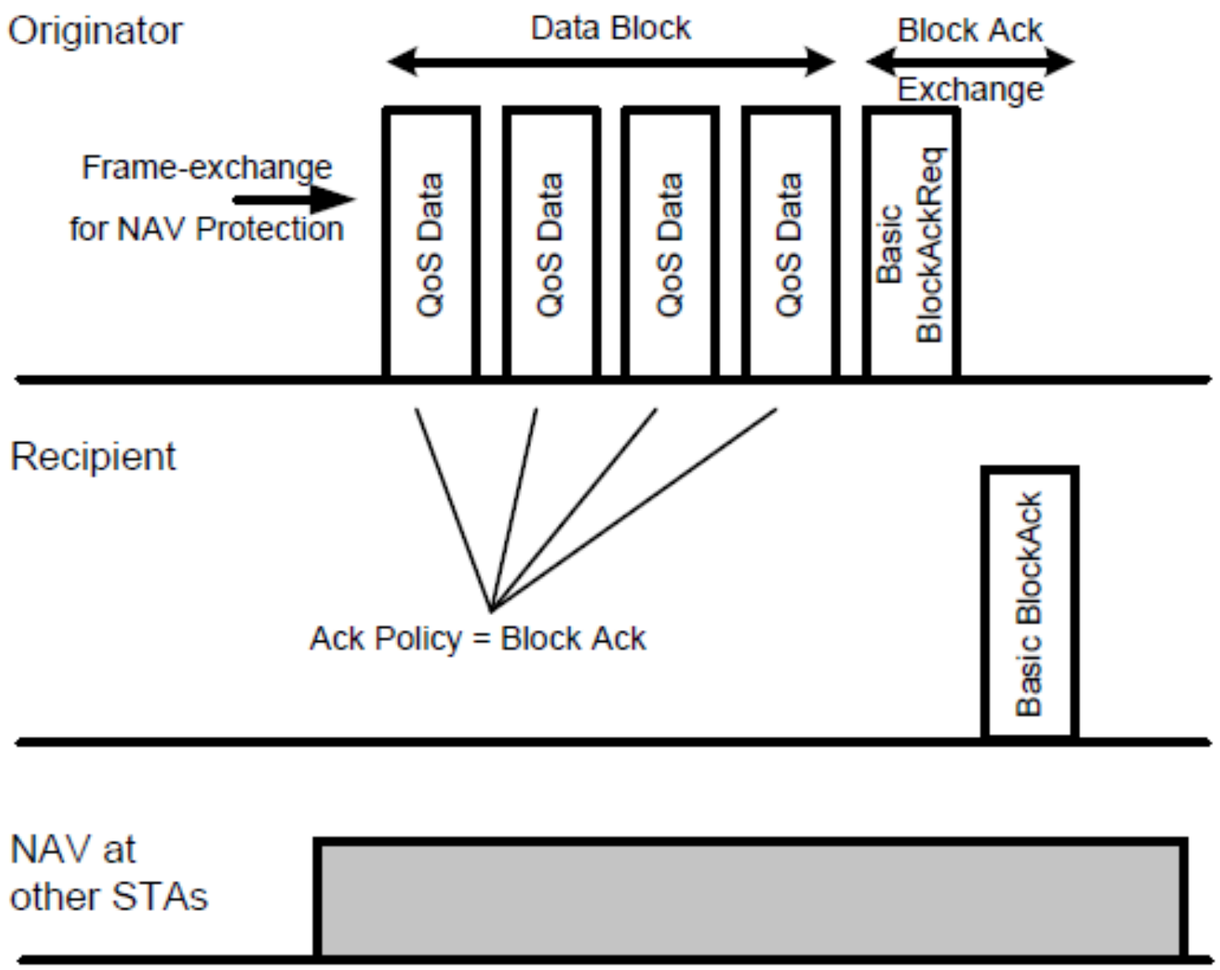


Figure 9-26—A typical Block Ack sequence when immediate policy is used

Delayed Block Ack

