Flex Ethernet: Background

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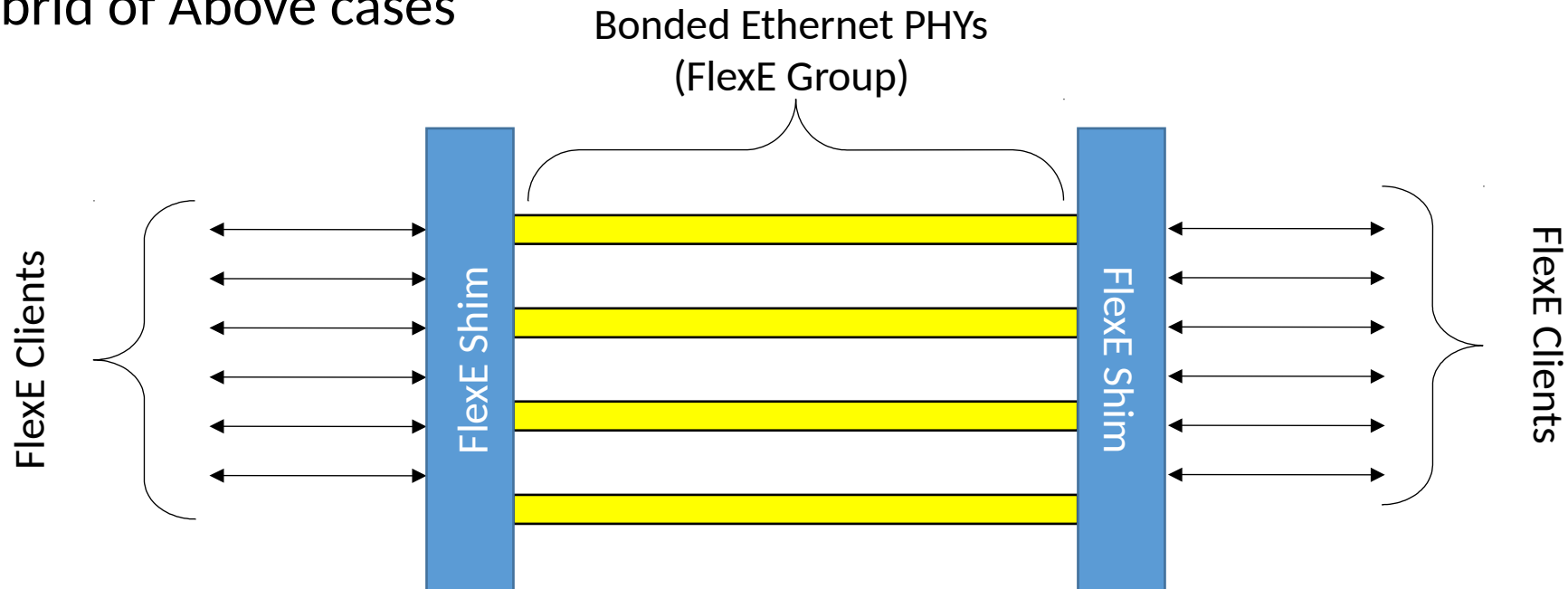Qilei Wang

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Introduction

- FlexE provides a mechanism to support a variety of ETH MAC rates that may or may not correspond to any existing ETH PHY rate;

- Data Plane recommendation has been defined in IEEE 802.3 and OIF;

- Control Plane Extension is assumed to be done in ccamp WG;

- Reference:
  - IEEE 802.3: IEEE Std 802.3™-2015 *Standard for Ethernet*.
  - OIF-FLEXE-01.0: *Flex Ethernet Implementation Agreement 1.0*

FlexE Requirement

- General Capabilities Supported:
  - Bonding of ETH PHY: (nx100G over n bonded 100G PHY)
  - Sub-rates of ETH PHY: (50G over a 100G PHY)
  - Channelization within a PHY or a group of bonded PHYs (e.g., 25G + 75G over a 100G PHY)
  - Hybrid of Above cases

Bonded Ethernet PHYs
(FlexE Group)

