# The Missing Objectives

Brad Booth

Azure Networking, Microsoft

# Supporters

- Rob Stone, Broadcom
- Tom Issenhuth, Microsoft

# Objectives and Lane Rates

| Application | 50G | 100G | 200G | 400G |
|---|---|---|---|---|
| Backplane | Y | Y (4x25,2x50) | Y (4x50) | N |
| Twinax | Y | Y (4x25,2x50) | Y (4x50) | N |
| 100m MMF | Y | Y (10x10,4x25,2x50) | Y (4x50) | Y (16x25) |
| 500m PSM | N | N | Y (4x50) | Y (4x100) |
| 2km SMF | Y | N | Y (4x50) | Y (8x50) |
| 10km SMF | Y | Y (4x25) | Y (4x50) | Y (8x50) |

P802.3cd adds
50G variants

P802.3bs

**No IEEE Standards
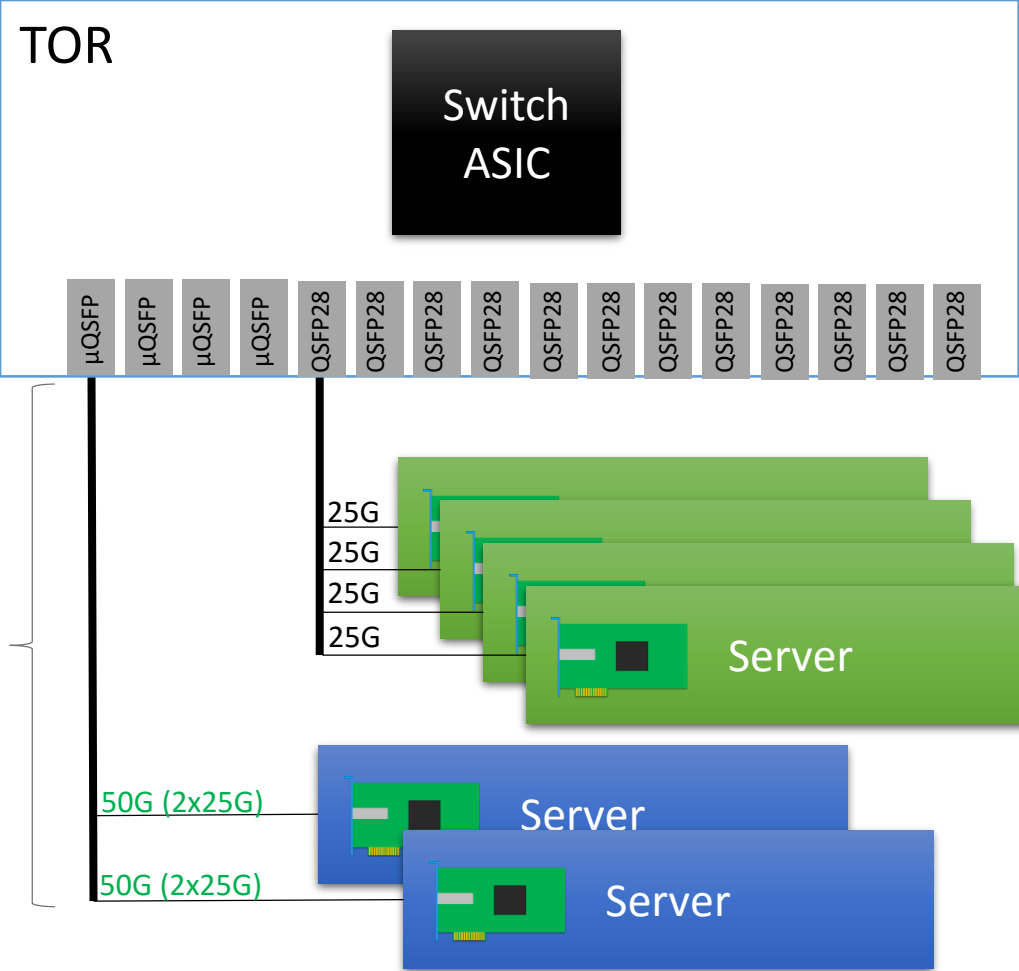Or Objectives!!!**

# Topologies

- Broad range of topologies in data centers
