Network cabling services

Data center white space

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HUBER+SUHNER

Cabling challenges in data center white space

Data center grows and changes constantly and continuously. When customers relocate hardware to multi-tenant or colocation white space of data centers, numerous fiber optic connections are needed. Fiber optic surpasses copper based communication and is de-facto most future-proof.

However, there is insufficient level of awareness and comprehension regarding fiber optic technology among the data center specialists. Many vendors provide different solutions and components, so it makes the choice even more complicated.

Without fully understanding all the nuances of selecting the necessary fiber optic equipment, network designers often seek an easier route, namely, using individual cables. Despite the fact that this approach is technically acceptable, it leads to a range of future problems.

To address these specific issues, every data center has a qualified resource available to help prevent such problems.

Benefits of engaging data center implementation teams

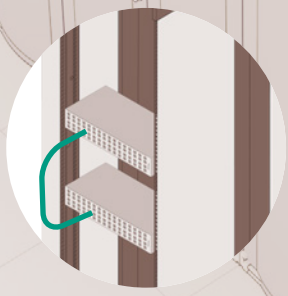
Implementation teams can help to set up a clean and structured cabling.

Customers may skip vendor research and order patch cables for swift setup. Implementation teams are trained to offer best solution.

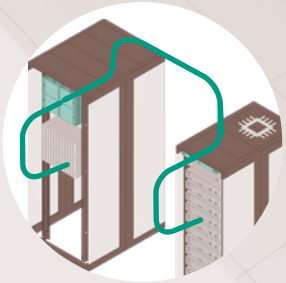
Employing cabling implementation teams with expertise, materials, tools and culture is a prudent choice for future-proofed customer connections.

Fiber optics connections inside the rented data center space

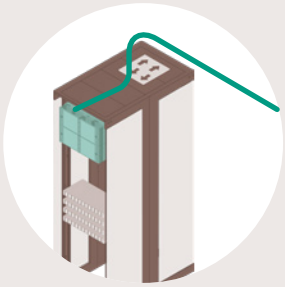
1 Inside rack connections
These are connections between equipment installed inside single or adjacent racks



2 Intra-rack connections
These are LAN/SAN connections between customer equipment installed within the same data hall, inside row or between rows

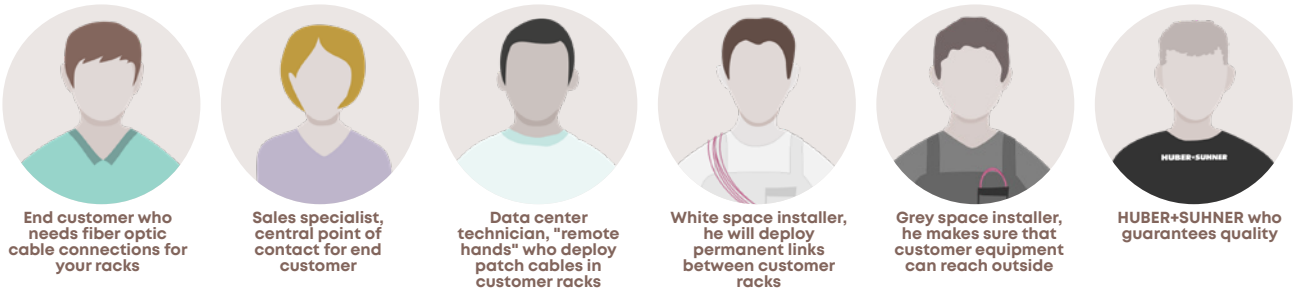


3 Outside connections
These are connections to other customers or service providers on the same floor or between floors.



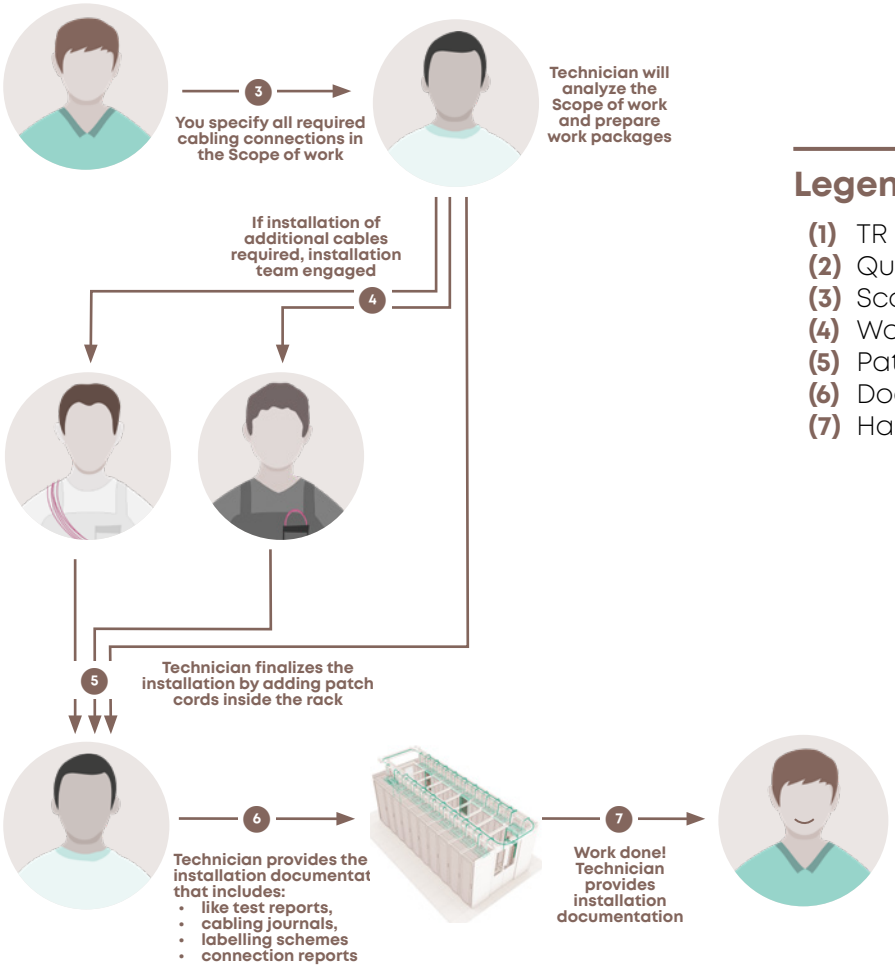
Cabling implementation process

Roles



Pre-sales process

Installation process



Legend

(1) TR (Technical Requirements)
(2) Quote
(3) Scope of work
(4) Work packages
(5) Patch cables
(6) Documenting
(7) Handover

Direct or in-rack connections

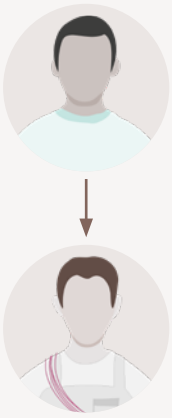
Connections within same or adjacent customer rack

Work packages for technician

- Breaks the scope of work in different work packages
- Keeps variety of cables at the premise: duplex patch cord, MTP patch cords, harness cables at various lengths
- Establishes connections, tests and labels
- Maintains high culture, organize cables neatly inside the rack
- He adds, removes and changes connections on a daily base
- Collects the installation documentation from white and grey space installers

Structured cabling within the white space

Connections between customer cabinets inside the same data hall

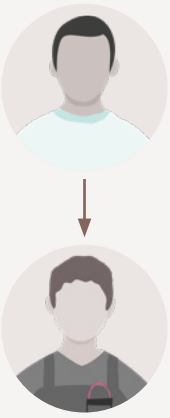


Work packages for white space installer

- Swiftly installing permanent links to suit various customer budgets and time lines;
- Trained on product portfolios and different installation techniques
- Deploy modular systems, that support most network applications, future upgrades and re-use of cables;
- Facilitates the option to add additional connections more quickly in the future;
- Ensures system available as soon as possible (from one working day to two weeks), depending on complexity. Cables are tested, deployed and labelled;

Structured cabling between white spaces

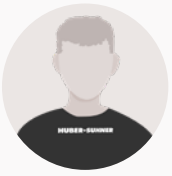
Connections to other customers or dark fibers in the same building.



