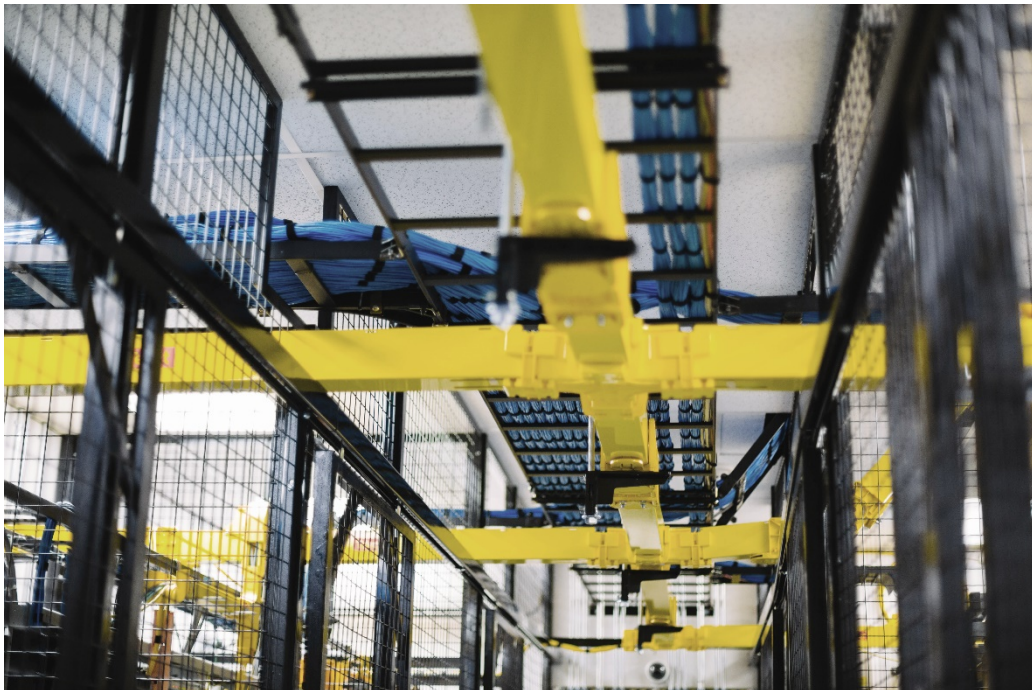


CASE STUDY



A comparison of three fiber cable raceway solutions

Amphenol Telect hired a structured cabling company to install and retrofit WaveTrax™ and two of its competitors to validate testimonial reports.

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EXECUTIVE SUMMARY

Today's communications service providers are frequently upgrading their optical fiber networks. They're adding fiber to the backbone and horizontal infrastructures in riser/plenum spaces and data centers.

They need to build out their networks to meet the forever-growing demands for bandwidth and lower latency.

When it's time to bulk up the fiber to support that demand, an optical fiber raceway that's easy to modify and scale makes retrofits much less expensive. A solid end-to-end solution creates a situation where network engineers can build the network for today, yet plan to grow tomorrow.

It's part of a sound cable management system.

WHY MANAGE YOUR CABLE

Building big networks with lots of fiber or adding more fiber to legacy networks can build a perfect storm. The cable needs to be managed properly; otherwise, network performance and reliability are at risk. The slightest pressure, temperature change or overbend can cause micro and macrofractures that can result in network degradation or even downtime.

Improper cable management can also result in:

- Inability to identify and access cable for maintenance, repair and mining
- Extended time spent on network expansion
- Increased operating expenses

Communications service providers can choose from three solutions that cover raceway infrastructure from end to end, including WaveTrax™, which Amphenol Telect introduced to the market more than 20 years ago.

Amphenol Telect has received reports from service providers and independent contractors that WaveTrax is quicker and easier to install. We set out to prove that by hiring a structured cabling installer to come into our data center and install each of the systems.



OUR SCENARIO

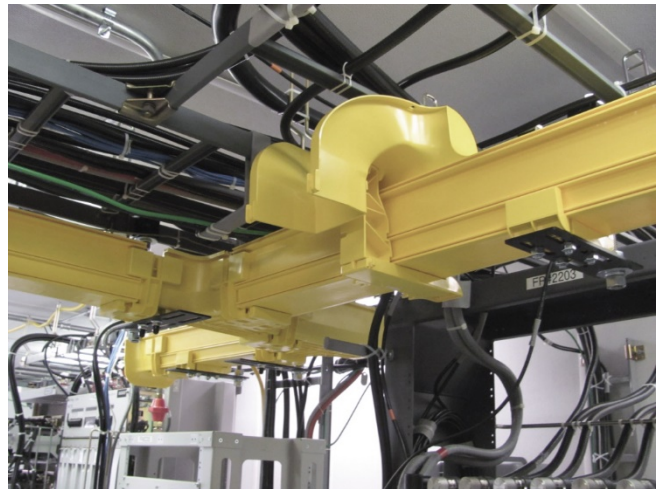
The cable raceway system in a data center is the network's backbone. It supports and routes the fiber between distribution equipment, protecting it from excessive bend, impact and other physical strains. It must be durable and sturdy enough to bear the stress of interaction with network technicians conducting maintenance or mining and adding fiber to the network.

