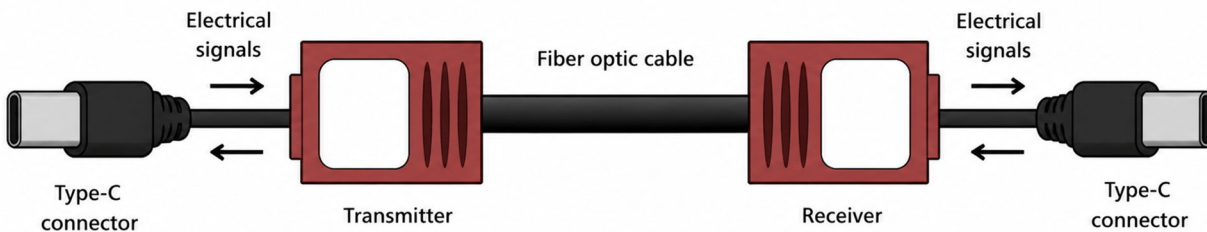


INTRODUCTION

What is Active Optical Cable (AOC)?

An **Active Optical Cable (AOC)** is a cabling technology that integrates **fiber-optic components** into a standard cable form factor to transmit ultra-high-definition audio and video signals. Unlike traditional passive copper cables, AOCs contain active electronics (lasers/photodetectors) at both ends to convert electrical signals into optical signals and back again.



How AOC works (with Type-C Connectors)

Key Characteristics

Feature	Details
Core Technology	Fiber-optic transmission with active signal conversion at each end
Primary Use	Ultra-high-definition audio & video signal distribution
Resolution Support	Up to 8K @ 60 Hz over long distances
Signal Immunity	Immune to EMI (Electromagnetic Interference) and RFI (Radio Frequency Interference)
Power Requirement	No external power needed — bus-powered via the connected devices
Physical Design	Lightweight, compact, flexible — easy to route in tight spaces

Comparison: AOC vs. Traditional Copper Cables

Aspect	Active Optical Cable (AOC)	Copper Cable
Max Distance at 8K60	Very long distances	Limited range
Cable Bulk	Thin, lightweight, flexible	Thick, heavy, rigid
Interference	Immune to EMI/RFI	Susceptible to interference
Installation Complexity	Simple, no external power needed	Bulky, complicated setups
Signal Loss	Minimal interconnection loss	Higher signal degradation over distance
Multi-Source Setups	Excellent for video walls & complex AV systems	Difficult to manage

Primary Advantages

- ♦ **Long-Distance 8K Support** — Can transmit 8K60 video signals over distances that copper cables simply cannot reach without signal boosters or repeaters.
- ♦ **EMI/RFI Immunity** — Since the signal travels as light (not electricity), it is completely unaffected by electromagnetic or radio frequency interference — critical in data centers, industrial environments, or near power lines.
- ♦ **Zero External Power** — The active electronics are powered directly through the host device's interface (e.g., HDMI or USB power), meaning no separate power adapters or additional cabling is needed.
- ♦ **Compact & Lightweight** — The thin, flexible design allows for easy routing through cable management trays, wall conduits, and tight spaces — a significant advantage in **video wall deployments** where multiple sources converge.
- ♦ **High Audio Quality** — Supports high-quality, uncompressed audio formats alongside the video signal without degradation.



ACTIVE OPTICAL CABLES

your best fiber optics partner

- ♦ **Minimal Interconnection Loss** — The active optical design ensures that signal integrity is maintained from source to display, reducing the common problems of flickering, signal dropouts, or color degradation seen in long copper runs.

Ideal Use Cases

- ♦ **Video Walls** — Multiple displays driven by a single or multiple sources, where cable management and signal integrity are paramount
- ♦ **Digital Signage** — Long runs from media players to distant displays in retail, airports, or stadiums
- ♦ **Data Centers** — Server-to-switch connections requiring high bandwidth over distance
- ♦ **Home Theater** — Clean, hidden cable runs between AV receivers and projectors/TVs at long distances
- ♦ **Broadcast & Pro AV** — Mission-critical environments where signal reliability cannot be compromised

Active Optical Cables (AOC) represent a **significant advancement** in AV distribution technology. By combining the **bandwidth and distance benefits of fiber optics** with the **plug-and-play simplicity of standard cables**, AOCs solve the fundamental limitations of copper cabling — namely distance, bulk, and interference — without adding complexity for the end user. For any application demanding **8K resolution, long cable runs, and reliable signal integrity**, AOCs are the superior choice.

ACTIVE OPTICAL CABLE (AOC) COMPLETE GUIDE

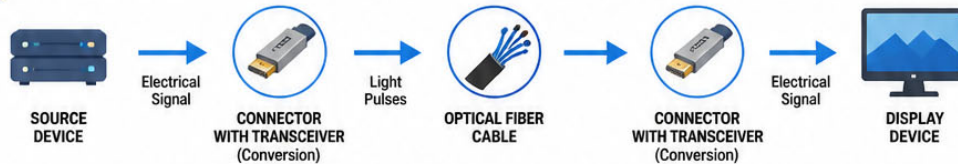


1 WHAT IS AOC?



Active Optical Cable (AOC) is a fiber-optic cabling technology that integrates optical transceiver modules at each end of the cable. It combines the plug-and-play convenience of copper cables with the high-bandwidth, long-distance performance of fiber optics. AOCs convert electrical signals to light pulses for transmission through optical fiber, then back to electrical signals at the receiving end, enabling ultra-high-definition AV signal transmission up to 8K60 over long distances.

2 HOW IT WORKS



⚡ AOC uses a hybrid fiber/copper design that draws power from the source device.

3 KEY BENEFITS



1. Ultra-High Bandwidth
Supports HDMI 2.0 up to 18 Gbps and DisplayPort 1.4 up to 48 Gbps over hundreds of meters



2. Long Distance
Transmits 8K60 signals hundreds of meters vs. copper's 2-5 meter limitation



3. EMI/RFI Immunity
Fiber-optic design eliminates electromagnetic and radio frequency interference



4. Lightweight & Thin
4.8mm thin; 10m AOC weighs under 300g vs. 5m copper weighing ~1kg



5. Plug & Play
No external power, software, or additional hardware needed



6. Immersive Audio
Supports Dolby TrueHD, DTS-HD, PCM 8-Channel, ARC, and up to 32 audio channels

4 KEY APPLICATIONS



Data Centers



Video Walls



Virtual Reality



Industrial Automation



Machine Vision



Consumer Electronics

5 AOC vs COPPER CABLE COMPARISON

Feature	AOC (Fiber)	Copper Cable
 Max Distance	Hundreds of meters	2-5 meters (without extenders)
 Bandwidth	Up to 48 Gbps (DP 1.4) / 18 Gbps (HDMI 2.0)	Limited by distance (degrades quickly)
 EMI/RFI Resistance	Excellent immunity (fiber optic)	Highly susceptible to interference
 Weight (10m)	Under 300 grams	Over 1.5 kilograms
 Thickness	~4.8 mm	7-10 mm (depends on AWG)
 Installation	Easy pull-through, flexible, tight bend radius	Bulky, stiff, difficult routing
 Reliability	Single all-in-one cable, minimal failure points	Requires extenders, multiple connection points



AOC Technology is the Future-Proof Solution for Next-Gen AV Distribution