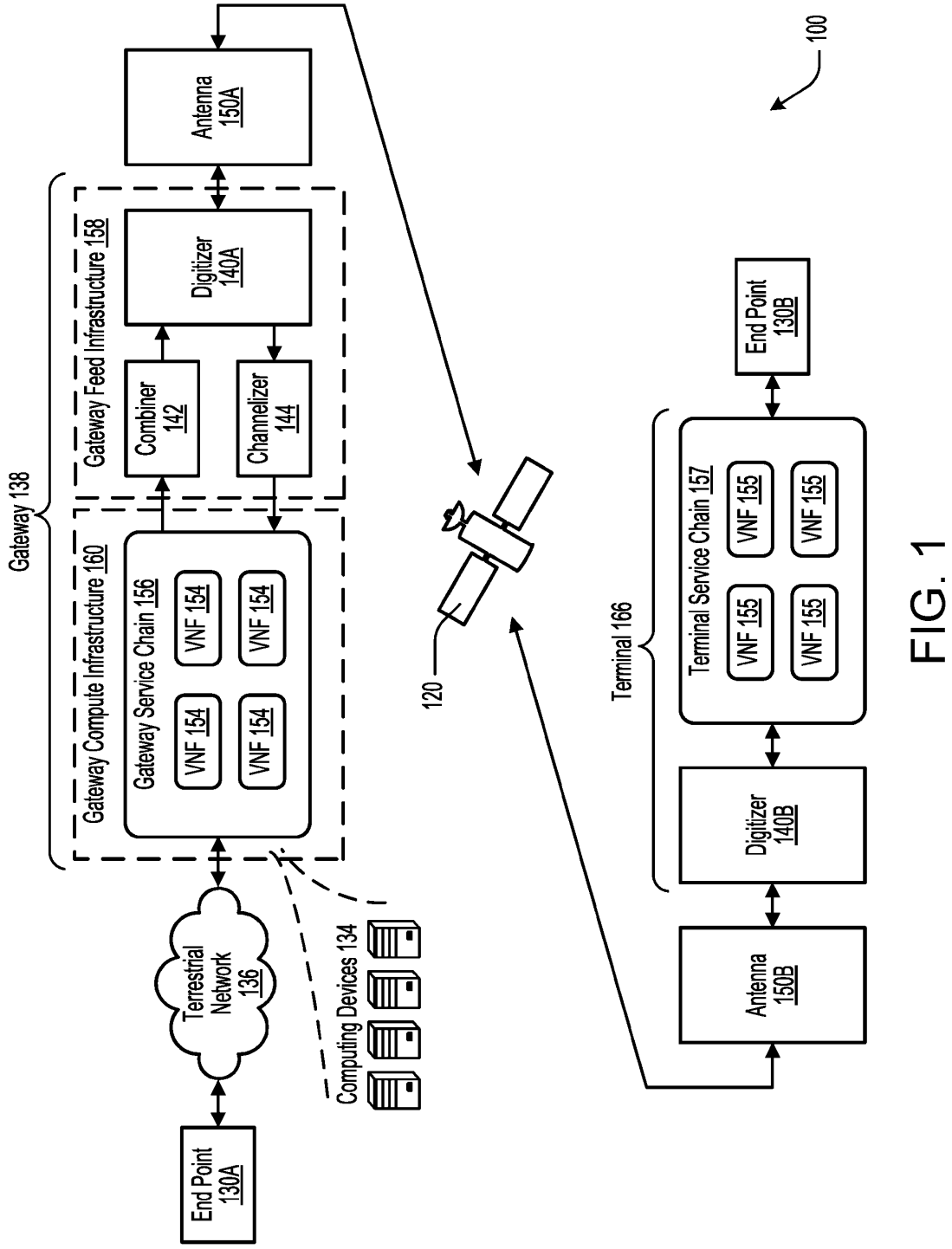

100
Gateway 138
Gateway Compute Infrastructure 160
Gateway Feed Infrastructure 158
Antenna 150A
Digitizer 140A
Combiner 142
Channelizer 144
Gateway Service Chain 156
VNF 154
VNF 154
VNF 154
VNF 154
Terrestrial Network 136
End Point 130A
Computing Devices 134
120
Terminal 166
Terminal Service Chain 157
VNF 155
VNF 155
VNF 155
VNF 155
End Point 130B
Digitizer 140B
Antenna 150B

