



NVIDIA Interconnect Cabling Requirements for IB NDR and 400G ETH Solutions

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This document provides an overview and prerequisites for installing both Single-Mode and Multi-Mode interconnect orchestration using 100Gbs per lane in the data center.

The new InfiniBand (IB) NDR and 400G Ethernet (ETH) interconnects make extensive use of pluggable optical transceivers and detachable optical fibers for easier installation, inspection and debugging.

For more information on best practices and recommendations to ensure best performance of our cables, refer to [NVIDIA Cable Management Guidelines](#) .

Structured Cabling

Structured cabling eases servicing of the optical transceivers in the data center as transceivers are detachable from the cable. This also allows easier installation since there are no ESD sensitive or bulky transceivers involved in the cabling.

Patch panels and trunk cables add further flexibility to the infrastructure.

Pluggable optical cables require special installation and cleaning procedures to avoid mishandling and bricking these products.

The maximum reach specifications of NVIDIA IB NDR and 400G ETH transceivers assume two optical connector junctions or patch panels in the link, a total of 4 ferule-to-ferule connections (See [LC-FR4 Connectivity](#) diagram).

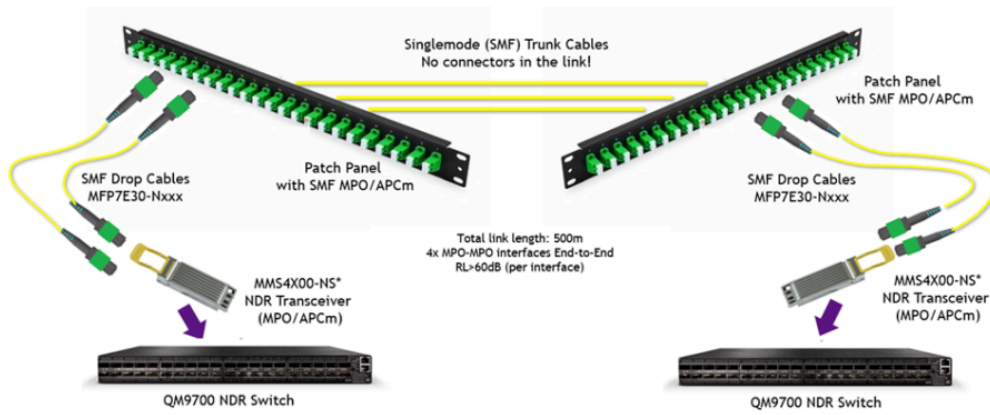
1. MPO Multi-Mode straight and splitter cables: Total length up to 50m (inc. patch panels, trunk, and cables).
2. MPO Single-Mode splitter cables: Total length up to 50m (inc. patch panels, trunk, and cables).
3. MPO Single-Mode straight cables: Total length up to 500m (inc. patch panels, trunk and cables).
4. LC Single-Mode straight cables: Total length up to 2000m (inc. patch panels, trunk and cables).

Patch Panels

Patch panels have multiple ports that connect multiple devices together and help organize the cables connecting them. The following diagrams illustrates how to connect the different devices together with either Single-Mode or Multi-Mode cables.

