Channel capability report during registration for 100G-EPON

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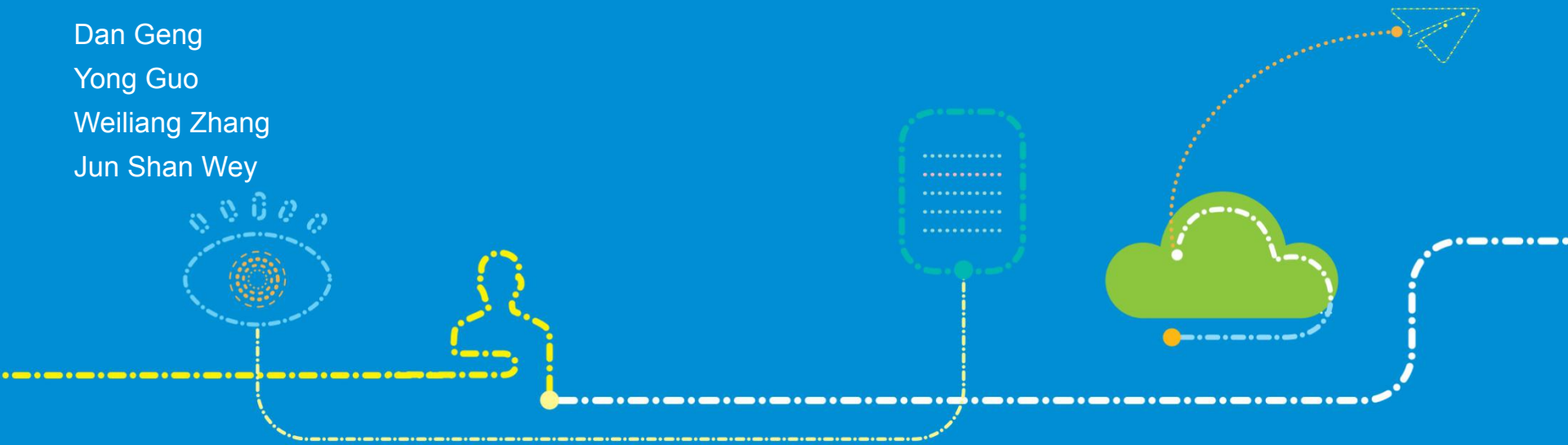

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- ONU channel capability report in registration process
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Background

- In the July meeting, we proposed to add channel capability reporting capability during the registration process (geng_3ca_1_0717). ONU reports the number of supported channels to OLT during registration and OLT can do ranging for this ONU on the related channels, which can help:
  - speed up ONU discovery
  - perform ranging on channels used by the ONU
  - bond the channels used by the ONU
- The following comments were received, which are addressed in this contribution
  - For 50G and 100G PON resilience, it should not be that OLT can only send Discovery Gate on one channel
  - Channel capability report may use more bits in REGISTER_REQ MPCPDU to show more detailed supported channel information
  - Channel capability report can be done by eOAM message
  - OLT can do ranging on one channel for one ONU, and caculate the other channel's equilization delay due to wavelength difference

ONU channel capability in 100G-EPON

- 100G EPON supports 25G, 50G and 100G ONUs
  - 25G ONU uses wavelength channel 0
  - 50G ONU uses wavelength channels 0 and 1
  - 100G ONU uses wavelength channels 0, 1, 2 and 3
- ONU channel capability includes
  - rate information
  - number of channels supported

ONU channel capability can be reported during or after registration process

- Registration in current 3ca draft uses four MPCPDU (see D0.4 3ca or backup slides)
  - DISCOVERY GATE MPCPDU
  - REGISTER_REQ MPCPDU
  - REGISTER MPCPDU
  - REGISTER_ACK MPCPDU
- During current registration process, OLT does not request ONU's channel capability and ONU does not report its own channel capability to OLT
- ONU channel capability can be reported to OLT during or after registration process. This contribution discusses both these methods

Using reserved bits in Table 144-2 for channel capability report

- REGISTER_REQ MPCPDU is the first message ONU sends to OLT, so it is the best place to carry and report ONU's channel capability
- Reserved bits in the Discovery Information Fields of REGISTER_REQ MPCPDU (Table 144-2) can be used for channel capability report

