

Stretched MetroCluster with Optical SAS and Fibre Bridge in a Nutshell

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Agenda

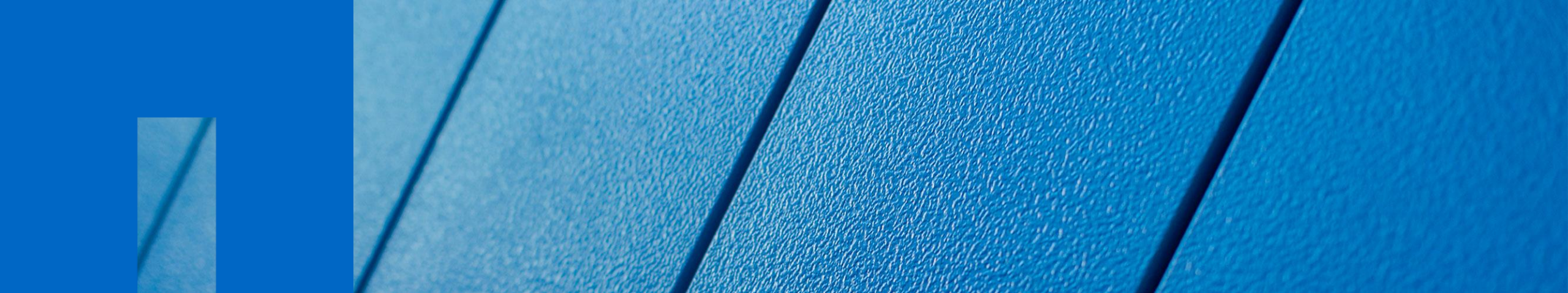
- Optical SAS
 - Basics + Value proposition
 - NetApp optical SAS components
 - Checklist / Blacklist
 - Typical Scenarios
 - With / without patchpanel
 - Multimode / Singlemode
- Fibre Bridge



Stretched MC Distances Overview

Incl. Patch Cable

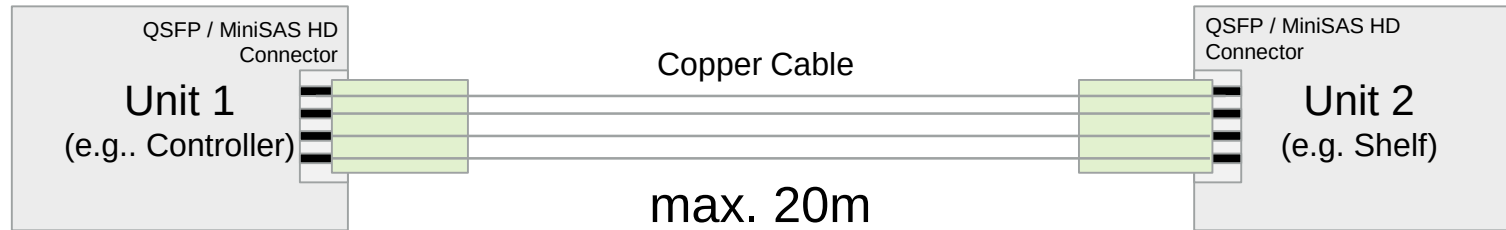
	0m	50m	90m	100m	150m	500m
Distanz	bis 50m	bis 90m	bis 100m	bis 150m	bis 500m	
Optical SAS 6 Gb/s	AOC		Multimode* OM3	OM4	Singlemode	
Optical SAS 12 Gb/s	AOC	Multimode*				
ATTO 6500 8 Gb/s			Multimode*			
ATTO 7500 16 Gb/s		Multimode*			Singlemode	



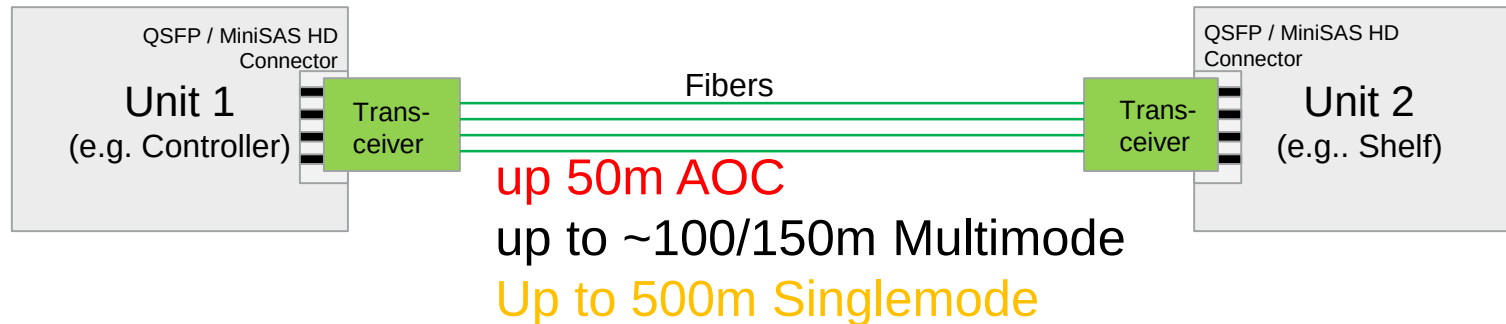
Optical SAS Overview

Optical SAS Basics

- Classical Copper SAS Cable



- Optical SAS Cable



Value Proposition

- Better flexibility
 - longer SAS distances possible
 - Up to ~100/150m Multimode (compared to 20m with Copper SAS Cables)
 - Up to 500m (Singlemode)
 - SyncMirror without MetroCluster into a second fire protection area
- Better Availability
 - Unmonitored Fibre Bridges are avoided
- Savings compared to 2 Fibre Bridges per Stack-Pair:
 - 4 RU less space (2 full DS2246/DS224C-HD-Stacks now fit in a 42RU rack)
 - Less energy
 - Less cost

Optical SAS Components 6 Gb/s

AOC-Cable

(Multimode)

Up to 50m

X66000A-R6 (1m)
X66001A-R6 (2m)
X66002A-R6 (3m)
X66003A-R6 (5m)
X66004A-R6 (7m)
X66005A-R6 (15m)
X66006A-R6 (30m)
X66007A-R6 (50m)



Breakout-Cable

Singlemode

with fixed Transceiver

Choice between LC-, SC or
MT-RJ-Connector

X66014A-R6 (5m LC)
X66015A-R6 (30m LC)



Transceiver

(Multimode)

X65400A-R6



QSFP

MPO

Breakout-Kabel Multimode

MPO to „something with 2 fibers“:
Choice between LC, SC
or MT-RJ-Connector

X1945A-R6 (5m LC)
X1946A-R6 (30m LC)

Hint: Only 8 of the
12 fibers are used



Optical SAS Components 12 Gb/s

AOC Cable

miniSAS HD to miniSAS HD
(Multimode) up to 50m

X66040A (1m)

X66041A (2m)

X66042A (3m)

X66043A (5m)

X66044A (15m)

X66045A (30m)

X66046A (50m)



Breakout Cable

Singlmode

With fixed
Transceiver

Breakout Cable Multimode

Mith fixed transceiver

MiniSAS HD to LC-Connectors

Hint: Only 8 of the
12 fibers are used

X66047A (5m)

X66048A (30m)



No unbundled transceiver (miniSASHD to MPO) available!

