YOFC
Smart Link Better Life.

YOFC iCONEC® Data Center 400G Cabling Schemes

With the arrival of the era of big data, massive data centers are being constructed deploying networks with data transmission rates on the "25G access +100G interconnection" scale, up from the previously commonplace "1G access +10G interconnection" scale. Deployment of "100G access +400G interconnection" data centers has also begun, paving the road for the 800G links of the future.

01 Data Center Cabling Development Trends

Data centers require high bandwidths while keeping overall costs low. Thus optical modules capable of parallel transmission and multi-core pre-terminated optical cables are becoming mainstream products for 100G-400G and even 800G application. In future, improved VCSEL technologies will likely to gradually become the major products supporting 400G and 800G Internet applications. TOR servers preferentially use 8-core pre-terminated patch cords, enabling smooth upgrades from 40G to 100G and to 200G, without requiring cable changes. 16-core pre-terminated optical cable systems can be used in the ToR-Leaf and Leaf-Spine in the 200G-400G transmission rate range, making these the ideal choice for data center construction over the next 2-3 years.

Where servers deal with multiple services and networks, application of LC interface SWDM4 wavelength-division, allowing the demands of 100G rates to be fulfilled, is recommended. When these servers process multiple services, over 90 optical fibre links may be connected into a single rack, relying on LC duplex patch cords to minimize the impact on rack airflow, avoiding generation of local hot spots, etc. This of course raises their deployment costs above those of parallel transmission at the same data rates.

02 Choosing Optical Fibres for Data Centers

Currently, data centers' TORs and leaf switches are typically positioned about 45 m apart, with leaf and ridge switches spaced at intervals not exceeding 200 m. OM3/OM4 fibre systems can thus be used for TOR-leaf switch links, while OM4/OM5/OS2 fibre systems are suitable for leaf-ridge switch links.

YOFC has adopted bending insensitive OM3, OM4 and OM5 8-16-core pre-terminated schemes, permitting seamless compliance with SR4, SR4.2 and SR8 transmission requirements.

Rate (Gb/s)	Standard	Wavelength (nm)	Number of Two-way Communication Optical Fibres	Maximum Transmission Distance (m)		
				OM3	OM4	OM5
10	10GBASE-SR	850	2	300	550	550
25	25GBASE-SR	850	2	70	100	100
40	40GBASE-SR4	850	8	100	150	150
100	100GBASE-SR4	850	8	70	100	100
	100GBASE-SR10	850	20	100	150	150
400	400GBASE-SR16	850	32	70	100	100
	400GBASE-SR8	850	16	70	100	100
	400GBASE-SR4.2	850	8	70	100	150

Table 1 Ethernet Standards Using OM3-OM5 Fibres

03 YOFC UDF Networking Schemes

UDF series optical distribution frames (ODFs) are applicable with standard 19-inch device cabinets or racks; 1U and 4U models are available. The 1U ODFs, at maximum height, are compatible with pre-terminated/welded 144-core (with double LC adapters) or 72-interface MPOs, while the 4U ODFs are compatible with pre-terminated/welded 576-core (with double LC adapters) or 288-interface MPOs. Both 1U and 4U ODFs are applicable in existing 40G-400G application schemes. Besides these, YOFC has released a series of 400G-SR8, 400G-DR4 and 400G-FR4 400G networking solutions for 400G applications.

(1) 400G-SR8 interconnection: uses 400G-SR8 interface ridge switches in both core and leaf layers for a multi-mode, low-loss MTP16 solution allowing perfect interconnection in 400G applications.

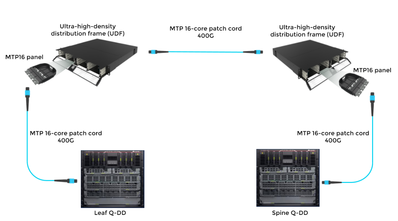

Figure 1 400G-SR8 Interconnection

Product Name	Model	Unit
Pre-terminated backbone	iCONEC-H-MTP/M-MTP/M-LSZH-BI OM5-16-50m	1
MTP panel	iCONEC-6-MTP-UDF	2
MDA ODF	iCONEC-UDF-4U-ODU-SLIDE	1
EDA ODF	iCONEC-UDF-1U-ODU-SLIDE	1
MTP patch cord	iCONEC-MTP/F-MTP/F-LSZH-BI OM5-16-5m	2

Table 2 Recommended 400G-SR8 Interconnection Scheme Products

(2) 400G-DR4 interconnection: uses 400G-DR4 interface ridge switches in the core layer and 100G-DR in the leaf layer, for single-mode ultra-low-loss Base8 MTP solutions upgradable for future use in 400G data applications.