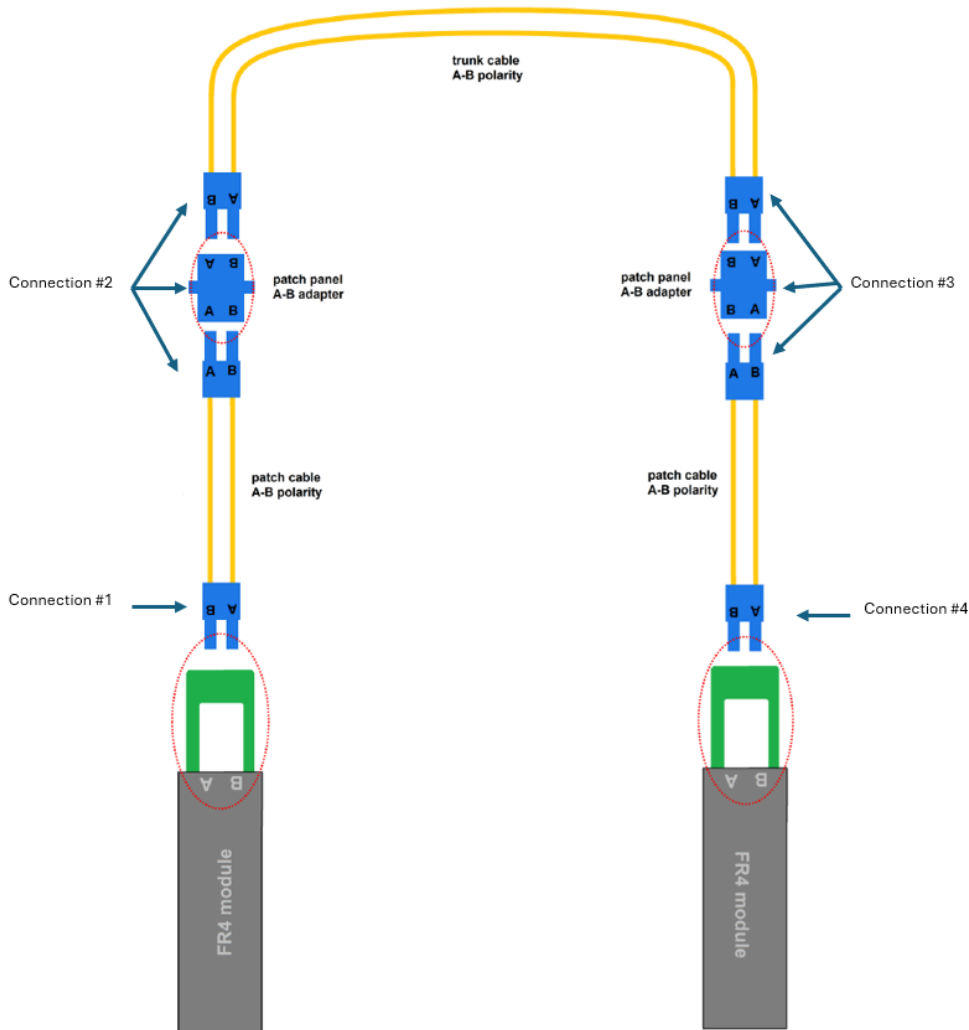
Single-Mode Connectivity Overview

The below image illustrates a connectivity orchestration of two patch panels connected together using Single-Mode MPO trunk cables:



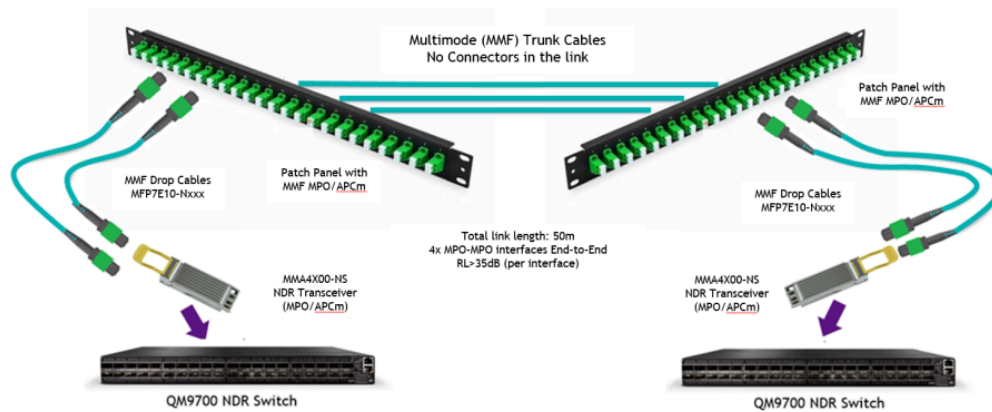
LC-FR4 Connectivity

The diagram below illustrates the LC connectivity of FR4 modules. The dotted red circles point to the 4 optical connector interfaces, a total of 4 ferule-to-ferule connections.

