

Simplifying Multi-Fiber Validation in Next-Generation in Cloud DC

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Simplifying Multi-Fiber Validation in Next-Generation

In Cloud Data Centers

Speaker

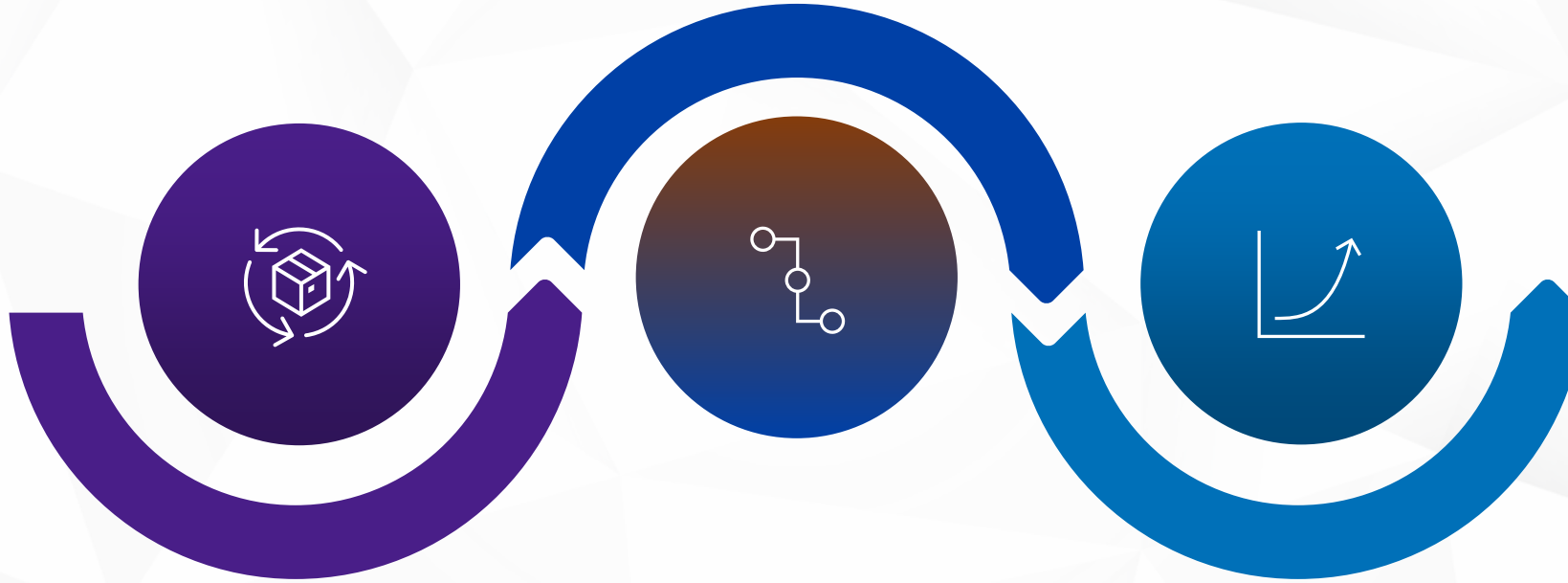


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The Multifiber Wave

Multifiber Wave

MULTIFIBER
CONNECTIVITY
Driven by higher speeds



MODERN
ARCHITECTURES
Spine / Leaf fabric

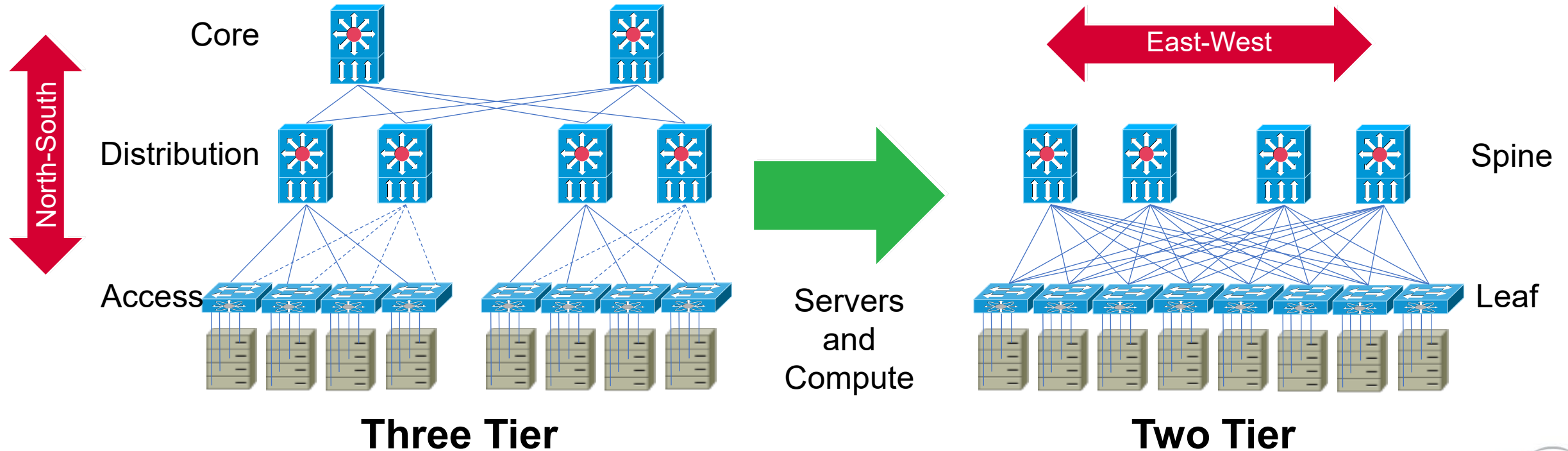
HYPERSCALE DENSITY

Volume of fibers
increasing

Modern Data Center Architecture

Spine / Leaf Fabrics

- Historically Enterprise has been a 3-tier topology – Core, Aggregation, Access
- Cloud data center networks are 2-tier topology
 - Optimized for East-West traffic
 - Speeds of 200/400/800Gbps – with movement to 1.6Tbps



Connectivity

High speeds are possible by using multiple “lanes” that can be combined into a single “pipe”.