FIG. 1

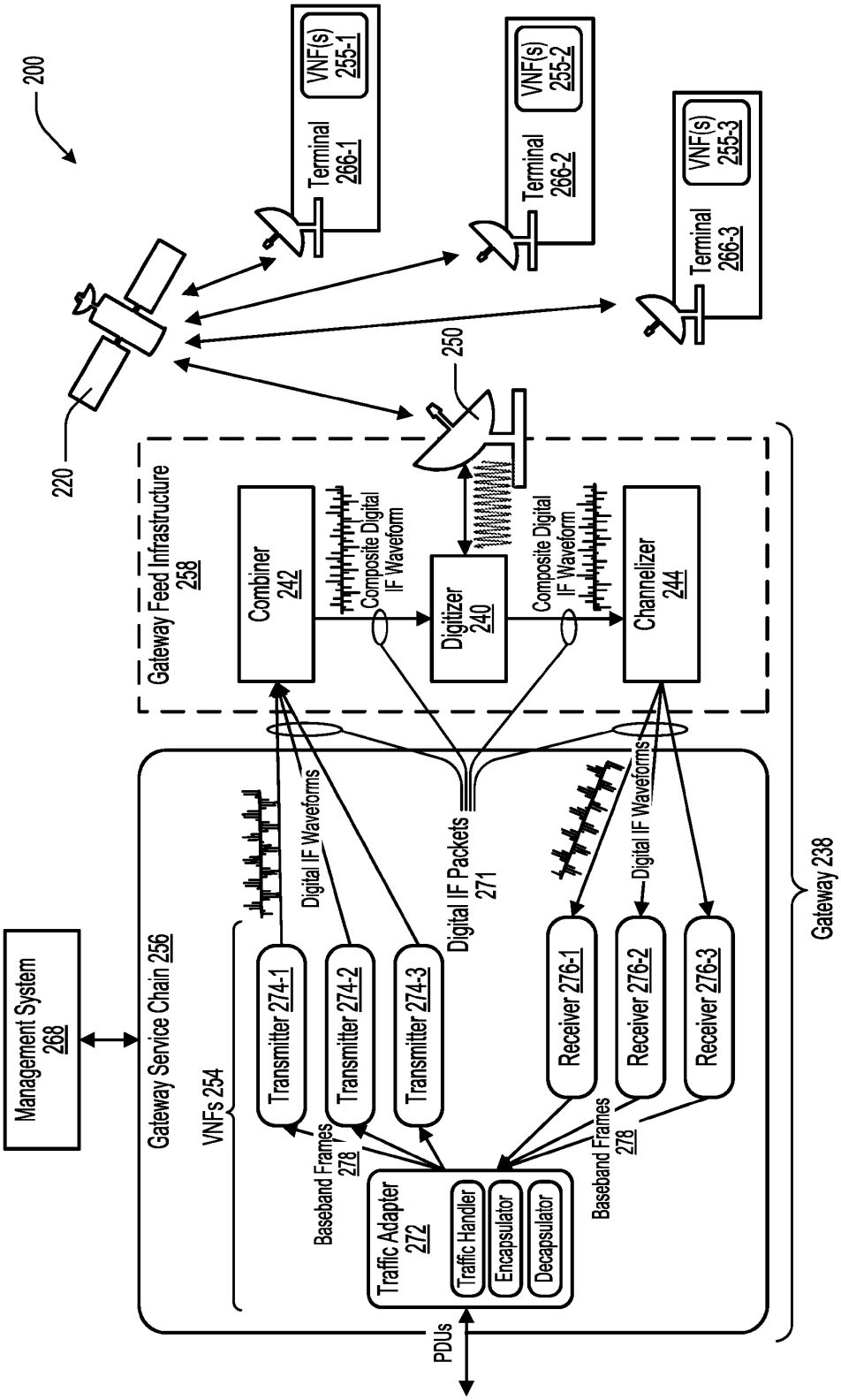

200
Terminal 266-1
VNF(s) 255-1
Terminal 266-2
VNF(s) 255-2
Terminal 266-3
VNF(s) 255-3
220
250
Gateway Feed Infrastructure 258
Combiner 242
Composite Digital IF Waveform
Digitizer 240
Composite Digital IF Waveform
Channelizer 244
Digital IF Packets 271
Digital IF Waveforms
Digital IF Waveforms
Management System 268
Gateway Service Chain 256
VNFs 254
Transmitter 274-1
Transmitter 274-2
Transmitter 274-3
Receiver 276-1
Receiver 276-2
Receiver 276-3
Baseband Frames 278
Baseband Frames 278
Traffic Adapter 272
Traffic Handler
Encapsulator
Decapsulator
PDUs
Gateway 238

FIG. 2

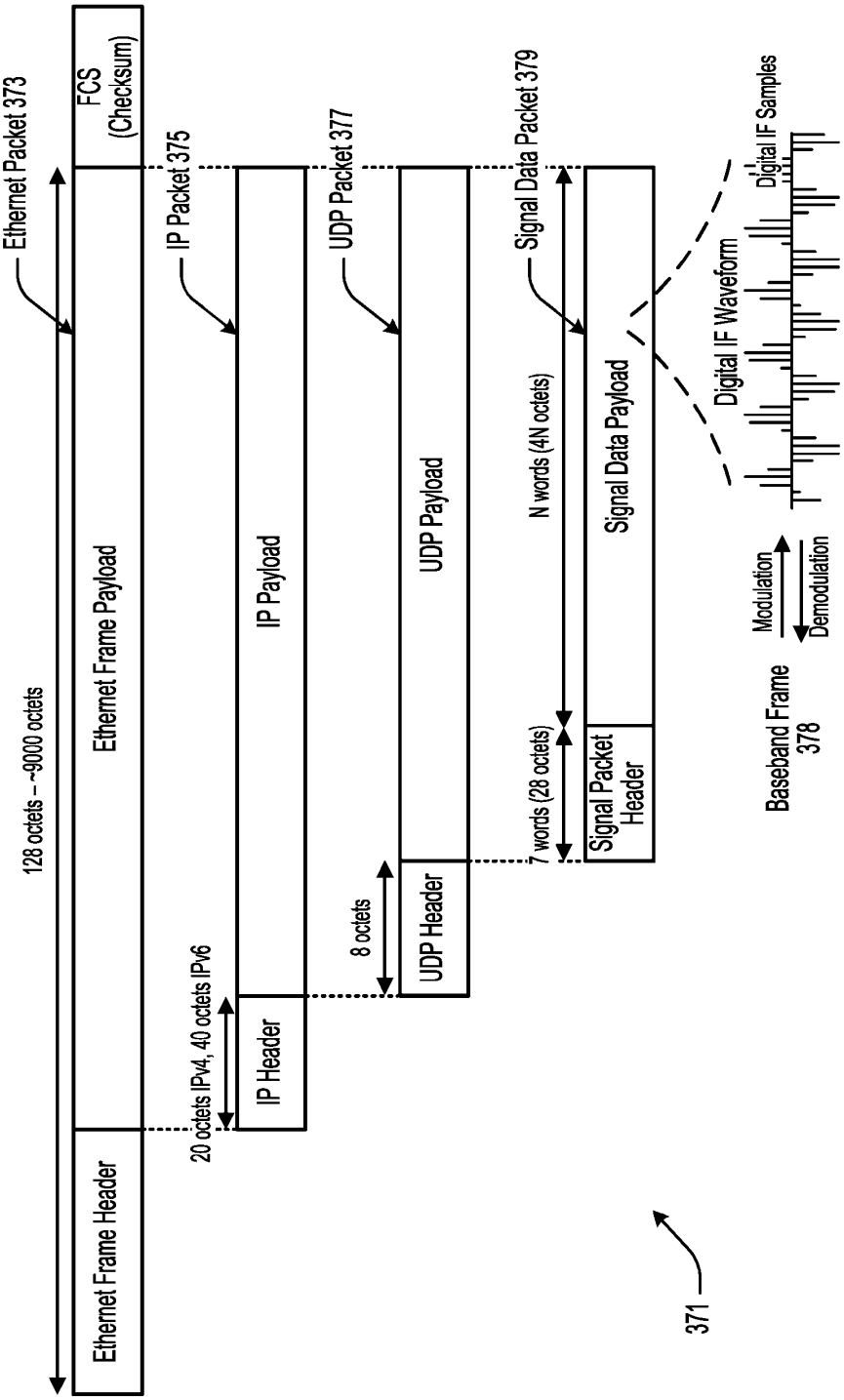

Ethernet Packet 373
FCS (Checksum)
IP Packet 375
UDP Packet 377
Signal Data Packet 379
Digital IF Samples
Digital IF Waveform
Ethernet Frame Payload
IP Payload
UDP Payload
N words (4N octets)
Signal Data Payload
128 octets – ~9000 octets
Modulation
Demodulation
Baseband Frame 378
Ethernet Frame Header
20 octets IPv4, 40 octets IPv6
IP Header
8 octets
UDP Header
7 words (28 octets)
Signal Packet Header
371

