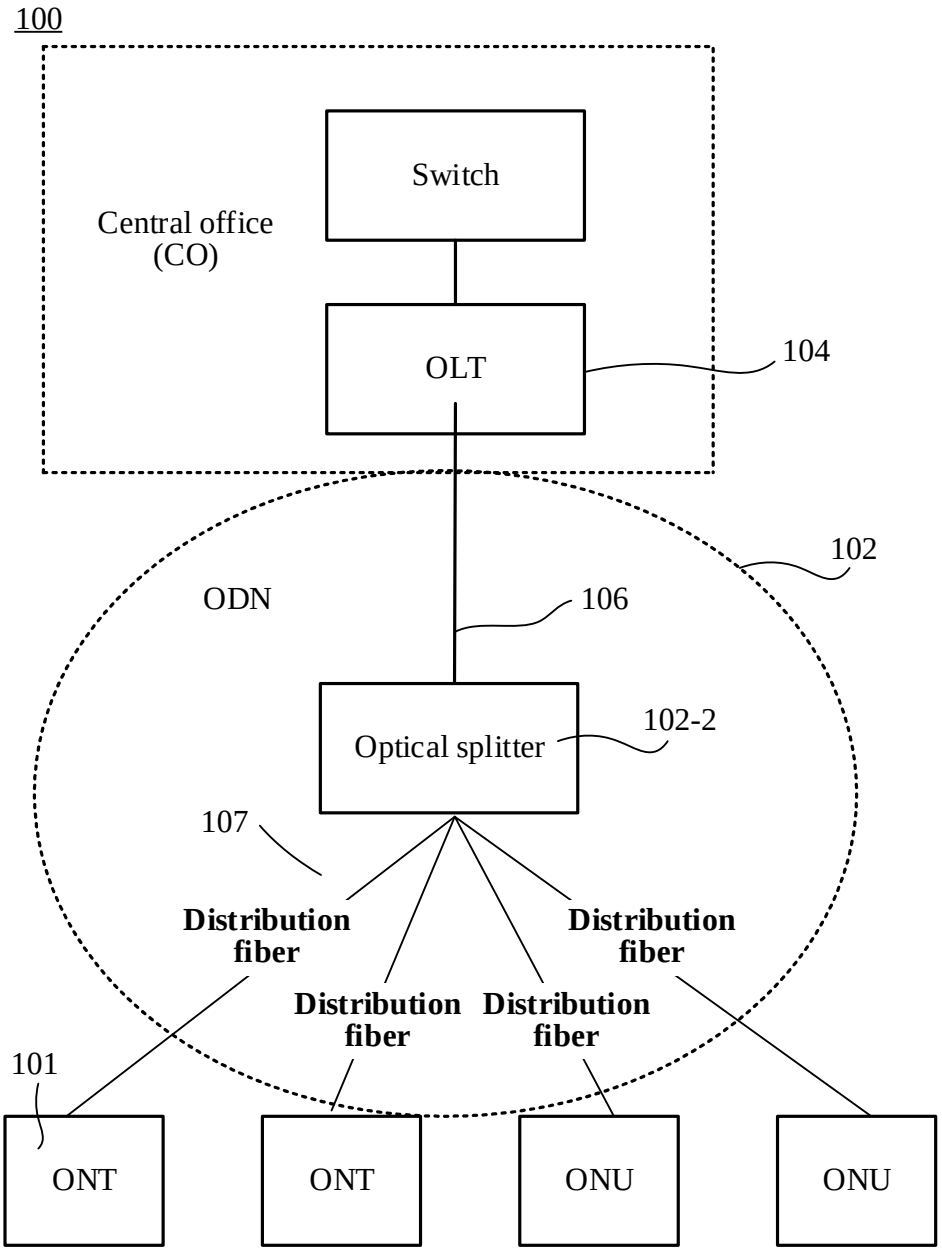

100
Central office
(CO)
Switch
OLT
104
102
ODN
106
Optical splitter
102-2
107
Distribution fiber
Distribution fiber
Distribution fiber
Distribution fiber
101
ONT
ONT
ONU
ONU