Bit	Flag Field	Values
0	ONU is 1G upstream capable	0 – ONU transmitter is not capable of 1 Gb/s 1 – ONU transmitter is capable of 1 Gb/s
1	ONU is 10G upstream capable	0 – ONU transmitter is not capable of 10 Gb/s 1 – ONU transmitter is capable of 10 Gb/s
2	ONU is 25G upstream capable	0 – ONU transmitter is not capable of 25 Gb/s 1 – ONU transmitter is capable of 25 Gb/s
3	Reserved	Ignored on Reception
4	1G registration attempt	0 – ONU transmitter is not capable of 1 Gb/s 1 – ONU transmitter is capable of 1 Gb/s
5	10G registration attempt	0 – ONU transmitter is not capable of 10 Gb/s 1 – ONU transmitter is capable of 10 Gb/s
6	25G registration attempt	0 – ONU transmitter is not capable of 25 Gb/s 1 – ONU transmitter is capable of 25 Gb/s
7	Reserved	Ignored on Reception
8-11	ONU Channel capability	(See next page)
12-15	Reserved	Ignored on Reception

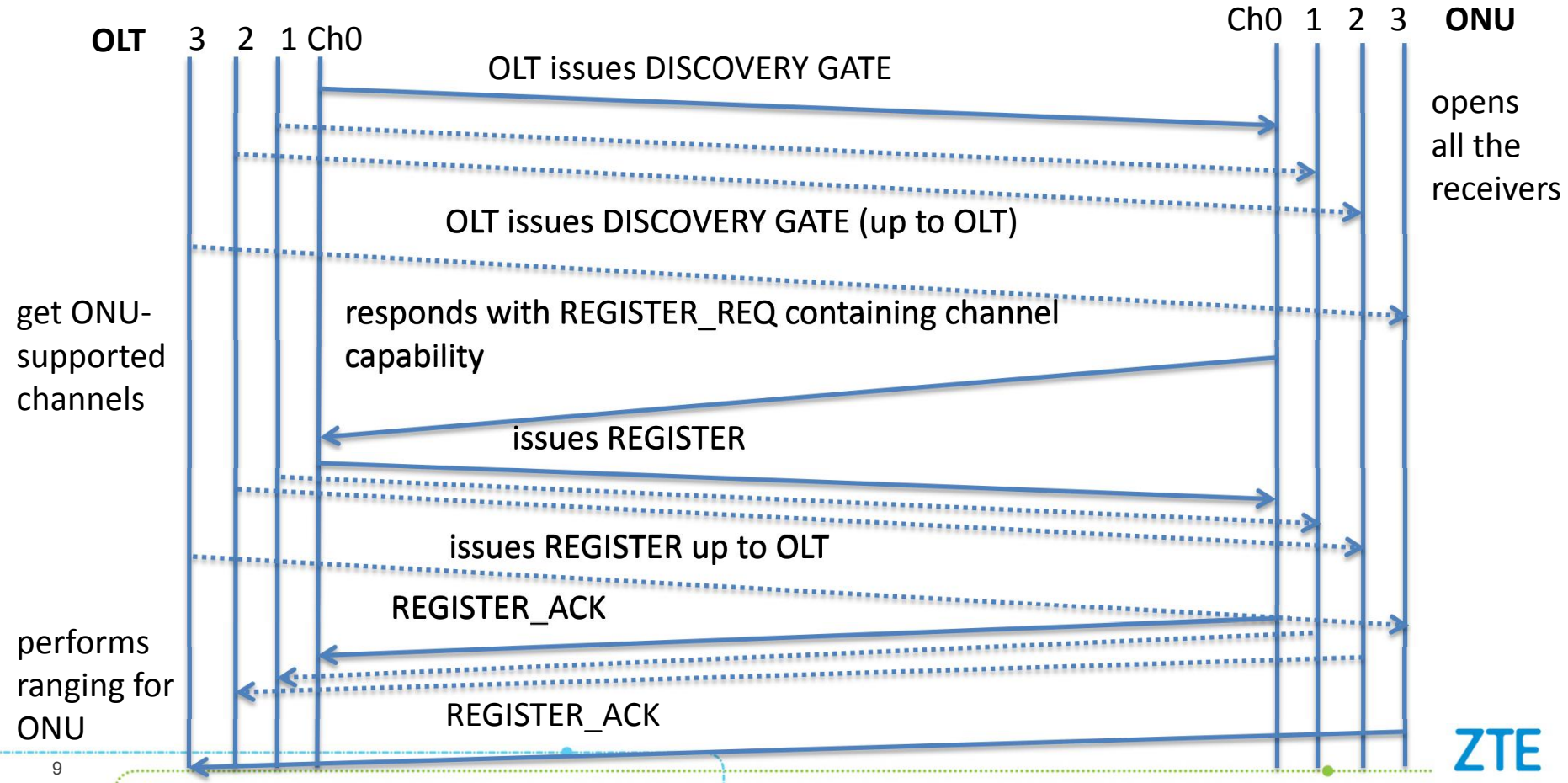
Proposed bit assignment

Bit 8-11	Rate	CH0	CH1	CH2	CH3
0001	25G	✓			
0010	25G		✓		
0100	25G			✓	
1000	25G				✓
0011	50G	✓	✓		
0101	50G	✓		✓	