Checkliste

- Patch panel (if applicable)
- Enough fibers?
 - At least 36 fibers (=18 LC connectors) free (32 per stack-pair + 4 FC-VI)
 - At least OM3/OM4 Multimode fiber quality
- Distance short enough?
 - Point2point distance max. 150m with OM4/6Gb, 100m with OM3/6Gb and OM4/12Gb
 - Total length of the chain max. 510m with Single-Mode
 - homogeneous distances (don't mix 2 trunks with different lengths!)
- Suitable ONTAP?
 - ONTAP 8.1.3 or 8.2.1 (no 8.2!) for 7-Mode Metrocluster
 - ONTAP 8.3.1 for c-Mode MetroCluster (only 2-Node)
 - ONTAP 9.1 for c-Mode MetroCluster (only 2-Node) with 12Gb/s
- Enough SAS ports at the controller (4 per stack-pair)?
- Stack limits met?



Blacklist (**don'ts**)

- Fabric MetroCluster
- Limited fiber count and quality between the data centers
- DS4243 Shelves (3 Gb IOMs are forbidden)
- DS4486 Shelves (not supported in Metrocluster, pure Syncmirror is supported)
- FAS22xx/FAS25xx/FAS26xx
- Fibers distributed over Fiber trunks with different lengths
- Optical SAS behind Fibre Bridges



Optical and Copper-SAS mixed

- Yes, but:
 - Connections between controller and shelves with optical SAS.
 - Connections between the shelves have to be equal (all optical or all copper)
 - If connections between the shelves are optical, the connections between controller and shelves have to be optical too
- Resulting supported combinations
 - a) All copper
 - b) All optical
 - c) Controller-Shelf optical, Shelf-Shelf copper