FIG. 1

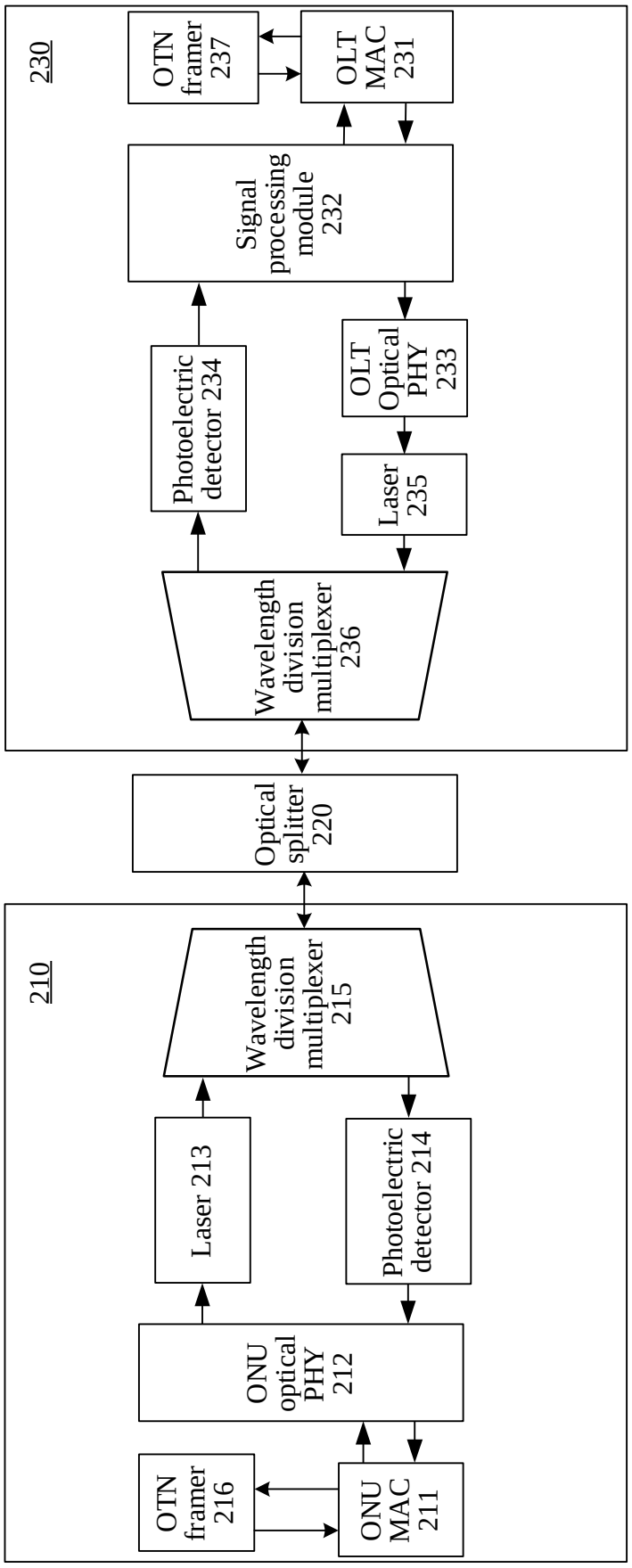

230
OTN framer 237
OLT MAC 231
Signal processing module 232
Photoelectric detector 234
OLT Optical PHY 233
Laser 235
Wavelength division multiplexer 236
Optical splitter 220
210
Wavelength division multiplexer 215
Laser 213
Photoelectric detector 214
ONU optical PHY 212
OTN framer 216
ONU MAC 211