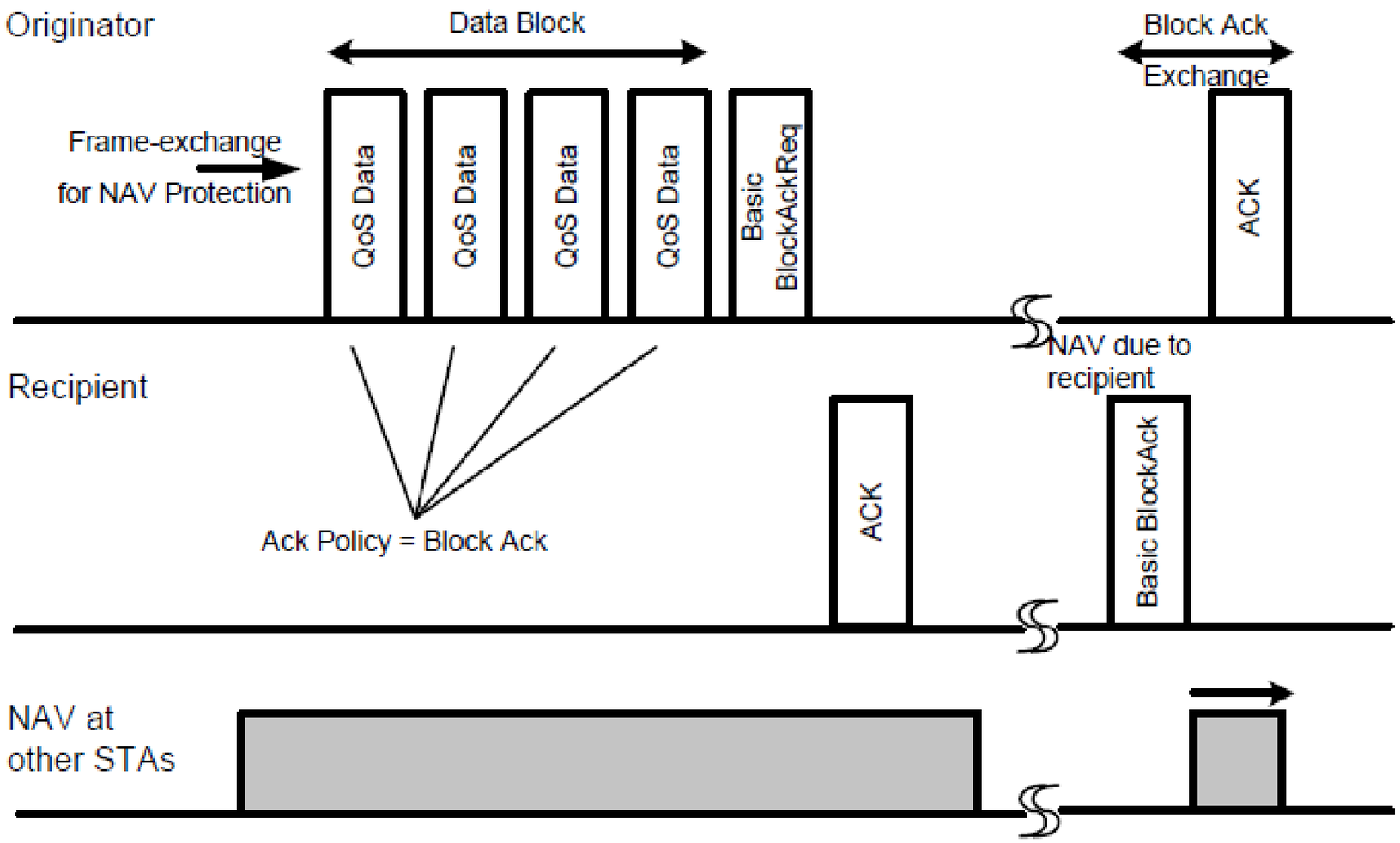


Figure 9-27—A typical BlockAck sequence when delayed policy is used

Block Ack Parameter Set