Work packages for grey space installers

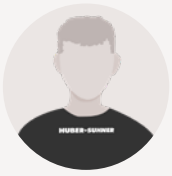
- Sustain the data center's core cabling infrastructure to guarantee flexibility for various cross-connections.
- Place the customer demarcation panel (to access the premise's fiber plant) within the customer cabinet.
- Cautious upkeep of fiber optic areas within shared grey space, which crucial for all tenants

HUBER+SUHNER's contribution



Consulting and training, supply of patch cables and transceivers

Training, supply of tools and components for structured cabling installation from white space portfolio

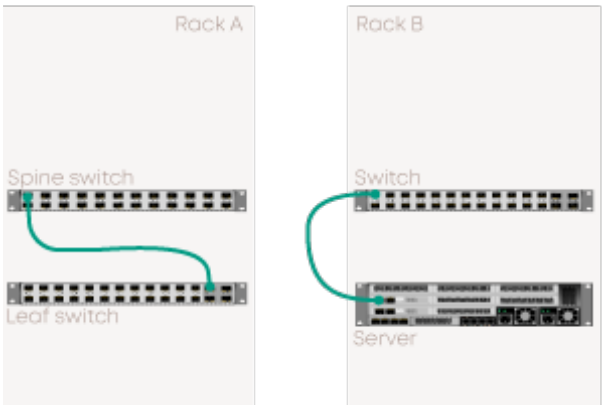


Help with design-in, consultancy, supply chain, process establishment, global data center portfolio

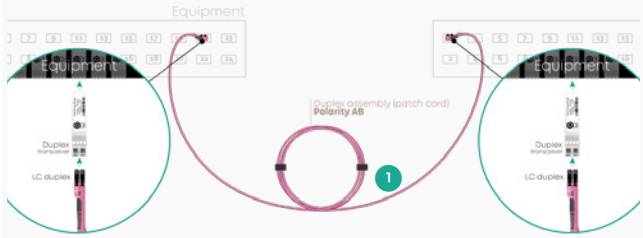
How to organize connections within rack?

These are examples of connections between equipment within the same or adjacent racks. No patch panels are needed in this scenario.

All these connections needs are basic and can be in minimum time established by data center technicians, because all required materials for these types of connections are available at premise.

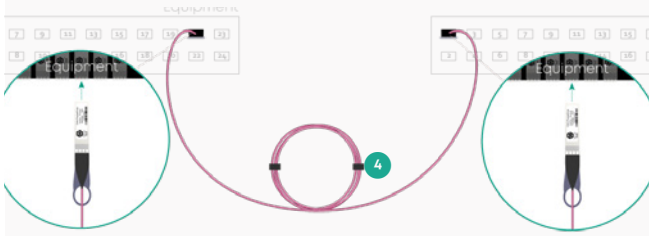


Duplex to duplex direct-connect



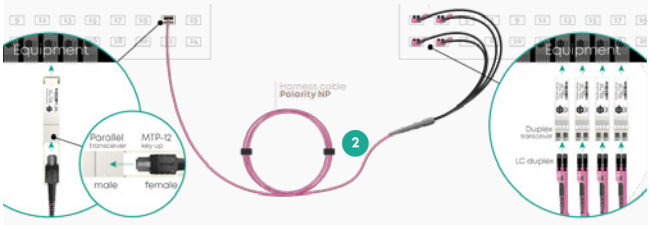
Examples:
SFP+ **10G** SR → SFP+ **10G** SR
SFP28 **25G** SR → SFP28 **25G** SR
SFP28 **25G** LR → SFP28 **25G** LR
QSFP28 **100G** CWDM4 → QSFP28 **100G** CWDM4

SFP to SFP direct-attach



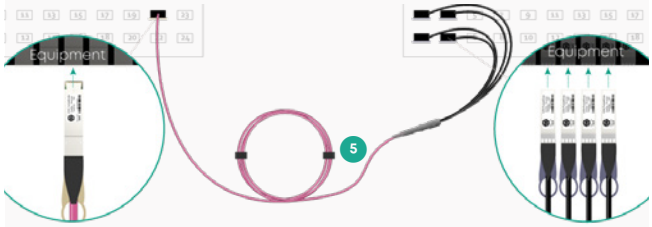
Examples:
AOC SFP+ **10G**
AOC SFP28 **25G**
AOC QSFP28 **100G**

Parallel to duplex direct-connect (QSFP to SFP breakout)



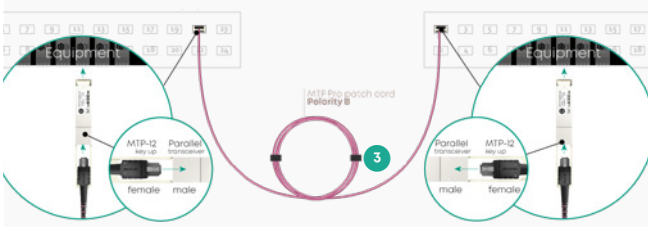
Examples:
QSFP+ **40G** SR4 → **4x** SFP+ **10G** SR
QSFP+ **100G** SR4 → **4x** SFP28 **25G** SR
QSFP28 **100G** PSM4 → **4x** SFP28 **25G** LR

QSFP to SFP direct-attach



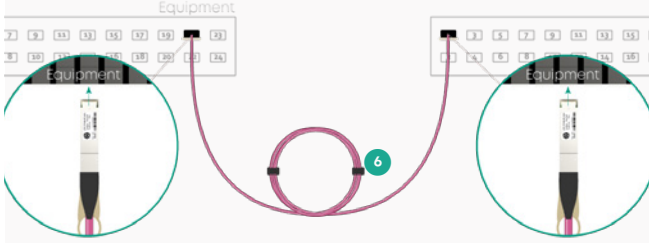
Examples:
AOC QSFP+ **40G** → **4x** SFP+ **10G**
AOC QSFP28 **100G** → **4x** SFP28 **25G**

Parallel to parallel direct-connect



Examples:
QSFP+ **40G** SR4 → QSFP+ **40G** SR4
QSFP28 **100G** SR4 → QSFP28 **100G** SR4
QSFP28 **100G** PSM4 → QSFP28 **100G** PSM4

QSFP to QSFP direct-attach



Examples:
AOC QSFP+ **40G**
AOC QSFP28 **100G**

Direct-connect, transceiver and patch cord

1 LC-XD patch cord multimode

PCRS_LCMX_LCMX_0421T_xxxx_LL

- Lengths from 1 to 5 m
- High density LC clip with label
- Reversable polarity

LC-XD patch cord singlemode

PCRS_LCUX_LCUX_A221T_xxxx_SS

- Lengths from 1 to 5 m
- High density LC clip with label
- Reversable polarity

2 Breakout cable MTP to LC multimode

OH08NPL_DA4xxxD_0000PF_5080LP

- Lengths from 1 to 5 m
- High density LC clip with label
- Polarity and gender change possible
- Single jacket ø2.0mm cable CPR D

Breakout cable MTP to LC singlemode

OH08NPL_DA0xxxD_0000PF_5080LP

- Lengths from 1 to 5 m
- High density LC clip with label
- Polarity and gender change possible
- Single jacket ø2.0mm cable CPR D