FIG. 2

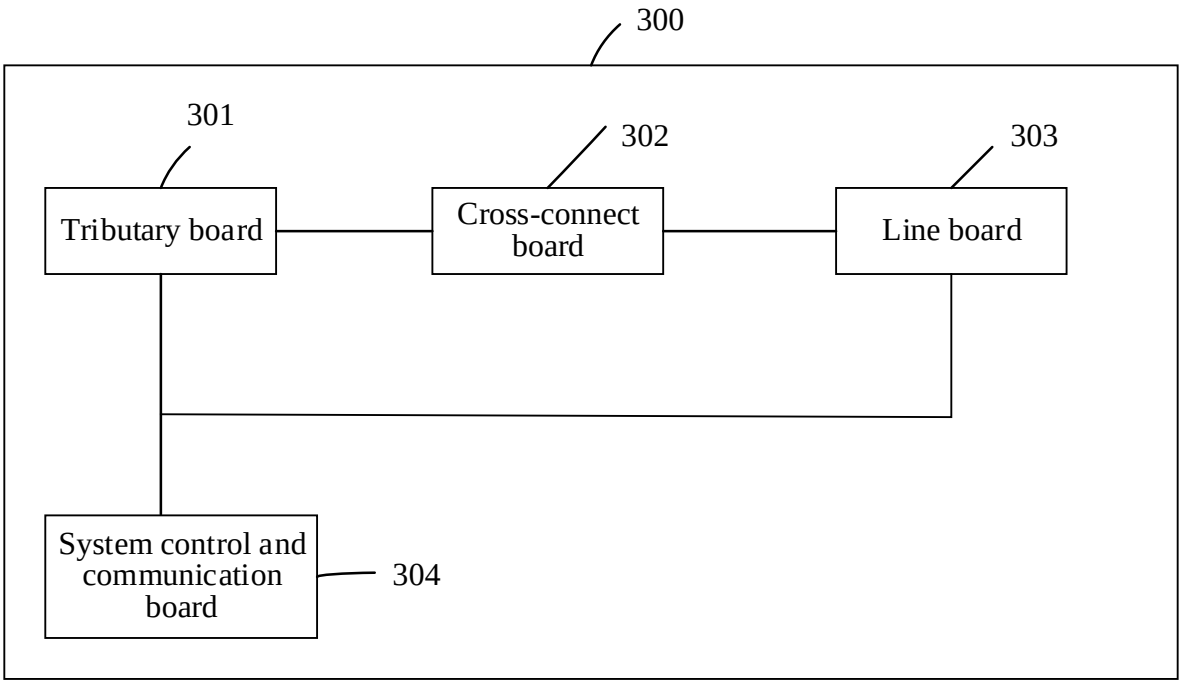

300
301
302
303
Tributary board
Cross-connect board
Line board
System control and communication board
304