FIG. 3

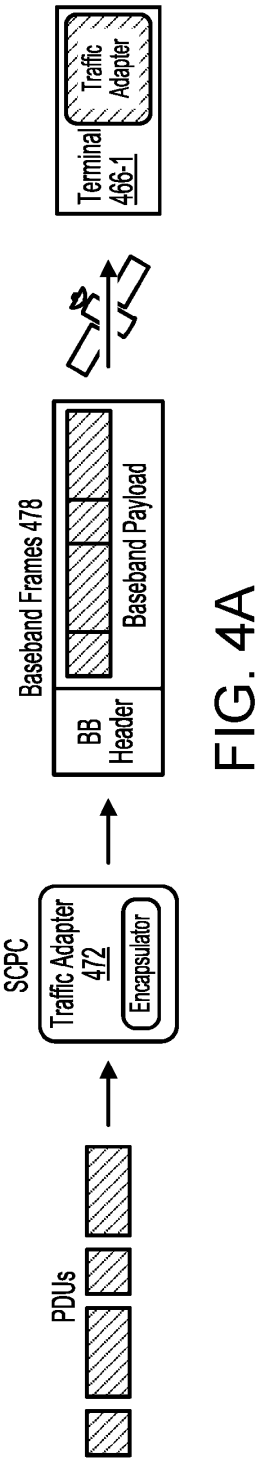


FIG. 4A

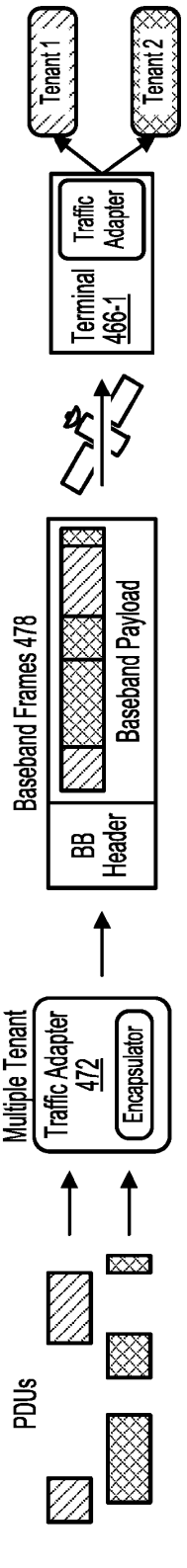


FIG. 4B

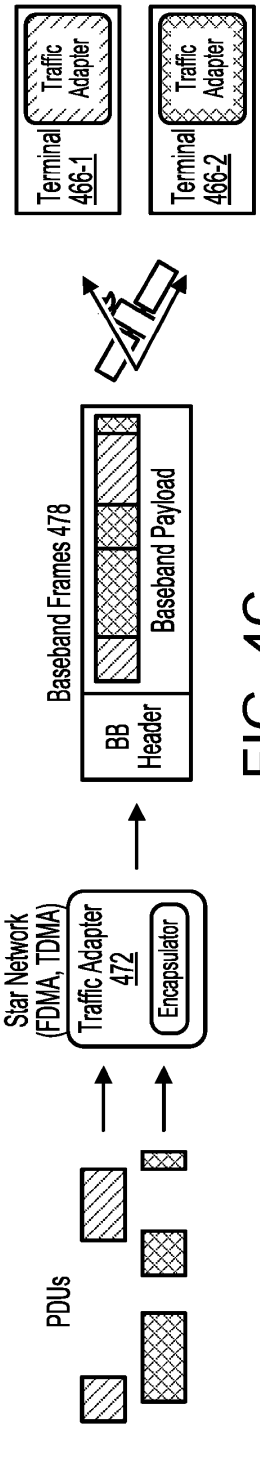


FIG. 4C

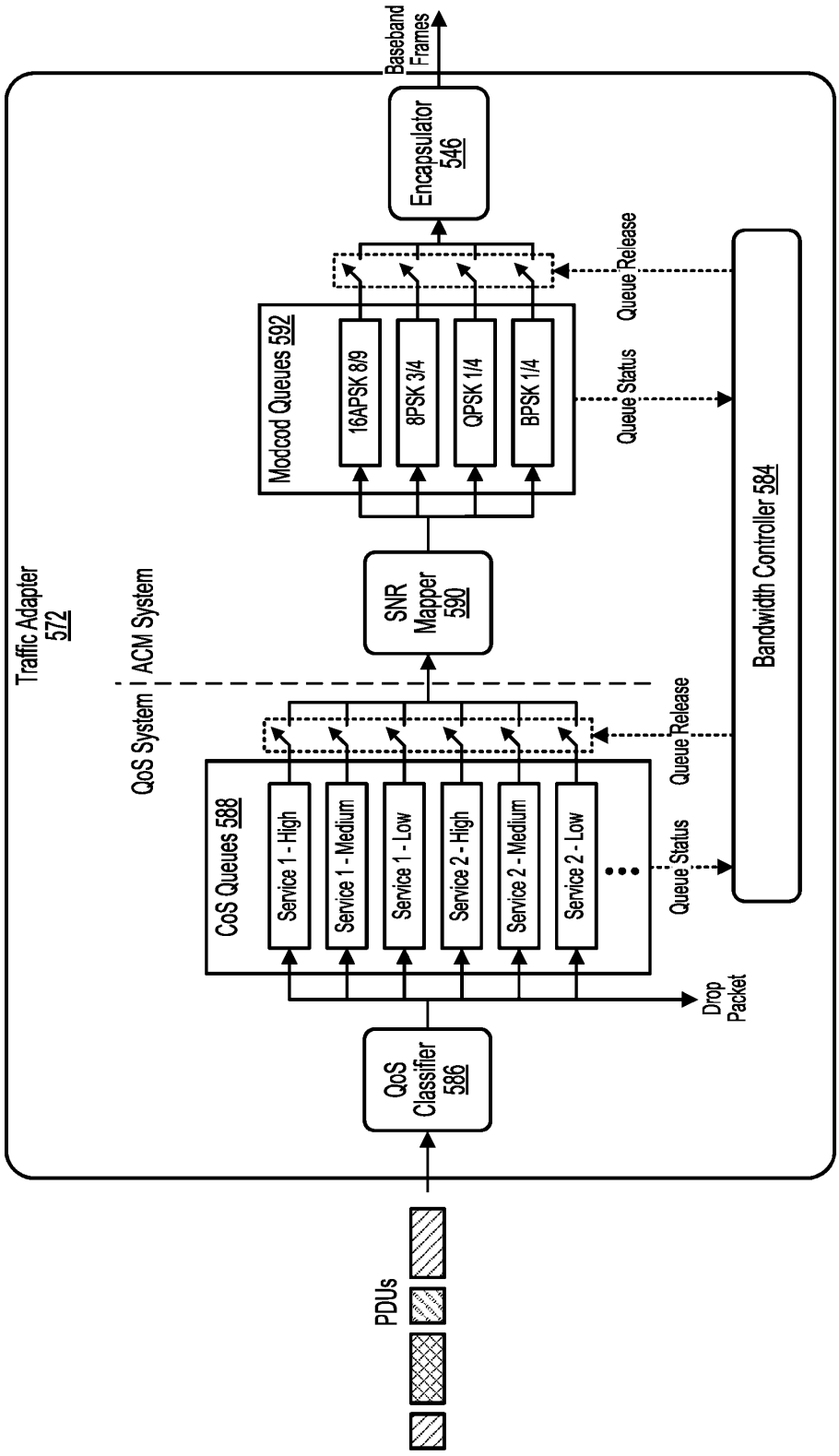

Traffic Adapter 572
QoS System
ACM System
PDUs
QoS Classifier 586
CoS Queues 588
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
Drop Packet
Queue Status
Queue Release
SNR Mapper 590
Modcod Queues 592
16APSK 8/9
8PSK 3/4
QPSK 1/4
BPSK 1/4
Queue Status