TECHNOLOGY	LANES	MEDIA	DESCRIPTION	EXAMPLE SPEEDS
SR4 (up to 100m)	4	MM MPO-12	4 lanes – 8 fibers	100GBASE-SR4 (25G per lane) 200GBASE-SR4 (50G per lane) 400GBASE-SR4 (100G per lane)
SR8 (up to 100m)	8	MM MPO-16	8 lanes – 16 fibers	400GBASE-SR8 (50G per lane) 800GBASE-SR8 (100G per lane)
DR4 (500m)	4	SM MPO-12	4 lanes – 8 fibers	200GBASE-DR4 (50G per lane) 400GBASE-DR4 (100G per lane)
DR8 (500m)	8	SM MPO-16	8 lanes – 16 fibers	800GBASE-DR8 (100G per lane)
FR4 (2km)	4	SM LC Duplex	4 lanes – 2 fibers, 4 wavelengths per fiber	200GBASE-FR4 (50G per lane) 400GBASE-FR4 (100G per lane)

SR = Short Reach

DR = Distance Range

FR = Far Reach

Density

MMC Rack-to-Rack, MPO to the Optics

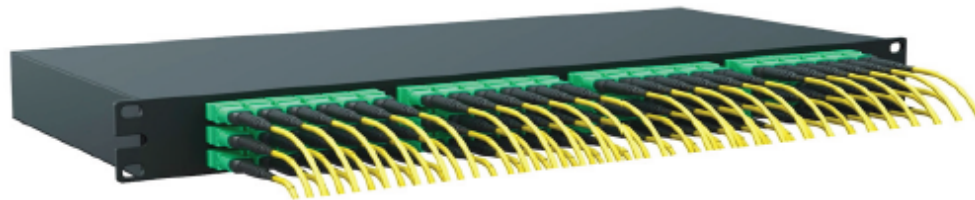
MPO



1x16

1x12

2x12



72 x MPO ports

864 fibers in 1RU using 12F MPO connectors
1,152 fibers in 1RU using 16F MPO connectors
1,728 fibers in 1RU using 24F MPO connectors