FIG. 3

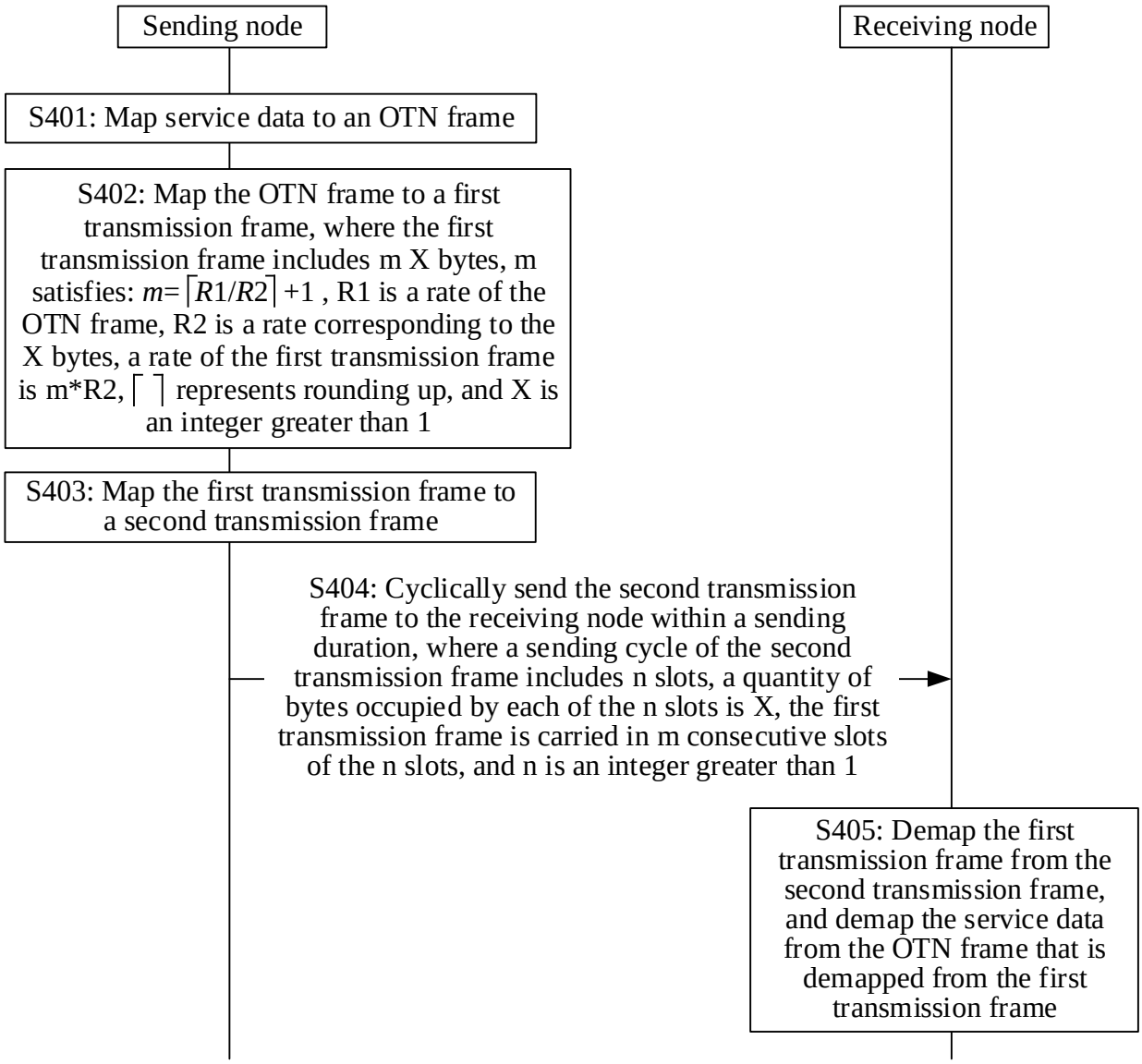

Sending node
Receiving node
S401: Map service data to an OTN frame
S402: Map the OTN frame to a first transmission frame, where the first transmission frame includes m X bytes, m satisfies: $m=\lceil R1/R2 \rceil +1$, R1 is a rate of the OTN frame, R2 is a rate corresponding to the X bytes, a rate of the first transmission frame is m*R2, ⌈ ⌉ represents rounding up, and X is an integer greater than 1
S403: Map the first transmission frame to a second transmission frame
S404: Cyclically send the second transmission frame to the receiving node within a sending duration, where a sending cycle of the second transmission frame includes n slots, a