When Amphenol Telect designed its end-to-end solution more than 20 years ago, our engineers sought to create a raceway that was simple to install and retrofit, saving installers time and, thus, reducing the total cost of ownership for the network provider.

WaveTrax is an open-trough system with a complete set of buildout components, including transitions, intersections, drops, reducers, couplers, interchanges, overpasses, covers and off-ramps.

Most components are available in two-inch, four-inch, six-inch and 12-inch widths that physically protect cable and maintain a minimum two-inch bend radius throughout the cable's path.

Its rigid troughs are self-supporting up to 175 lbs. (79.5 kg) at up to six-foot intervals.



The Express series of products, particularly the Off-Ramp, feature custom-engineered support brackets that provide convenient fastening and easy re-configuration or expansion.

Through engagement with installers who have worked with WaveTrax, we've learned they find our system quicker and easier to install.

One installer said WaveTrax is 20 percent faster on greenfield builds and 50 percent faster on retrofits. Another reported a 50 percent reduction in time spent on a greenfield installation.

We wanted to validate these reports with a time-comparison study of installation and retrofit of WaveTrax and its two competitors.

THE COMPETITORS

All three vendors promise to ensure maximum network reliability, sturdy components and easy configuration. Each vendor says its product will ultimately lead to maximum network reliability and reduced cost of ownership.

The Competitor No. 1 system claims to ensure total off-frame protection and ease of use. Its basic components include horizontal and vertical straight sections, horizontal and vertical elbows, downspouts, junctions and numerous support hardware and flex-tube kits.

Like the Express Off-Ramp and Fastlock coupler with WaveTrax, Competitor No. 1 offers similar products for drops and junctions for connecting troughs and transitions.

The Competitor No. 2 cable-routing system features troughs and covers to protect cable, directional fittings, snap-together couplers, mounting brackets and accessories that require a minimum use of tools and small fasteners to assemble.

The No. 2 system features a coupler which, according to the installation guide, allows components to be assembled in less than five seconds without the use of tools.

INSTALLATION

Amphenol Telect contracted a structured cabling installation company that is familiar with all three vendor products.

We:

- Proposed a two-part installation for each vendor product: one, a full installation of a cable raceway system; two, a basic retrofit
- Provided the contracted installers with a drawing configured by our application engineers and the complete set of required parts from each vendor
- Ordered the parts

The installers were expected to unbox each part, inspect the inventory, assess the tools required and build the raceway in a linear fashion.

The layout comprised a perimeter, a backbone and multiple rows to simulate a greenfield build.

Our application engineers estimated the installation of a 200-linear-foot raceway would take approximately six hours with two installers at the helm—or 12 man hours at 25 linear feet per hour. This estimate was based on information from the installers and general industry knowledge.

We required the installers to then conduct a one-stage retrofit, installing a final row on the layout they had already assembled.

No fiber was present in the tray.

THE RESULTS

INSTALLATION

We often observed our contracted installers going up and down their ladders to get the right tools and fittings while they worked on our competitors' systems.

We were not surprised to learn the installations on the competitor products did take longer—significantly longer—than on WaveTrax.

The results started showing when the installers were opening each system's packaging.

“Competitor No. 2 had the most packaging,” said Installer No. 1. “Their boxes were thick. They were a pain to rip open. We hate that stuff. It wastes time.”

Amphenol Telect, they said, had the least amount of paper for box stuffing and the boxes tore open easily.

| | TIME ON SITE | |
|------------------|--------------|-------------------|
| Raceway System | Total Time | Time in Man Hours |
| Competitor No. 1 | 8 h 30 m | 17 h |
| Competitor No. 2 | 8 h | 16 h |
| WaveTrax | 4 h | 8 h |

Competitor No. 1

During this installation, the installers often dropped T bolts as they attempted to manage the components, tools and accessories all at once.

The trough material proved difficult to cut for fit, which also extended time spent on the retrofit.

When the installers encountered difficulty understanding the installation guide, they turned to their phones and searched for the right YouTube videos.

The installers, however, reported that they like the fit and finish of Competitor No. 1 better than any other system. They also prefer the use of split nuts, especially when working with existing threaded rod.

Competitor No. 2

The installers found this product the easiest material to cut.

"I like the raceway itself," said Installer No. 1. "I like the feel of it. I like the material it's made of."

They preferred the slip-on couplers and off-ramps more than the matching components on this system.

However, they broke a coupler trying to force it into place and another one broke when it was dropped from the top of a ladder.

They also encountered a tool annoyance with the off-ramp. Installation required two different sizes of hardware on the one component.