3 MTP Pro jumper Base-12e multimode

MB12_MPMM_MPMM_0440y_xxxx_LL

- Lengths from 5 up to 50 m
- Male to male (gender change possible)
- Polarity B (polarity change possible)
- Double jacket ø4.0mm cable CPR B

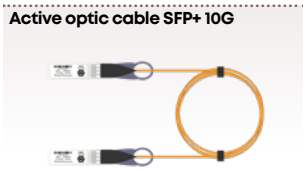
MTP Pro jumper Base-12e singlemode

MB12_MPAM_MPAM_A240y_xxxx_BB

- Lengths from 5 up to 100 m
- Male to male (gender change possible)
- Polarity B,
- Double jacket ø4.0mm cable CPR B

Direct-attach, active optic cable (AOC)

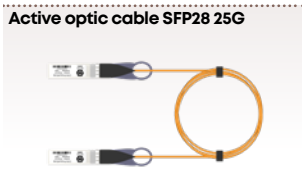
4 Active optic cable SFP+ 10G



SFP_10G_AOC_xx

- Various codings and lengths

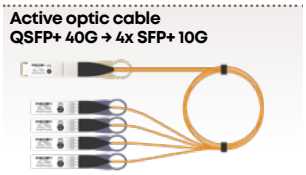
Active optic cable SFP28 25G



SFP28_25G_AOC_xx

- Various codings and lengths

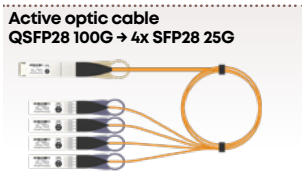
5 Active optic cable QSFP+ 40G → 4x SFP+ 10G



QSFP_40G_SFP_10G_AOC_xx

- Various codings and lengths

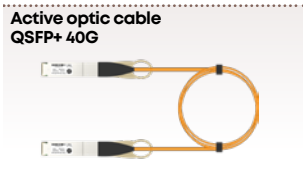
Active optic cable QSFP28 100G → 4x SFP28 25G



QSFP28_100G_SFP28_25G_AOC_xx

- Various codings and lengths

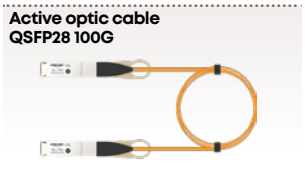
6 Active optic cable QSFP+ 40G



QSFP_40G_AOC_xx

- Various codings and lengths

Active optic cable QSFP28 100G

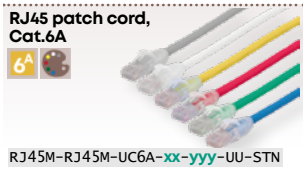


QSFP28_100G_AOC_xx

- Various codings and lengths

Copper, RJ45 patch cords

RJ45 patch cord, Cat.6A



RJ45M-RJ45M-UC6A-xx-yyy-UU-STN

- Slim cable AWG28
- U/UTP, category 6A, 500 MHz
- Various colours xx and lengths yyy

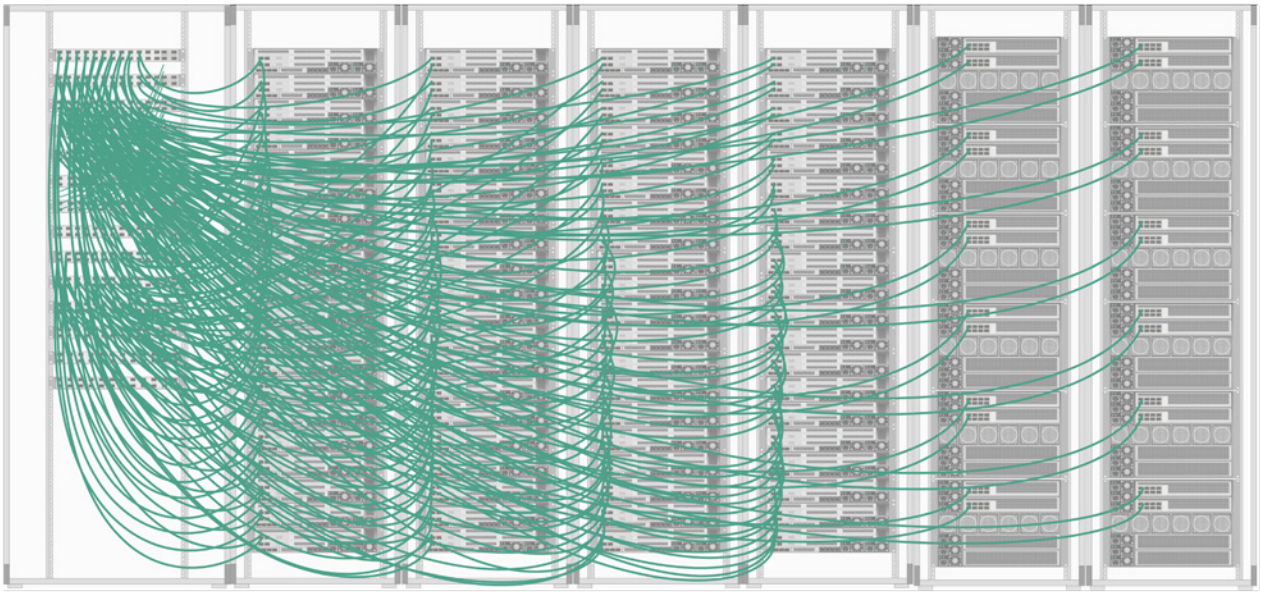
RJ45 patch cord, Cat.6A

RJ45M-RJ45M-SC6A-xx-yyy-SF-STN

- Slim cable AWG28
- S/FTP, category 6A, 500 MHz
- Various colours xx and lengths yyy

Spaghetti cabling methods

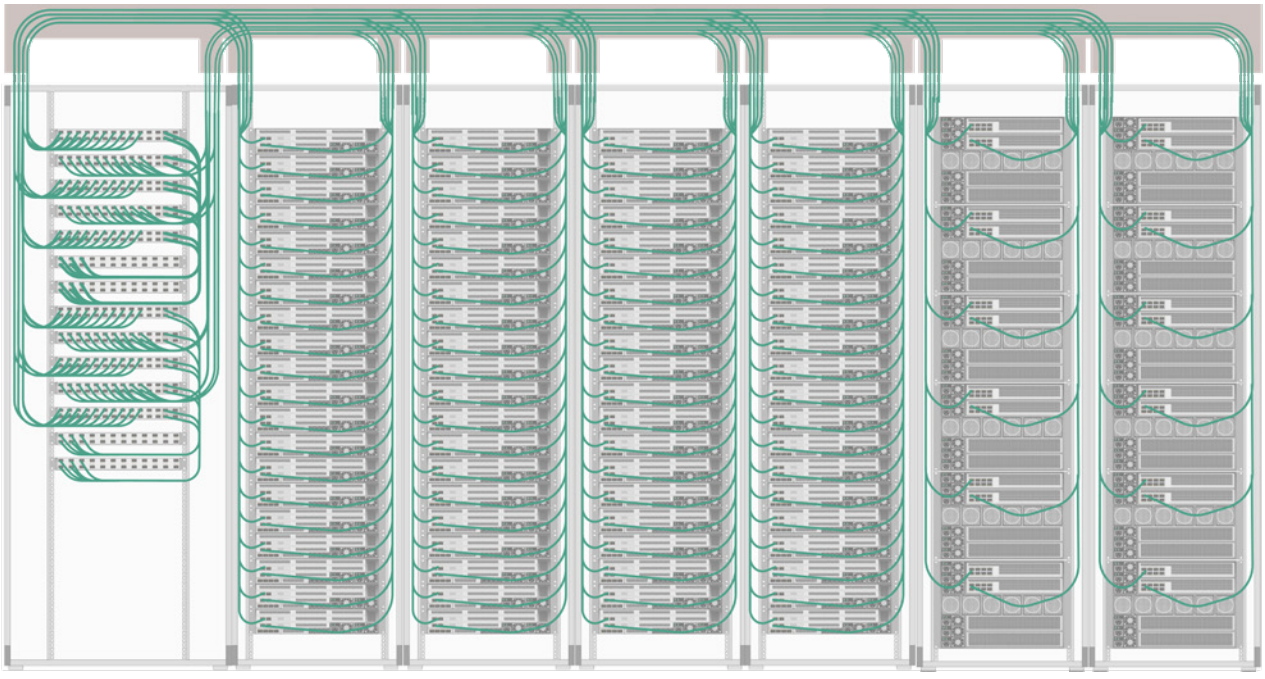
Direct-connect or direct-attach links deployed without any cable management accessories



Why should direct-connects (or point-to-point) be minimized between racks in data center?