quantity of bytes occupied by each of the n slots is X, the first transmission frame is carried in m consecutive slots of the n slots, and n is an integer greater than 1
S405: Demap the first transmission frame from the second transmission frame, and demap the service data from the OTN frame that is demapped from the first transmission frame

FIG. 4

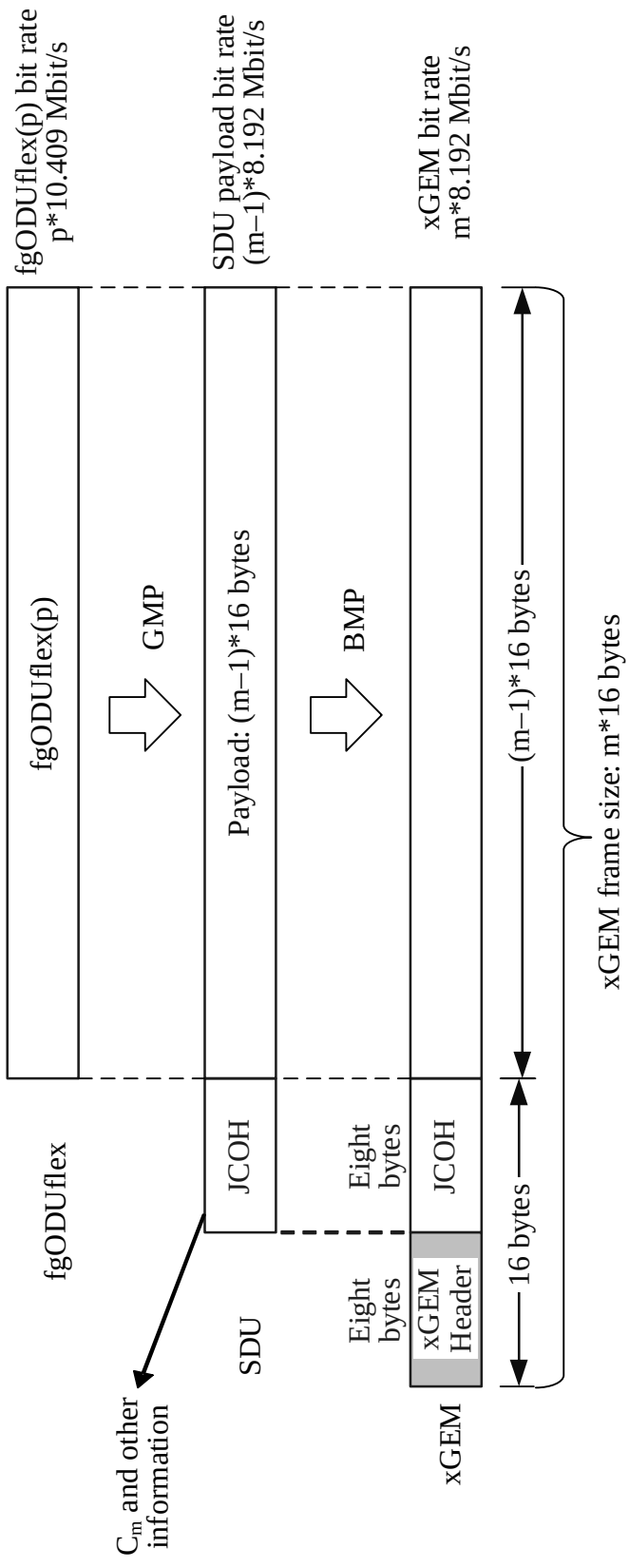

fgODUflex(p) bit rate
p*10.409 Mbit/s
SDU payload bit rate
(m–1)*8.192 Mbit/s
xGEM bit rate
m*8.192 Mbit/s
fgODUflex(p)
GMP
Payload: (m–1)*16 bytes
BMP
(m–1)*16 bytes
xGEM frame size: m*16 bytes
fgODUflex
JCOH
Eight bytes
JCOH
16 bytes
SDU
Eight bytes
xGEM Header
xGEM
C_m and other information