FlexE Clients

FlexE Shim

FlexE Shim

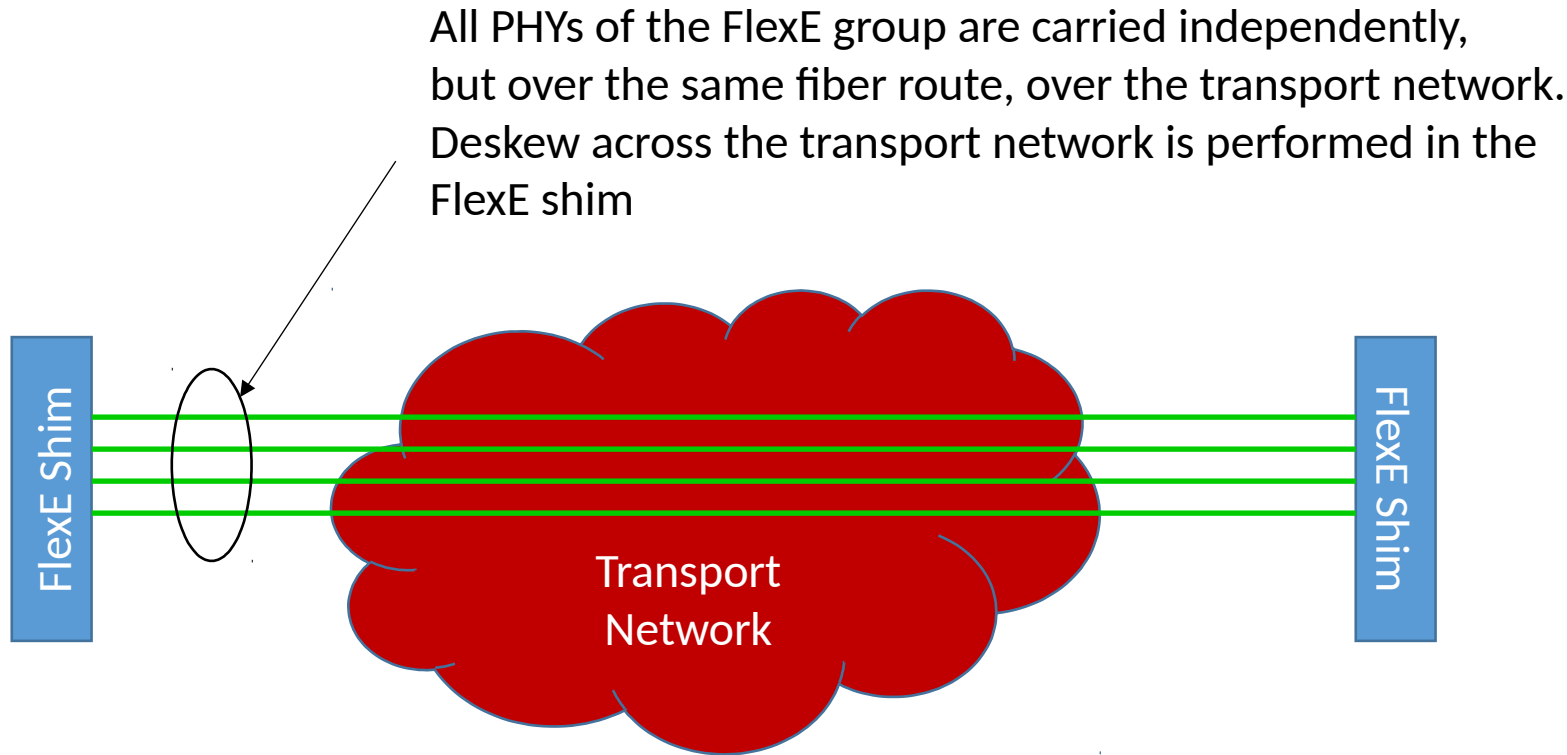FlexE Clients

Key FlexE Terminologies

- FlexE Group: A FlexE Group is composed of from 1 to n Ethernet PHYs. In the first version of FlexE each PHY is identified by a number in the range [1-254].

- FlexE Client: an Ethernet flow based on a MAC data rate that may or may not correspond to any Ethernet PHY rate.

- FlexE Shim: the layer that maps or demaps the FlexE clients carried over a FlexE group.