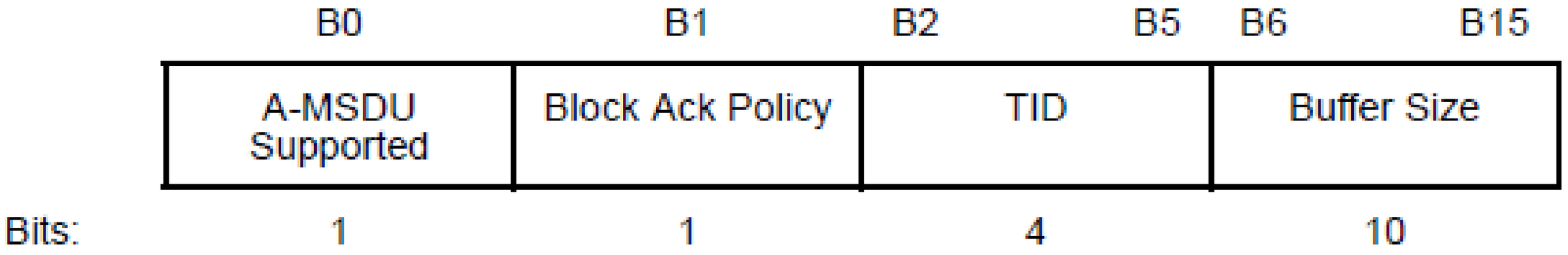
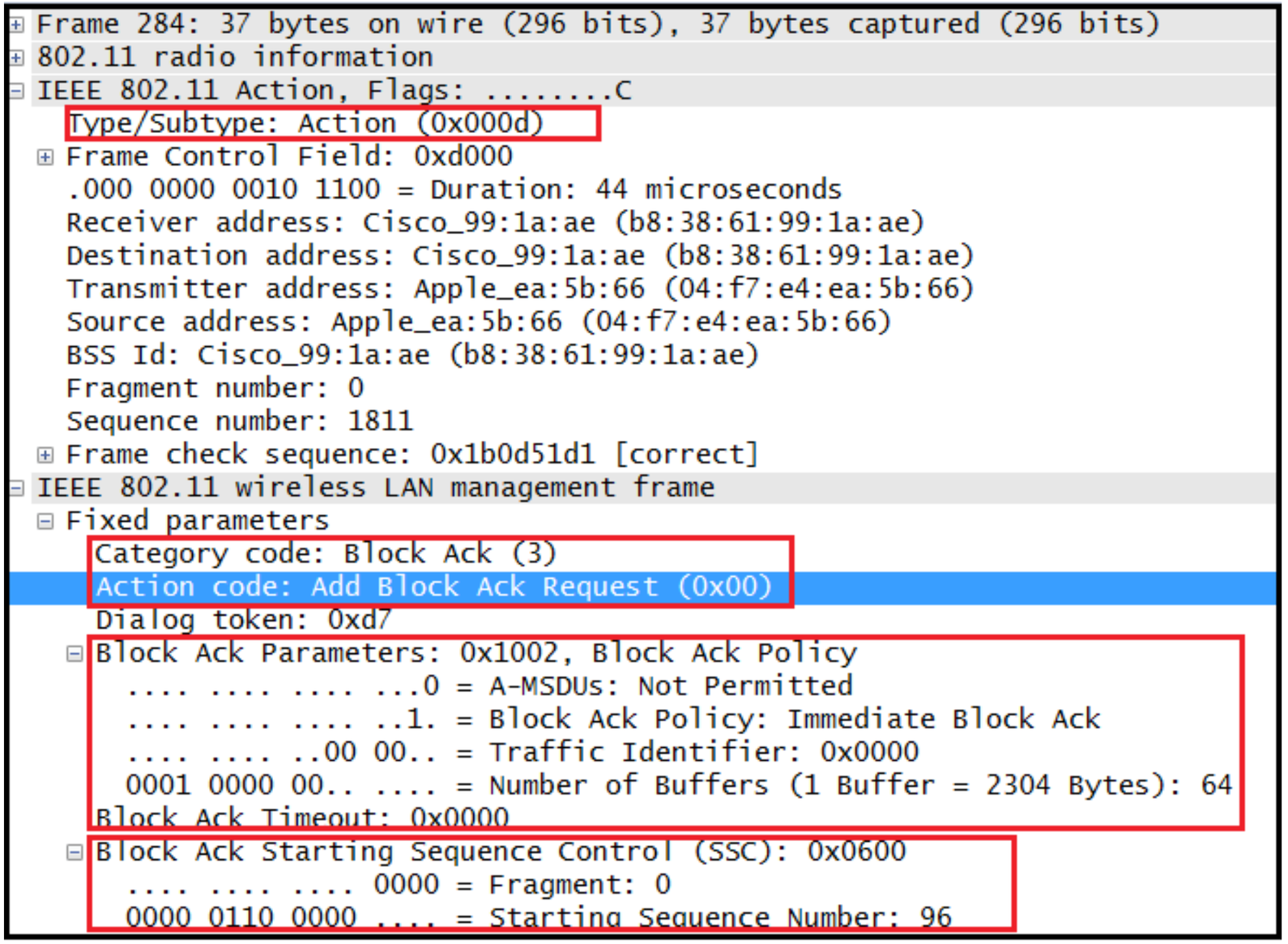
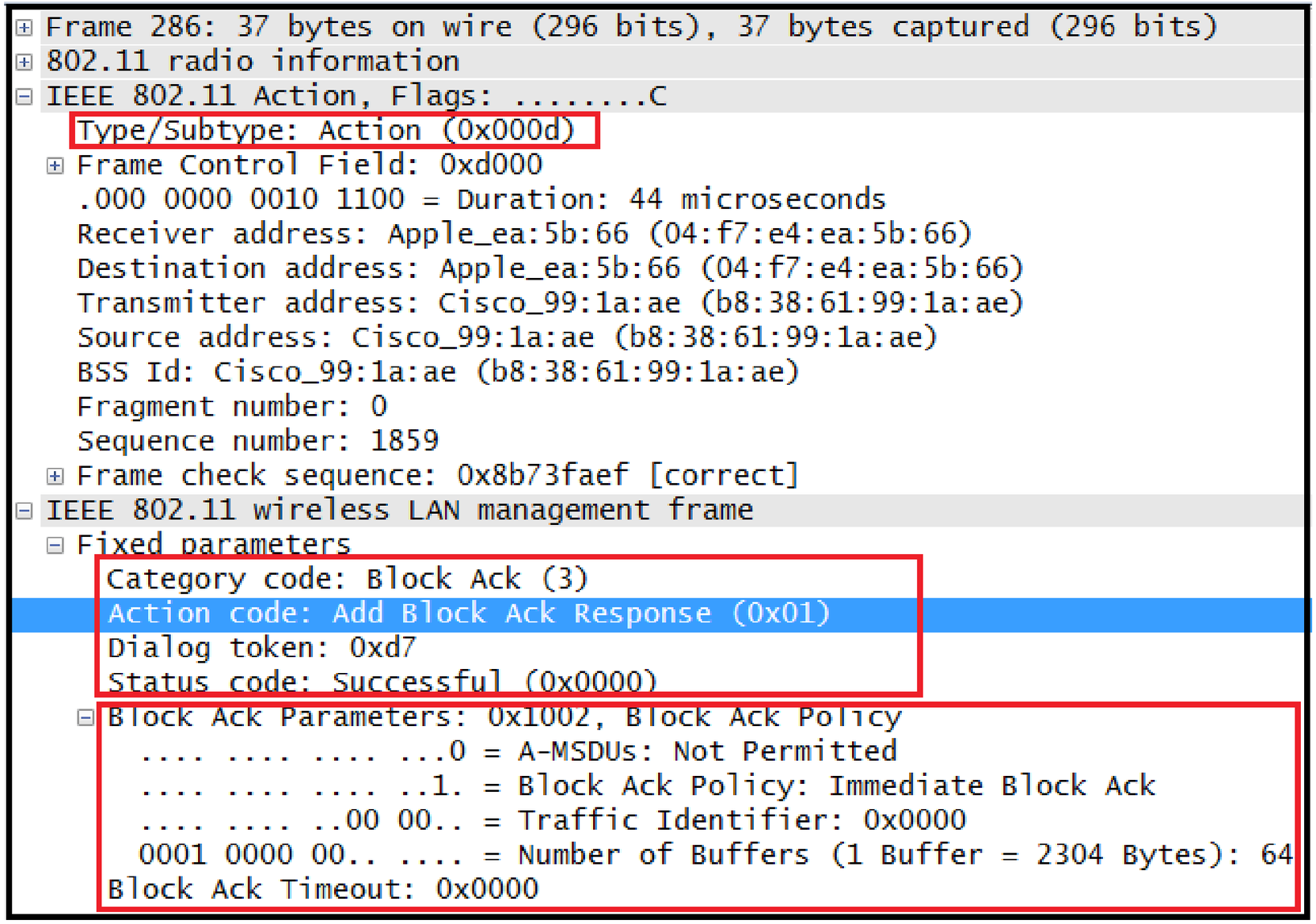