- 25G technology today provides the capability for 25G, 50G and 100G within the network
  - Server links can operate at 10G, 25G or 50G
  - Core and fabric can operate at 50G or 100G
- 50G technology of the future
  - Enterprise (brownfield) likely to require support for 25G & 50G coexistence
  - Server links can growth to be 25G, 50G or 100G
  - Core and fabric move to be 100G or 400G
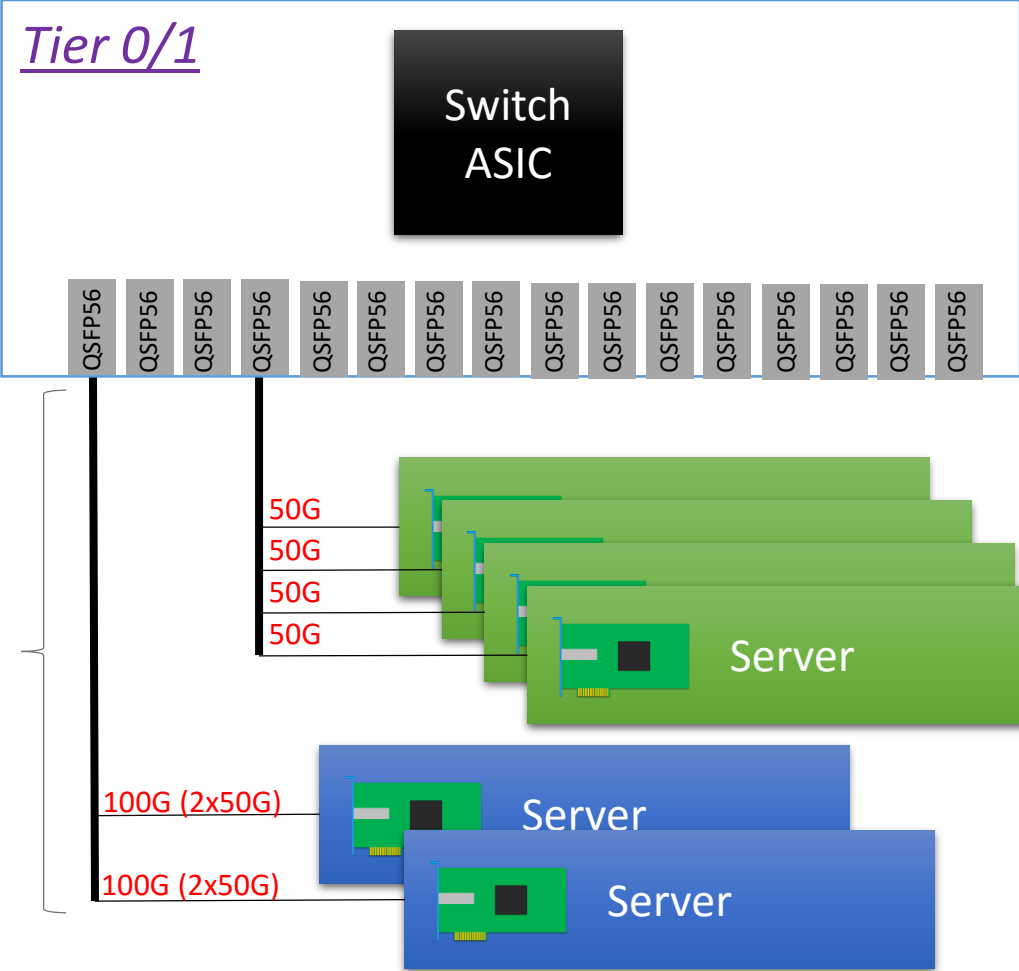
# Assumptions

- DAC
  - Very strong assumption only DAC will exist between server and TOR (Tier 0)
  - Module form factors permit multiple implementation scenarios
  - Avoid assuming server-TOR links only use DAC