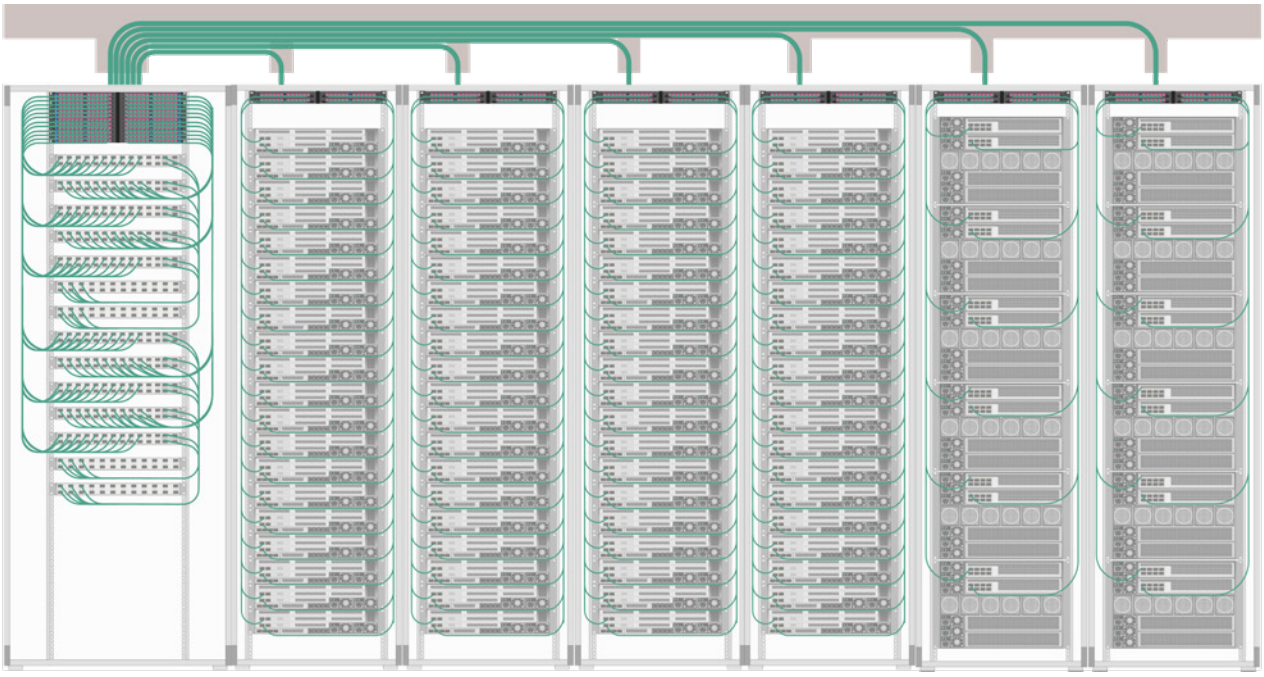
Minimizing point-to-point connections in favour of structured cabling solutions enhances **scalability**, simplifies **maintenance**, provides **flexibility**, promotes **organization**, optimizes **airflow, cooling, power and floor plan** in a data center .

Direct-connect or direct-attach links deployed with use of cable management accessories



How to reorganize connections between racks?

Structured cabling - inter-connect links deployed between racks



Benefits of structured cabling

Scalability

Data centers tenants often need to expand or reconfigure their equipment. Point-to-point connections can become unwieldy and difficult to manage as the number of racks and connections increases.

Maintenance

Managing and troubleshooting individual point-to-point connections can be time-consuming and error-prone. Structured cabling solutions, make maintenance and changes more efficient. It reduces downtime and minimizes the risk of accidentally disconnecting the wrong cables

Flexibility

Structured cabling allows for more flexibility when adding, moving, or changing equipment. It simplifies the process of rerouting connections without disrupting the entire network.

Organization

Structured cabling promotes a more organized and tidy data center environment, reducing the risk of cable congestion, accidental disconnections, and human errors.

Aesthetics

A clean and organized data center not only functions better but also presents a more professional and efficient image to clients, auditors, and stakeholders.

Airflow and cooling

Excessive cables obstruct airflow within the data center, making it harder to maintain proper cooling. A well-designed data center minimizes cable congestion to ensure efficient cooling, which is critical for preventing equipment overheating.

Floor plan optimization

Balancing power and cooling can be challenging when using direct cables because they restrict your planning options. In contrast, structured cabling not only extends the cable distance between equipment but also offers the flexibility to reconfigure the floor plan, which can optimize power and cooling.

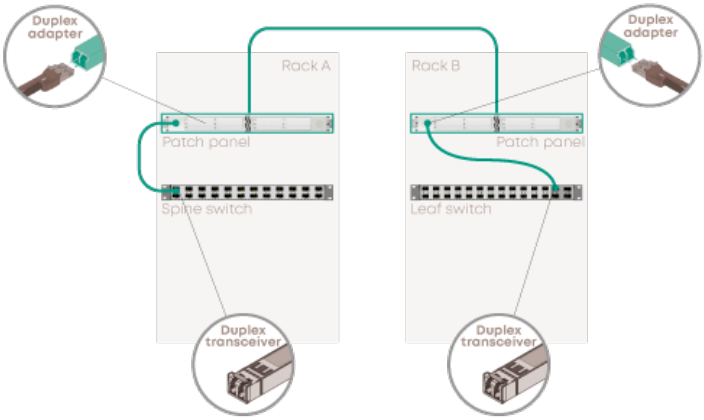
No copper

An organized cabling methodology enables the elimination of copper connections between racks.

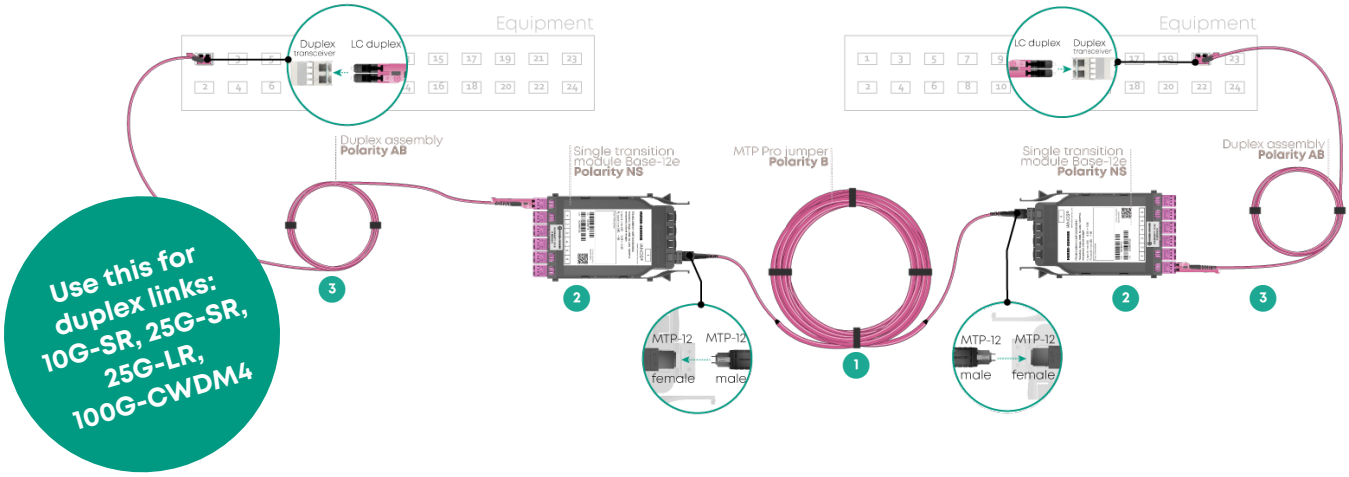
Structured cabling methods

Below is one of most popular scenario of connections between equipment with duplex transceivers, such as SFP+ 10G SR, SFP28 25G SR, SFP28 25G LR, QSFP28 100G CWDM4, QSFP-DD 400G FR4 in discrete racks.