Figure 8-48—Block Ack Parameter Set fixed field

Addba Request



Addba Response



BlockAck Request Frame

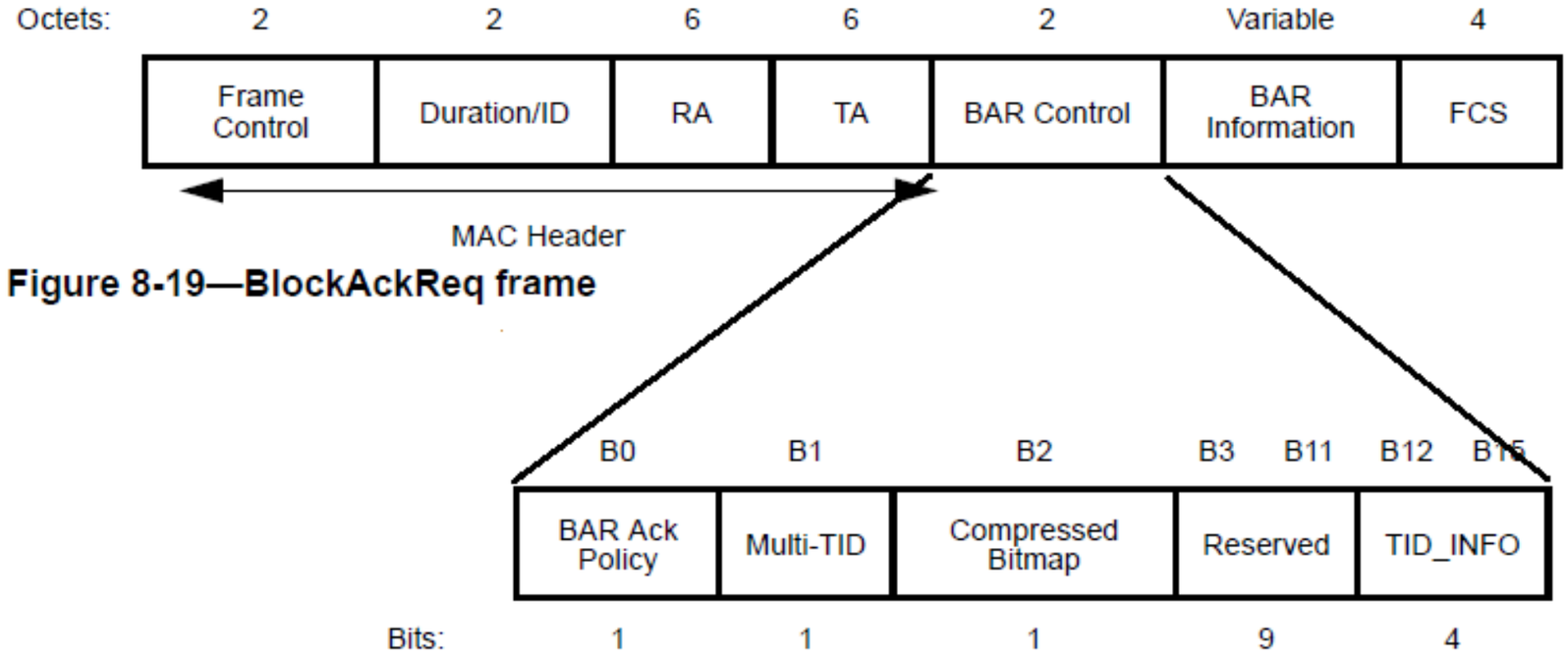
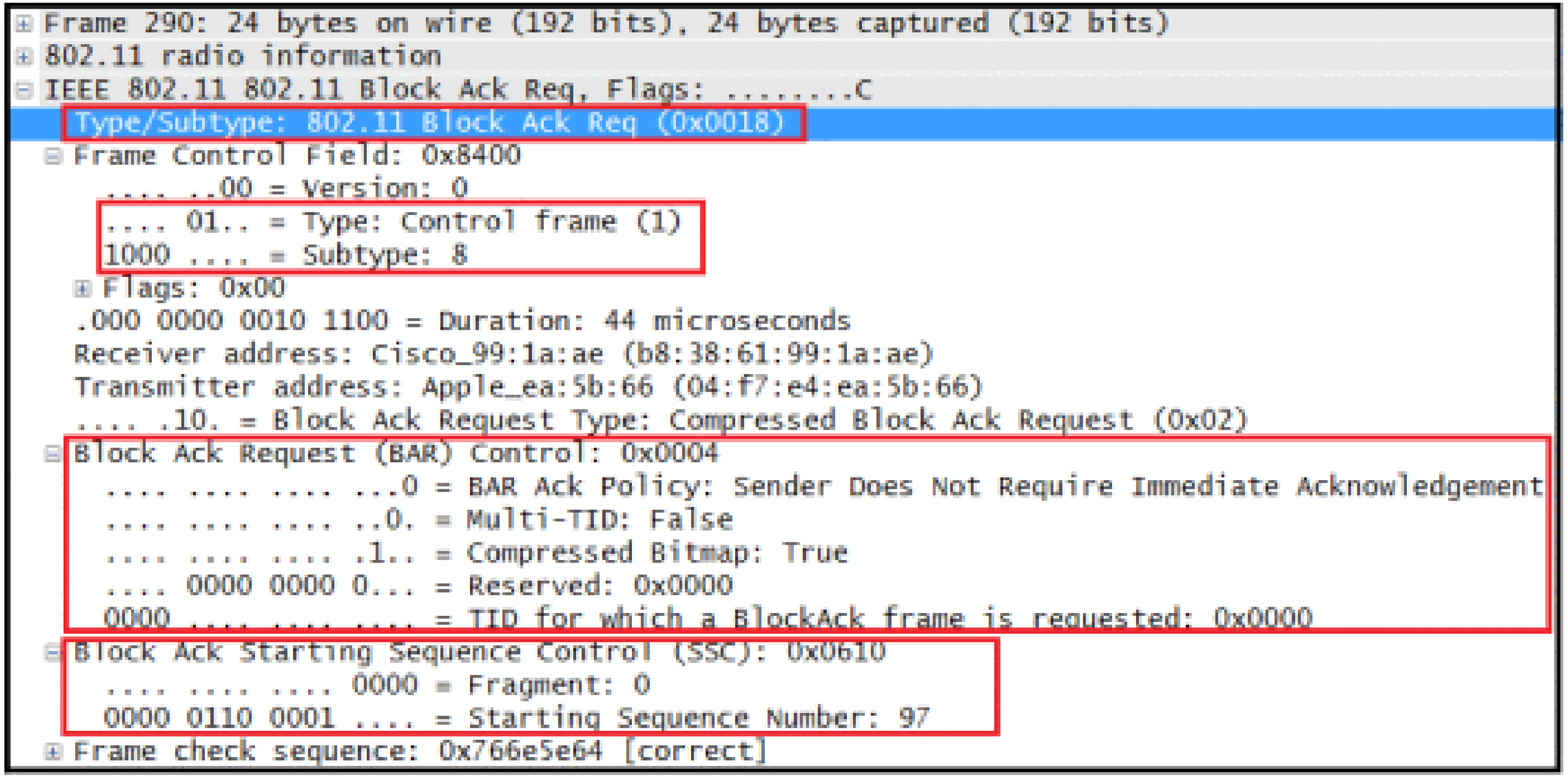