Queue Release
Bandwidth Controller 584
Encapsulator 546
Baseband Frames

FIG. 5

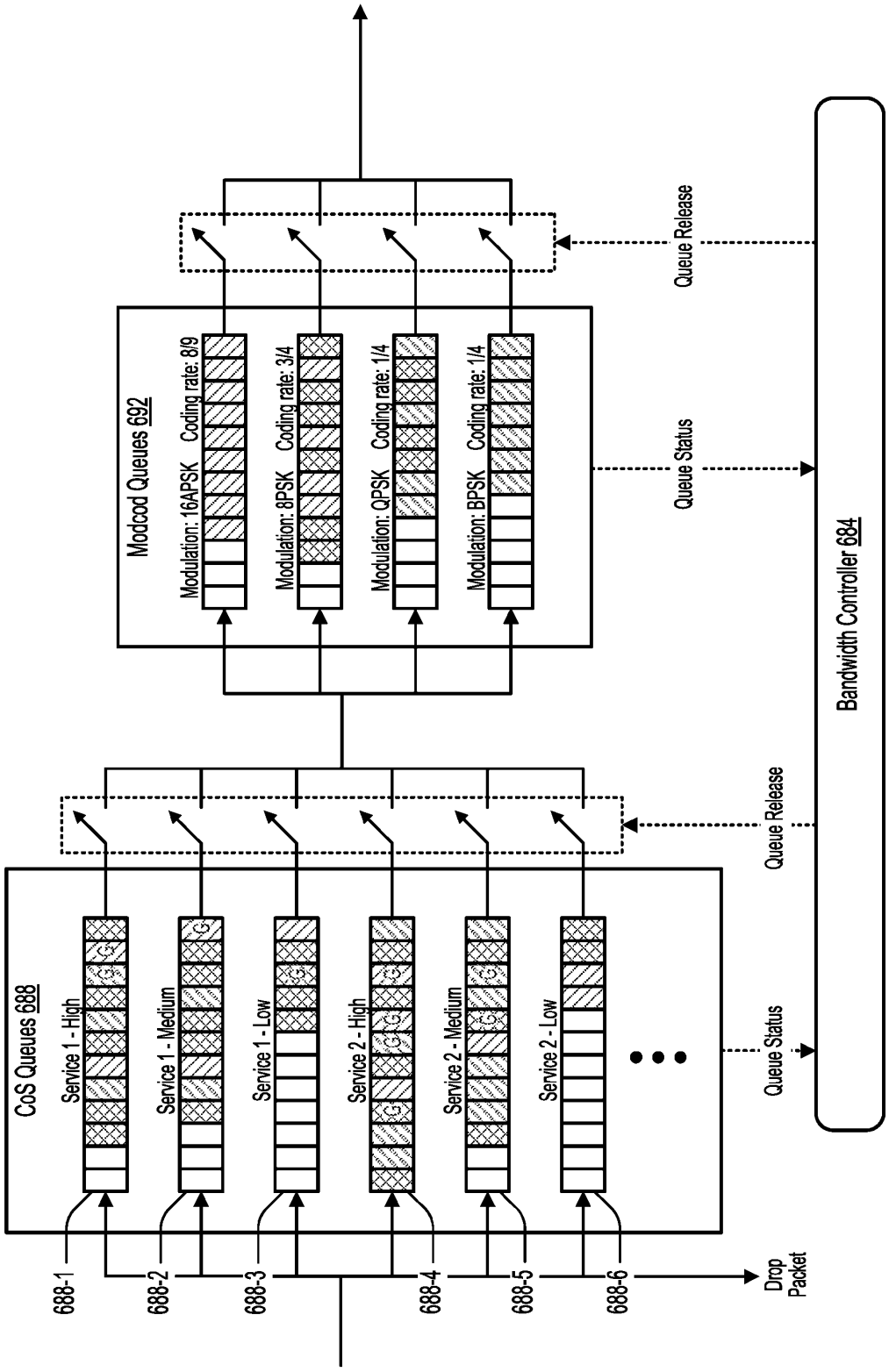

Bandwidth Controller 684
Queue Release
Queue Status
Modcod Queues 692
Modulation: 16APSK Coding rate: 8/9
Modulation: 8PSK Coding rate: 3/4
Modulation: QPSK Coding rate: 1/4
Modulation: BPSK Coding rate: 1/4
Queue Release
Queue Status
CoS Queues 688
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
688-1
688-2
688-3
688-4
688-5
688-6
Drop Packet