"You have to switch from one nut size to another nut size just to get one part done," said Installer No. 2. "It's like you're constantly switching socket sizes."

WaveTrax

Our contracted installers sped through the WaveTrax installation, finding the FastLock couplers easy to use.

The Express bracket, a ratcheted attachment for the Express Off-ramp and Express T, the best component they had to work with.

The installers reported that WaveTrax was simple and clear to assemble.

Once they hung the brackets and laser leveled them, they could start attaching couplers to the brackets. Then they cut the trough and connected it by clicking in the couplers.

"It's more flexible to install. You don't have to be precise. You can adjust it whenever. If you have to do a 90, you can come back and adjust it."

~ Installer No. 1



"With the Express bracket, you didn't have to bend it up to snap it in together. You just put (the components) together and put the bracket on. That made it a lot quicker."

They found, however, the installation could be even quicker if Amphenol Telect used split nuts on threaded rod.

The notches created by the WaveTrax notching tool are not as deep and crisp as the other systems, though.

The installers said there wasn't as much "bite" on WaveTrax when they were connecting the components together via the notches.

RETROFIT

Once the installation on each system was completed, the installers were directed to add a perpendicular cross-section to simulate a retrofit for network expansion.

RETROFIT TIME

| Raceway System | Total Time |
|------------------|-------------|
| Competitor No. 1 | 2 h |
| Competitor No. 2 | 2 h |
| WaveTrax | 45 m |

Competitor No. 1

Before installing each section of trough to accomplish the retrofit, the installers needed to:

1. Attach the cut-in T jig
2. Vertically cut into the trough and score the bottom

3. Break off the sidewall
4. Attach the T before installing more trough.

They had to repeat these steps four times.

"The cut-in was really difficult," said Installer No. 1. "The trough material was the toughest to cut. It seems like there's more fiberglass in the material."

Competitor No. 2

The installers had to loosen the entire lineup before they could begin the retrofit.

To achieve completion, they had to:

1. Remove a section of trough
2. Cut it
3. Add a coupler and a T junction

They had to repeat these steps two more times to add a T and a four-way intersection.

The installers reported the off-ramp design was easier to use than the similar component in the system from Competitor No. 1. However, undoing the couplers and removing the trough was very difficult.

WaveTrax

The installers didn't have to loosen or remove any components to complete the retrofit, nor did they have to cut into any of the existing trough.

The Express T is used to transition to new horizontal runs anywhere along an existing trough. It requires no tools or cuts, only the ratcheting bracket.

The installers snapped the Express T onto the trough and locked it into place by sliding the bracket tight.

THE LAST WORD

Time is money.

The decision makers in every company know this and the cost of labor can carry a burden on expenses when it comes to selecting the physical infrastructure for network architecture.

Installation contractors typically cost between \$80 to \$100 per hour.

Our time-comparison case study shows a significant time and cost savings for cable raceway installations and retrofits.

| SAVINGS | | |
|------------------|--------------------------|------------------------------|
| System | Installation Time | Cost per Linear Foot* |
| Competitor No. 1 | 17 h | \$8.50 |
| Competitor No. 2 | 16 h | \$8 |
| WaveTrax | 8 h | \$4 |

*Average cost of \$90 per hour

Our installers were relieved we had no fiber installed in the trays during the retrofit portion of the case study. Otherwise, they would have been with us even longer than they were.

During a true retrofit with the two competitors' systems, they would have to lift the fiber out of the trough, wrap it in butcher paper and tie it to the ladder racking or unistrut so they could cut into the trough. This method protects the fiber from possible damage during the cut-in phase, but it is time-consuming.

And the fiber is still at risk from the excessive handling!

While they liked parts of each system—from sturdiness to the tightness of the lock—the duo agreed WaveTrax is the best solution for the fastest installation or retrofit.

LOWERING YOUR TCO

This time-comparison case study allows us to confirm that WaveTrax, especially the Express line of components, allows communications service providers to reduce their total cost of ownership (TCO) on cable raceway.

Not only does it reduce time spent on installations by 50 percent but it makes retrofits quicker by 60 percent.

WaveTrax Highlights

- Speeds up new fiber builds and expansion on existing layouts
- Easy installation requiring few tools
- Simplifies design layouts
- Expansion requires no cutting into existing infrastructure
- Snap-on components install anywhere along the trough
- Universal design of Express components fit competitor raceway solutions
- Most components available in two-, four-, six- and 12-inch sizes

Engineers ready to design custom solution

Each network facility is unique. Thus, your cable-management solution needs to be tailored to the design of your layout.

The Amphenol Telect engineering team uses your specifications to develop a WaveTrax solution that suits your needs. Your Custom Configured Solution (CCS) is included in the cost of your buildout.

We provide this service to any size of application, from small cell huts to large data centers. When you provide us with your configuration, we create drawings of an overhead layout and a full bill of materials for the project.

Call us today to get started: 509.926.6000.