Figure 8-19—BlockAckReq frame

Multi-TID subfield value	Compressed Bitmap subfield value	BlockAckReq frame variant
0	0	Basic BlockAckReq
0	1	Compressed BlockAckReq
1	0	Reserved
1	1	Multi-TID BlockAckReq

BlockAck Request Frame



BlockAck Frame Format

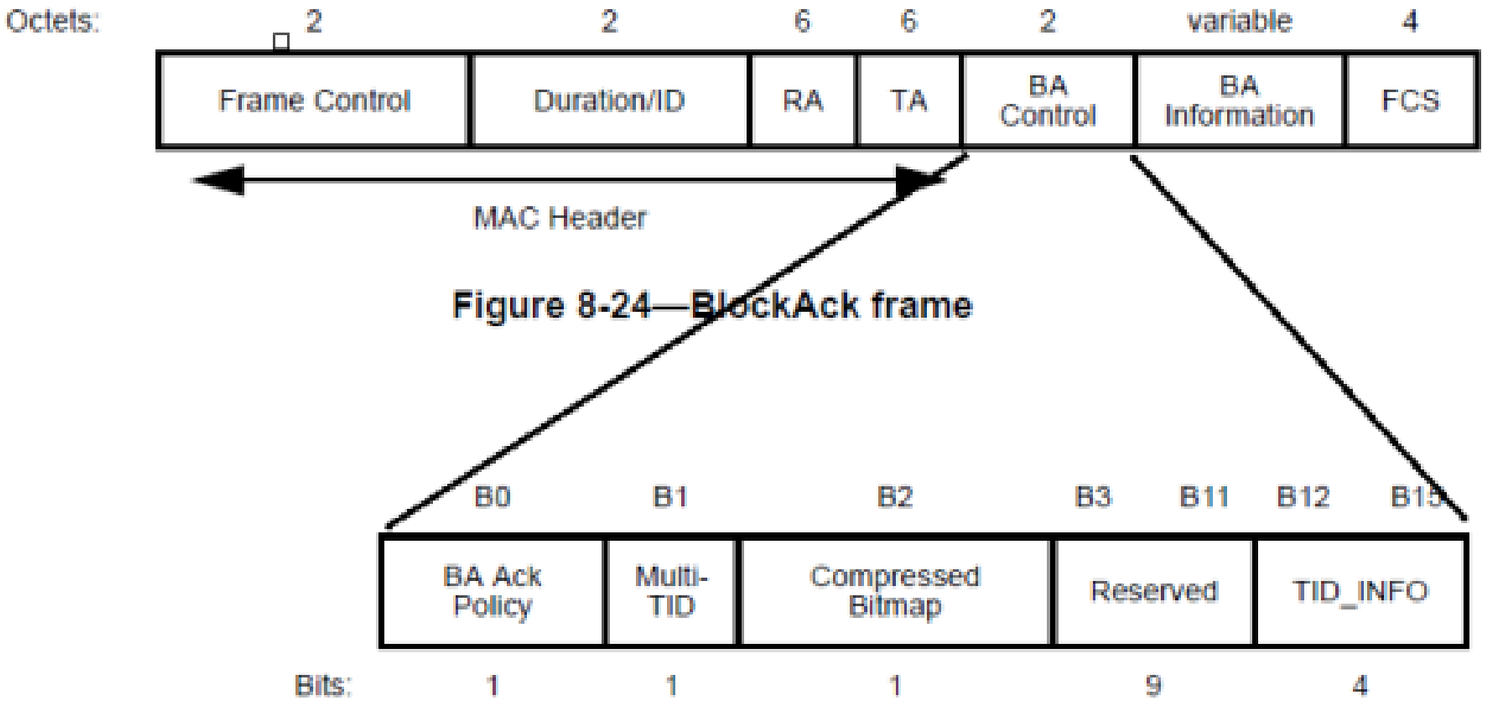
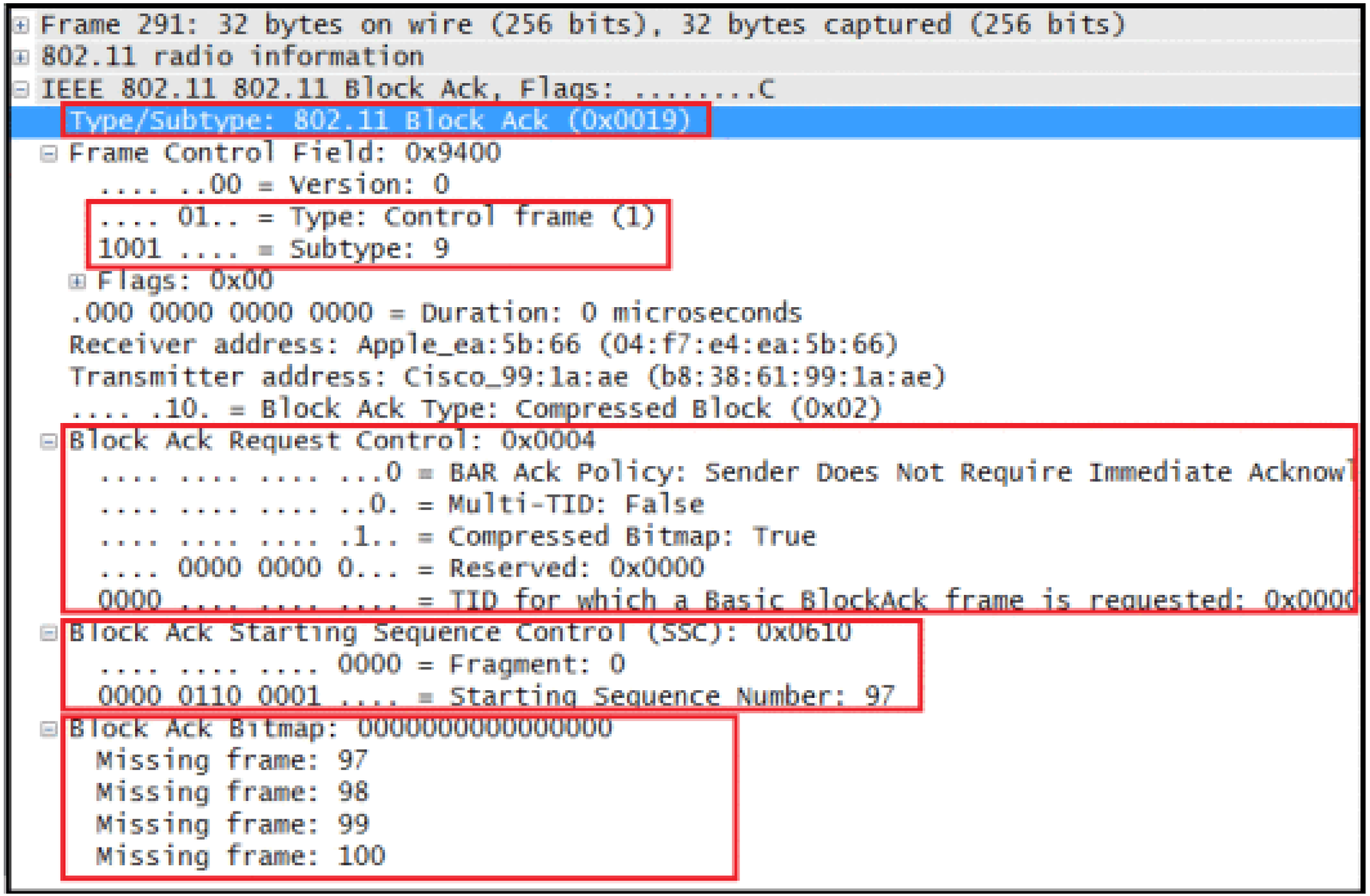