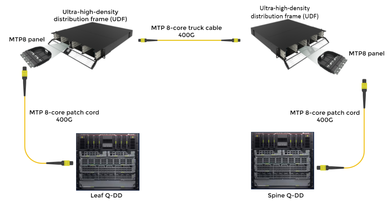

Figure 2 400G-DR4 Interconnection

Product Name	Model	Unit
Pre-terminated backbone	iCONEC-H-MTP/F-MTP/F-LSZH-G657A2-8-50m	1
MTP panel	iCONEC-6-MTP-UDF	2
MDA ODF	iCONEC-UDF-4U-ODU-SLIDE	1
EDA ODF	iCONEC-UDF-1U-ODU-SLIDE	1
MTP patch cord	iCONEC-MTP/F-MTP/M-LSZH-G657A2-8-5m	1

Table 3 Recommended 400G-DR4 Interconnection Scheme Products

(3) 400G-2FR4 interconnection: uses 400G-2FR4 interface ridge switches in the core layer and 100G-CWDM4 in the leaf layer, for single-mode low-loss MTP and CS solutions upgradable for future use in 400G applications.

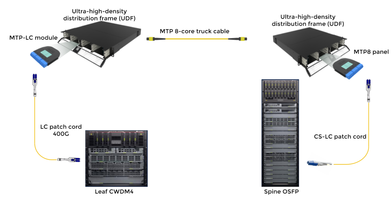

Figure 3 400G-2FR4 Interconnection

Product Name	Model	Unit
Pre-terminated backbone	iCONEC-H-MTP/F-MTP/F-LSZH-G657A2-8-50m	1
MTP-LC module box	iCONEC-12-MTP-DLC/UPC-G657A2-UDF	2
MDA ODF	iCONEC-UDF-4U-ODU-SLIDE	1
EDA ODF	iCONEC-UDF-1U-ODU-SLIDE	1
LC patch cord	iCONEC-DLC/U-DLC/U-LSZH-G657A2-20-5m	1
CS-LC patch cord	iCONEC-CS/U-DLC/U-LSZH-G657A2-20-5m	2

Table 4 Recommended 400G-2FR4 Interconnection Scheme Products:

UDF networking features:

- 1U ODFs can be configured for 144-core (DLC) or 72-interface MPOs, while 4U ODFs configured for 576-core (DLC) or 288-interface MPOs offer industry-leading density;
- Thanks to harmonized design, individual ODF models are compatible with 12-core (Base-12), 16-core (Base-16) and 24-core modules (Base-8), which can be switched randomly and configured on demand, and are adaptable to future network capacity expansion demands and changes;
- LC adapters are equipped with internal dust-proof doors for safety and cleanliness, improving cabling efficiency.

04 About Us

Yangtze Optical Fibre and Cable Joint Stock Limited Company (YOFC) is a leading global provider of optical fibre preforms, optical fibres and cables, offering a wide variety of optical fibre and cable products and solutions for communications and other sectors including public utility, transportation, oil & chemistry engineering, medicine and health care. YOFC is committed to leading in the information transmission and smart connectivity fields!

In recent years, YOFC has focused on developing diversified relevant businesses, of which the data center business has formed an important part. Its iCONEC® cabling products have been widely used in large domestic data centers, showcasing their strengths in areas including reliability, density, performance, scalability. In the future, adhering to the "Smart Link Better Life" mission, YOFC will always take "Client Focus, Accountability, Innovation, and Stakeholder Benefits" as its core values, continue to enhance technological innovation in the data center field, and develop more high-performance products to contribute to the construction of next-generation data centers.