10G-100G Active Optical Cables

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What is an Active Optical Cable? (AOC)

Electrical ← Post-Amp | Pin RX | Laser Driver | VCSEL → **Optical** ← Pin RX | Post-Amp | VCSEL | Laser Driver → **Electrical**

Optical-to-Electrical conversion is *inside* the cable end-plugs
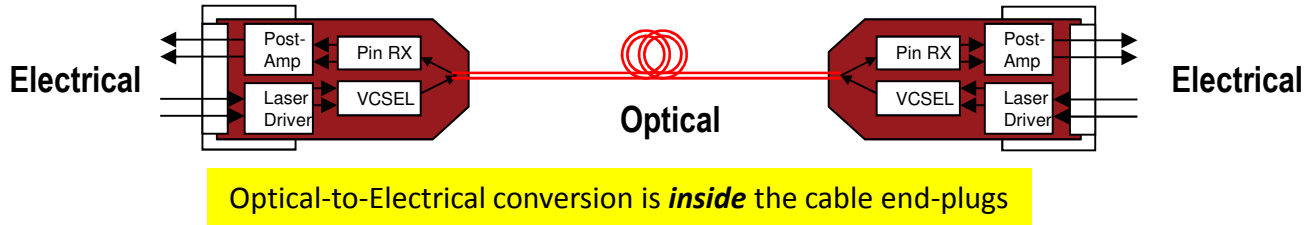
Compared to Copper Cables
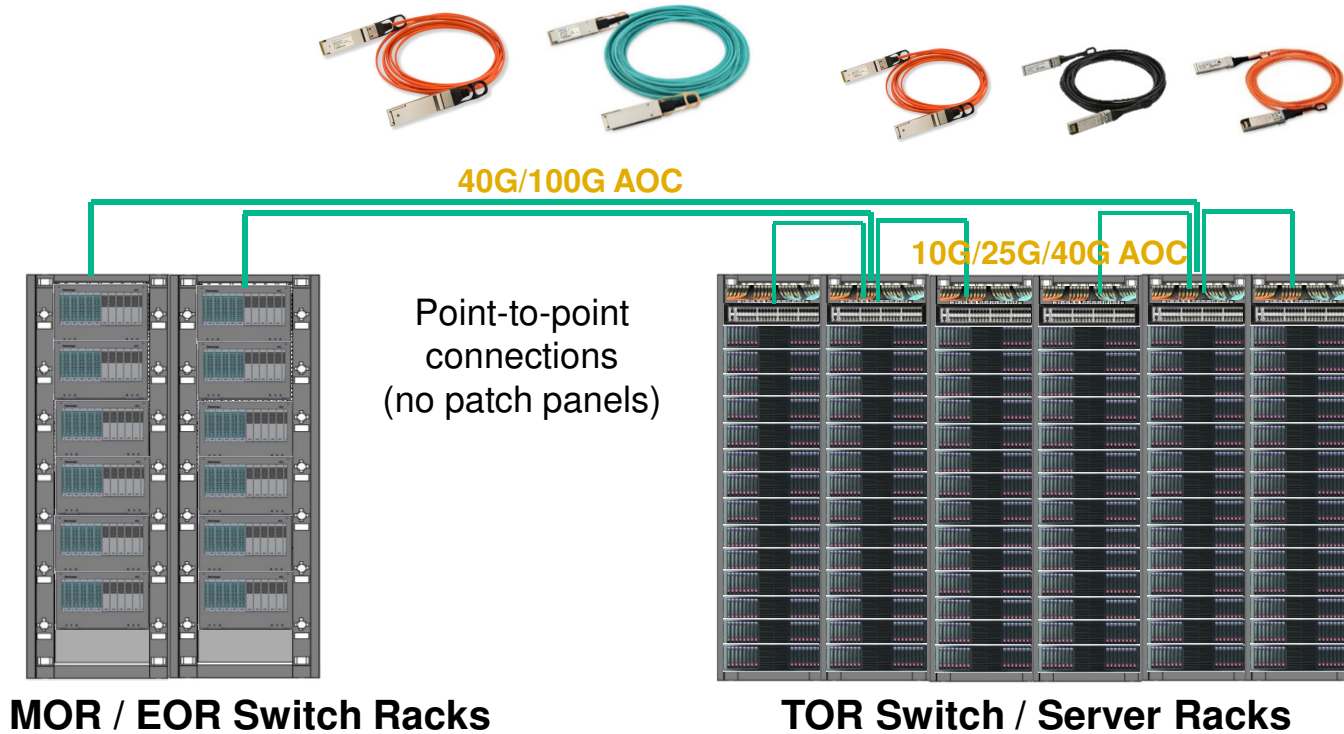
◆ **Lower weight & tighter bend radius –** Easier cable management

