



## **Advancements in J-hook Design:**

### *Innovative Solutions for Managing High-Performance Cabling*

Written by Steve Cardone

The exploding market demand for bandwidth and transmission speed requires unprecedented levels of performance from the structured cabling that moves data through the enterprise. This trend has been amplified by the increasing popularity of power over Ethernet (PoE) as a method of providing electrical power to networked devices. Cable manufacturers are responding with new product designs that optimize key factors like heat dissipation and bend radius while minimizing signal loss.

But beyond cable design, these trends have also required new and better methods of cable management, including advances in J-hook technology. This paper discusses how taking advantage of enhanced product design and installation methods for J-hooks can enable the user to maximize cable performance and simplify installation and maintenance, all while reducing the cost of cable management materials and labor.

#### **Demands on High-Performance Cable**

In the enterprise, wire and cable are facing increased performance demands. This impact is especially noticeable in a number of important application spaces with the greatest opportunity for growth, including:

- Data centers: Driven by insatiable consumer appetite for smartphones, tablets and other computing devices, combined with a trend toward business migration to cloud services and outsourced data management, data centers continue to grow in number and size, with accompanying design challenges. These include an explosive demand for power and cooling, and critical functionality such as telecommunications, data transmission and storage, system updates and monitoring, and ongoing maintenance.
- Healthcare: In what can truly be called life-or-death situations, hospitals and other medical facilities must manage such critical information as patient records and diagnostics. Even operating rooms and other treatment facilities increasingly rely on networked electronics. The amount of data that must be created, transmitted, managed, and stored has grown dramatically, while the Health Insurance Portability and Accountability Act, or HIPAA, presents stringent requirements for record safety, maintenance and privacy.
- Schools and universities: As mobile devices change the way education is delivered, schools and universities require ever-larger networks of computers and server systems that span the entire campus or even large metropolitan areas. This requires a cabling network that allows for access for all the computers and data devices located on campus as well as bring-your-own devices. In many school environments it is also necessary to have universally accessible audio/visual equipment so that video can be streamed to multiple sites campus-wide.

One of the more recent, and most impactful, technologies influencing the selection and management of high-performance cabling is PoE. First standardized in 2003, this technology enables a single cable to provide both data connections and electric power to networked devices such as lighting, fire alarms, cameras and desktop monitors. In this way, PoE reduces the amount of building materials required to power and connect a device to the network. However, it places significant demands on cable. For example, higher power levels running through a cable can cause performance issues,

in part by making the cable hotter, possibly leading to signal loss, downtime, and damage to the cable itself.

The growing demand for high-performance cabling brought on by PoE and other technologies also can have a major impact on wire and cable management. Users are looking for standards-compliant solutions that can provide relief from increased heat generation, while reducing stress and strain on cabling that can lead to cable sag, jacket deformation, pinching and unacceptable bend radius.

### **Cable and Wire Management Practices Evolve to Keep Pace**

The key industry standard for these cable management applications is ANSI/TIA-569-D “Telecommunications Pathways and Spaces,” developed by the TR-42.3 Pathways and Spaces Subcommittee of the Telecommunications Industry Association (TIA) and published in April 2015. It describes product performance and installation requirements for cabling pathways and spaces that provide support for cable in commercial and multi-tenant buildings as well as access provider and service provider spaces. Pathway locations include areas above the ceiling, duct systems located under the floor, and areas around the perimeter.

Traditional wire management methods have included raceways, wire trays and duct and, even earlier, such methods as bridle rings, cable ties, wire, string and ceiling grid supports. Achieving higher cable performance, however, requires non-continuous solutions that provide the necessary bend radius support and distributed load on load-bearing surfaces. And, as the required number of cables grew, users found it highly labor-intensive to install new cable tray in existing facilities with layers of existing infrastructure like ceiling grids, HVAC, additional support beams and joists, and other facility equipment in these spaces.

Among the challenges that conventional cable tray and conduit systems may be unable to resolve are:

- The ability to quickly move and relocate cables.
- The ability to separate cables at selected distances and identify cable bundles.
- Finding a cost-effective method to distribute IT cabling without having to install additional support structures.