FIG. 5

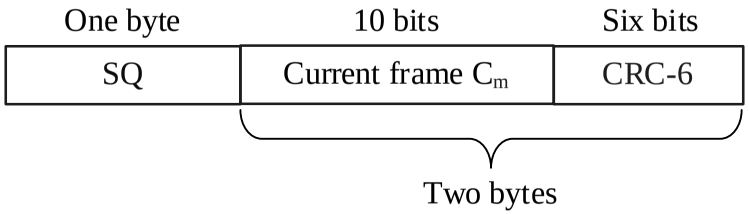


FIG. 6a

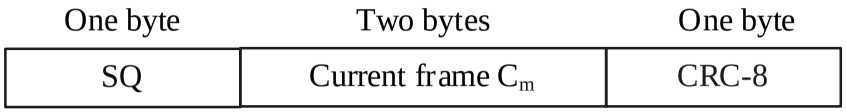


FIG. 6b

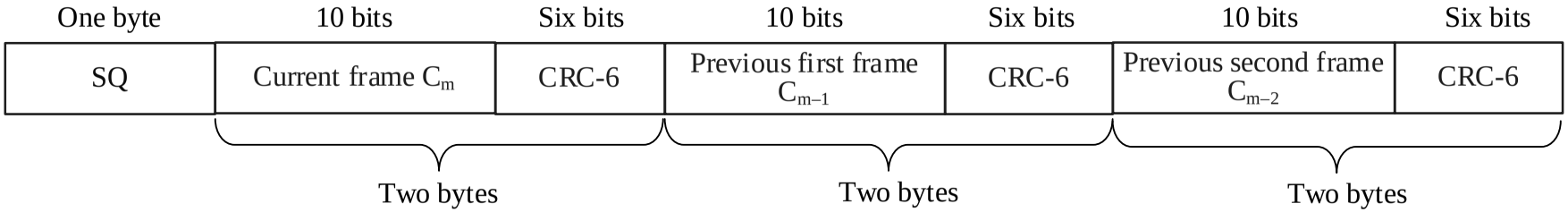


FIG. 6c

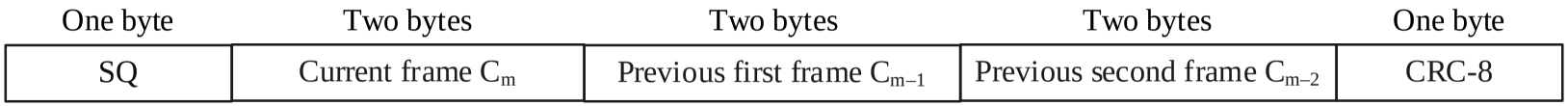


FIG. 6d

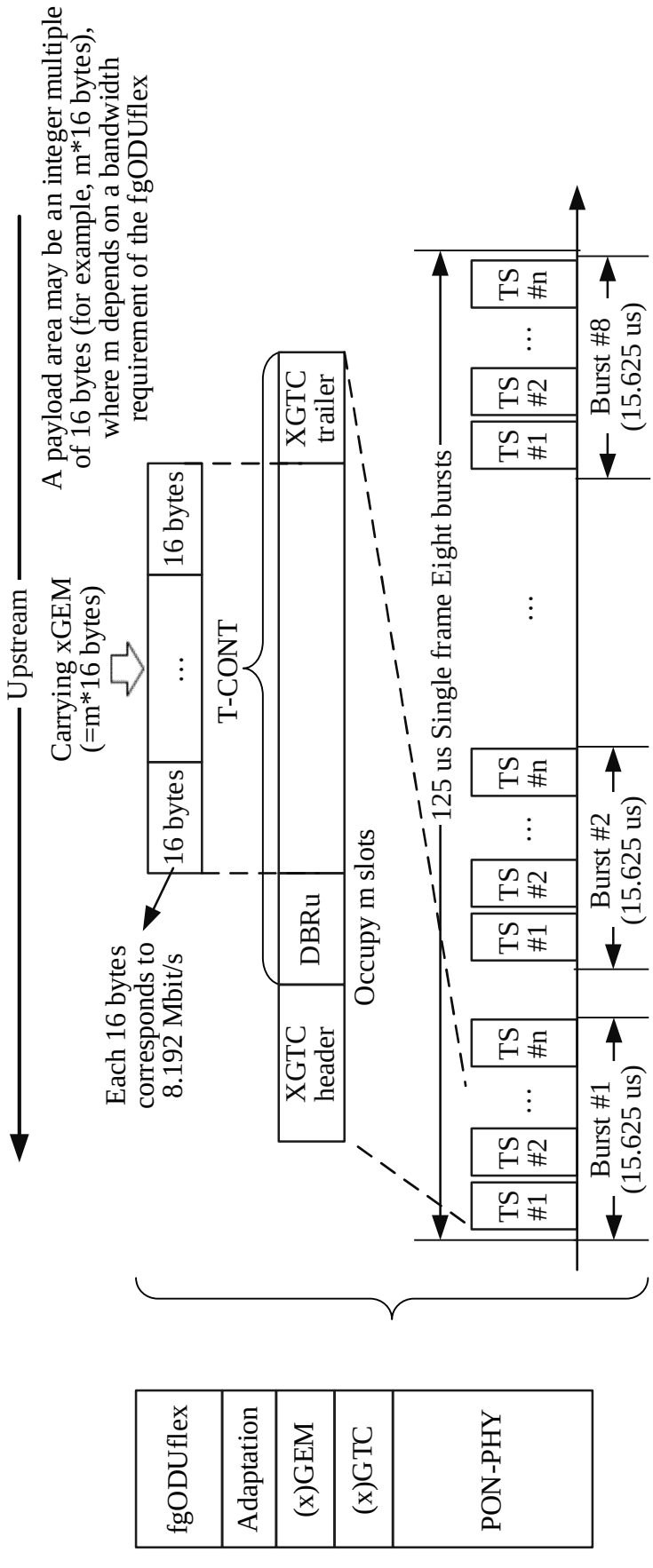

fgODUflex
Adaptation
(x)GEM
(x)GTC
PON-PHY
Upstream
A payload area may be an integer multiple of 16 bytes (for example, m*16 bytes), where m depends on a bandwidth requirement of the fgODUflex
Carrying xGEM (=m*16 bytes)
16 bytes
16 bytes
T-CONT
XGTC header
DBRu
XGTC trailer
Each 16 bytes corresponds to 8.192 Mbit/s
Occupy m slots
125 us Single frame Eight bursts
TS #1
TS #2
TS #n
Burst #1 (15.625 us)
Burst #2 (15.625 us)
Burst #8 (15.625 us)