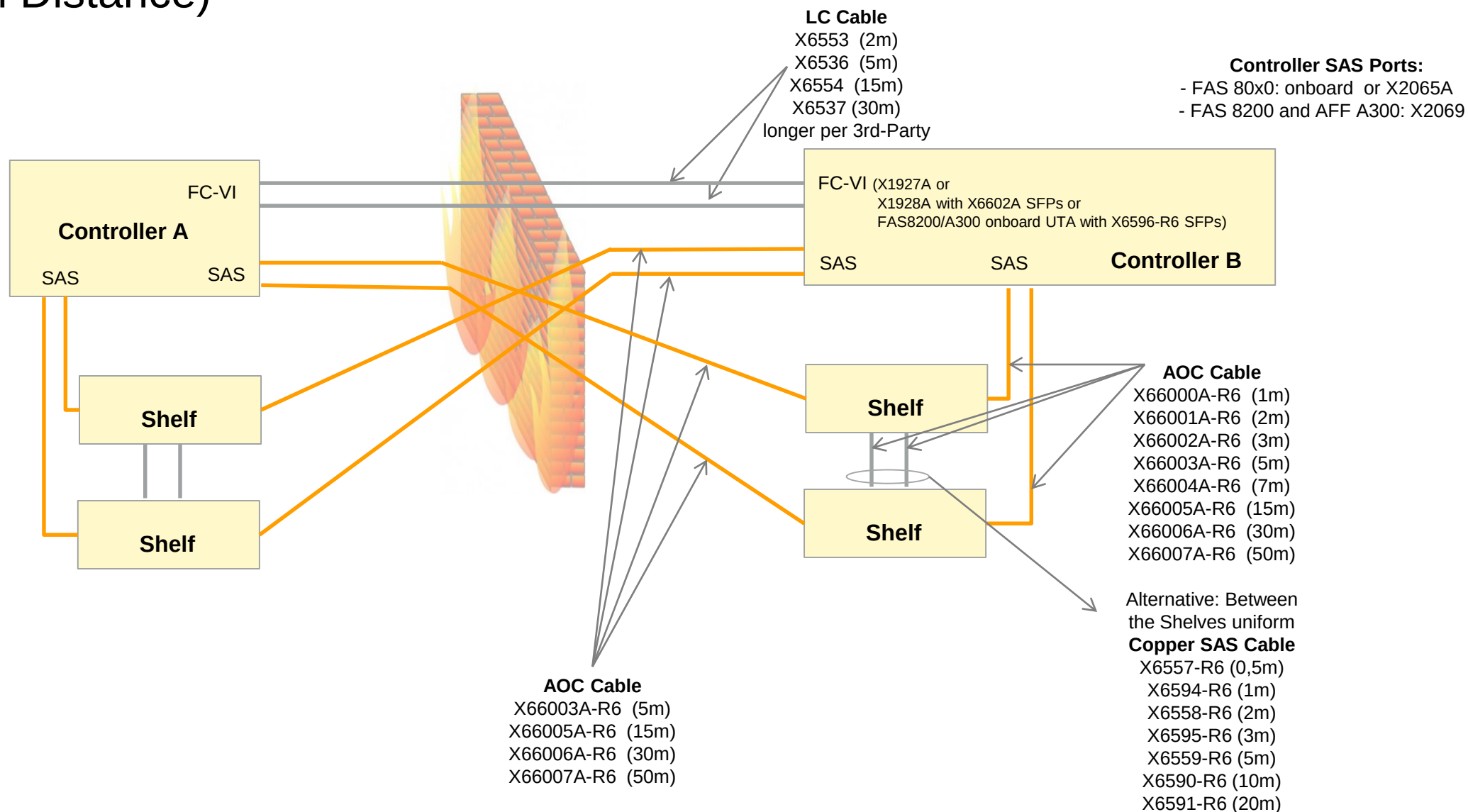


The old Optical SAS World

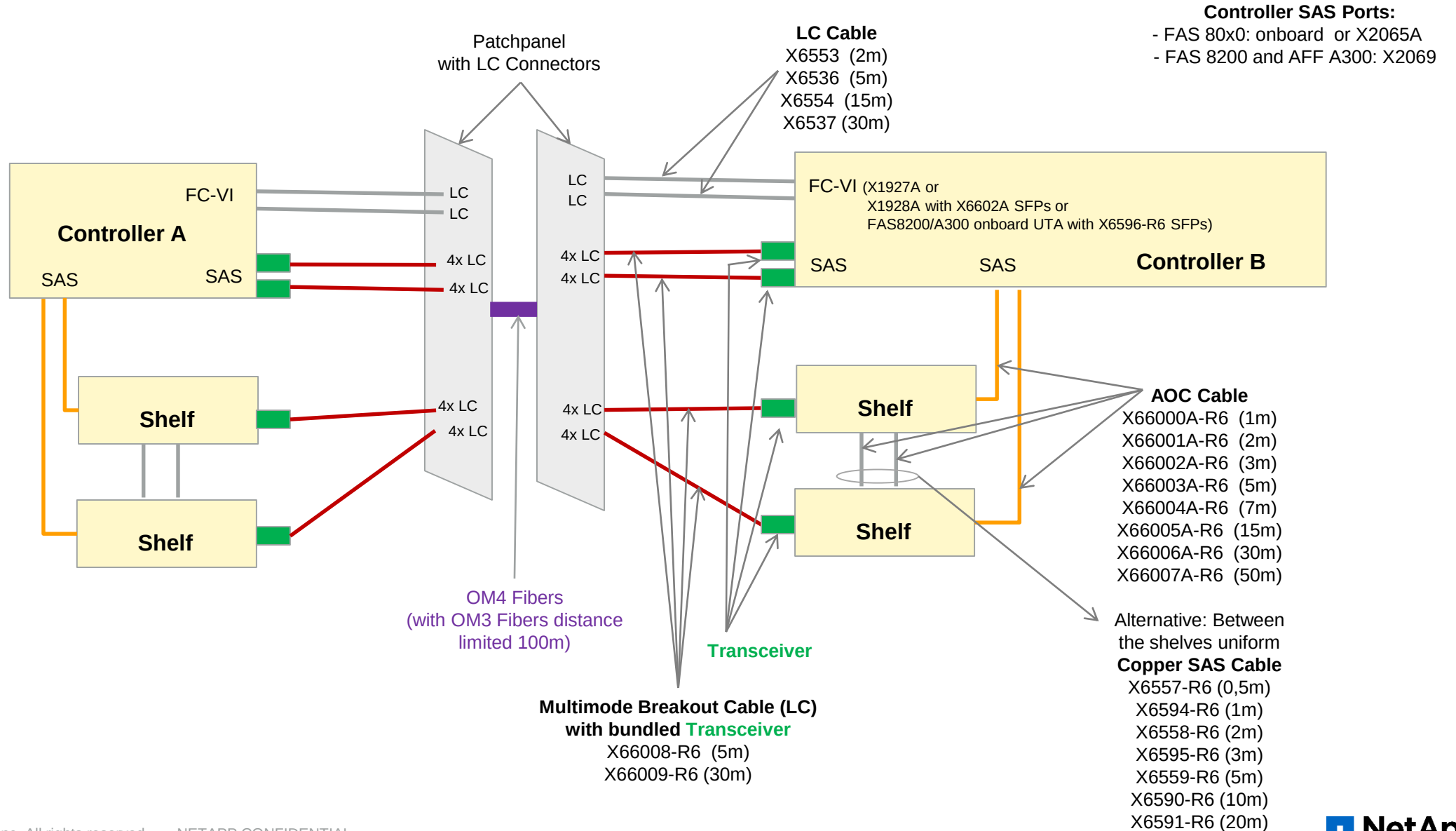
6 Gb/s Technology for DS2246+DS4246
and SAS-Ports with QSFP Connectors



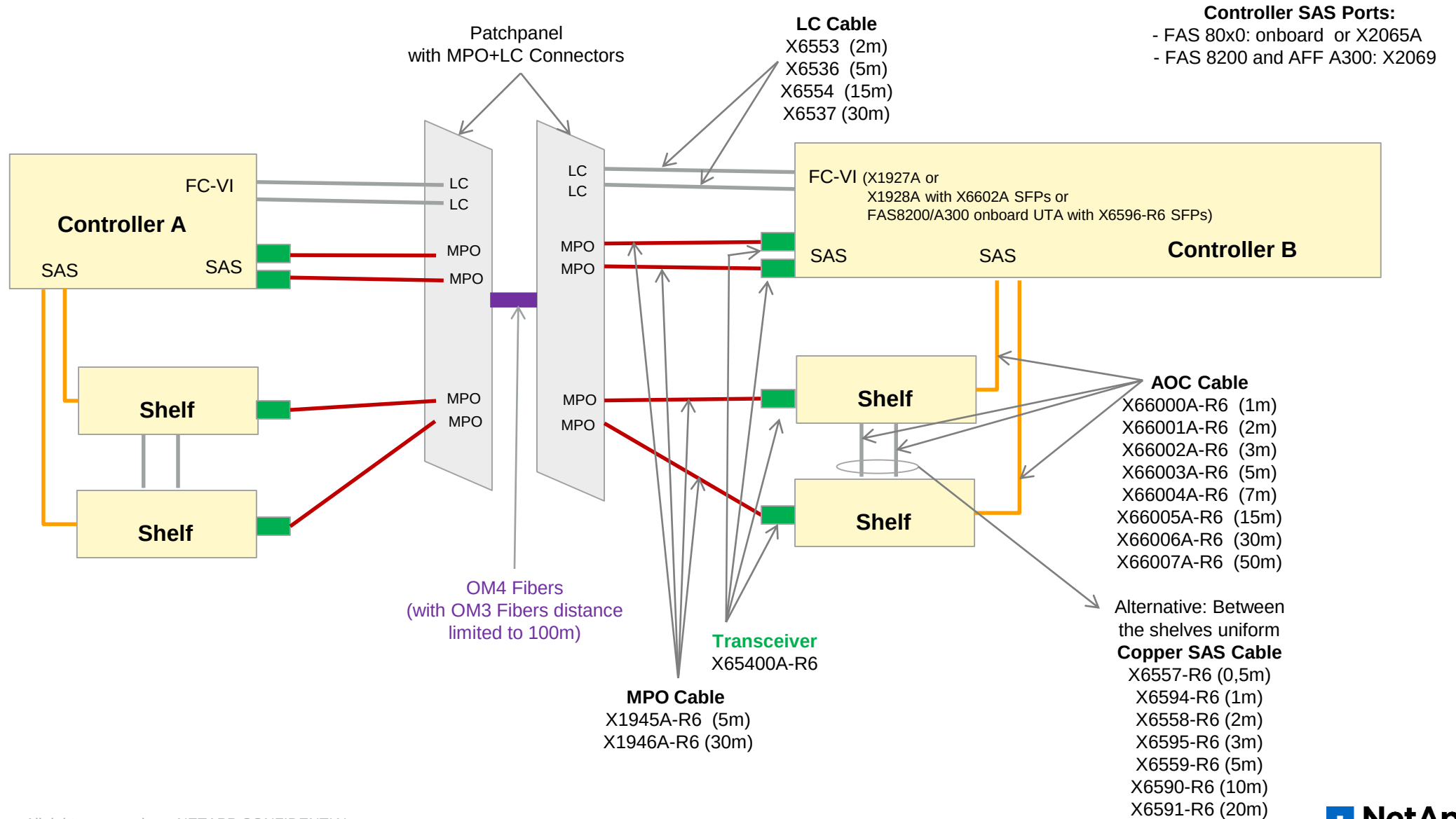
Optical SAS Stretched Metrocluster Cabling without Patchpanels (up to 50m Distance)



Optical SAS Stretched Metrocluster Cabling with LC Multimode Trunk and Patchpanels (up to 150m Distance)



Optical SAS Stretched Metrocluster Cabling with MPO+LC Multimode Trunk and Patchpanels (up to 150m Distance)