A more recent innovation that addresses many of these issues is the J-hook, an advanced, non-continuous support solution for today's high-performance cabling systems.

J-hooks are a proven and very popular horizontal pathway promoted in the BICSI® TDM manual as a means to route communications cables (Figure 1). But the conventional J-hook has its own inherent problems. They also may not be self-supporting, as many are plastic and experience structural failure with building vibrations. Plastic j-hooks also often break under the downward load of the cables. They may not be easily connected to columns or beams without drilling. In addition, rough edges cause the bottom cables to be cut by weight of other cables and the act of pulling.

What has been needed is a hybrid between conventional conduit systems and the J-hook: a truly flexible, scalable, vertical cable support system.

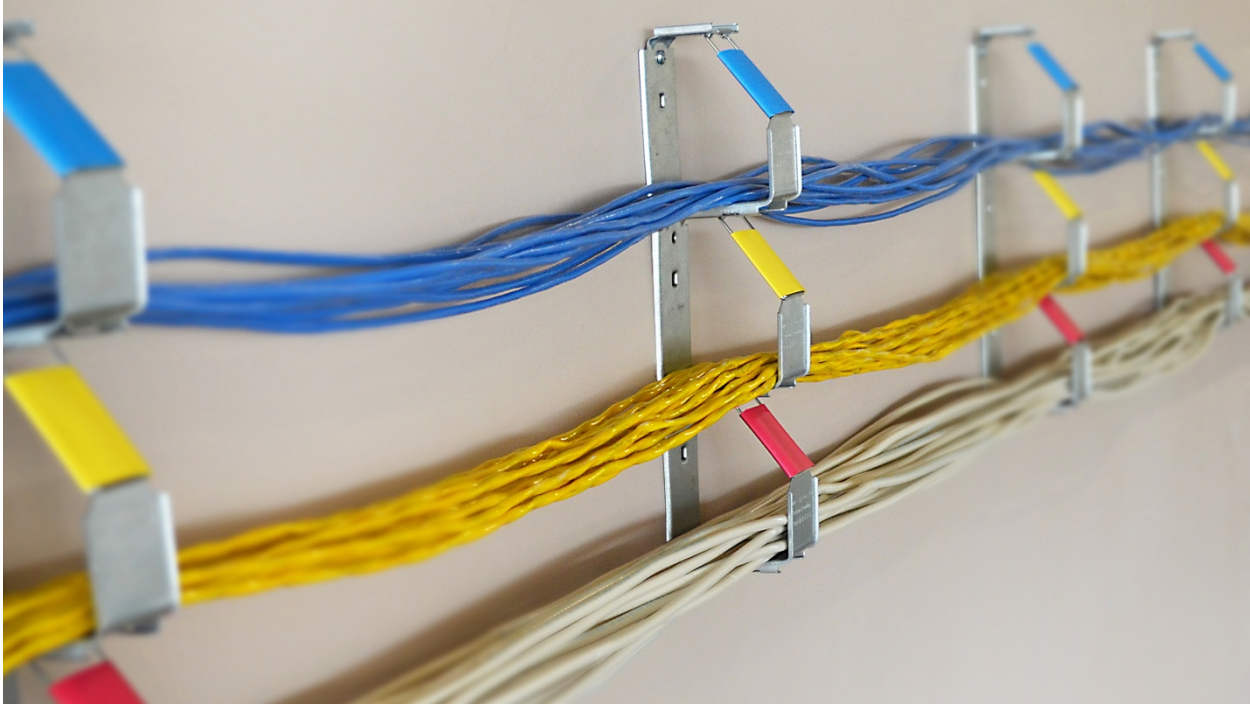


Figure 1: J-hooks are a proven and very popular horizontal pathway promoted in the BICSI® TDM manual as a means to route communications cables.