1001	50G	✓			✓
1100	50G			✓	✓
0111	100G	✓	✓	✓	✓

Method 1: Reporting DURING registration

- OLT issues DISCOVERY GATE on some channels
  - OLT issues DISCOVERY GATE on channel 0
  - If there is fault on channel 0, OLT can also issues DISCOVERY GATE on other channels.
- ONU opens all the receivers and responds with REGISTER_REQ containing channel capability on the channel that ONU receives DISCOVERY GATE the earliest
- OLT gets the ONU-supported channels and OLT performs ranging for this ONU
  - OLT issues REGISTER on one channel.
    - OLT can do ranging for ONU on only one channel, and compute other channels' equalization delay
  - OLT issues REGISTER on all the channels supported by this ONU
    - OLT can do ranging for ONU on all the channels supported by this ONU
- ONU responds with REGISTER_ACK on the channels on which ONU receives REGISTER

Method 1: Reporting DURING registration



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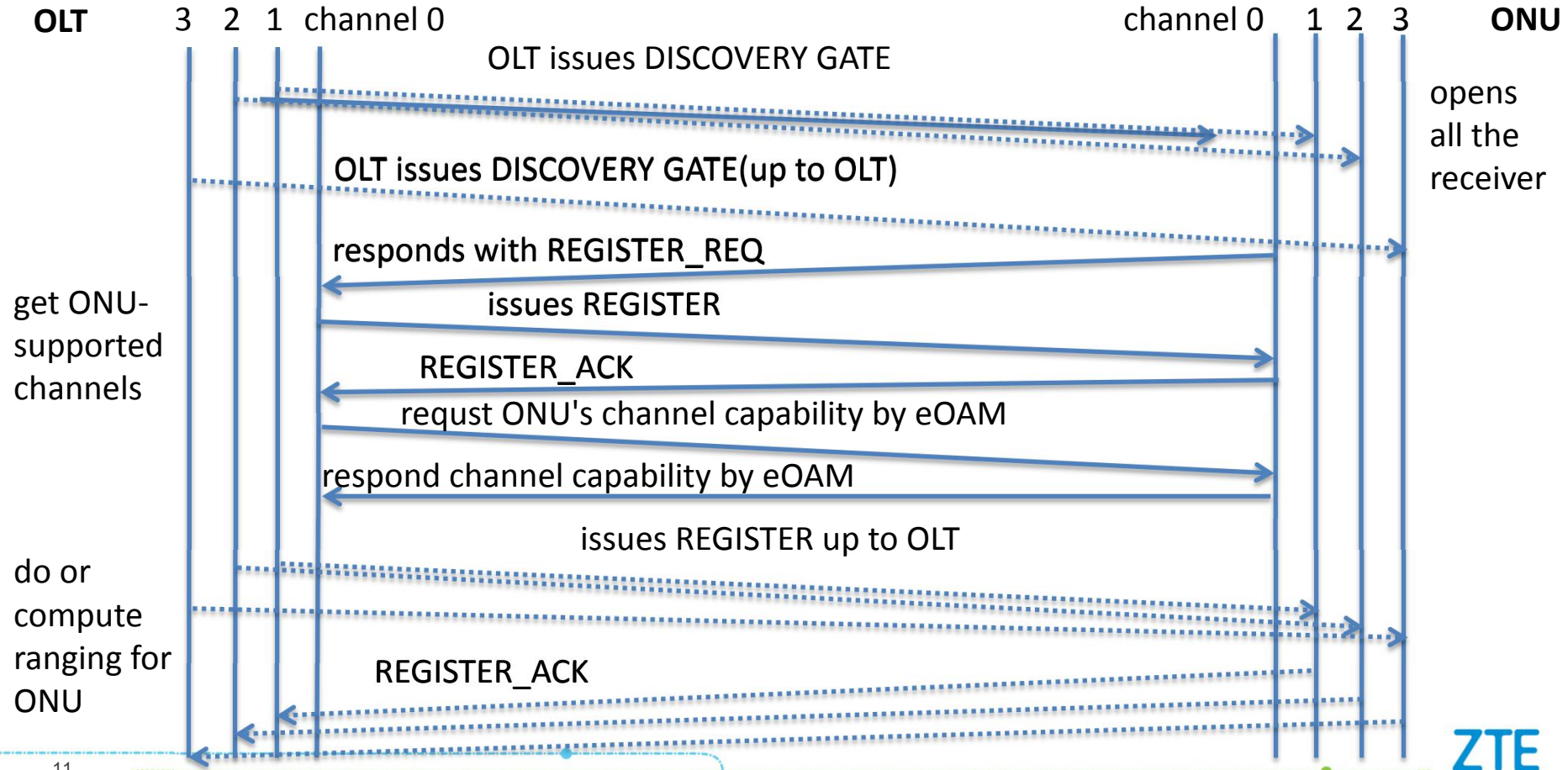
Method 2: Reporting AFTER registration