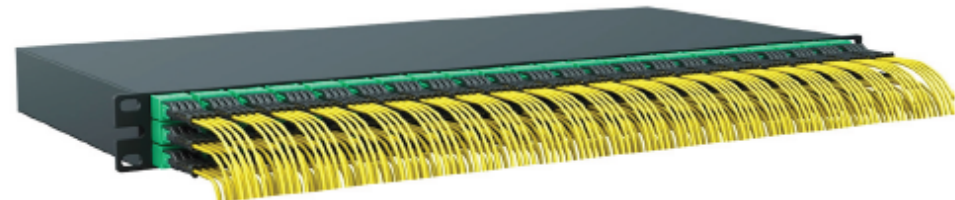
MMC



1x16

1x12

2x12



264 x MMC ports (>3x MPO in 1RU)

3,168 fibers in 1RU using 12F MMC connectors
4,224 fibers in 1RU using 16F MMC connectors
6,336 fibers in 1RU using 24F MMC connectors

*Image courtesy of
USConec*

Multifiber Test Challenges

Multifiber Test Challenges

PINING AND POLARITY
Impact on test cords
and/or reference
methods



END FACE CONDITION

Much more
challenging to keep
multifiber connectors
clean vs. simplex

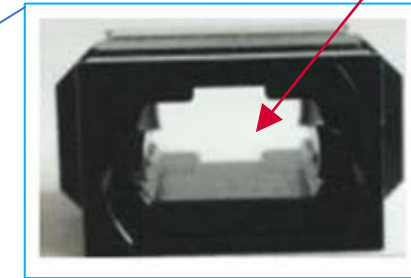
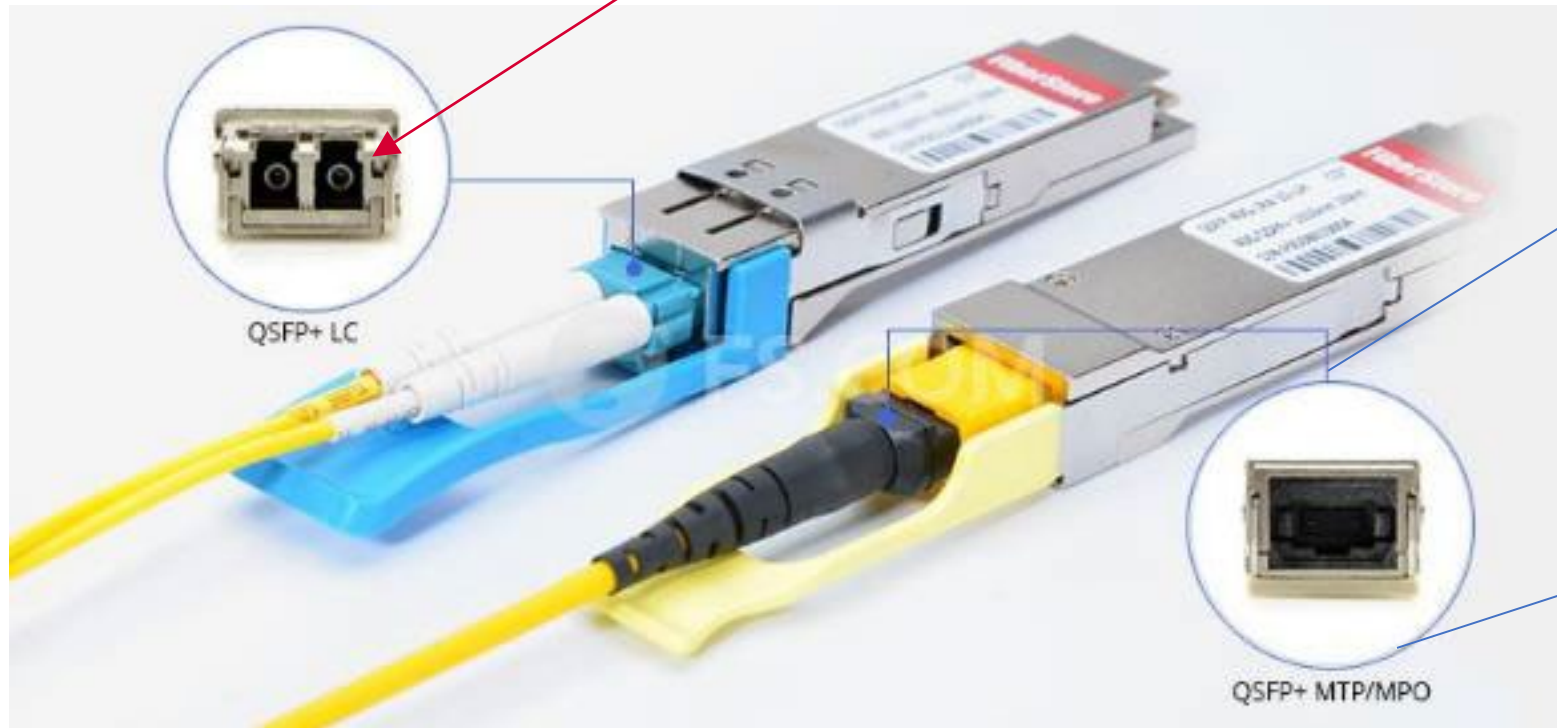
FIBER COUNTS