- Break-out
  - Strong assumption that break-out is only used to the server
  - End users are using break-out for the core/fabric portion of their network

- Decoupling
  - Many end users see 200G module as supplying two links of 100GbE
  - MAC and PHY/PMD rates are often decoupled
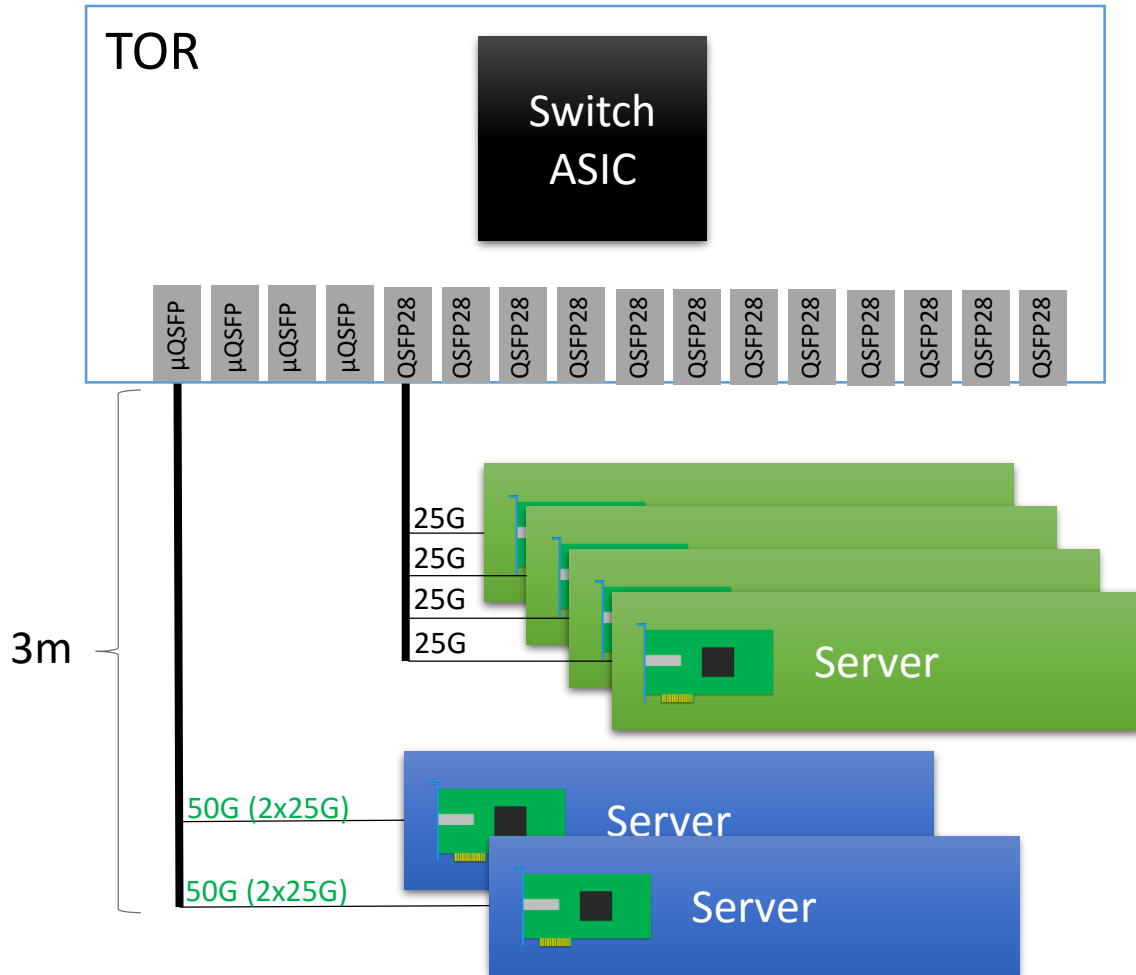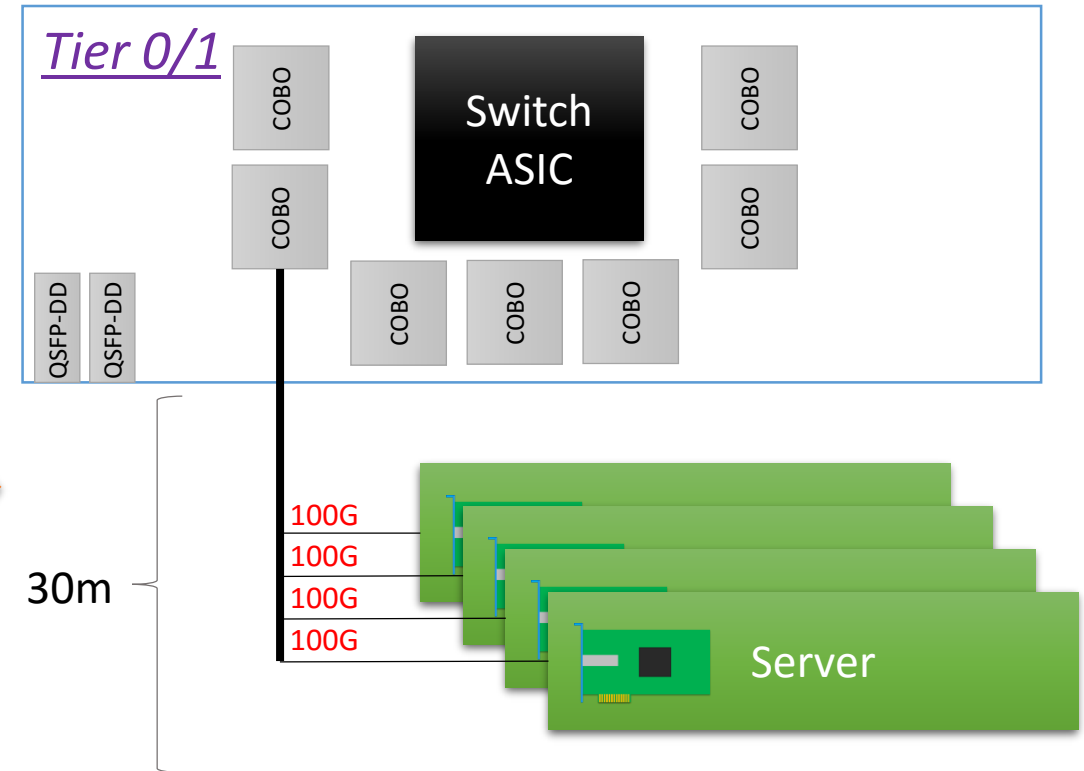
# Example: Server Transition – 50G family