**New J-Hook Designs Increase Effectiveness**

In response, the industry has introduced new design enhancements to the J-hook that address these issues, in part by rethinking the product’s traditional curved shape. As cable capacity grows, it has been shown that the face of the curved J-hook forces unnecessary pressure on those cables that are located towards the bottom center of the hook, which could negatively impact overall network performance (Figure 2). The nadir of the curve pinches the cables, applying uneven weight distribution, focusing additional strain on the so-called “point load” at the bottom of the curve.

### Curved J-hook Design

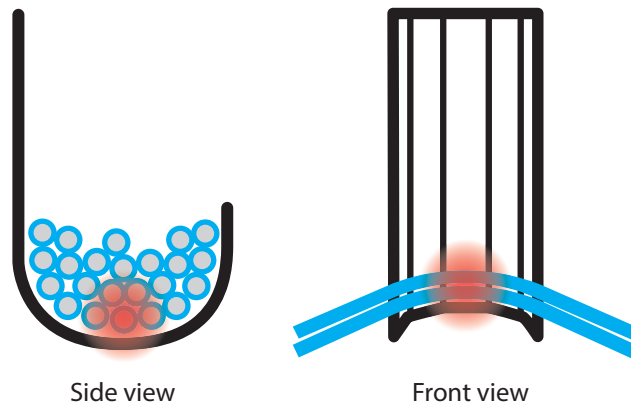


Figure 2: Due to its curved shape, traditional J-hooks force unnecessary pressure on those cables that are located towards the bottom center of the hook.

A new, flat-profile J-hook available on the market provides a number of significant advantages. First, cables naturally nestle in between adjacent cables, due to their round shape, so pressure is evenly dispersed throughout the J-hook (Figure 3). The wider, flatter base provides even weight distribution and also helps minimize cable sag (defined as the distance between the middle of the J-hook and the lowest point of the suspended cable). The hook's rounded edges allow for safer cable support, preventing damage to cables while protecting the installer from injury.

### Flat J-hook Design

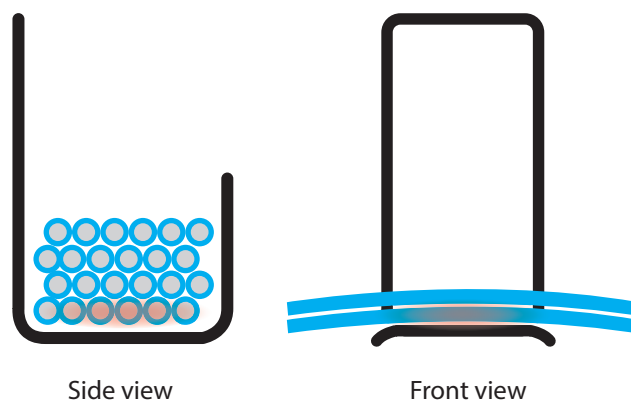


Figure 3: In a flat-profile J-hook, cables naturally nestle in between adjacent cables, so pressure is evenly dispersed.

The flat J-hook is designed with a sturdy two-inch-wide cable-bearing surface. Available in durable zinc-plated or stainless steel, the product can be specified in two different sizes based on fill capacity and load requirements (Table 1). It also costs less than competitive products, leading to a more affordable cable management system designed to offer greater functionality at a lower total cost.

Size	Fill capacity	Load *
4" (h) x 3" (w)	Category 5e – 150 Category 6 – 100 Category 6a – 60 Category 7 – 42	75 lbs.
2" (h) x 3" (w)	Category 5e - 75 Category 6 – 50 Category 6a – 30 Category 7 – 21	60 lbs.

**Table 1: Fill capacity and load limits for flat-profile J-hooks.**

\* The static load for each hook is divided by the number of additional hooks when not using additional hardware during installation.

### **Simplified Installation Cuts Material and Labor Costs**

Cable and wire management systems using the flat-profile J-hooks are also easier to install than traditional offerings, thanks to a proprietary design that simplifies the add-on process. While some j-hooks require additional brackets to create tiered channels, or “trees”, these latest offerings feature an innovative design approach that uses a snap-on tier system, allowing multiple hooks to infinitely link together while eliminating the need to install more hardware (Figure 4). J-hook trees can be created simply and economically, in any configuration, including back-to-back assemblies using a center hanger bracket.