- 8, 12, 16, and 24
- 10's of
thousands
of links to test

End Face Condition

1.25mm sleeve = 1.2mm² area

9.5mm X 5.0mm opening = 47.5mm² area



MPO / MMC adapters have no sleeve or alignment feature, they are wide open

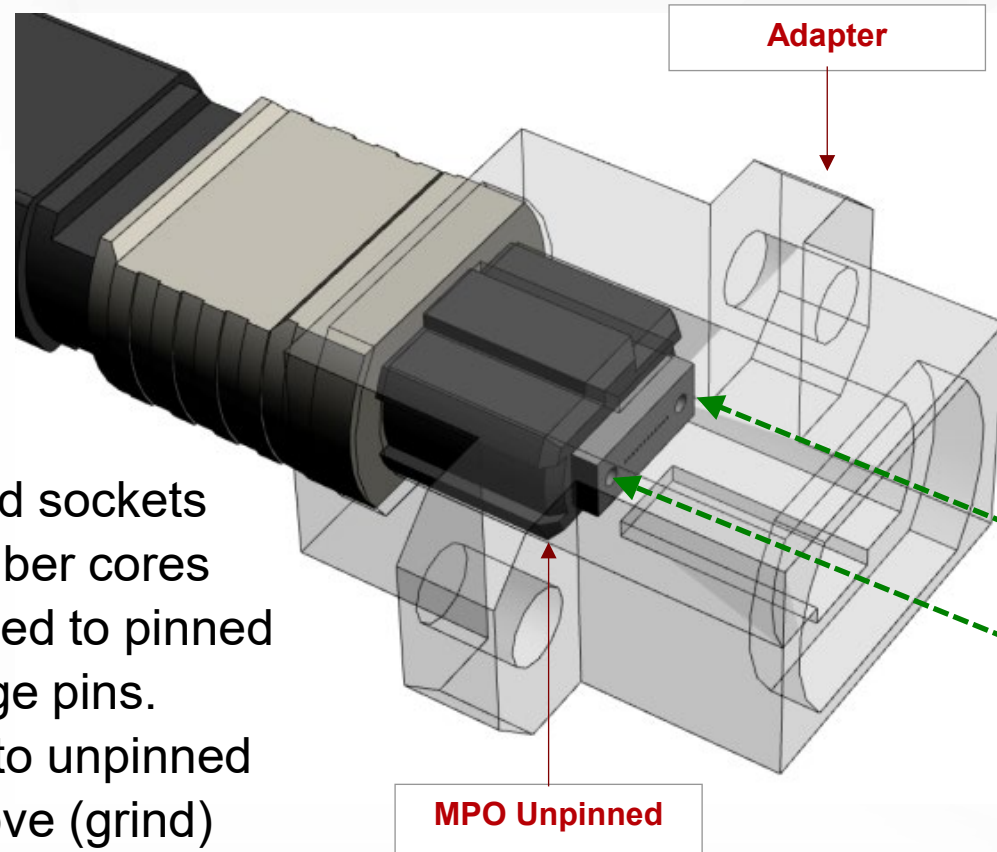
PROBABILITIES SCALE EXPONENTIALLY:

If 1 fiber is 95% likely to be clean, 12 fibers are $(0.95)^{12} = 55\%$ likely to be clean

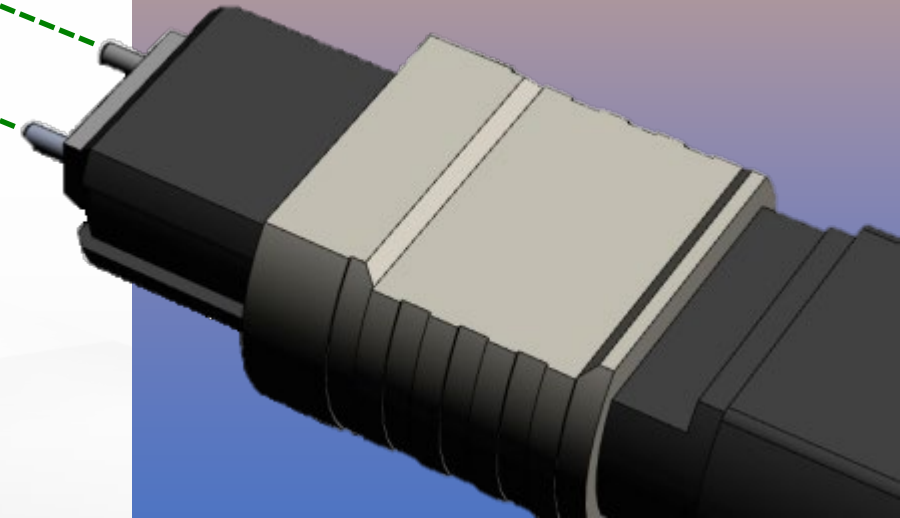
Pinned and UnPinned

Focused on the Connection

The alignment pins and sockets ensure the individual fiber cores align. Connecting pinned to pinned has potential to damage pins. Connecting unpinned to unpinned allows the fibers to move (grind) against each other – potentially damaging the fibers – as well as not providing core alignment.