Patch panels, modules and jumper cables are used to prevent point-to-point cabling.



Duplex to duplex inter-connect link, plug-and-go deployment method



MTP Pro jumper Base-12e singlemode 1

MB12_MPAM_MPAM_A240y_XXXX_BB
- Lengths from 5 up to 100 m
- Male to male (gender change possible)
- Polarity B,
- Double jacket ø4.0mm cable CPR B

MTP Pro jumper Base-12e multimode 1

MB12_MPMM_MPMM_0440y_XXXX_LL
- Lengths from 5 up to 50 m
- Male to male (gender change possible)
- Polarity B (polarity change possible)
- Double jacket ø4.0mm cable CPR B

IANOS 1U patch panel

85102690
IANOS-STD-CHASSIS-FLX-1U-2G-T4
- Up to 12 single modules / 6 double modules
- Sliding design
- Capacity 144 fibers (LC duplex)

IANOS 1U rear cable manager

85107331
IANOS-LITE-REAR-CAB-MGR-1U-T4
- Universal for any rack type

IANOS single module transition 2

85099763
ITS-06-LCUD-01-12CF-SM-NS-00WW
- 12 fibers, 1x MTP female to 6x LC UPC duplex
- Universal polarity NS
- Base-12e

IANOS single module transition 2

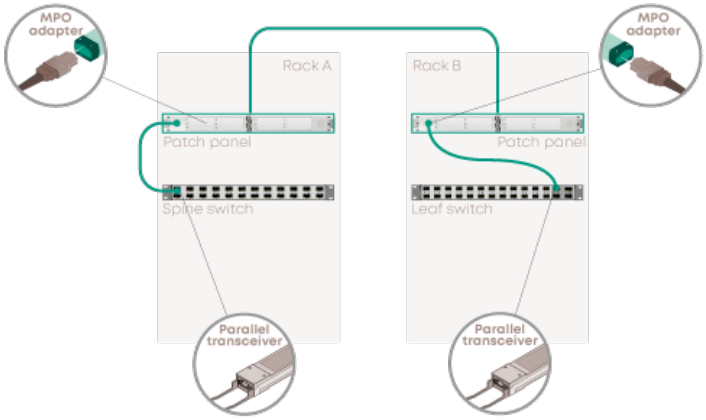
85125715
ITS-06-LCMD-01-12AF-04-NS-00UU
- 12 fibers, 1x MTP female to 6x LC duplex
- Universal polarity NS
- Base-12e

LC-XD patch cord singlemode 3

PCRS_LCUX_LCUX_A221T_XXXX_SS
- Lengths from 1 to 5 m
- High density LC clip with label
- Reversable polarity

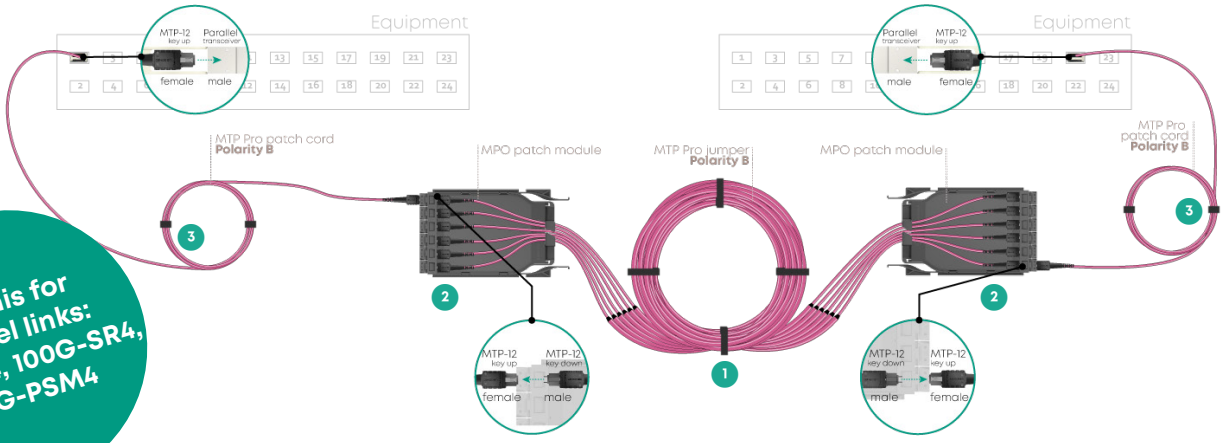
LC-XD patch cord multimode 3

PCRS_LCMX_LCMX_0421T_XXXX_LL
- Lengths from 1 to 5 m
- High density LC clip with label
- Reversable polarity



This is another popular scenario of connections between equipment with parallel transceivers in discrete racks, such as QSFP+ 40G SR4, QSFP28 100G SR4, QSFP28 100G PSM4, QSFP-DD 400G DR4.

Parallel to parallel transceiver, inter-connect, plug-and-go deployment method



Use this for parallel links: 40G-SR4, 100G-SR4, 100G-PSM4

MTP Pro jumper Base-12e singlemode

1

MB12_MPAM_MPAM_A240y_xxxx_BB

- Lengths from 5 up to 100 m
- Male to male (gender change possible)
- Polarity B,
- Double jacket ø4.0mm cable CPR B

MTP Pro jumper Base-12e multimode

1

MB12_MPMM_MPMM_0440y_xxxx_LL

- Lengths from 5 up to 50 m
- Male to male (gender change possible)
- Polarity B (polarity change possible)
- Double jacket ø4.0mm cable CPR B

IANOS 1U patch panel

85102690
IANOS-STD-CHASSIS-FLX-1U-2G-T4

- Up to 12 single modules / 6 double modules
- Sliding design
- Capacity 144 fibers (LC duplex)

IANOS 1U rear cable manager

85107331
IANOS-LITE-REAR-CAB-MGR-1U-T4

- Universal for any rack type

IANOS MPO patch module

2

85116941
IPS-06-12AF-00-0000-00-00-0000

- 6x MPO adapters key up/key down

MTP Pro patch cord Base-12e singlemode

3

MB12_MPAF_MPAF_A220y_xxxx_BB

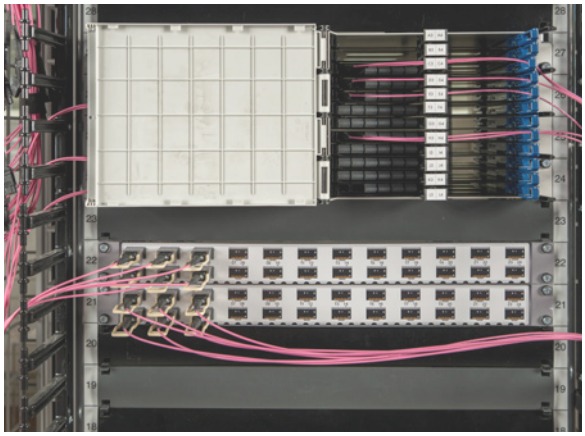
- Lengths from 1 to 5m
- Female to female (gender change possible)
- Polarity B
- Single jacket ø2.0mm cable CPR D

MTP Pro patch cord Base-12e multimode

3

MB12_MPMF_MPMF_0420y_xxxx_LL

- Lengths from 1 to 5m
- Female to female (gender change possible)
- Polarity B (change possible)
- Single jacket ø2.0mm cable CPR D



Structured cabling services

The distinction between a cabling implementation team and IT specialists, concerning cabling, arises from their areas of focus and expertise.