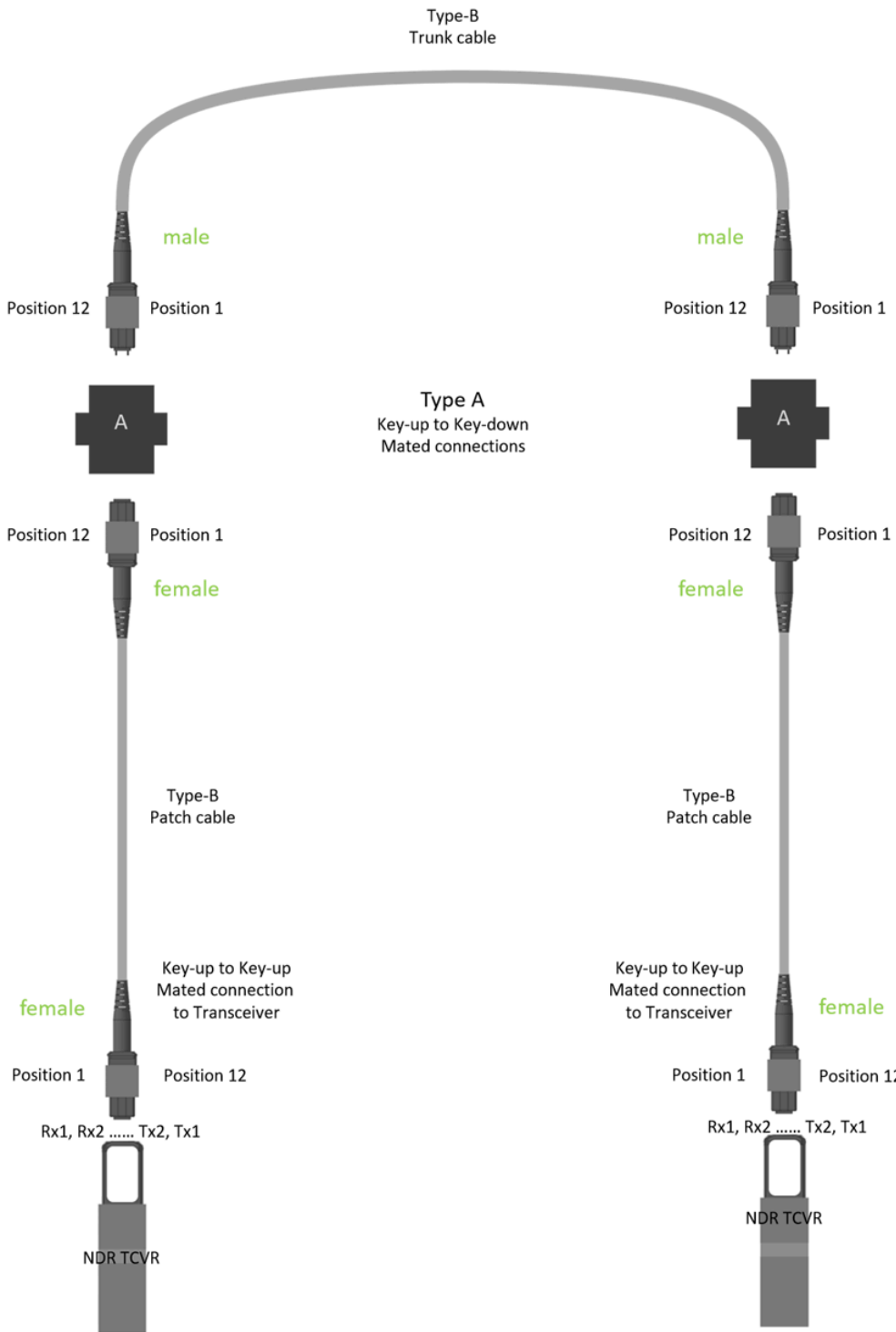


Multi-Mode Connectivity Overview

The below image illustrates a connectivity orchestration of two patch panels connected together using Multi-Mode trunk cables:



The below illustration shows an end-to-end connectivity of NVIDIA interconnect products with MPO connectors:



MPO/LC Cable Requirements

The below table details NVIDIA NDR Single-Mode (SM) and Multi-Mode (MM) cabling requirements:

Parameter		MPO MM Patch/Trunk	MPO SM Patch/Trunk	LC SM Patch/Trunk
Connect or	Type and Grade	MPO low loss or MTP Elite, Green Tab	MPO low loss or MTP Elite, Green Tab	LC low loss grade B per IEC 61753-1, blue housing.
	IL (Max)	0.35dB	0.35dB	0.25dB
	RL (Max)	-35dB	-60dB	-55dB
	Gender	Female for patch, Male for Trunk	Female for patch, Male for Trunk	N/A
	End face polish	APC	APC	UPC
	Spec compliance	IEC 61754-7 and EIA/TIA-604-5 (FOCIS-5)	IEC 61754-7 and EIA/TIA-604-5 (FOCIS-5)	IEC 61754-20, TIA 604-10-A (LC)
Fiber	Grade	OM3: L≤30m OM4: 30m<L≤50m	OS2	OS2
	Attenuation	3 dB/km	0.4 dB/km	0.4dB/Km
	Spec compliance	ITU-T G.651.1	ITU-T G.652D and G.657.A1	ITU-T G.652D and G.657.A1
Cable	Fiber count per strand	8 (12 is allowed)	8 (12 is allowed)	1 (Simplex connector) 2 (Duplex connector)

Parameter		MPO MM Patch/Trunk	MPO SM Patch/Trunk	LC SM Patch/Trunk
	Jacket	Ø3.0mm-2.0mm, Aqua Patch: LSZH-OFNR Trunk: OFNP* <ul style="list-style-type: none"> • EU environmental regulation concern (normally contain Halogens) 	Ø3.0mm-2.0mm, Yellow Patch: LSZH-OFNR Trunk: OFNP* <ul style="list-style-type: none"> • EU environmental regulation concern (normally contain Halogens) 	Ø3.0mm-2.0mm, Yellow Patch: LSZH-OFNR Trunk: OFNP* <ul style="list-style-type: none"> • EU environmental regulation concern (normally contain Halogens)
	Operational Temp.	0C-70C	0C-70C	0C-70C
	Polarity	Type-B, per TIA-568	Type-B, per TIA-568	A-B polarity, per TIA-568
	Spec compliance	Telcordia GR-409-CORE, GR-1435, ROHS	Telcordia GR-409-CORE, GR-326/GR-1435, ROHS	Telcordia GR-409-CORE, GR-326/GR-1435, ROHS
NVIDIA end-to-end requirements	Max Interfaces (connectors) throughout an optical link	4	4	4
	MPO/MTP adapter type (patch panel)	TYPE A (KEY UP – KEY DOWN) Complies to GR-1435	TYPE A (KEY UP – KEY DOWN) Complies to GR-1435	A-B adapter, per TIA-568
	Max Length	50m	500m	2Km
	Max IL	2dB	2dB	2dB

Document Revision History

Rev	Date	Description
1.2	Aug. 2024	Added requirements for LC connectivity and 400G ethernet.
1.1	Apr. 2024	Minor updates.
1.0	Jul. 2023	Initial release.

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