

RIVO MULTITRADE OPTICAL SYSTEMS

Copper cable without optical module



Overview

SFP transceivers are available with a variety of transmitter and receiver specifications, allowing users to select the appropriate transceiver for each link to provide the required optical or electrical reach over the available media type (e.g. twisted pair or twinaxial copper cables, multi-mode or single-mode fiber cables). Transceivers are also designated by their transmission speed.

Key Takeaways

Direct Attach Copper (DAC) cables are copper-based network cables with integrated transceivers that connect devices directly without requiring separate optical modules.

A DAC cable is a physical copper cable with transceivers on both ends, designed to connect network devices such as switches, servers, or storage units directly, without the need for optical conversion. These cables are plug-and-play and hot-swappable, supporting high-speed connections like 10G, 25G, 40G, and even 100G in modern data centers.

Types of DAC Cables

- Passive DAC:
 - Contains only copper wiring without signal amplification.
 - Low power consumption and cost-effective.
 - Limited to short distances, typically up to 7 meters.
 - Ideal for intra-rack connections where minimal latency and cost are priorities.

- Active DAC:
- Includes built-in electronics to amplify signals.
- Supports longer distances, up to around 15 meters.
- Slightly higher power consumption and cost compared to passive DACs.
- Preferred for connections between adjacent racks or slightly longer runs .

Advantages

- Lower Cost: Copper DAC cables are generally cheaper than fiber-optic solutions, reducing both cable and transceiver expenses .
- Power Efficiency: They consume less power since no optical-electrical conversion is required .
- High Data Rates: Modern DACs support speeds from 4Gbps up to 100Gbps (QSFP28 DAC) and are compatible with major switch brands like Cisco, Huawei, and Mellanox .
- Ease of Deployment: Plug-and-play design simplifies installation and maintenance.
- Good Heat Dissipation: Copper cores effectively dissipate heat, enhancing reliability .

Limitations

- Distance Constraints: Best suited for short-range connections; performance degrades over longer distances .
- Electromagnetic Interference (EMI): Copper cables are more susceptible to EMI compared to fiber-optic solutions, which can affect signal integrity in noisy environments .
- Physical Bulk: Passive copper cables can be bulky, making cable management in dense racks more challenging .

Typical Use Cases

- Connecting a switch to a server within the same rack.
- Linking adjacent racks in a data center where distances are short.
- Cost-sensitive deployments where power efficiency and low latency are important .

Comparison with Optical Modules

While optical modules and fiber cables excel in long-distance and EMI-prone environments, DAC cables are preferred for short-range, high-speed, and cost-sensitive applications. Hybrid setups may combine both technologies to optimize performance, cost, and scalability . In summary, DAC copper cables provide a reliable, low-cost, and energy-efficient solution for short-range network connections, eliminating the need for separate optical modules while maintaining high-speed performance. Proper selection between passive and active DACs depends on distance requirements, power considerations, and deployment environment.

Article Content

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Overview SFP types QSFP Applications Standardization Mechanical dimensions Digital diagnostics monitoring

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SFP+ Types Overview: Optical, Copper, and Direct Attach

Active Optical Cables (AOCs) integrate optical transceivers and multimode fiber into a factory-terminated cable

DAC Cables vs Optical Modules: Best Solution for Reliable Short ...

A Copper Direct Attach Cable (DAC) is a physical copper cable with transceivers on either side to connect network

Optica Executive Forum: Copper vs. Optical

- AEC (Active Electrical Cable): A copper cable with digital signal processing (DSP) in the cable ends to retime and

Can You Use Fiber Optic Cable with RJ45? | Fiber vs Copper Guide

RJ45 interfaces are strictly electrical; they have no optical components. In summary: RJ45 ≠ Fiber - they are two

Passive Copper Cables Vs Active Optical Cables

Passive copper cables are known for their simplicity and cost efficiency since they do not need additional power

Why aren't fiber-optic cables the gold standard for data ...

Copper on the other hand is quite ductile and you don't need fancy optical connectors. A few metal bits folded from stamped metal is

Comparing AOC, DAC, ACC, and AEC Cables for AI and Data Center

In network switching, various connectivity options are available, including optical modules paired with fiber, Active

What Is an SFP Optic Module and How Does It Work

SFP modules work with different speeds and types, like fiber and copper. You see SFP modules used a lot in Ethernet

Copper vs Fiber Optic Cables: What's the Difference?

The choice between copper and fiber optic cables comes down to the specific needs of the project. Copper is a time

Fiber Optic Cable vs Copper Cable: Key Differences

Copper cable, transmitting electrical signals, is more vulnerable to eavesdropping through inductive taps that can

Fiber Optic Cable Types: A Complete Guide

The plethora of fiber optic cable types can seem overwhelming, but choosing the right cable for the job is important.

Does Fiber Optic Cable Have Copper In It?

Does Fiber Optic Cable Have Copper In It? Decoding the Composition No, in its core functionality, fiber optic cable

Difference between Fiber optic cable and Copper wire

Both are used for data transmission: Both fiber optic cables and copper wires are used to transmit data in various

Difference Between Copper Cable and Fiber Optics

The crucial difference between copper cable and fiber optics is that copper cable transmits signal in the form of electrical pulses while

Does Fiber Optic Cable Have Copper In It ?

The Bottom Line Standard high-performance fiber optic data cables do not contain copper elements. Their glass or

Fiber Optic vs. Copper Cable, Which Shall I Choose?

Compatibility Copper cable connectors are widely built into all kinds of electronics and consumer devices. It could be a

Copper vs Fiber Optic Cable Migration | Upgrading Network ...

Copper vs fiber optic cable? Learn why the time is now to replace copper with fiber optic cabling to upgrade the

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