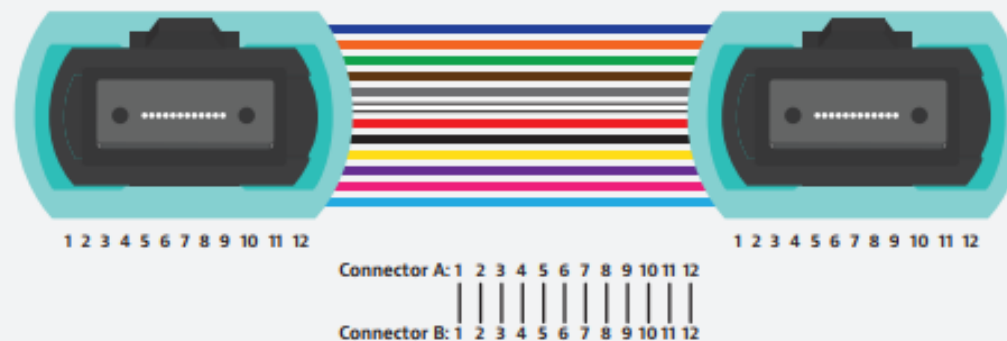
MPO Pinned



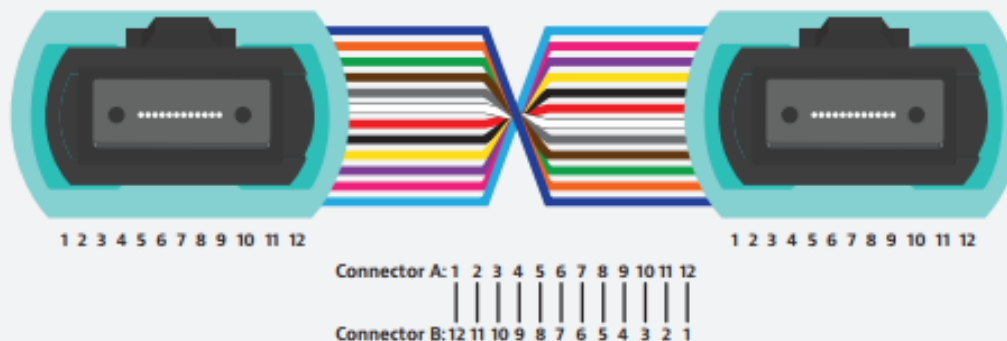
Polarity

Set Reference
Polarity Needs
to Match System
Polarity

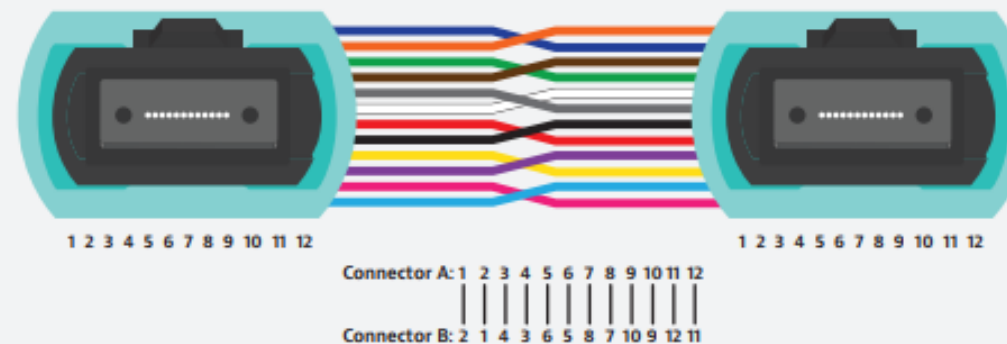
Type A Cable



Type B Cable

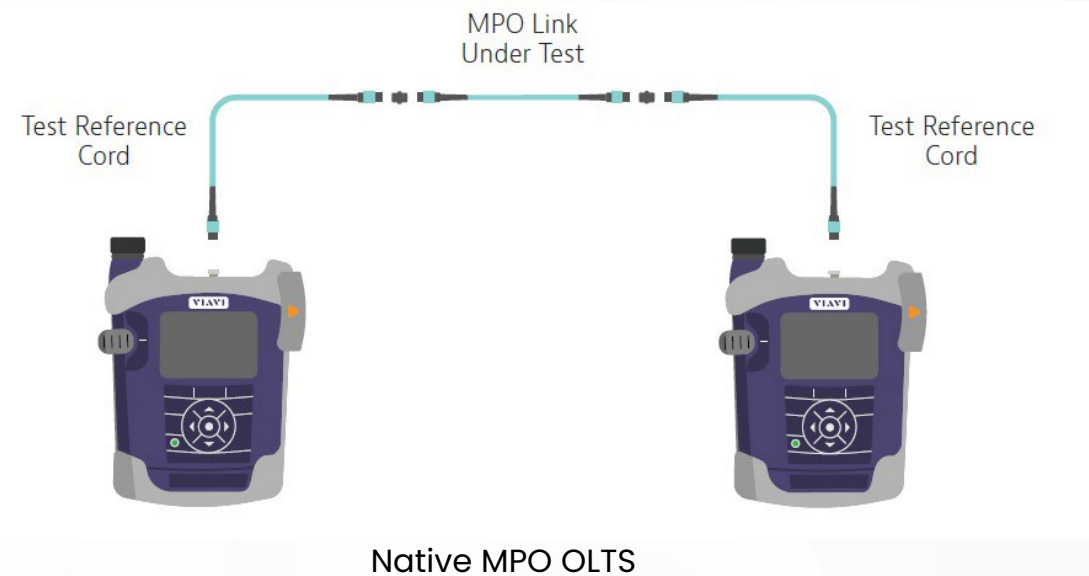
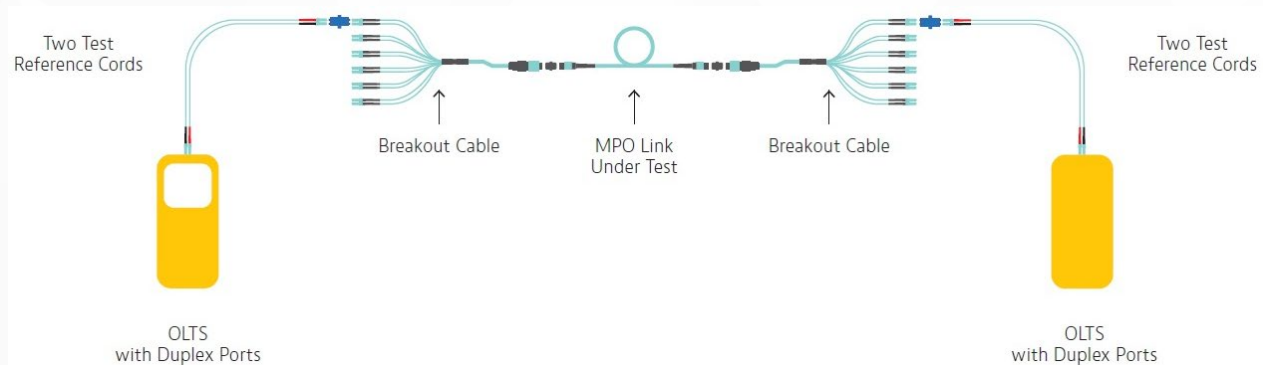