FIG. 6A

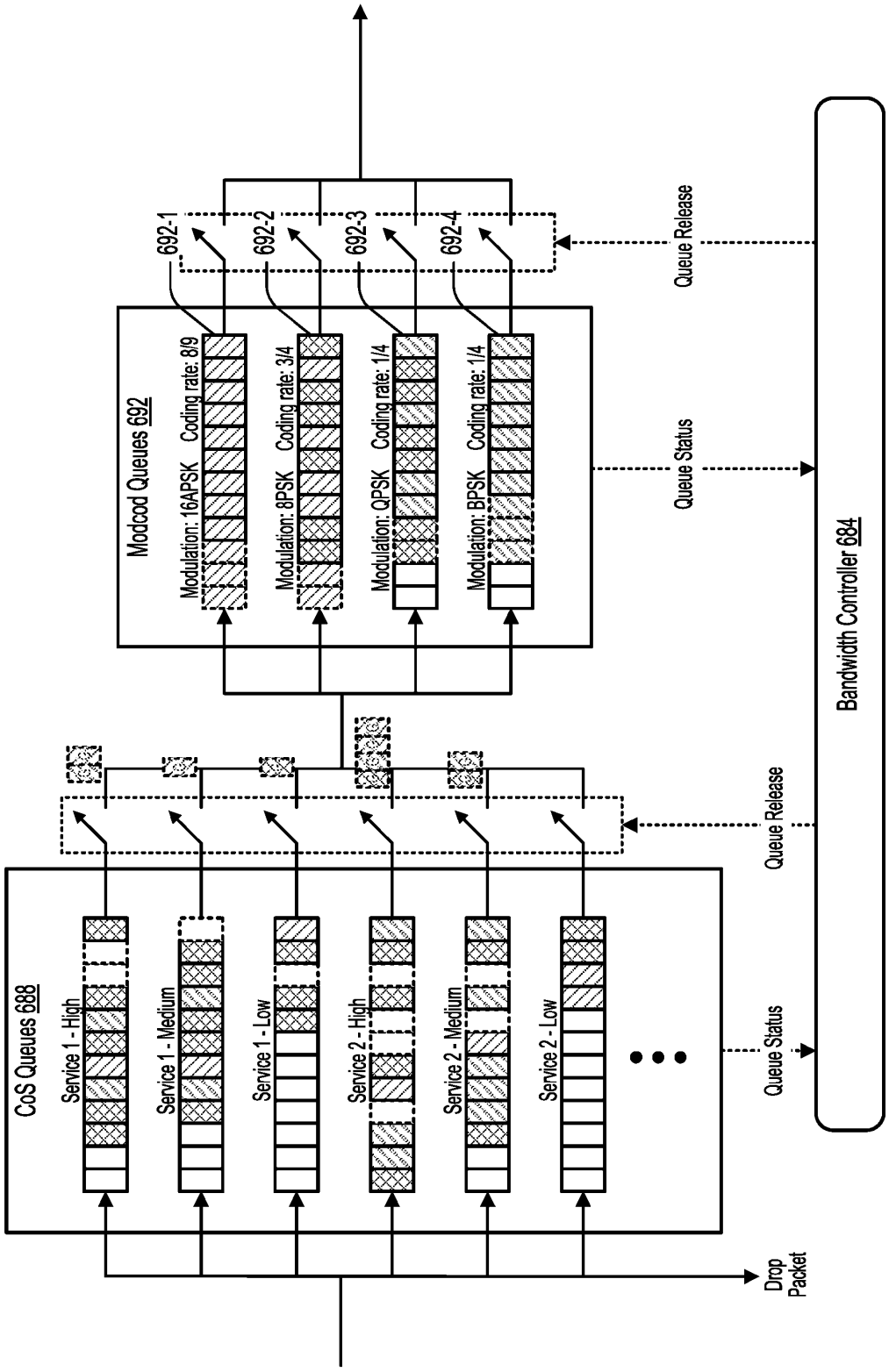

CoS Queues 688
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
Drop Packet
Queue Status
Queue Release
Modcod Queues 692
Modulation: 16APSK Coding rate: 8/9
Modulation: 8PSK Coding rate: 3/4
Modulation: QPSK Coding rate: 1/4
Modulation: BPSK Coding rate: 1/4
692-1
692-2
692-3
692-4
Queue Status
Queue Release
Bandwidth Controller 684