◆ **Thinner cables** – Better airflow

◆ **Lower power consumption** – No power-hungry conditioning ICs
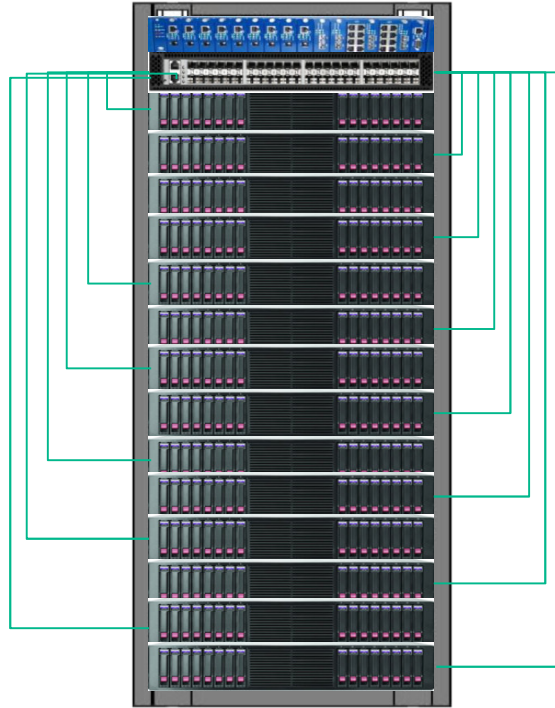
Compared to Optical Transceivers

◆ **Cost-optimized –** Don't need to meet IEEE optical standards

◆ **Data Center-friendly** – No issues with dust on optics

AOC

Copper

AOC in Data Centers: Inter-rack Connections

40G/100G AOC

10G/25G/40G AOC

Point-to-point connections (no patch panels)

MOR / EOR Switch Racks

TOR Switch / Server Racks

AOC in Data Centers: Server Connections

10G AOC

25G AOC

TOR Switch / Server Racks

Benefits of AOCs vs. DACs (copper)

- Longer reach at higher data rates
- More immune to signal loss
- Immunity to Electromagnetic Interference (EMI)
- Better security (harder to tap)
- Lighter and thinner, which facilitates cable management and lowers transportation costs.
- Lower total power consumption (host + cable)

DAC

AOC

Google

Benefits of AOC vs. Transceiver+Cabling Solutions

- Cost-optimized
- Simple solution: One SKU to buy per link
- Easy installation, "plug-and-play"
- No optical connector cleaning; no risk of dust
- Simpler link diagnostics
- No cable slack; customized lengths

II-VI AOC Products family

SFPwire®

::quadwire®

::::C.wire®

10G (SFP+)
25G (SFP+)

40G (QSFP,QSFP+)
56G (QSFP)
100G (QSFP28)

12x10G (CXP)

200G,400G….

- ■ II-VI-designed Technology Inside:
  - ➢ II-VI (Finisar)-designed VCSELs, LD, PD,TIA and CDR
  - ➢ II-VI (Finisar)-proprietary Connectivity Diagnostics™

Connectivity Diagnostics® Functionality Summary

- **Connectivity Diagnostics® implements three features:**
  - *LynkFind™*
    - Helps locate the other end of an AOC by lighting up both of its pull-tab LED lights.
  - *LynkGuardian™*
    - Triggers the pull-tab LED lights of both AOC ends upon Digital Diagnostic Monitoring warning or alarm events, or upon a transmitter fault or a receiver loss of signal.
  - *LynkCommander™*
    - Allows a host to control the pull-tab LEDs of both AOC ends by writing a command byte to the near-end transceiver.