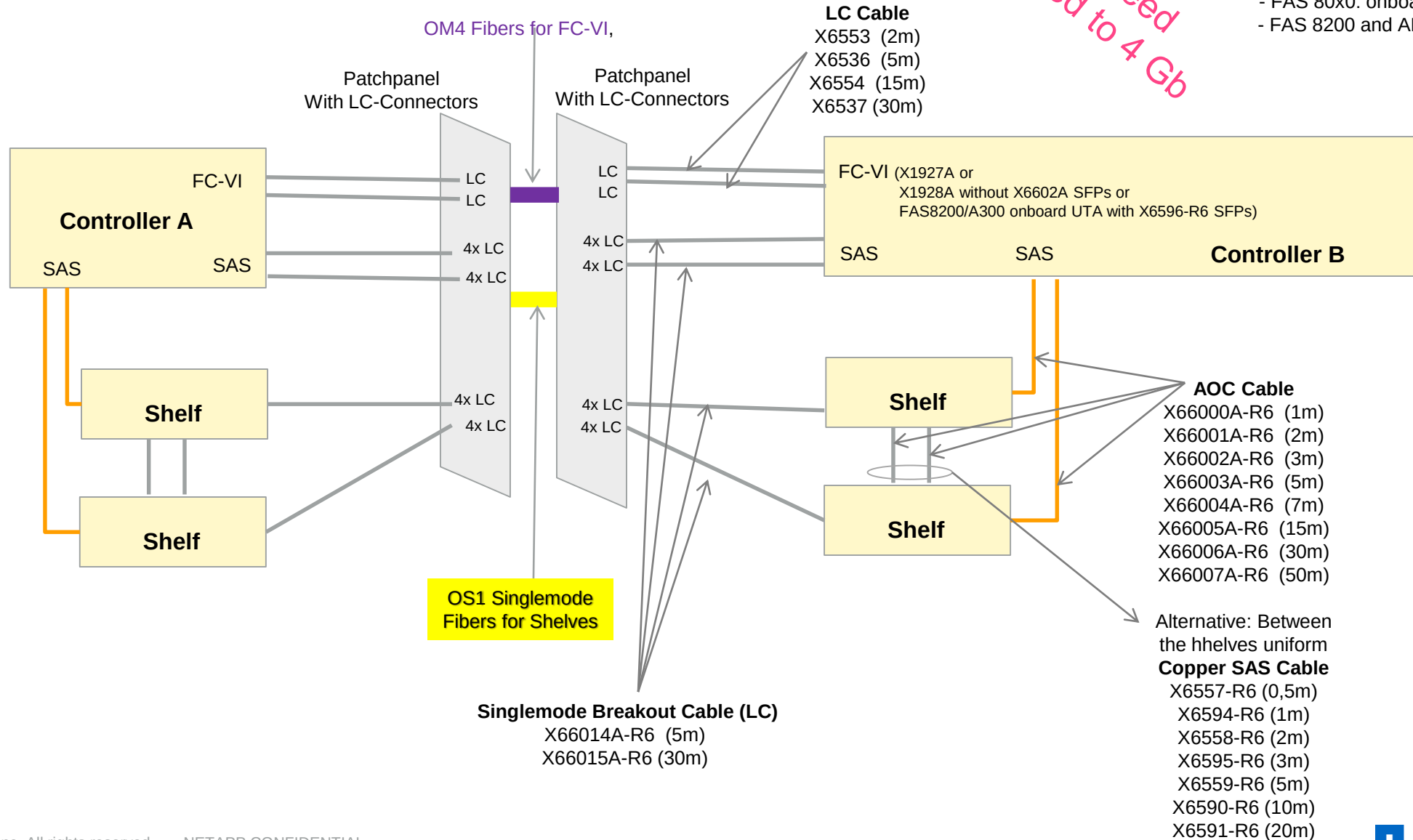
Optical SAS Stretched Metrocluster Cabling

with LC Multi+Singlemode Trunk und Patchpanels (150-270m Distance)

Attention:
FC-VI Speed
reduced to 4 Gb

Controller SAS Ports:

- FAS 80x0: onboard or X2065A
- FAS 8200 and AFF A300: X2069



Optical SAS Stretched Metrocluster Cabling with LC Singlemode Trunk and Patchpanels

(150-500m Distance between Controller and first Shelf)

(max. 510m between Controller and last Shelf)

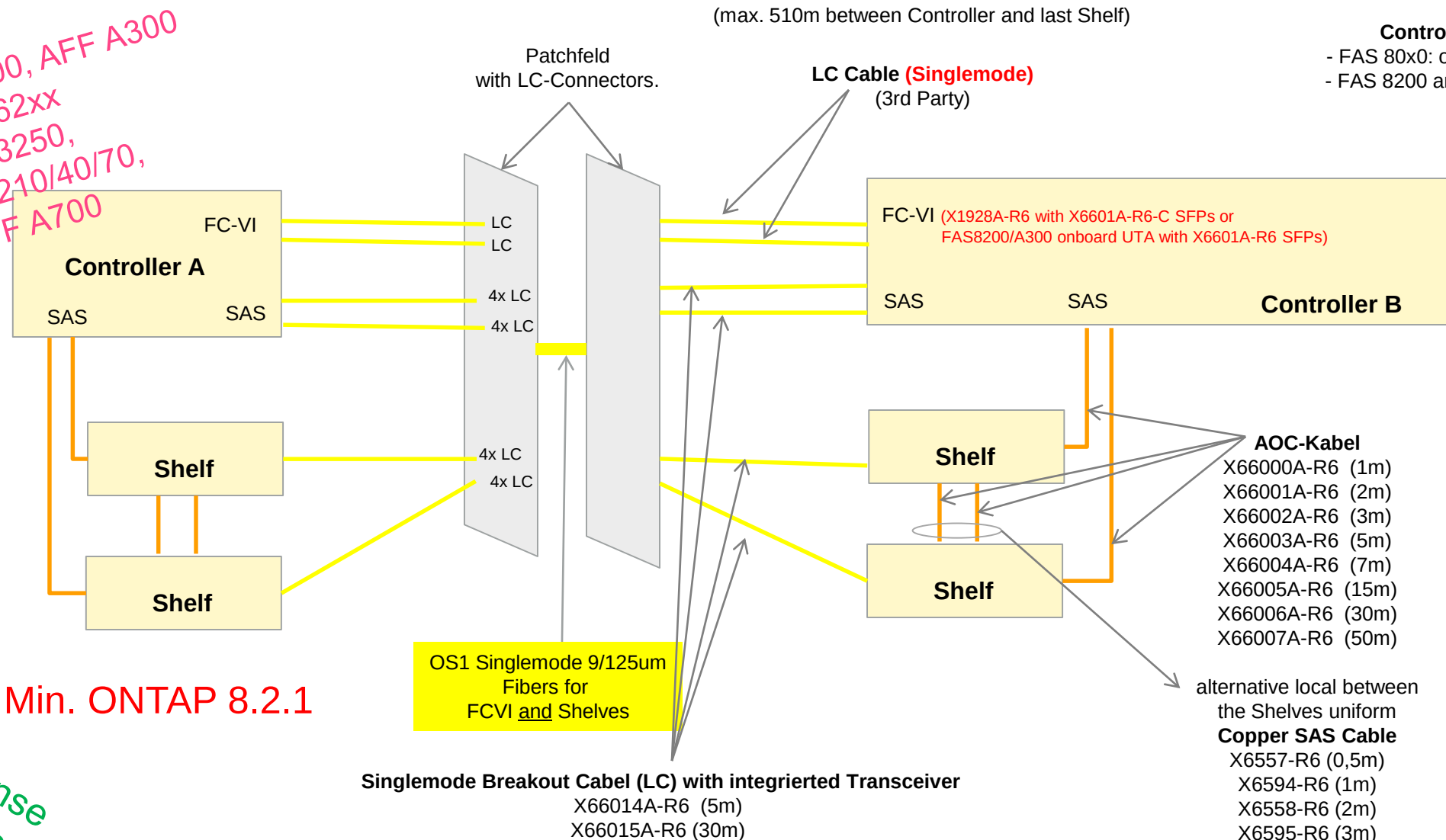
Controller SAS Ports:

- FAS 80x0: onboard or X2065A
- FAS 8200 and AFF A300: X2069

Only for FAS8200, AFF A300
and FAS8000, 62xx
and FAS3220/3250,
Not for FAS 3210/40/70,
FAS9000, AFF A700

Min. ONTAP 8.2.1

Only makes sense
for 150+m Distance



Support SAS Connectors at the Controller

- onboard SAS Ports (FAS 80x0)
- X2065A (Standard 4-Port SAS HBA)
- X2067 (Vertical SAS HBA for V62x0)
- X2069 (clocked down to 6Gb/s)



The new Optical SAS World with SAS-3 / 12 Gb/s

For DS224C/DS424C and
old DS2246/DS4246 with IOM12 Upgrade



Turbo Glowworm – Optical SAS with 12Gb

Total Distance max. 100m (up to 90m recommended)

■ SAS-3 AOC Optical Cables

- X66040A 112-00449 1m Active Optical Cable (MiniSAS HD connectors)
- X66041A 112-00450 2m Active Optical Cable (MiniSAS HD connectors)
- X66042A 112-00451 3m Active Optical Cable (MiniSAS HD connectors)
- X66043A 112-00452 5m Active Optical Cable (MiniSAS HD connectors)
- X66044A 112-00453 15m Active Optical Cable (MiniSAS HD connectors)
- X66045A 112-00454 30m Active Optical Cable (MiniSAS HD connectors)
- X66046A 112-00455 50m Active Optical Cable (MiniSAS HD connectors)

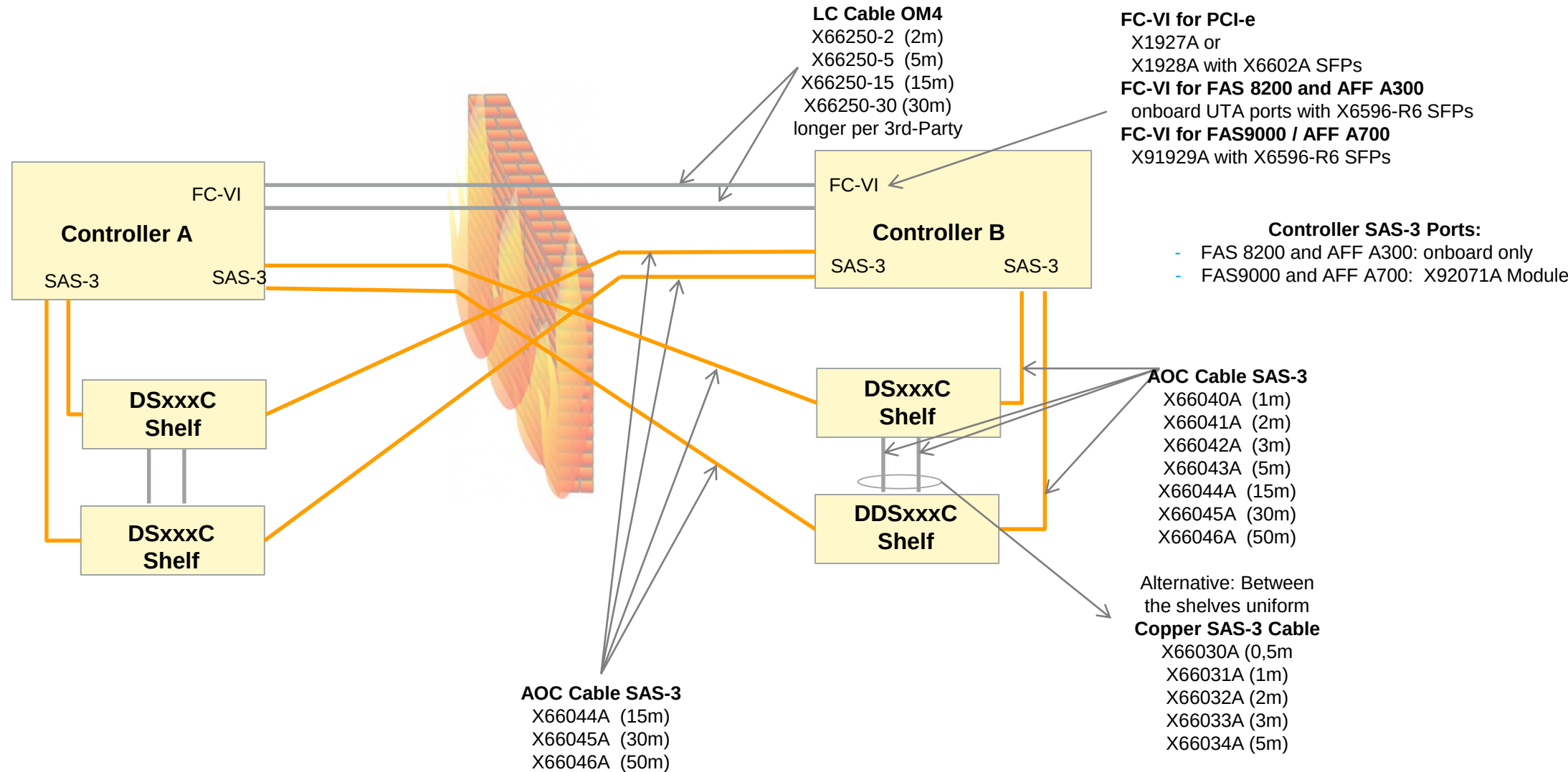
■ SAS-3 MM Breakout Optical Cables with integrated Transceiver

- X66047A 112-00456 5m MiniSAS HD to LC breakout (for patch panels)
- X66048A 112-00457 30m MiniSAS HD to LC breakout (for patch panels)

■ Hints:

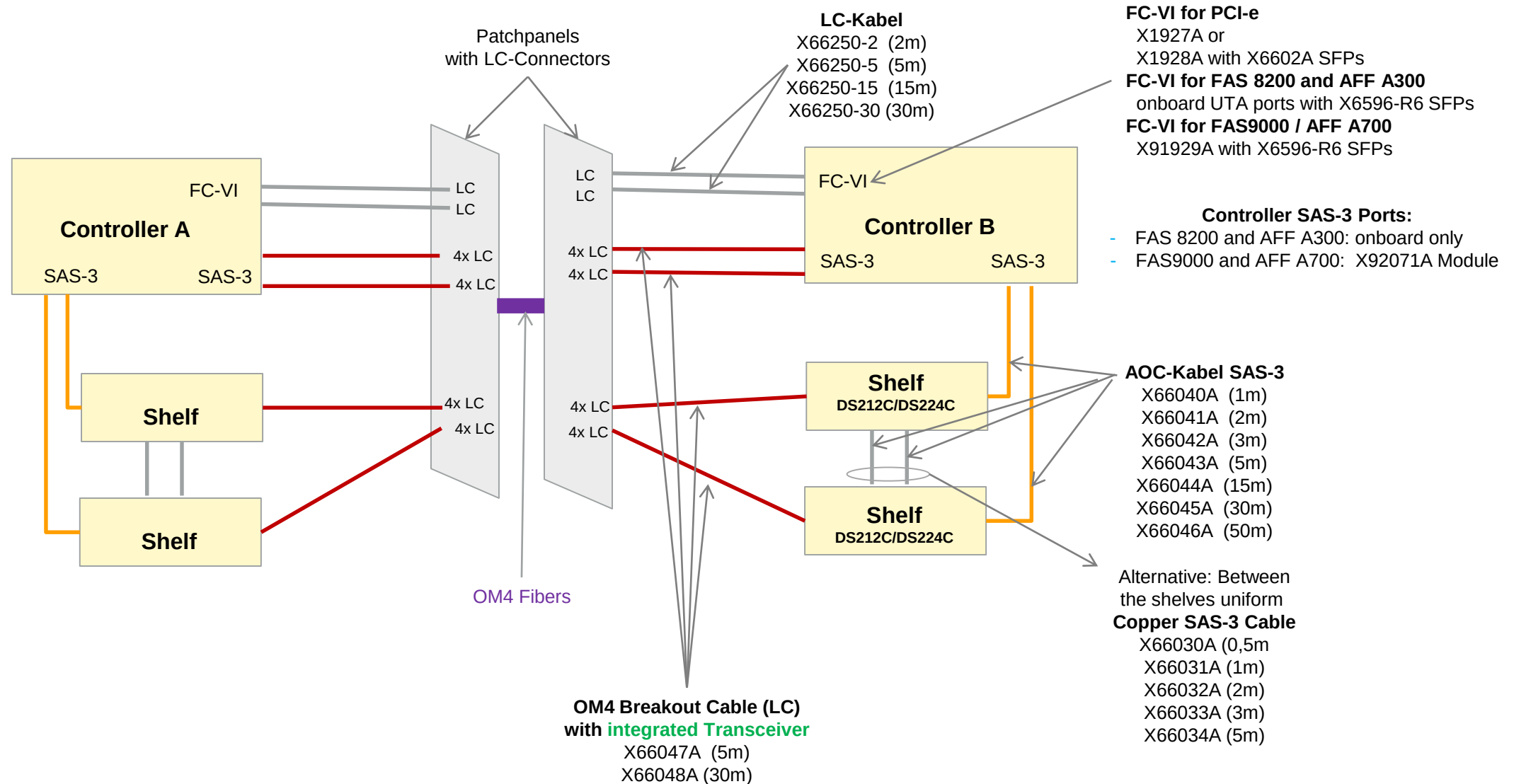
- SAS-3 MM Transceiver for PCIe-Controller not available. X65400A-R6 is only 6 Gb/s capable
- Yet **no** Singlemode available!

Optical SAS-3 (12 Gb/s) Stretched Metrocluster Cabling **without** Patchpanel (up to 50m Distance)



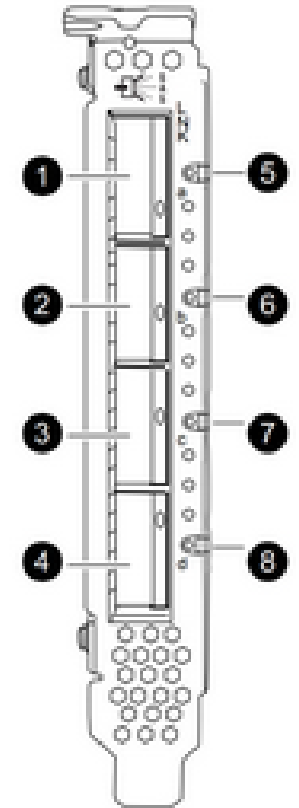
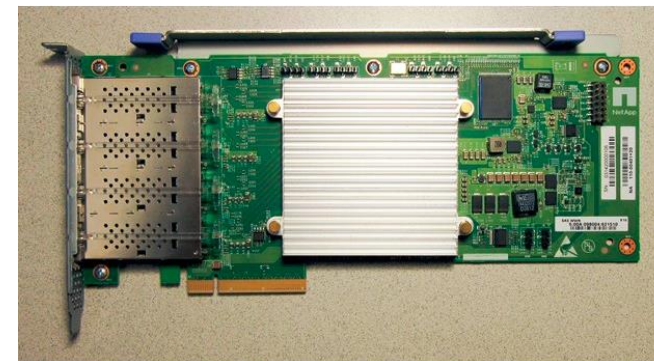
Optical SAS-3 12Gb/s Stretched Metrocluster Cabling with LC Multimode Patchpanel

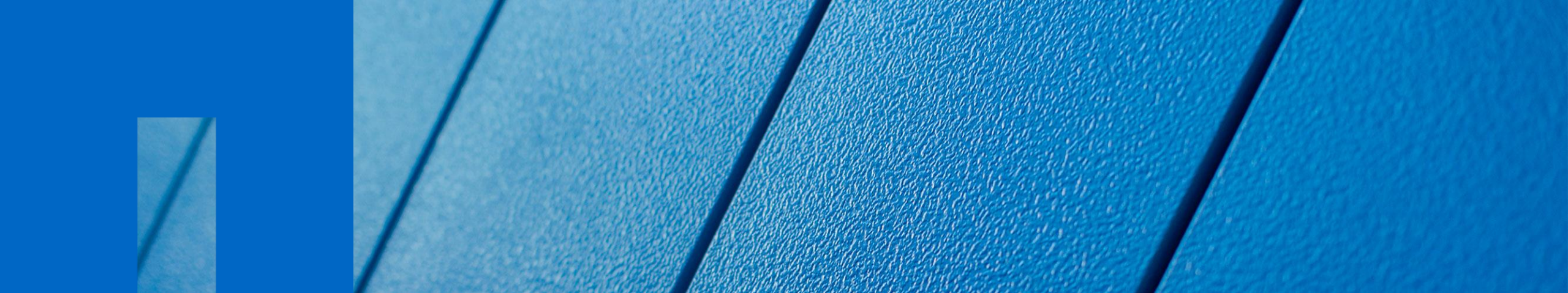
(up to 100m Distance, recommended max. 90m)



Attention: X2069-R6 Adapter for Platforms with PCIe Slots

- SAS-3 with 12Gb/s
- **QSFP Connectors**
- Suitable Optical SAS Transceiver: X65400A-R6 (332-00335) is **only 6 Gb/s capable**
- End Results:
 - Yet no 12 Gb/s Optical SAS for FAS8000
 - FAS8200 / AFF A300 max. 1 stack pair with onboard SAS ports