FIG. 6B

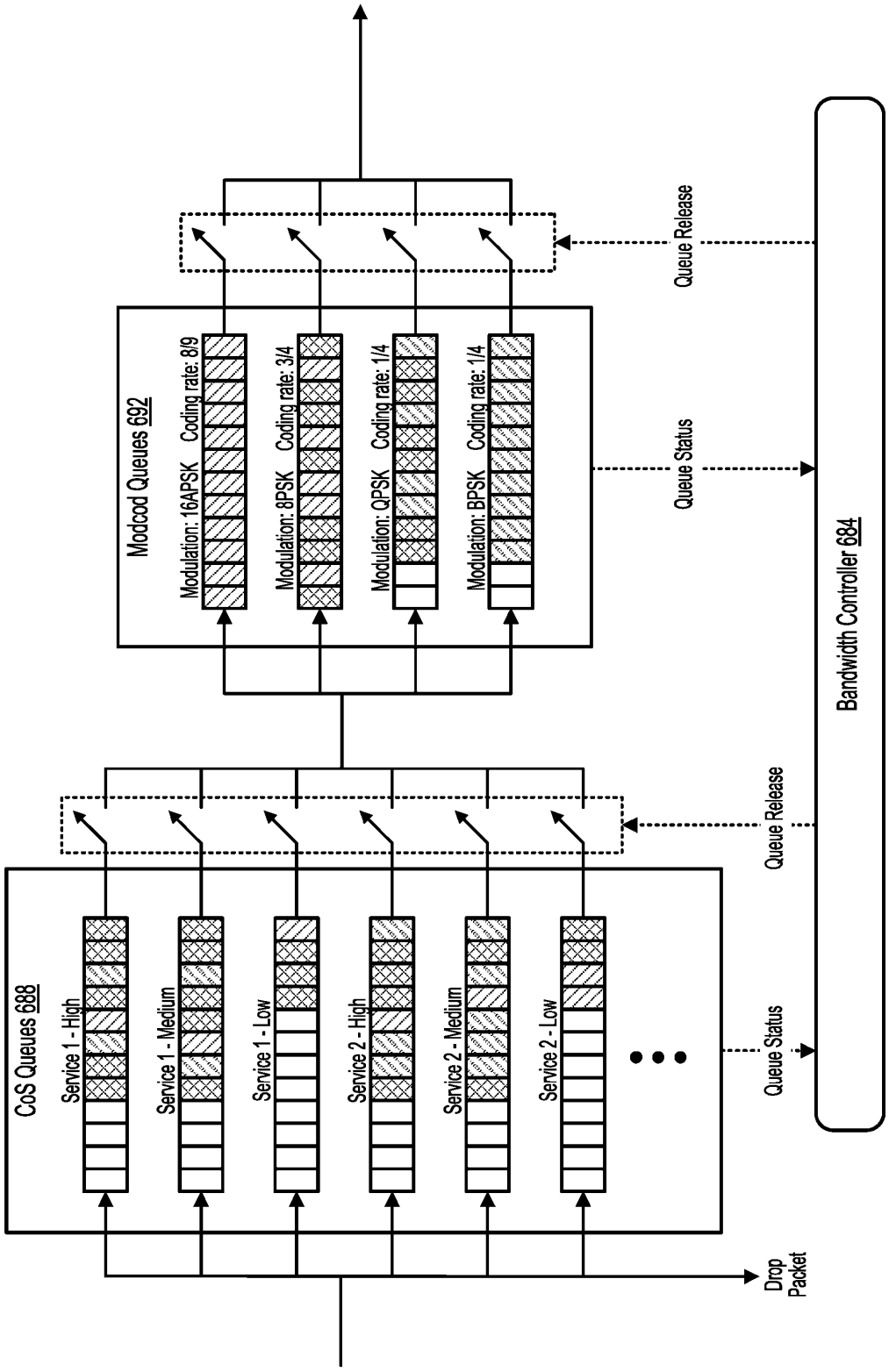

CoS Queues 688
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
Modcod Queues 692
Modulation: 16APSK Coding rate: 8/9
Modulation: 8PSK Coding rate: 3/4
Modulation: QPSK Coding rate: 1/4
Modulation: BPSK Coding rate: 1/4
Queue Release
Queue Status
Queue Release
Queue Status
Bandwidth Controller 684
Drop Packet

FIG. 6C

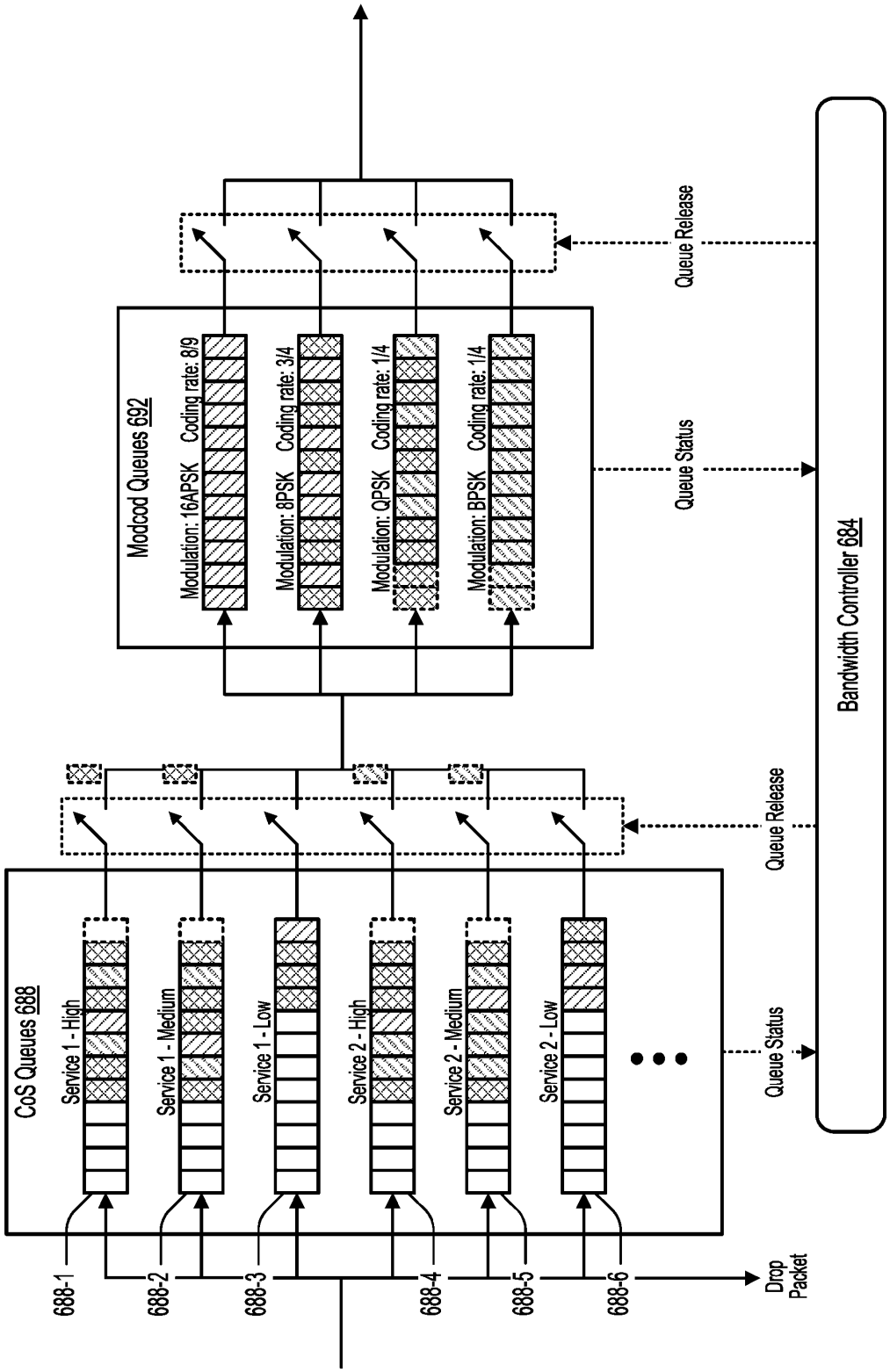

Modcod Queues 692
Modulation: 16APSK Coding rate: 8/9
Modulation: 8PSK Coding rate: 3/4
Modulation: QPSK Coding rate: 1/4
Modulation: BPSK Coding rate: 1/4
CoS Queues 688
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
Queue Release
Queue Status
Queue Release
Queue Status
Bandwidth Controller 684
688-1
688-2
688-3
688-4
688-5
688-6
Drop Packet