IT specialists primarily ensure that equipment operates in accordance with specifications, whereas a cabling implementation team is primarily dedicated to the precise installation of cables and the enhancement of the visual aesthetics of their work.

Implementation team can

Consult you on variety of options

Based on HUBER+SUHNER's portfolio of structured cabling solutions for white space deployments, implementation team can offer you different options.

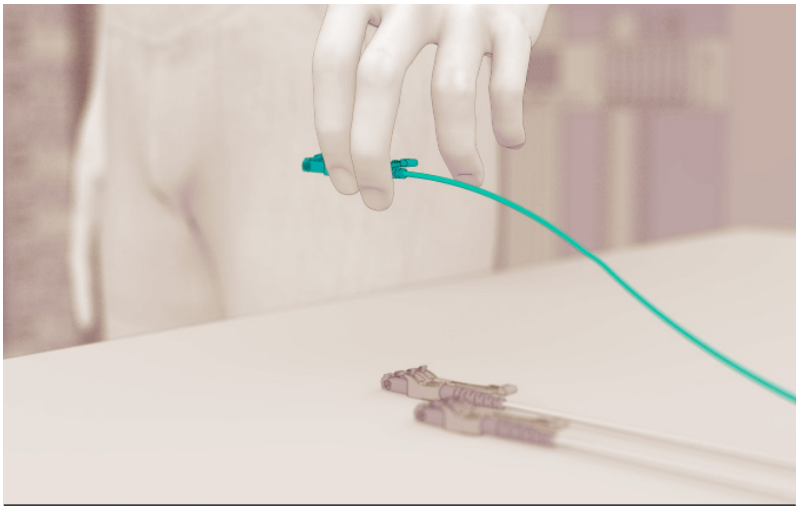
There are many products to choose from, and our team is familiar with the portfolio.

Select appropriate cables

When it comes to choose cables, it is essential to be compliant to local fire safety regulations, ensure space limitations and design of pathways.

For example, cables for in-rack cabling must be flexible and tiny.

Cables for intra-rack cabling must be also flexible but robust, to ensure to hold more stress.



Implementation team follows recommendations from regulatory bodies and make sure to use state-of-art cables

Calculate cabling lengths

It can be tedious task for the customer, but our installation team can confidently perform the necessary calculations and make a list of required cables/ lengths.

Implementation team can in minimum time calculate using CAD

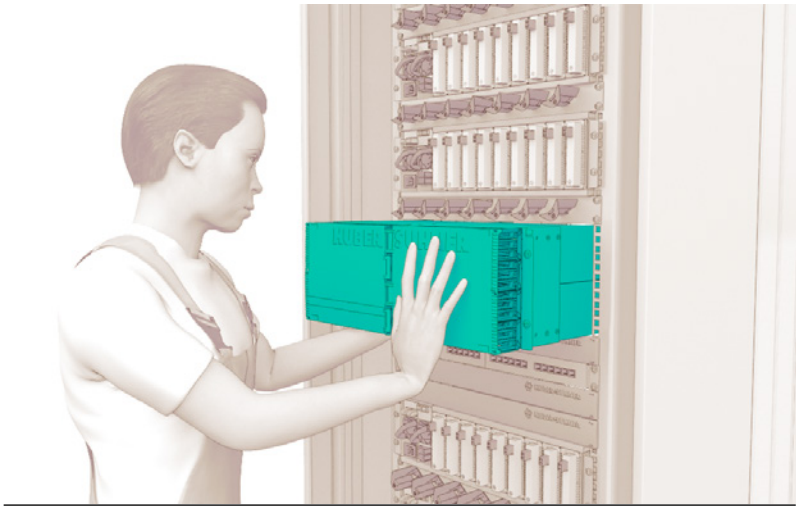
Test and verify

Every deployed fiber must be tested and verified for future use. It guarantees that the fiber support the network application.

Implementation team has set of equipment that is required for fiber testing

Prepare for deployment

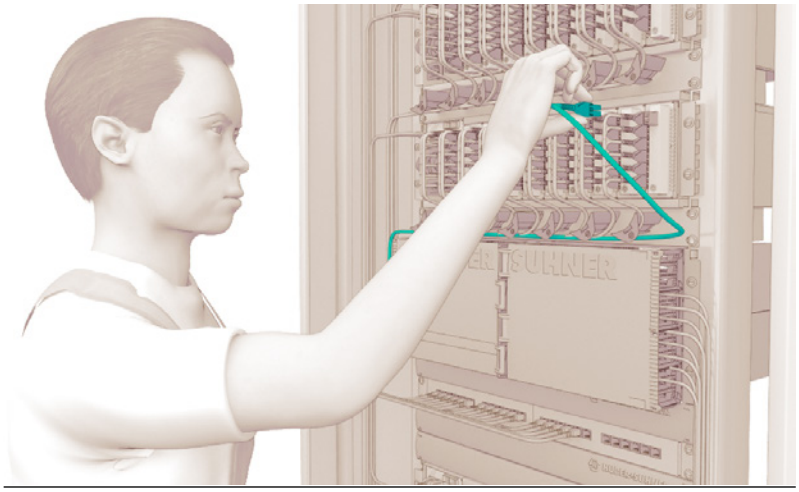
Some fiber optic components require pre-installation set ups, such as polarity change, gender change, performance verification to make sure products, that are deployed matching specifications and requirements.



Implementation team has set of equipment that is required for pre-deployment product verification

Take care of order in rack

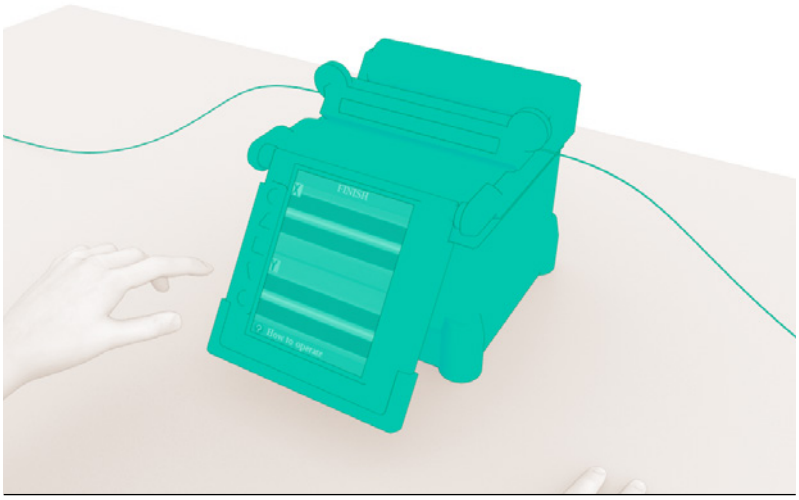
Implementation team loves to work with cables and patch cords. Instead of paying large bills for "tidy up your rack" service, it is better to work with professionals from beginning.