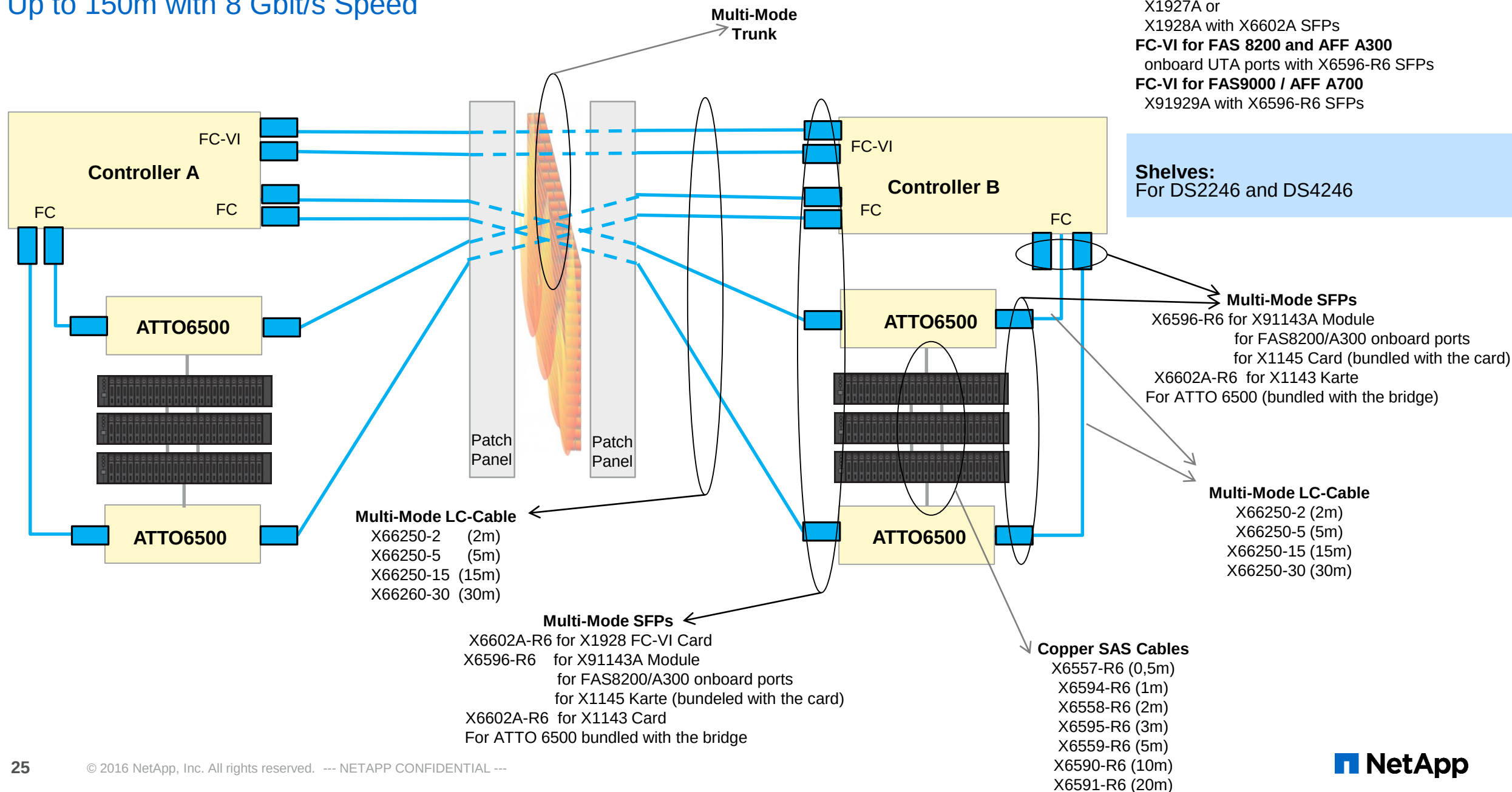


Stretched MetroCluster with Fibre Bridges



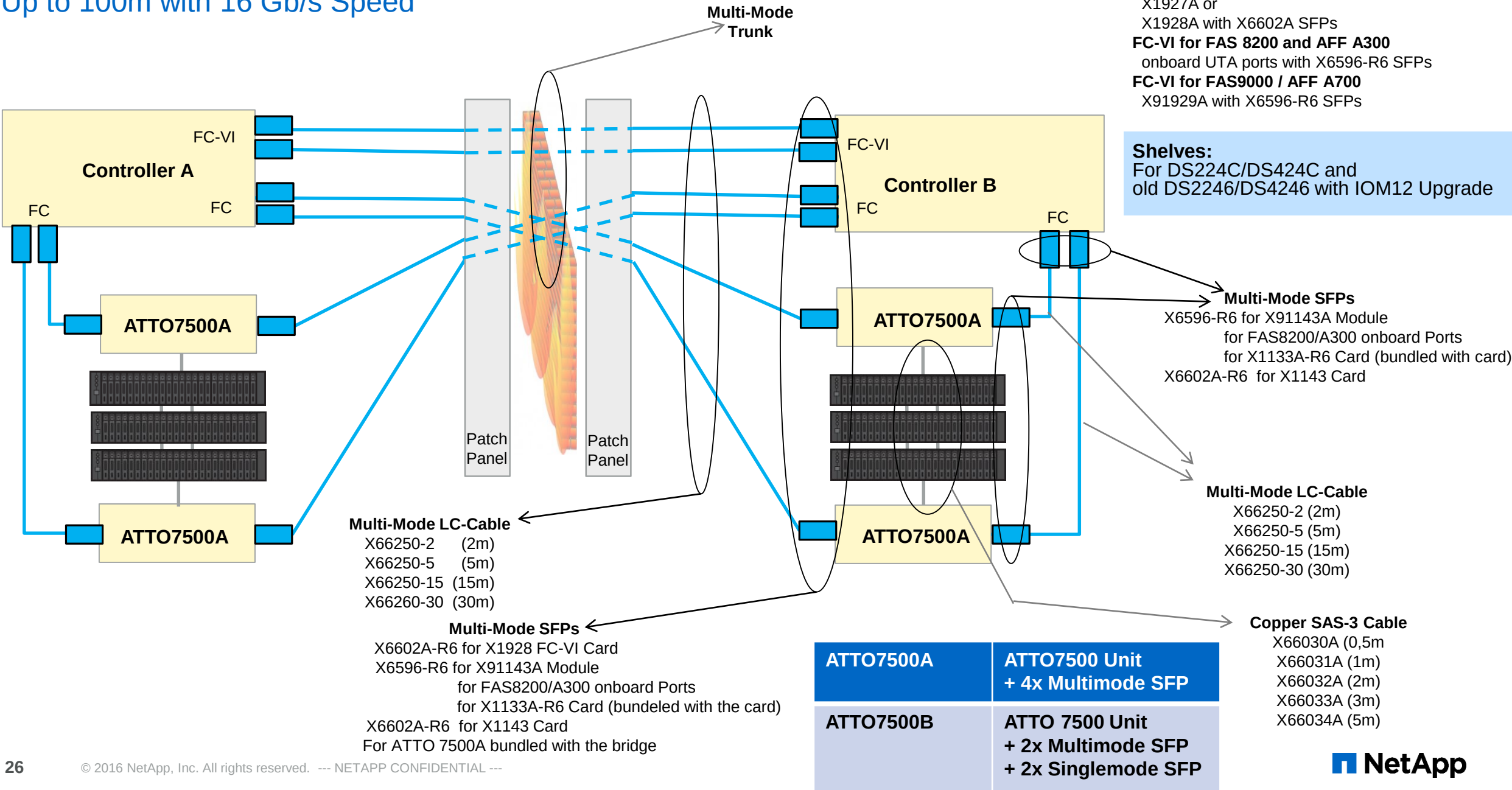
Multi Mode Stretched MC with 8 Gbit ATTO 6500 Fibre Bridges