- **Connectivity Diagnostics® availability:**
  - **10G/25G SFPwire®** and **40G/56G Quadwire®** AOCs

- **Technical Support:**
  - Please check with II-VI which features are implemented in the AOCs of interest
  - Refer to II-VI's Application Note AN-2158 for technical details.
  - Check out our demo video at https://www.youtube.com/watch?v=Ji7NiGvgCao

SFPwire® 10G AOC

FCBG110SD1Cxx   (without CD)
FCBG110SD1Cxx-1V (with CD)

PRODUCT BASICS
- Hot-pluggable SFP+ cable ends
- Supports 10.3125Gb/s bit rate
- RoHS-6 compliant
- SFI Limiting interface
- Single 3.3V power supply
- Low power dissipation
- 0ºC to 70ºC
- Rigid pull-tab for improved high-density installations

COMPETITIVE ADVANTAGES
- The worldwide leading supplier of optical communication products
- The only one with the best vertical integration capability
- II-VI-designed and owned technology inside
- II-VI-designed and owned global manufacture and QA process

AVAILABILITY
- Mass Production

SFPwire® 25G AOC

FCBG125SD1Cxx (without CD)
FCCG125SD1Cxx (with CD)

PRODUCT BASICS
- ➢ Hot-pluggable SFP+ cable ends
- ➢ Supports 25.7813Gb/s bit rate
- ➢ SFI limiting interface
- ➢ Input equalization and output emphasis controls
- ➢ Single 3.3V power supply
- ➢ Low power dissipation
- ➢ 0ºC to 70ºC
- ➢ Rigid pull-tab
- ➢ RoHS compliant

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AVAILABILITY
- ➢ Mass Production

Quadwire® 40G AOC

::quadwire®

FCBx410QD3Cyy   (without CD)
FCCx410QD3Cyy   (with CD)

PRODUCT BASICS
➢ Four-channel full-duplex active optical cable
➢ Multi-rate capability: 1.06Gb/s to 10.5Gb/s per channel
➢ Complies with QSFP MSA high density form factor
➢ Reliable VCSEL array technology using multimode fiber
➢ Round, plenum-rated (OFNP) and riser-rated (OFNR),
   low smoke zero halogen (LSZH) cables
➢ Hot Pluggable
➢ Low power dissipation: <1.3W per cable end
➢ 0ºC to 70ºC
➢ RoHS-6 Compliant

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AVAILABILITY
➢ Mass Production

Quadwire® 56G AOC

FCBx414QD3Cyy   (without CD)
FCCx414QD3Cyy   (with CD)

PRODUCT BASICS
➢ Four-channel full-duplex active optical cable
➢ Multi-rate capability: 1.06Gb/s to 14.0625Gb/s per channel
➢ Complies with QSFP MSA high-density form factor
➢ Reliable VCSEL array technology using multimode fiber
➢ Round, plenum-rated (OFNP) and riser-rated (OFNR),
   low smoke zero halogen (LSZH) cables
➢ Hot Pluggable
➢ Low power dissipation: <1.3W per cable end
➢ 0ºC to 70ºC
➢ RoHS-6 Compliant

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AVAILABILITY
➢ Mass Production

Quadwire® 100G AOC

FCBx425QE2Cxx (Ethernet)

FCBx425QB2Cxx (InfiniBand)

FCBx425QM2Cxx (Multirate)

PRODUCT BASICS
- 4 lanes x 25.78125 Gbit/s
  - Multirate supports 28Gb/s per lane
- Based on QSFP28 MSA form factor
- <2.5W maximum power dissipation per end
- InfiniBand, Ethernet, and Multirate versions
- Supporting up to 100m cable lengths
- 0 to 70C operating case temperature
- Uses II-VI 25G VCSEL and PIN arrays
- Round, plenum-rated (OFNP) and riser-rated (OFNR), low smoke zero halogen (LSZH) cables

COMPETITIVE ADVANTAGES
- The worldwide leading supplier of optical communication products
- The only one with the best vertical integration capability
- II-VI-designed and owned technology inside
- II-VI-designed and owned global manufacture and QA process

AVAILABILITY
- Mass Production

Quadwire® 100G Octopus AOC

FCBx525QE1Cxx

PRODUCT BASICS
- Four-channel full-duplex active optical cable with breakout from QSFP28 to four SFP28
- Complies with QSFP28 and SFP28 MSA form factors
- Round, plenum-rated cable
- Reliable VCSEL array technology using multimode fiber
- Low power dissipation: <2.5W on QSFP28 end, <1W on SFP28 end
- 0ºC to 70ºC
- RoHS-6 Compliant

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AVAILABILITY
- Mass Production

II-VI

MATERIALS THAT MATTER