FIG. 6D

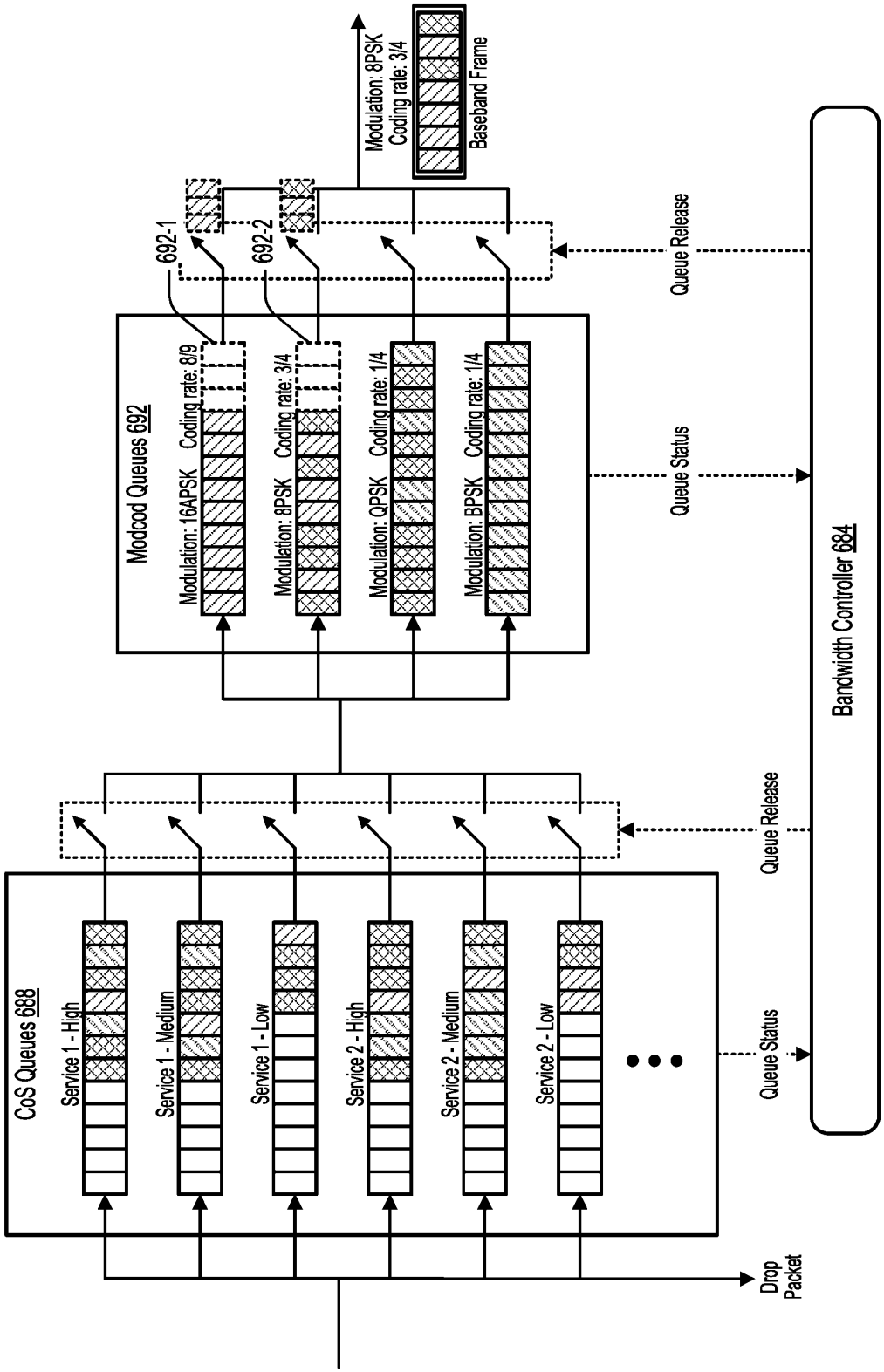

CoS Queues 688
Service 1 - High
Service 1 - Medium
Service 1 - Low
Service 2 - High
Service 2 - Medium
Service 2 - Low
Drop Packet
Queue Release
Queue Status
Modcod Queues 692
Modulation: 16APSK Coding rate: 8/9
Modulation: 8PSK Coding rate: 3/4
Modulation: QPSK Coding rate: 1/4
Modulation: BPSK Coding rate: 1/4
692-1
692-2
Modulation: 8PSK
Coding rate: 3/4
Baseband Frame
Queue Release
Queue Status
Bandwidth Controller 684