# Example: Server Transition – 100G family



Today

TOR

Switch ASIC

μQSFP μQSFP μQSFP μQSFP QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28 QSFP28

3m

25G
25G
25G
25G

Server

50G (2x25G)

Server

50G (2x25G)

Server

Future

Tier 0/1

COBO COBO

Switch ASIC

COBO

COBO COBO COBO
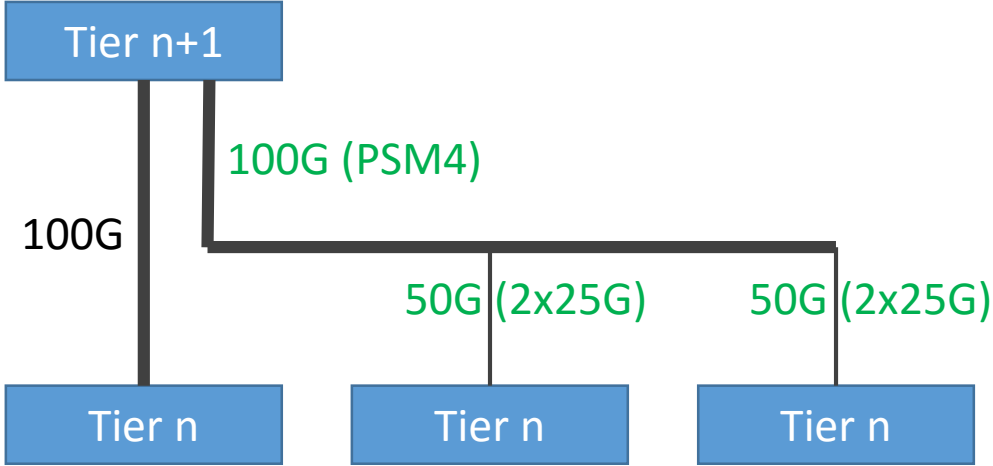
QSFP-DD QSFP-DD

30m

100G
100G
100G
100G

Server

**No Supporting SMF PMDs**

# Example: Core/Fabric Transition – PSM

Today

Future
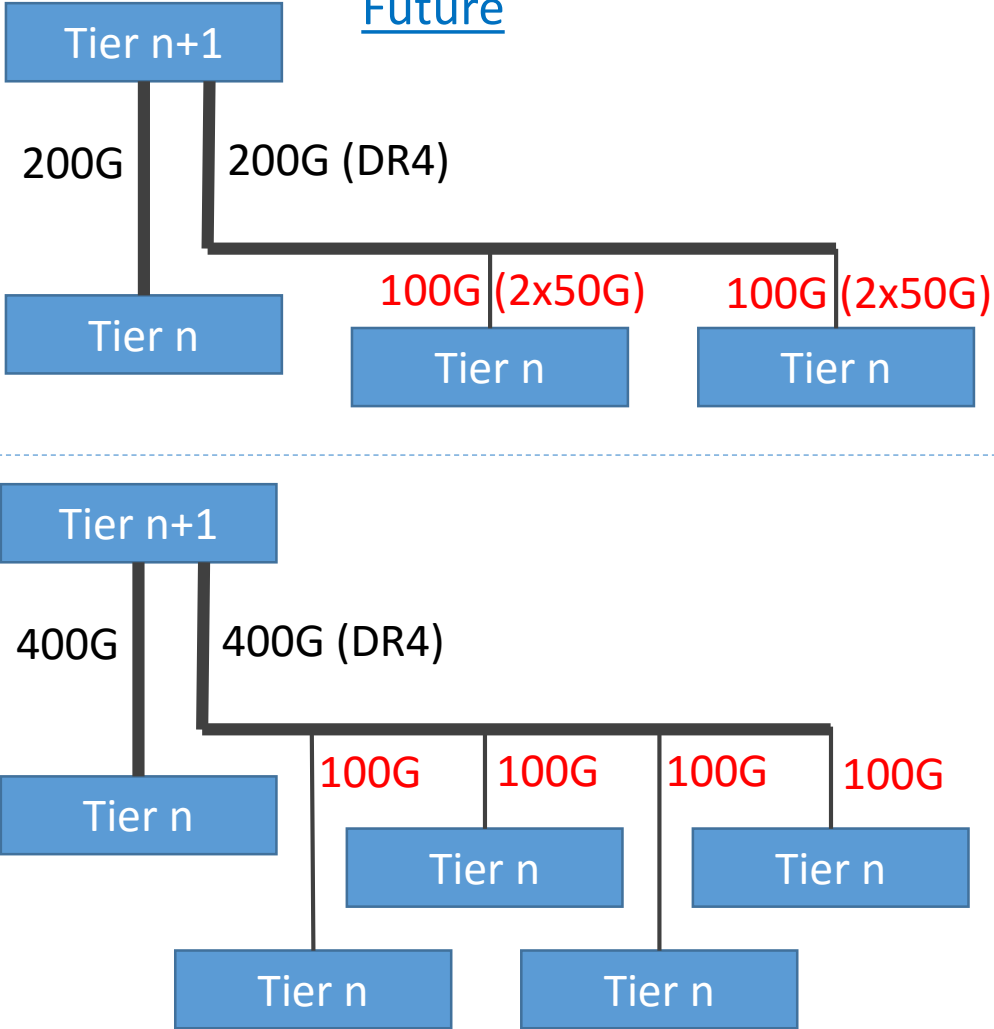


Tier n+1

100G (PSM4)