FIG. 7

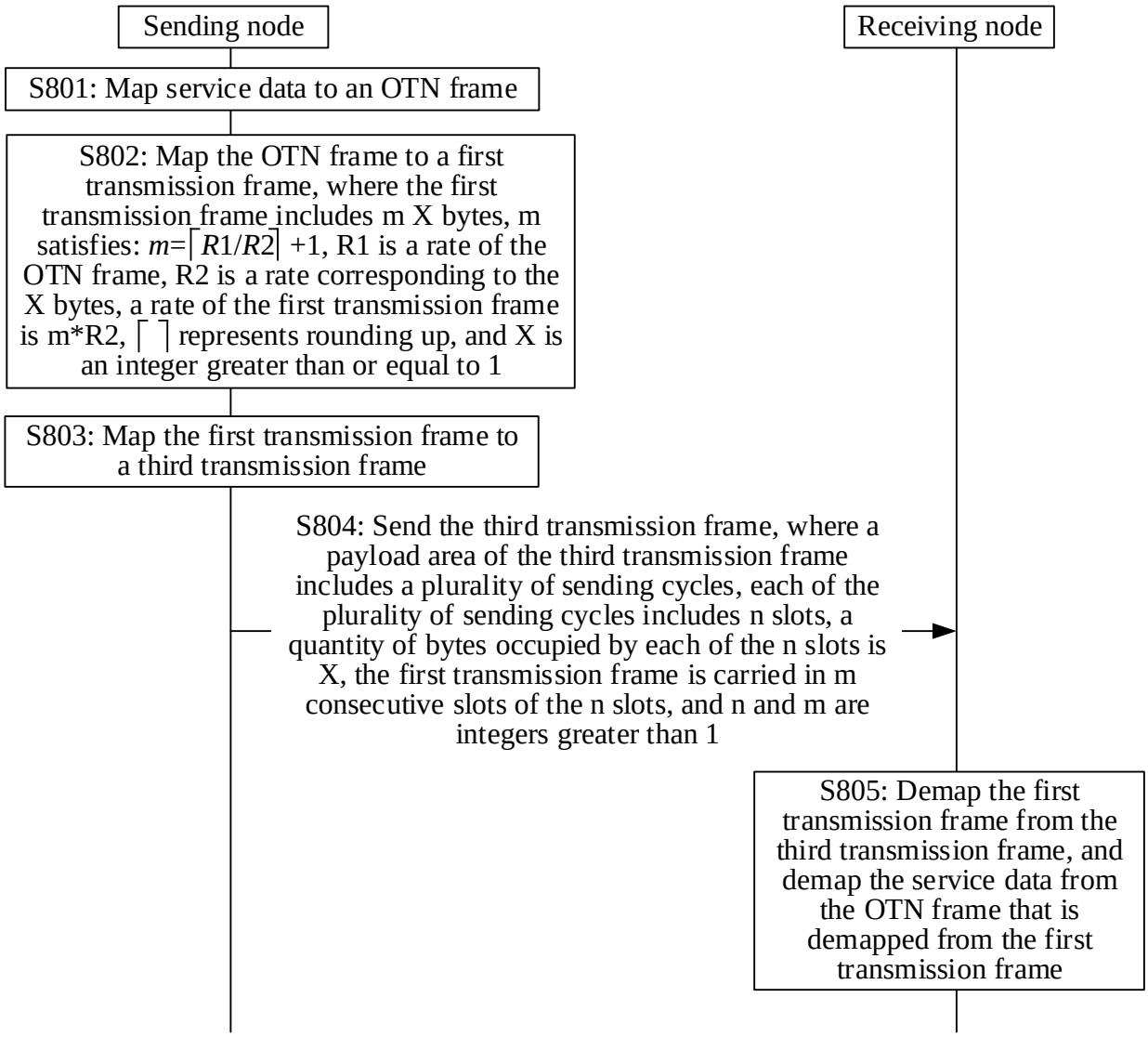

Sending node
Receiving node
S801: Map service data to an OTN frame
S802: Map the OTN frame to a first transmission frame, where the first transmission frame includes m X bytes, m satisfies: $m=\lceil R1/R2 \rceil +1$, R1 is a rate of the OTN frame, R2 is a rate corresponding to the X bytes, a rate of the first transmission frame is m*R2, $\lceil\ \rceil$ represents rounding up, and X is an integer greater than or equal to 1
S803: Map the first transmission frame to a third transmission frame
S804: Send the third transmission frame, where a payload area of the third transmission frame includes a plurality of sending cycles, each of the plurality of sending cycles includes n slots, a quantity of bytes occupied by each of the n slots is X, the first transmission frame is carried in m consecutive slots of the n slots, and n and m are integers greater than 1
S805: Demap the first transmission frame from the third transmission frame, and demap the service data from the OTN frame that is demapped from the first transmission frame