- OLT issues DISCOVERY GATE on some channels
  - OLT issues DISCOVERY GATE on channel 0
  - If there is fault on channel 0, OLT issues DISCOVERY GATE on other channels.
- ONU opens all the receivers and responds with REGISTER_REQ on the channel that ONU receives DISCOVERY GATE the earliest
- OLT issues REGISTER on the channel on which OLT recieves REGISTER_REQ from this ONU
- ONU responds with REGISTER_ACK on above channels
- OLT requst ONU's channel capability by eOAM message
- ONU responds its channel capability to OLT by eOAM message
- OLT gets the ONU-supported channels and OLT can do ranging or computes the equalization delay for other channels supported by the ONU

Method 2: Reporting AFTER registration



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Summary

- For 50G and 100G PON resilience, OLT can only send Discovery Gate on more than one channel
- Proposed to use Bit 8-11 in REGISTER_REQ MPCPDU to show more detailed supported channel information
- Two methods can be used for channel capability report
    1. During registration process by REGISTER_REQ MPCPDU
    2. After registration process by eOAM: require more message exchange between OLT and ONU hence longer registration time
- OLT can perform ranging on one channel for one ONU, and calculate the other channel's equalization delay due to wavelength difference

Thank you

Tomorrow never waits

DISCOVERY GATE MPCPDU

DISCOVERY GATE MPCPDU

- Channel Assignment indicates which upstream wavelength can be used
- Start Time indicates the start time of upstream burst
- Discovery information indicates the upstream data rate that can be received in this window

Table 144–3—Discovery Information Fields

Bit	Flag field	Values
0	Reserved	0 – OLT does not support 1 Gb/s reception 1 – OLT supports 1 Gb/s reception
1	OLT is 10G upstream capable	0 – OLT does not support 10 Gb/s reception 1 – OLT supports 10 Gb/s reception
2	OLT is 25G upstream capable	0 – OLT does not support 25 Gb/s reception 1 – OLT supports 25 Gb/s reception
3	Reserved	Ignored on Reception
4	OLT is opening 1G discovery window	0 – OLT cannot receive 1 Gb/s data in this window 1 – OLT can receive 1 Gb/s data in this window
5	OLT is opening 10G discovery window	0 – OLT cannot receive 10 Gb/s data in this window 1 – OLT can receive 10 Gb/s data in this window
6	OLT is opening 25G discovery window	0 – OLT cannot receive 25 Gb/s data in this window 1 – OLT can receive 25 Gb/s data in this window
7-15	Reserved	Ignored on Reception