FIG. 6E

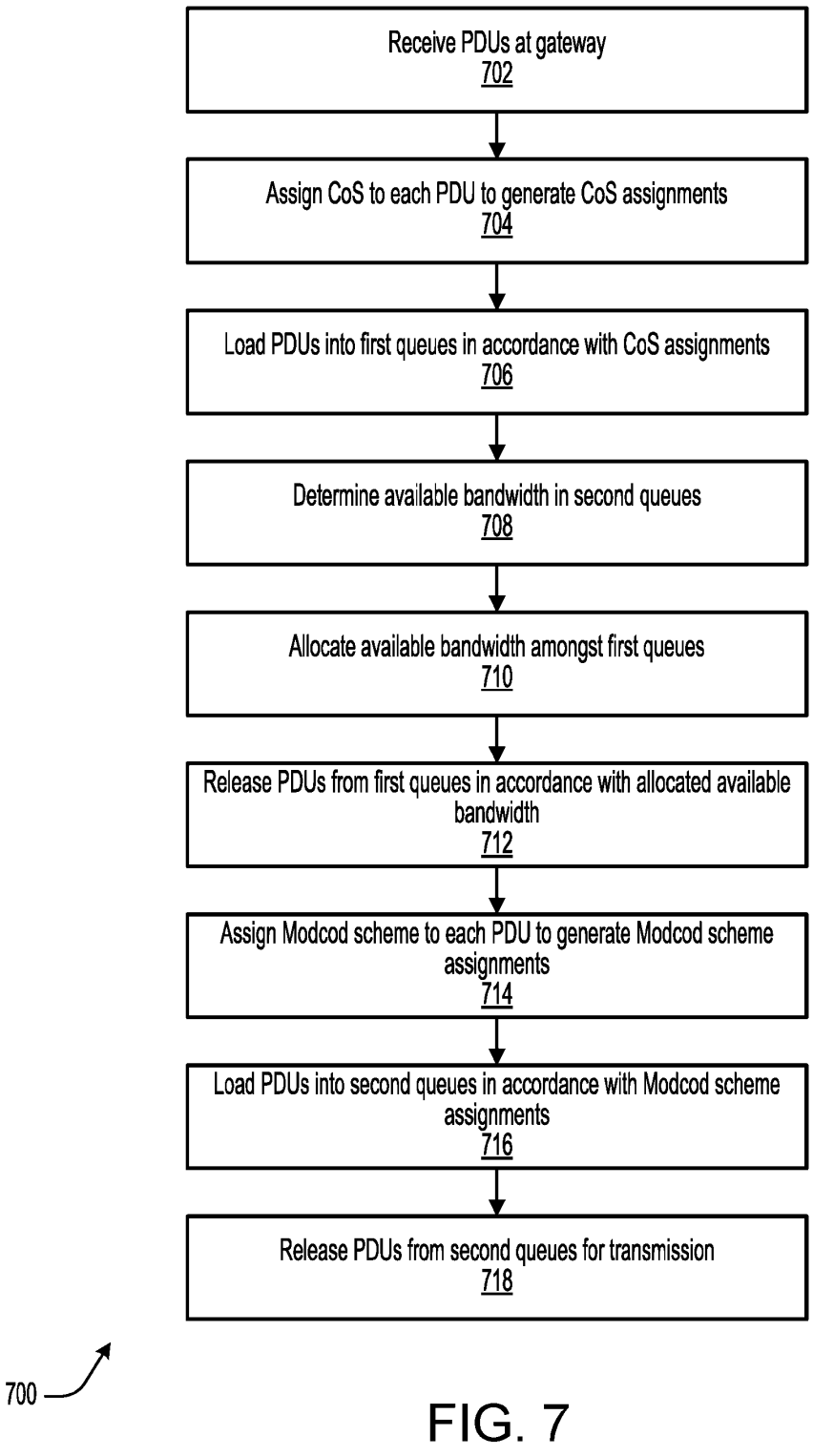

Receive PDUs at gateway
702
Assign CoS to each PDU to generate CoS assignments
704
Load PDUs into first queues in accordance with CoS assignments
706
Determine available bandwidth in second queues
708
Allocate available bandwidth amongst first queues
710
Release PDUs from first queues in accordance with allocated available bandwidth
712
Assign Modcod scheme to each PDU to generate Modcod scheme assignments
714
Load PDUs into second queues in accordance with Modcod scheme assignments
716
Release PDUs from second queues for transmission
718
700

FIG. 7

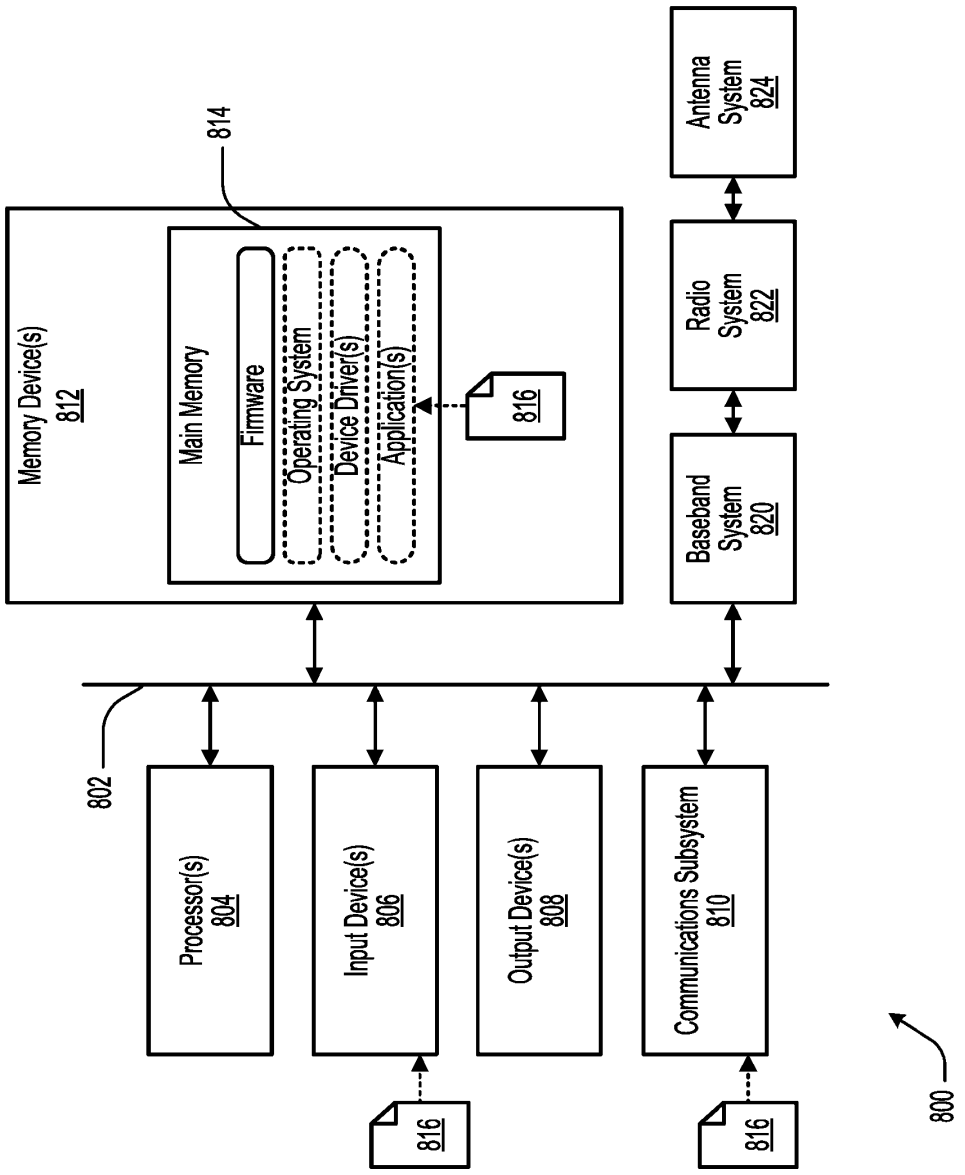

Memory Device(s)
812
814
Main Memory
Firmware
Operating System
Device Driver(s)
Application(s)
816
Antenna System
824
Radio System
822
Baseband System
820
802
Processor(s)
804
Input Device(s)
806
Output Device(s)
808
Communications Subsystem
810
816
816
800

FIG. 8