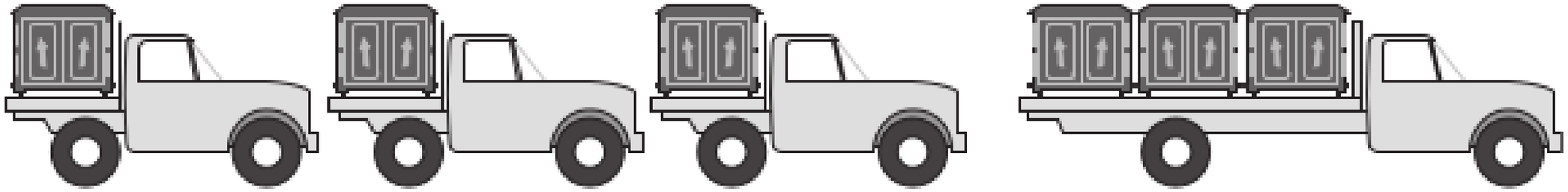
Figure 8-24—BlockAck frame

Multi-TID subfield value	Compressed Bitmap subfield value	BlockAck frame variant
0	0	Basic BlockAck
0	1	Compressed BlockAck
1	0	Reserved
1	1	Multi-TID BlockAck

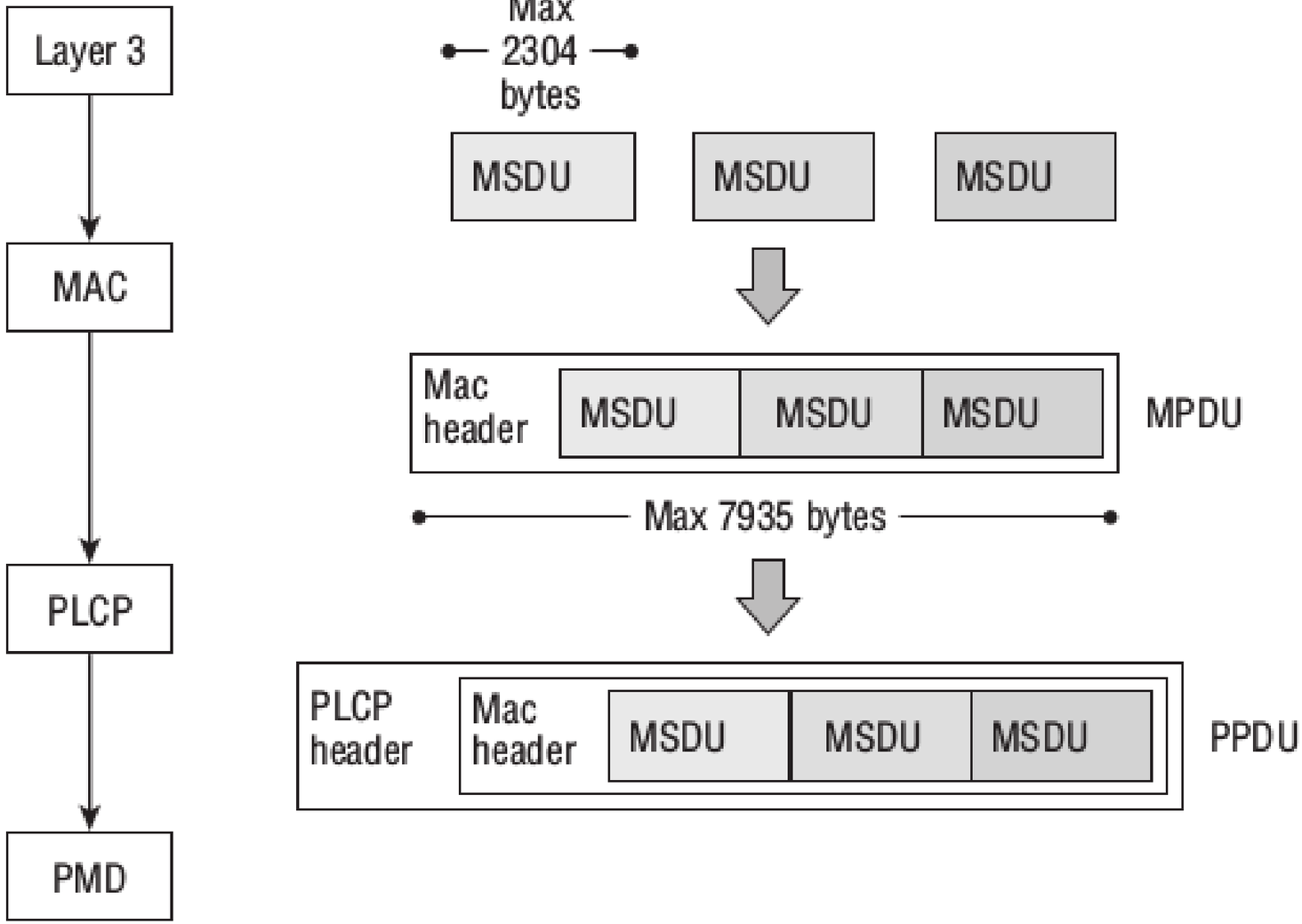
Cont...