Implementation team follows best practices of patch cord management

Splice fibers

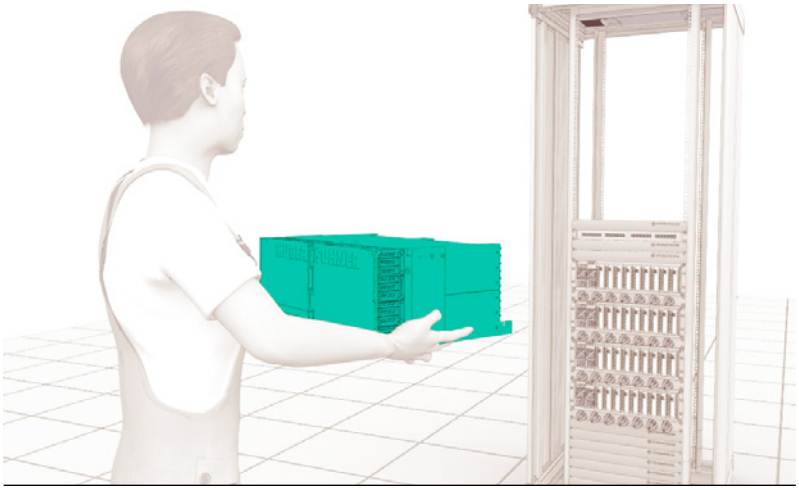
Sometimes splicing in data center cabling can effectively be used. It is not only improves the optical performance of permanent link, but also can reduce project budget. Splicing can also be used to repair some faulty connections.



Implementation team has required tools and skill set to perform splicing jobs

Find the best location for patch panels

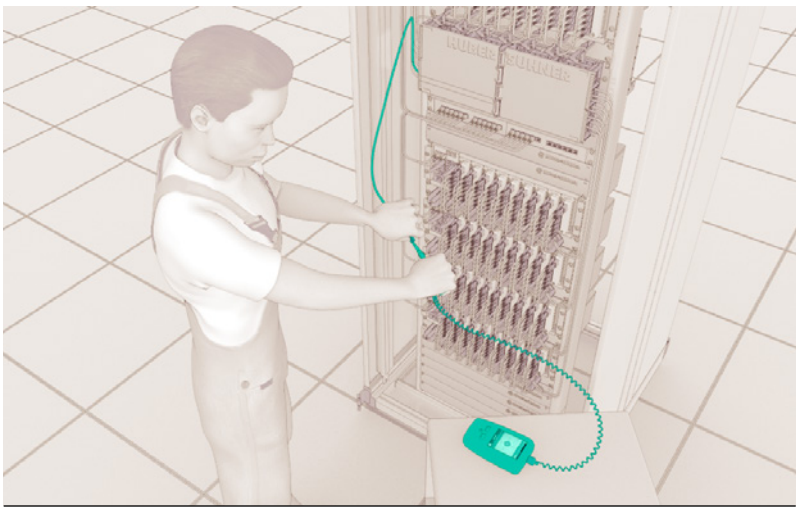
There are lots of different rack types inside data center with different air circulation schemes. It has impact on the location of patch panel. The next important stage is to bring cables to the panel and equipment.



Implementation team considers rack type, panel location and uses appropriate accessories

Really clean fiber optic connectors

You've heard about fiber optic connector cleaning? But how often is this ignored? Implementation team's DNA is to provide professional service, so we really clean interface before mating.



Implementation team considers rack type, panel location and uses appropriate accessories

Labelling and documentation

In the end, customer want to keep track and up-to-date status of installed cables, modules, panels. That is why labelling together with installation documentation is important. And this comes as the deliverable of the every work package.

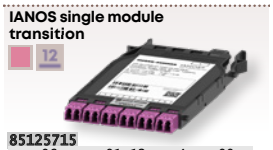
Implementation team generates installation documentation and ensures every component is labelled

Product summary

Modules and panels

IANOS single module transition

85099763
ITS-06-LCUD-01-12CF-SM-NS-00WW

IANOS single module transition

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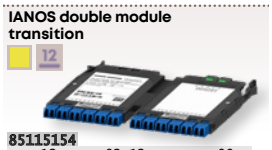
IANOS double module transition

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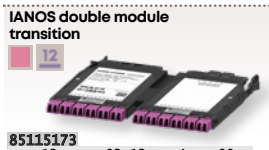
IANOS double module transition

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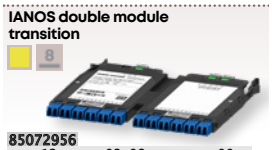
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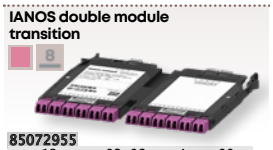
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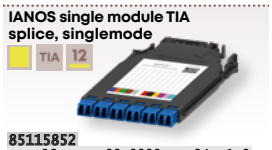
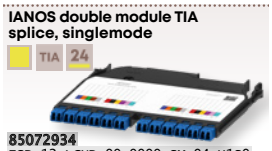
ITD-12-LCMD-03-08AF-04-NS-00UU

IANOS single module TIA splice, singlemode

85115852
ISS-06-LCUD-00-0000-SM-04-H1S0

IANOS single module TIA splice, multimode

85115850
ISS-06-LCMD-00-0000-04-04-H1L0

IANOS double module TIA splice, singlemode

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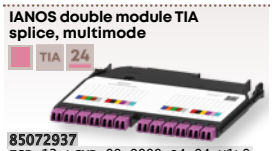
IANOS double module TIA splice, multimode

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IANOS single module DIN splice, singlemode

85141996
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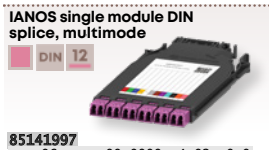
IANOS single module DIN splice, multimode

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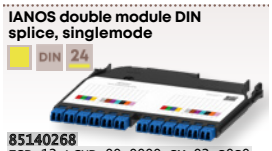
IANOS double module DIN splice, singlemode

85140268
ISD-12-LCUD-00-0000-SM-02-S0S0

IANOS double module DIN splice, multimode

85140240
ISD-12-LCMD-00-0000-04-02-S0L0

IANOS LC patch module, singlemode

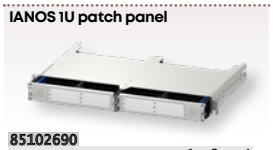
85072924
IPS-06-LCUD-00-0000-SM-00-0000

IANOS LC patch module, multimode

85073355
IPS-06-LCMD-00-0000-04-00-0000

IANOS MPO patch module

85116941
IPS-06-12AF-00-0000-00-00-0000

IANOS 1U patch panel

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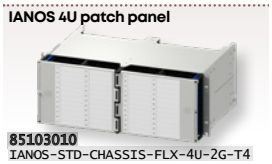
IANOS-STD-CHASSIS-FLX-1U-2G-T4

IANOS 4U patch panel

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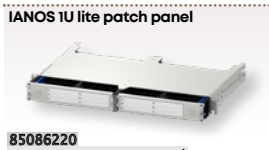
IANOS 1U lite patch panel

85086220
IANOS-LITE-STANDARD-T4

IANOS layer clip

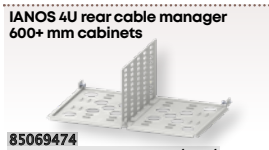
85069563
IANOS-LAYER-CLIP-BK

IANOS 1U door, for labelling

85181140
IANOS-LABEL-DOOR-1U-T4

IANOS 1U rear cable manager 600+ mm cabinets

85069473
IANOS-REAR-CABLE-MGR-1U-T4

IANOS 4U rear cable manager 600+ mm cabinets

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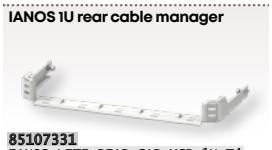
IANOS-REAR-CABLE-MGR-4U-T4