100G

50G (2x25G)    50G (2x25G)

Tier n    Tier n    Tier n

200G

400G

Tier n+1

200G    200G (DR4)

Tier n    100G (2x50G)    100G (2x50G)

Tier n    Tier n

Tier n+1

400G    400G (DR4)

Tier n    100G    100G    100G    100G

Tier n    Tier n

Tier n    Tier n

Consortium/MSA
No Supporting SMF PMDs

# Example: Core/Fabric Transition – WDM

# Example: Core/Fabric Transition – WDM



**400G**

Tier n+1

QSFP28 QSFP28 QSFP28 QSFO28 ... QSFP28 QSFP28 QSFP28 QSFP28

100G-CLR4

100G-CWDM4

100G-LR4

100G-LR4

QSFP28 QSFP28 ... QSFP28 QSFP28

QSFP28 QSFP28 ... QSFP28 QSFP28

Tier n+1

TBD TBD TBD TBD ... TBD TBD TBD TBD

400G-FR8

400G-LR8

2x200G-FR4/LR4

4x100G

TBD TBD ... QSFP56 QSFP56

QSFP28 QSFP28 ... QSFP28 QSFP28
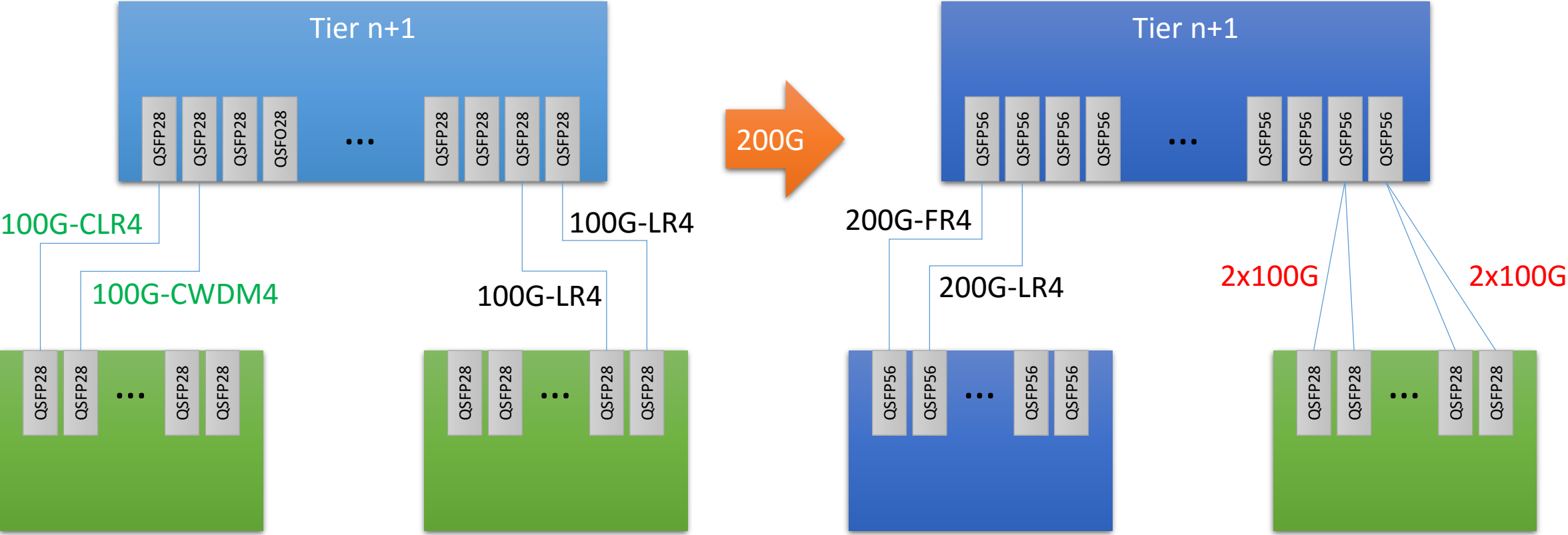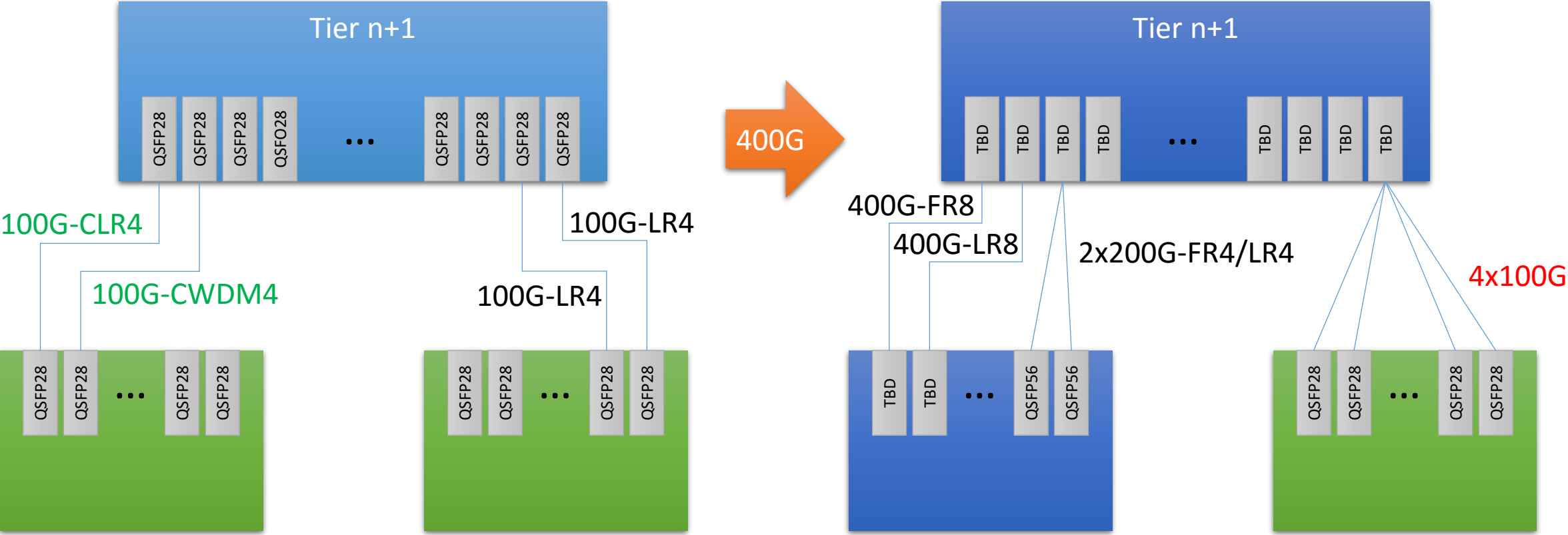
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**End Users are expecting these PMDs for their datacenters**

**Compatibility and interoperability are critical!!**

# Recommendation

- Additional PMDs would fill the gap with an Ethernet standard
  - A 500m 50G PMD would provide the ability to do the following:
    - Consider optimization of the three reaches/applications spaces
    - Ensure cost-effective break-out with the PSM variant (200G-DR4)
  - SMF 100G PMDs provide server and fabric break-out capabilities
    - 100G infrastructure is being built out based upon MSAs
    - 2x50G and 1x100G are important to provide standardized break-out capabilities
    - Enable compliance for Enterprise (brownfield) 25G to 50G mapping

- Standards provide compliance and interoperability test points
  - Maximize implementations through standards
  - End users really don't like multiple MSAs – slows market adoption

# Recommended Objectives

- Provide physical layer specifications which provide support for 100 Gb/s operation over:
    - At least 500 meters on two-lanes of SMF
    - At least 500 meters on one-lane of SMF
    - At least 2 kilometers of SMF

- Provide physical layer specifications which provide support for 50 Gb/s operation over at least 500 meters of SMF

# Thank You