Type C Cable



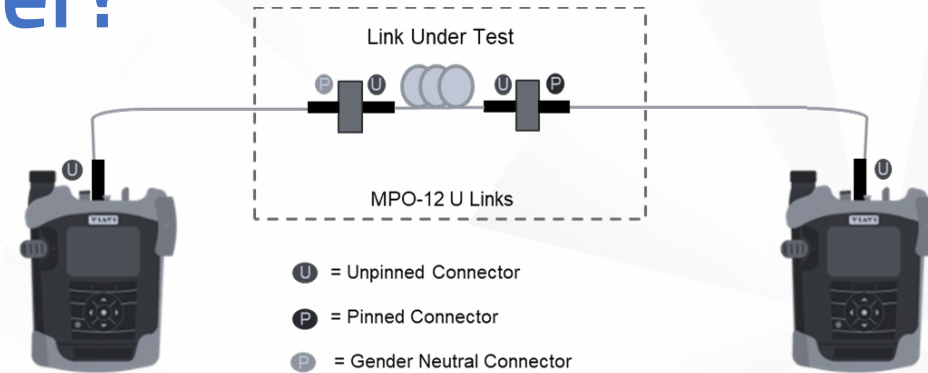
12F MPO Testing

Duplex Tester vs. 12F Tester

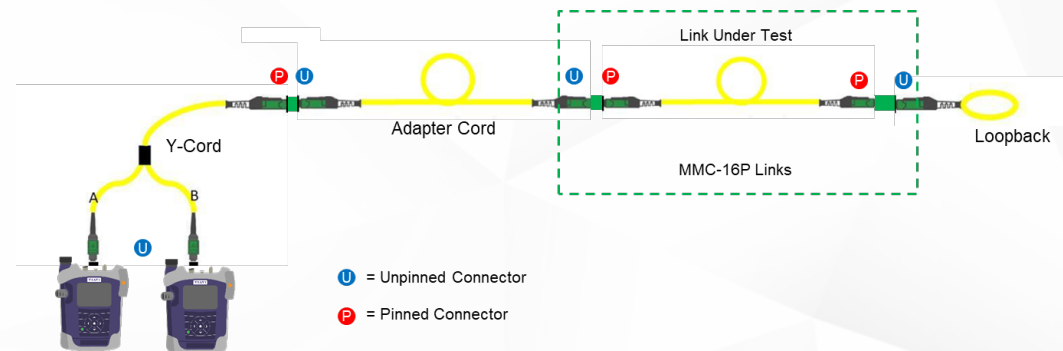


How to Adapt to Different Multifiber Systems, from a MPO-12 Pinned native tester?