Frame 291: 32 bytes on wire (256 bits), 32 bytes captured (256 bits)
802.11 radio information
IEEE 802.11 802.11 Block Ack, Flags: C
Type/Subtype: 802.11 Block Ack (0x0019)
Frame Control Field: 0x9400
.... ..00 = Version: 0
.... 01.. = Type: Control frame (1)
1001 .... = Subtype: 9
Flags: 0x00
.000 0000 0000 0000 = Duration: 0 microseconds
Receiver address: Apple_ea:5b:66 (04:f7:e4:ea:5b:66)
Transmitter address: Cisco_99:1a:ae (b8:38:61:99:1a:ae)
.... .10. = Block Ack Type: Compressed Block (0x02)
Block Ack Request Control: 0x0004
....0 = BAR Ack Policy: Sender Does Not Require Immediate Acknow
....0. = Multi-TID: False
.... .1.. = Compressed Bitmap: True
.... 0000 0000 0... = Reserved: 0x0000
0000 .... = TID for which a Basic BlockAck frame is requested: 0x0000
Block Ack Starting Sequence Control (SSC): 0x0610
.... 0000 = Fragment: 0
0000 0110 0001 .... = Starting Sequence Number: 97
Block Ack Bitmap: 0000000000000000
Missing frame: 97
Missing frame: 98
Missing frame: 99
Missing frame: 100

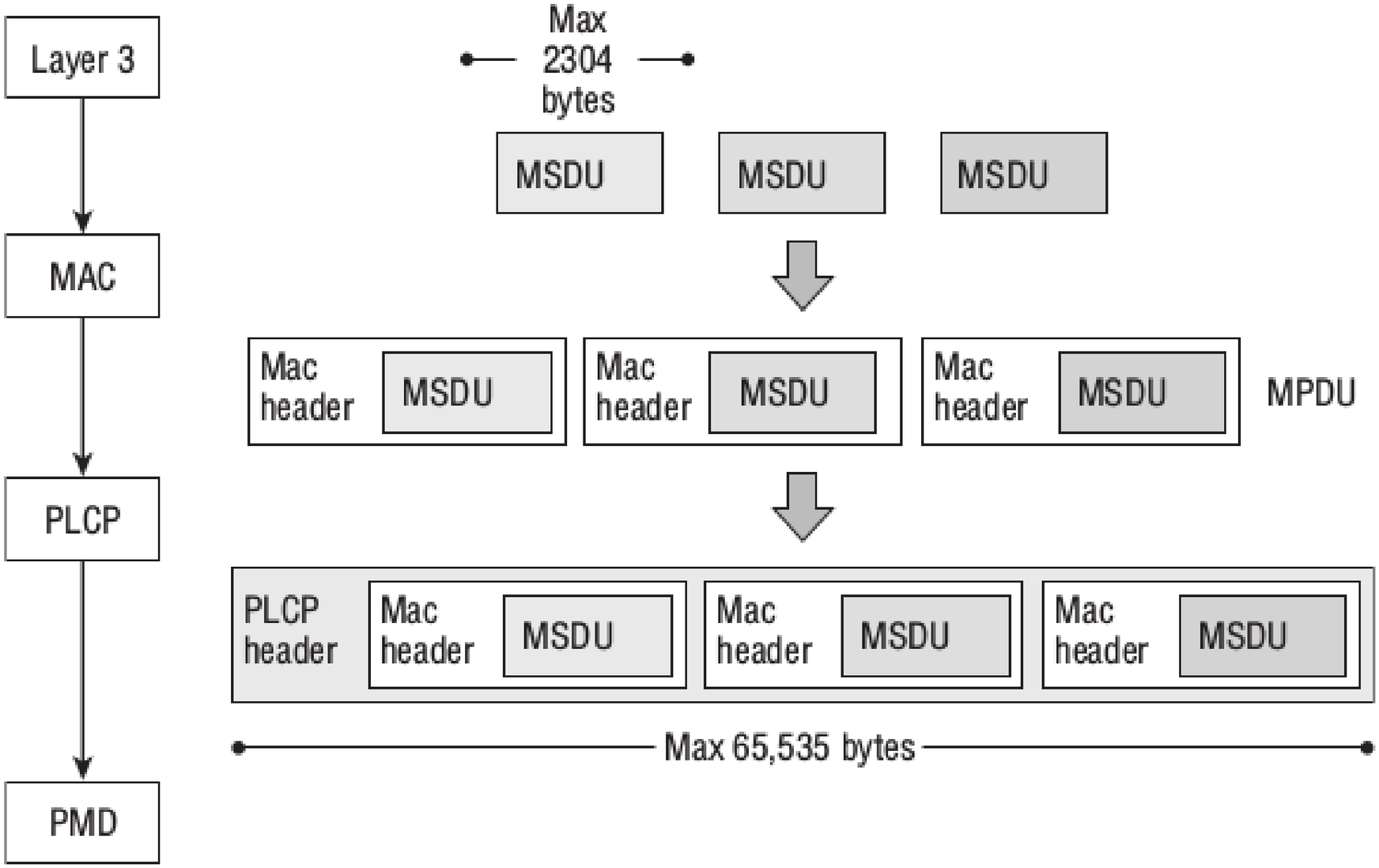
Aggregation



A-MSDU Aggregation



A-MPDU Aggregation



Thank You!

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