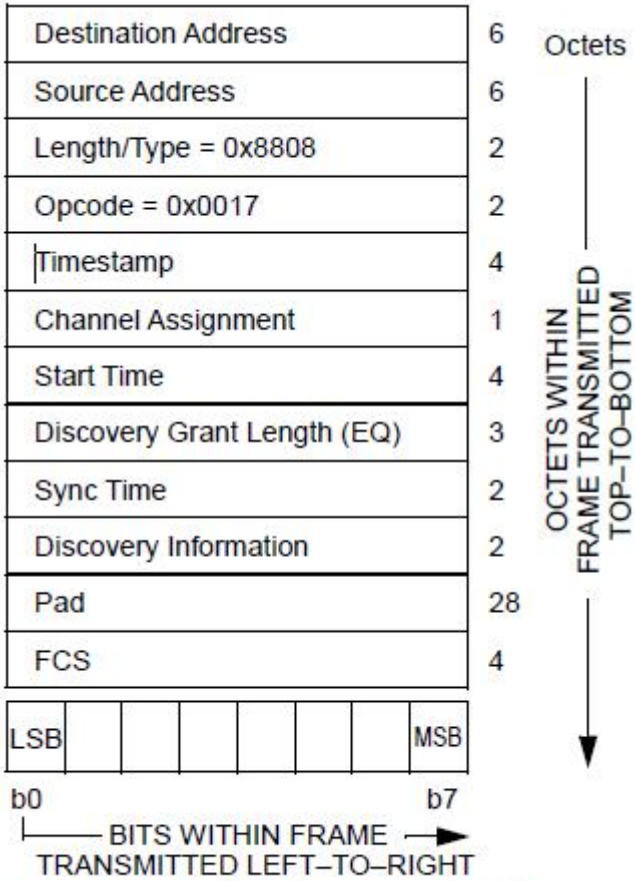

Figure 144–9—DISCOVERY GATE MPCPDU

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REGISTER_REQ MPCPDU

REGISTER_REQ MPCPDU

- Discovery Information indicates which upstream data rate is attempted during registration

Table 144–2—Discovery Information Fields

Bit	Flag field	Values
0	ONU is 1G upstream capable	0 – ONU transmitter is not capable of 1 Gb/s 1 – ONU transmitter is capable of 1 Gb/s
1	ONU is 10G upstream capable	0 – ONU transmitter is not capable of 10 Gb/s 1 – ONU transmitter is capable of 10 Gb/s
2	ONU is 25G upstream capable	0 – ONU transmitter is not capable of 25 Gb/s 1 – ONU transmitter is capable of 25 Gb/s
3	Reserved	Ignored on Reception
4	1G registration attempt	0 – ONU transmitter is not capable of 1 Gb/s 1 – ONU transmitter is capable of 1 Gb/s
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7-15	Reserved	Ignored on Reception

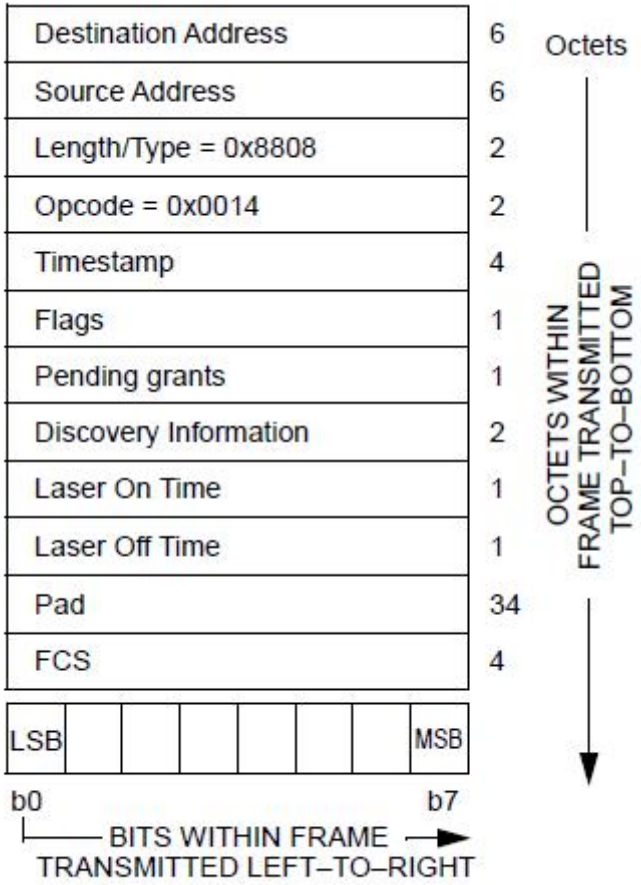

Figure 144–6—REGISTER_REQ MPCPDU

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REGISTER MPCPDU

REGISTER MPCPDU

- Assigned Port (PLID) indicates the assigned port link ID for the ONU that is registering