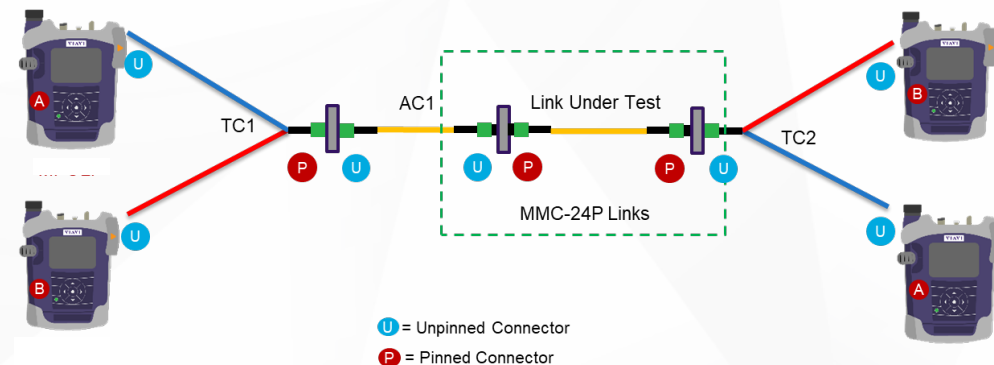
MPO-12: cord reference with gender neutral cords



MMC-16: Loopback reference with adapter cord

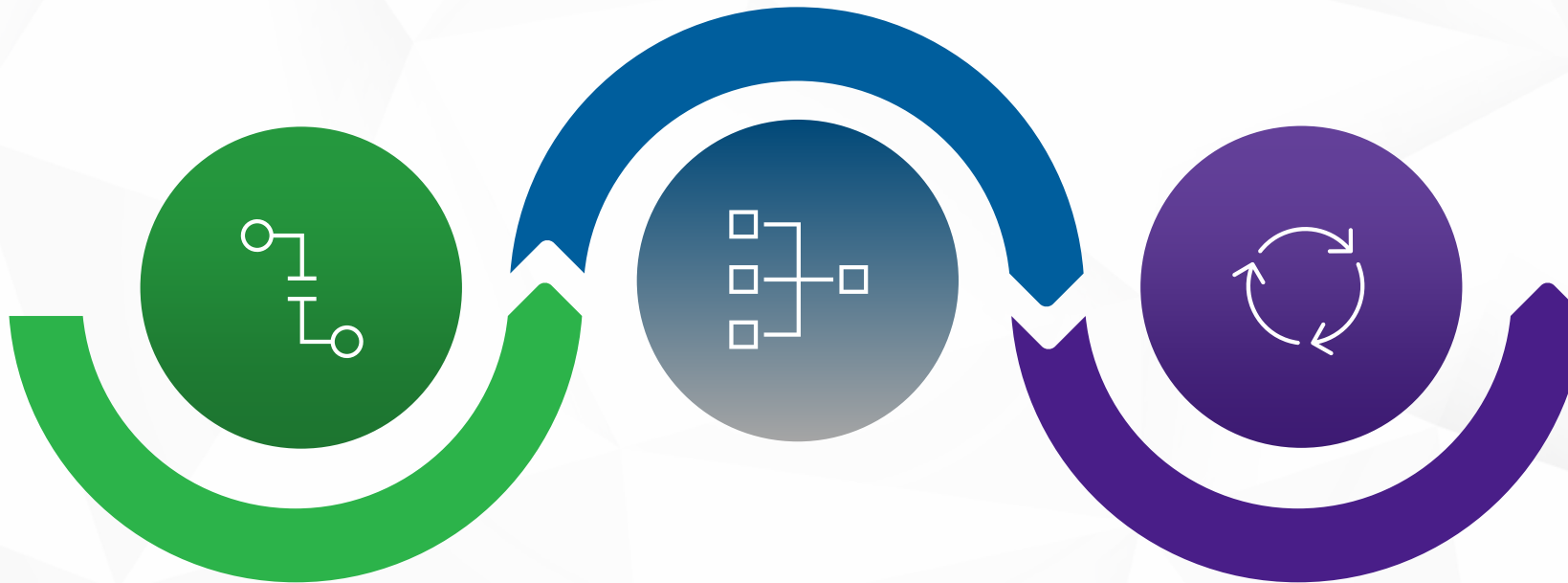


MMC-12Y-cables with adapter cord



Overcoming the Challenges

Native MULTIFIBER
Tier 01 Certifier
Simple references for
MPO and MMC links



Native MULTIFIBER
INSPECTION PROBE
Purpose built for
modern connectivity
and density

TEST PROCESS
AUTOMATION
Workflow is more
than the
instrument

Questions?



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