IANOS 1U rear cable manager

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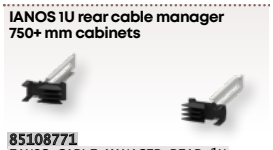
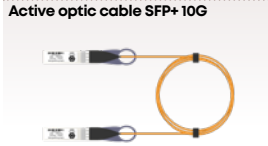
IANOS-LITE-REAR-CAB-MGR-1U-T4

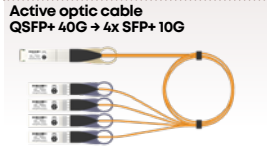
IANOS 1U rear cable manager 750+ mm cabinets

85108771
IANOS-CABLE-MANAGER-REAR-1U

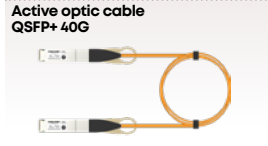
IANOS 1U rear cable manager, 750+ mm cabinets

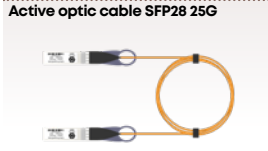
85108772
IANOS-CABLE-MANAGER-REAR-4U

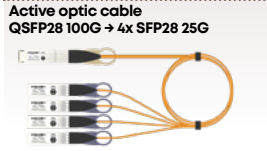
Active optic cables

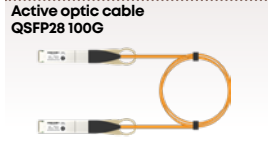
Active optic cable SFP+ 10G

SFP_10G_AOC_xx

Active optic cable QSFP+ 40G → 4x SFP+ 10G

QSFP_40G_SFP_10G_AOC_xx

Active optic cable QSFP+ 40G

QSFP_40G_AOC_xx

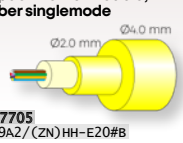
Active optic cable SFP28 25G

SFP28_25G_AOC_xx

Active optic cable QSFP28 100G → 4x SFP28 25G

QSFP28_100G_SFP28_25G_AOC_xx

Active optic cable QSFP28 100G

QSFP28_100G_AOC_xx

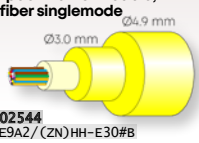
Cables

Optipack DJ trunk cable, 12- fiber singlemode



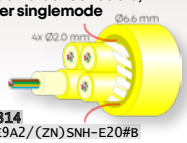
85137705
12-E9A2/(ZN)HH-E20#B

Optipack DJ trunk cable, 24- fiber singlemode



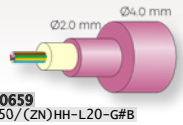
85102544
24-E9A2/(ZN)HH-E30#B

Optipack breakout cable, 48- fiber singlemode



85089314
48-12E9A2/(ZN)SNH-E20#B

Optipack DJ trunk cable, 12- fiber multimode



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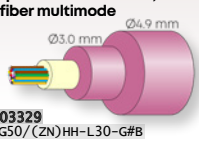
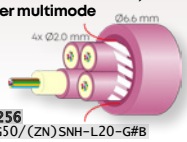
12-G50/(ZN)HH-L20-G#B

Optipack DJ trunk cable, 24- fiber multimode



85103329
24-G50/(ZN)HH-L30-G#B

Optipack breakout cable, 48- fiber multimode



85092256
48-12G50/(ZN)SNH-L20-G#B

MTP Pro jumper Base-12e singlemode

MB12_MPAM_MPAM_A240y_xxxx_BB

5m	85166291	35 m	85166297
7m	85184251	37 m	85184257
10m	85166292	40 m	85166298
12m	85184252	42 m	85184258
15m	85166293	45 m	85184309
17m	85184253	47 m	85184310
20m	85166294	50 m	85166299
22 m	85184254	60 m	85166300
25 m	85166295	70 m	85166301
27 m	85184255	80 m	85166302
30 m	85166296	90 m	85166303
32 m	85184256	100 m	85166304

MTP Pro jumper Base-12e multimode

MB12_MPMM_MPMM_0440y_xxxx_LL

5 m	85166275	35 m	85166287
7 m	85166280	37 m	85184369
10 m	85166281	40 m	85166288
12 m	85166282	42 m	85184370
15 m	85166283	45 m	85166289
17 m	85179962	47 m	85184385
20 m	85166284	50 m	85166290
22 m	85184366		
25 m	85166285		
27 m	85184367		
30 m	85166286		
32 m	85184368		

Patch cords

LC-XD patch cord singlemode

PCRS_LCUX_LCUX_A221T_xxxx_SS

1 m	85016597	10 m	85016602
2 m	85016599	12 m	85085713
3 m	85016600	15 m	85020821
3.5 m	85020818	17 m	85144374
4 m	85019951	20 m	85020822
5 m	85016601	25 m	85025976
7 m	85020820	30 m	85025977

LC-XD patch cord multimode

PCRS_LCMX_LCMX_0421T_xxxx_LL

1 m	85011862	10 m	85019840
2 m	85019837	12 m	85126556
3 m	85019838	15 m	85021397
3.5 m	85021394	17 m	85153272
4 m	85019950	20 m	85021398
5 m	85019839	25 m	85025988
7 m	85021396	30 m	85025989

LC-XD labelling clip

85141483
FLC-LAB-CLP-XD_100-P

MTP Pro patch cord Base-12e singlemode

MB12_MPAF_MPAF_A220y_xxxx_BB

1 m	85184335		
2 m	85184362		
3 m	85184363		
4 m	85184364		
5 m	85184365		

MTP Pro patch cord Base-12e multimode

MB12_MPMF_MPMF_0420y_xxxx_LL

1 m	85184386		
2 m	85184388		
3 m	85184392		
4 m	85184393		
5 m	85184394		

Breakout cable MTP to LC singlemode

OH08NPL_DA0xxxD_0000PF_5080LP

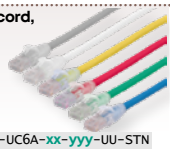
1 m	85197823
2 m	85197878
3 m	85197879
4 m	85197880
5 m	85197881

Breakout cable MTP to LC multimode

OH08NPL_DA4xxxD_0000PF_5080LP

1 m	85197825
2 m	85197826
3 m	85197827
4 m	85197828
5 m	85197829

RJ45 patch cord, Cat.6A



RJ45M-RJ45M-UC6A-xx-yyy-UU-STN

RJ45 patch cord, Cat.6A

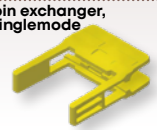
RJ45M-RJ45M-SC6A-xx-yyy-SF-STN

Tools

MTP Pro tool

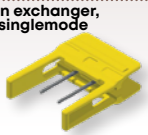
85096933
FIELD_TOOL_MT_PRO

MTP Pro pin exchanger, no pins, singlemode



85096882
PIN_EX_MT_PRO_YE_10-P

MTP Pro pin exchanger, with pins, singlemode

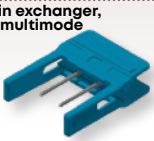


85096884
PIN_EX_MT_PRO_SME_YE_10-P

MTP Pro pin exchanger, no pins, multimode

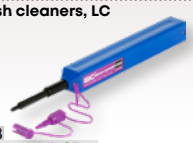
85096881
PIN_EX_MT_PRO_TQ_10-P

MTP Pro pin exchanger, with pins, multimode



85096883
PIN_EX_MT_PRO_MME_TQ_10-P

IBC™ push cleaners, LC



84065528
Cleaner, IBC, 1.25mm

IBC™ push cleaners, MTP

84097537
MTP-IBC-7104

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