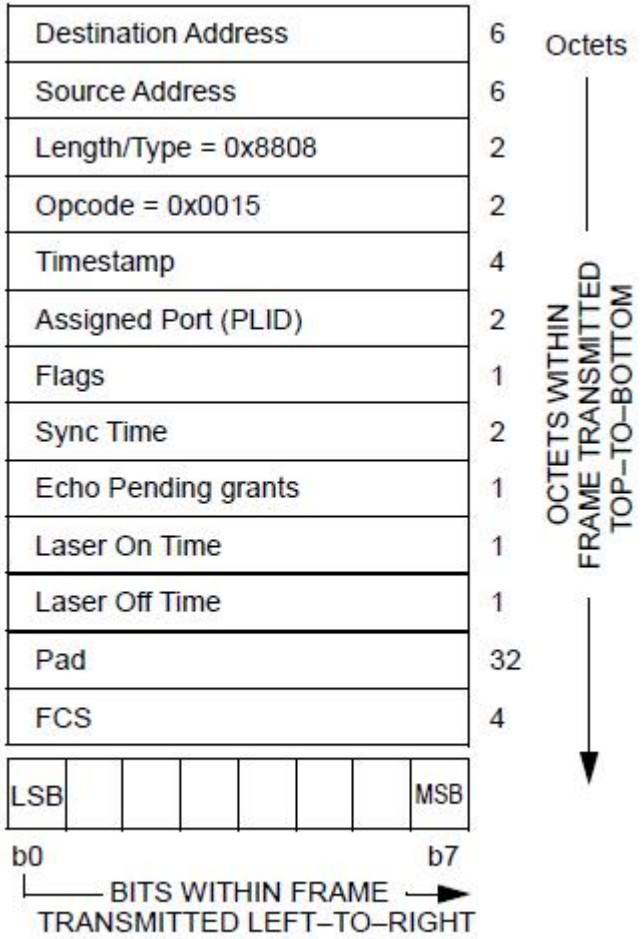

Figure 144–7—REGISTER MPCPDU

REGISTER_ACK MPCPDU

REGISTER_ACK MPCPDU

- Timestamp to help OLT perform ranging for the ONU

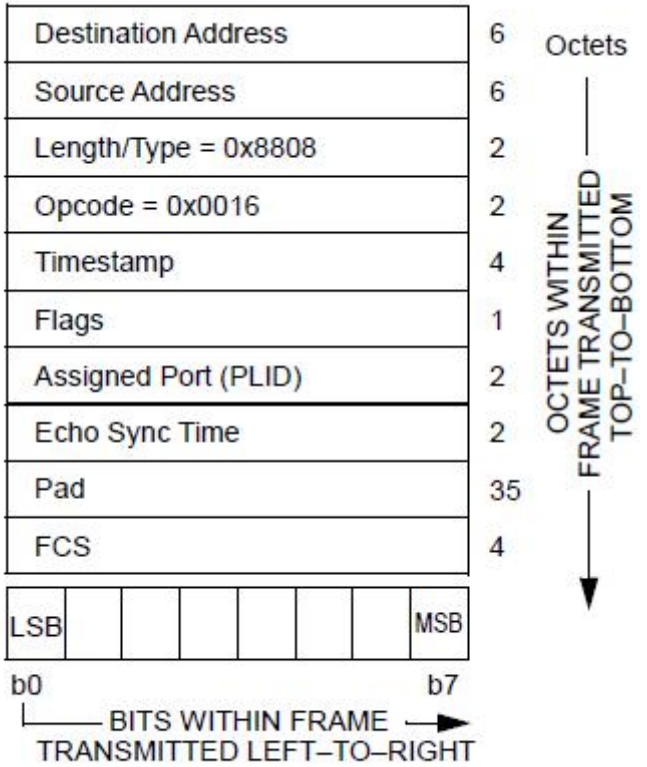

Figure 144–8—REGISTER_ACK MPCPDU

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