Up to 150m with 8 Gbit/s Speed



Multi Mode Stretched MC with 16 Gb/s ATTO 7500 Fibre Bridges

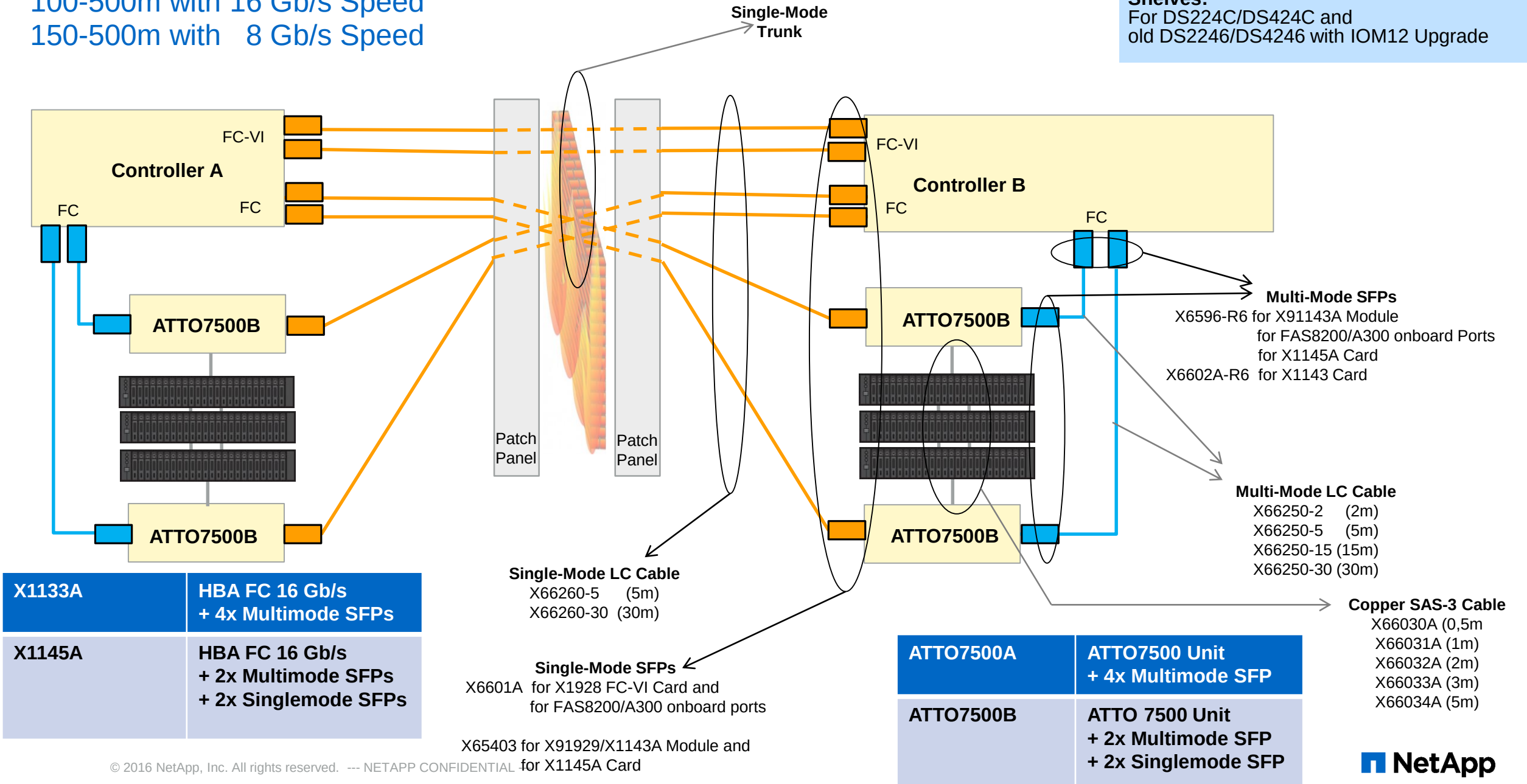
Up to 100m with 16 Gb/s Speed



Single Mode Stretched MC with 16 Gbit ATTO 7500 Bridges

100-500m with 16 Gb/s Speed
150-500m with 8 Gb/s Speed

Shelves:
For DS224C/DS424C and
old DS2246/DS4246 with IOM12 Upgrade



Fiber Type Mix within one Point to Point Connection

(e.G. Singlemode SFPs with Multimode Cables)

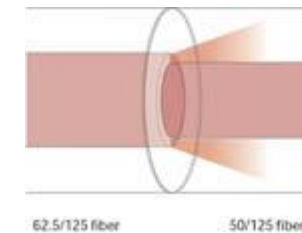
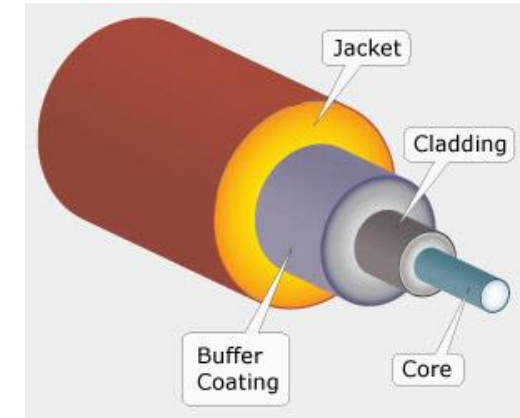
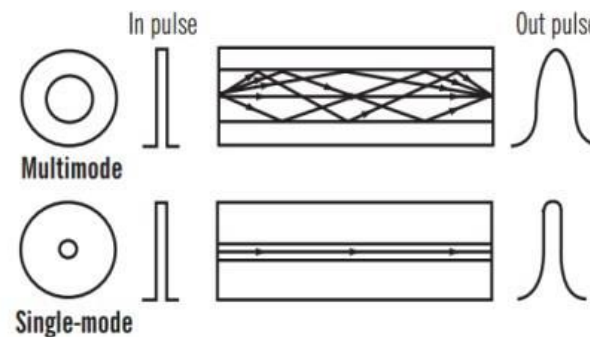
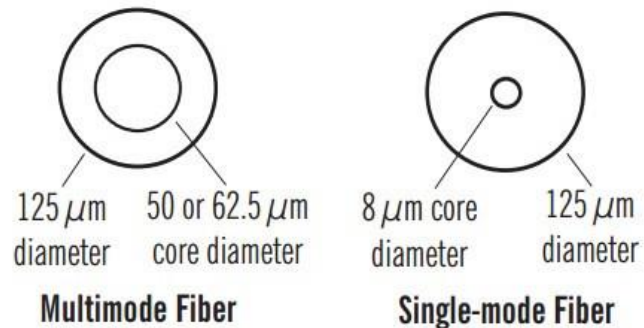
Strictly forbidden (because of different core diameters) !!

■ Allowed

- Multimode (50/62,5 μm) to Multimode (50/62,5 μm)
- Singlemode (8 μm) to Singlemode (8 μm)

■ Forbidden

- Multimode (50/62,5 μm) to Singlemode (8 μm)



A photograph of a modern building's exterior. The building features large glass windows on the left and a wall of blue panels on the right. A large, white, rectangular architectural element is mounted on the blue wall. The text "In all other cases: Ask your friendly NetApp SE!!" is overlaid in red.

In all other cases:
Ask your friendly NetApp SE!!