FlexE Use Case

- FlexE Unaware Transport
- FlexE Termination in Transport
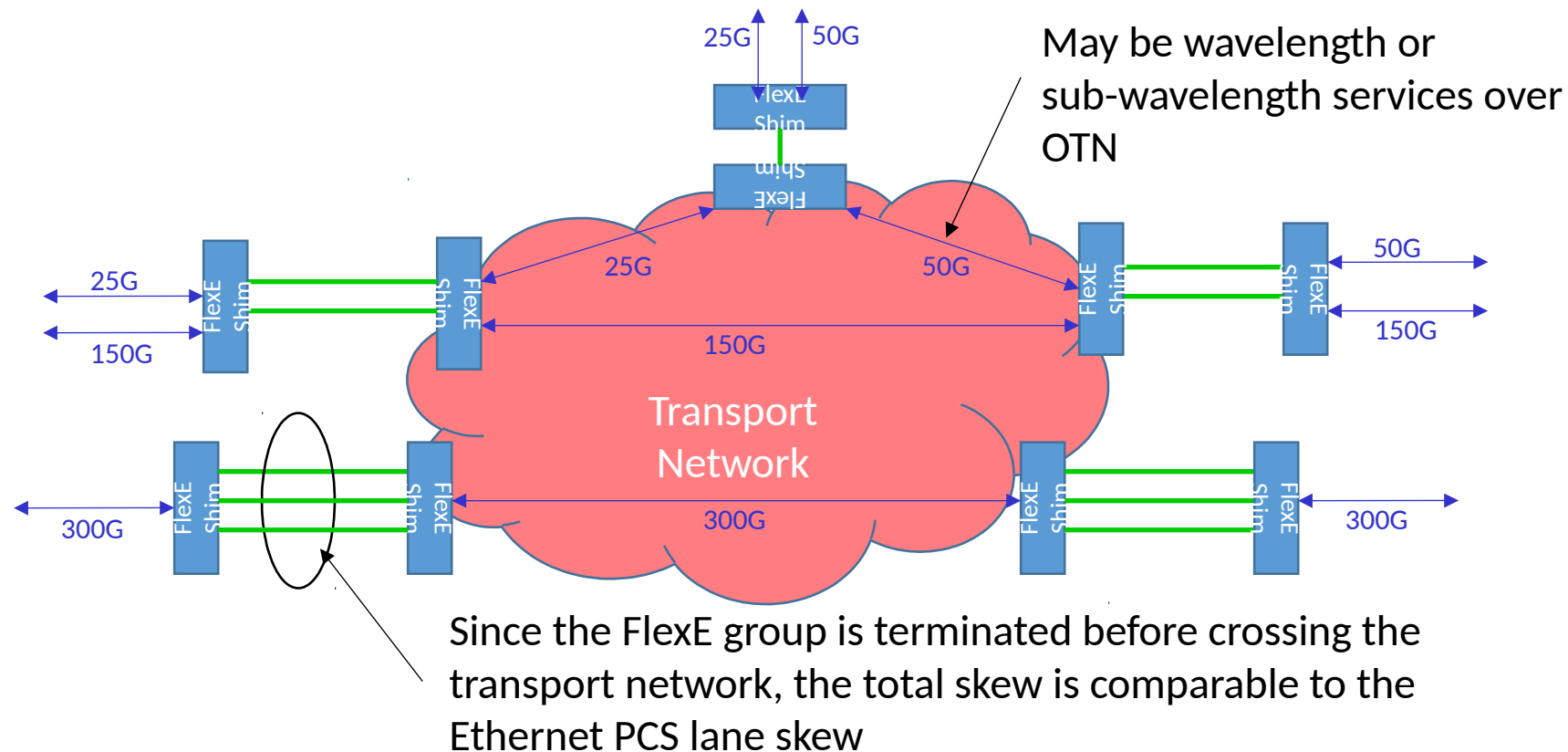- FlexE Aware Transport

FlexE Unaware Transport

- Transport is unaware of FlexE: FlexE shim need to map the clients over a group of bonded Ethernet PHYs. All PHYs in this case carried over the same fiber route.

All PHYs of the FlexE group are carried independently,
but over the same fiber route, over the transport network.
Deskew across the transport network is performed in the
FlexE shim

FlexE Shim

Transport
Network

FlexE Shim

FlexE Termination in transport network

- Transport network equipment terminates the FlexE group in this case. The transport network carried the FlexE clients, instead of PHYs of the FlexE group, over wavelength.

- Usually the application limited to 40km.

FlexE Aware Transport

- Transport network is aware of FlexE PHY but does NOT terminate;

- Can be used when wavelength rate is less than ETH PHY rate, or not an integral mul tiple of the PHY rate;

- Also applicable when the card is incapable for termination;

All PHYs of the FlexE Group are carried independently, but over the same fiber route, over the transport network. Deskew across the transport network is performed in the FlexE shim.

FlexE Group PHYs are configured so that only 75% of the calendar slots on each PHY are available to carry FlexE clients

Special mapper discards unavailable slots. Special demapper restores unavailable slots to get back to the original PHY rate

FlexE Shim

FlexE Shim

150G

100G

100G

75G

100G

100G

150G

Transport Network