FIG. 8

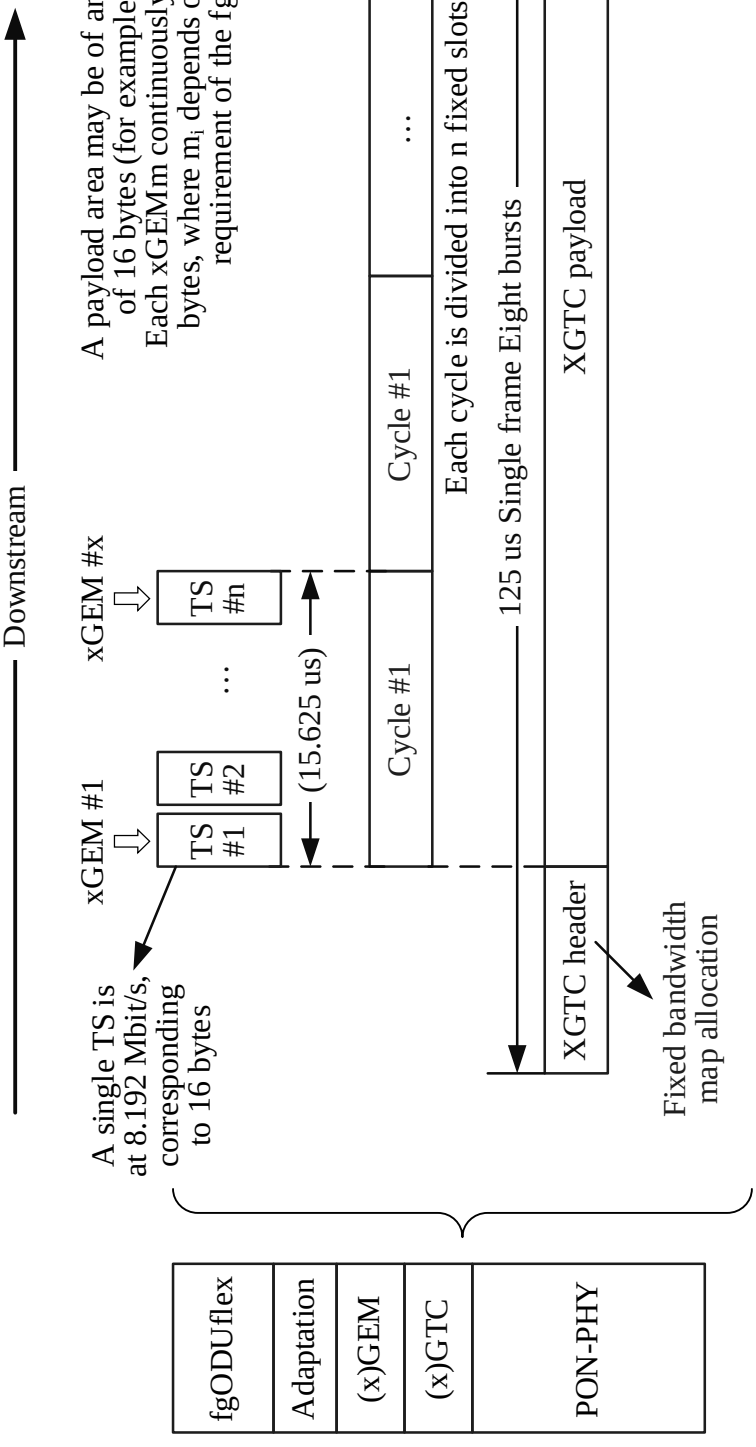

Downstream
A payload area may be of an integer multiple of 16 bytes (for example, m*16 bytes)
Each xGEMm continuously occupies m_i 16 bytes, where m_i depends on a bandwidth requirement of the fgODUflex
xGEM #1
xGEM #x
TS #1
TS #2
TS #n
(15.625 us)
Cycle #1
Cycle #1
Cycle #8
Each cycle is divided into n fixed slots
125 us Single frame Eight bursts
XGTC header
XGTC payload
A single TS is at 8.192 Mbit/s, corresponding to 16 bytes
Fixed bandwidth map allocation
fgODUflex
Adaptation
(x)GEM
(x)GTC
PON-PHY

FIG. 9

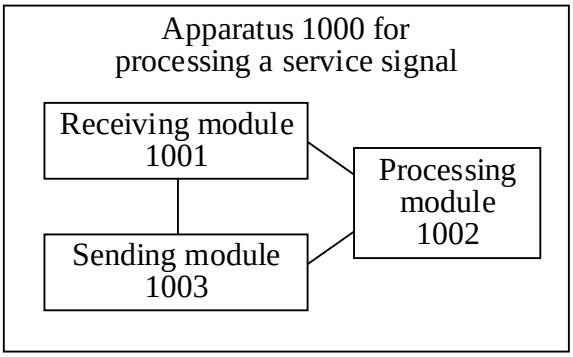


FIG. 10

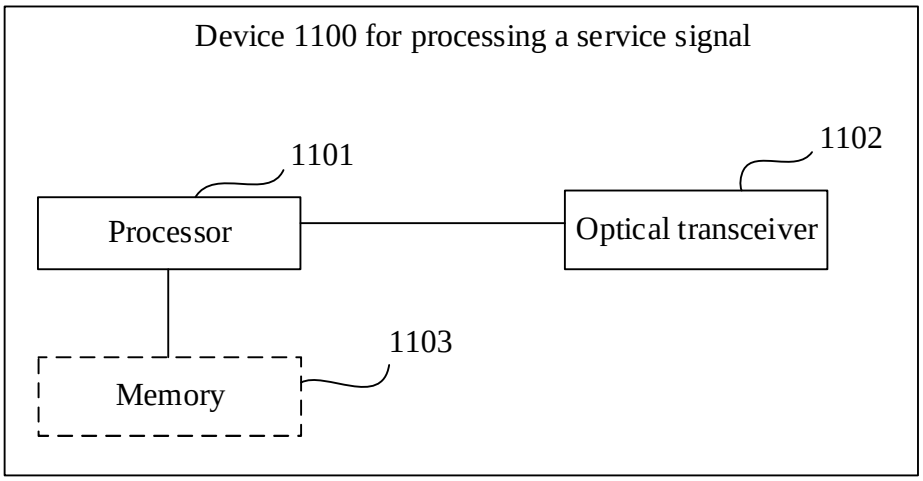


FIG. 11

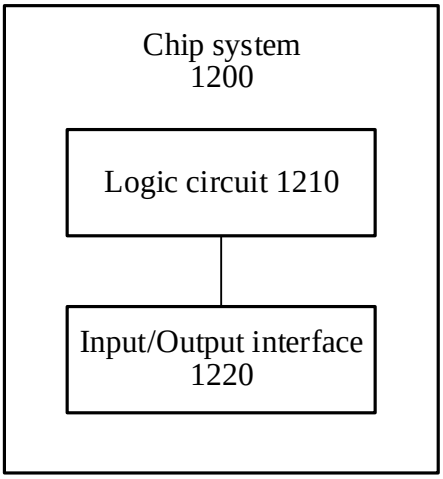


FIG. 12

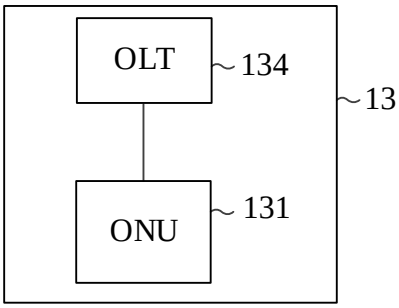


FIG. 13