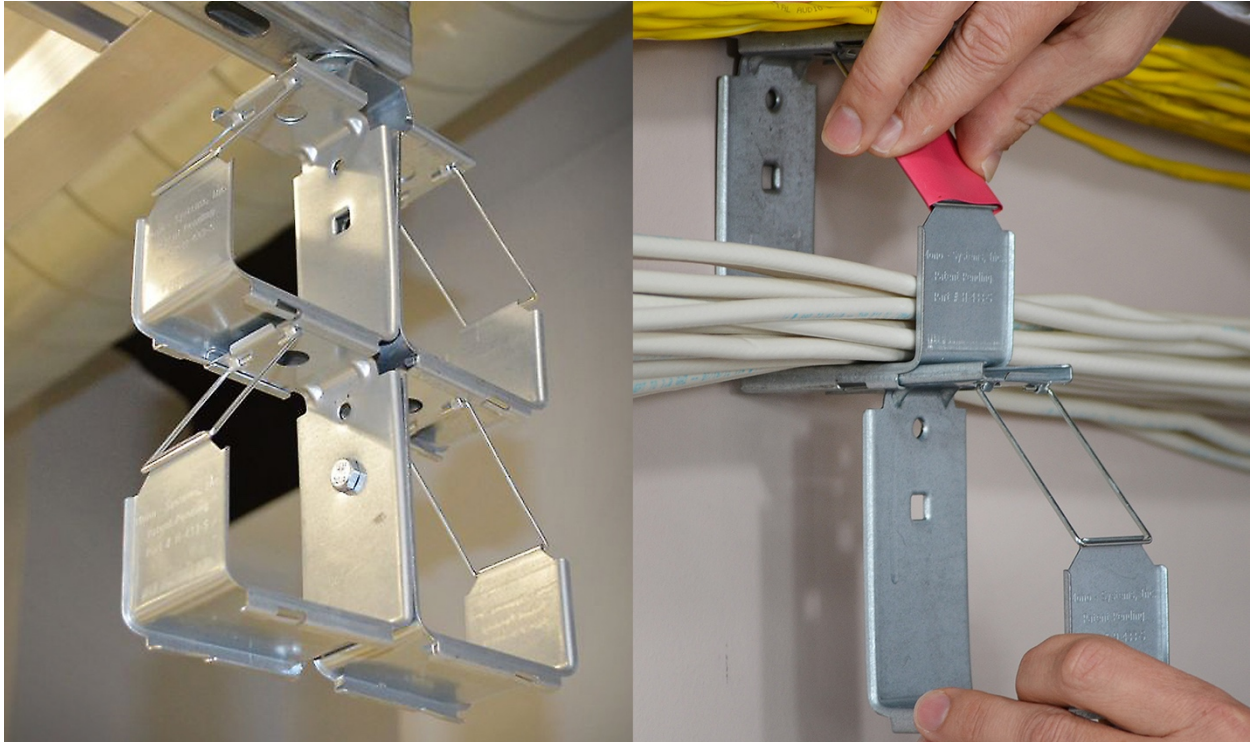


Figure 4: Advanced J-hook system design features an innovative approach that uses a snap-on tier system, eliminating the need to install more hardware.

This creates a secure, tiered cable support system that segregates cabling media in separate pathways for services, such as fire alarm and video, and prevents crossover. Optional plenum-rated color bands can be applied enable the installer to visually separate channels and show start- and end-points, facilitating inspection of the run to ensure it meets codes and inspection requirements.

This approach represents a simple but highly effective labor- and material-saving method of separating various wire or cable installations according to function. Attached to an existing cable tray, snap-on J-hooks can add a dedicated pathway in seconds (Figure 5). Fewer parts and pieces are required in-field or to maintain inventory, which also results in a greener solution. In fact, an engineering cost analysis conducted by MonoSystems shows that these products can provide for a better overall raceway infrastructure while reducing cable infrastructure initial costs by as much as 45 percent and future cable infrastructure operational costs by as much as 25 percent.



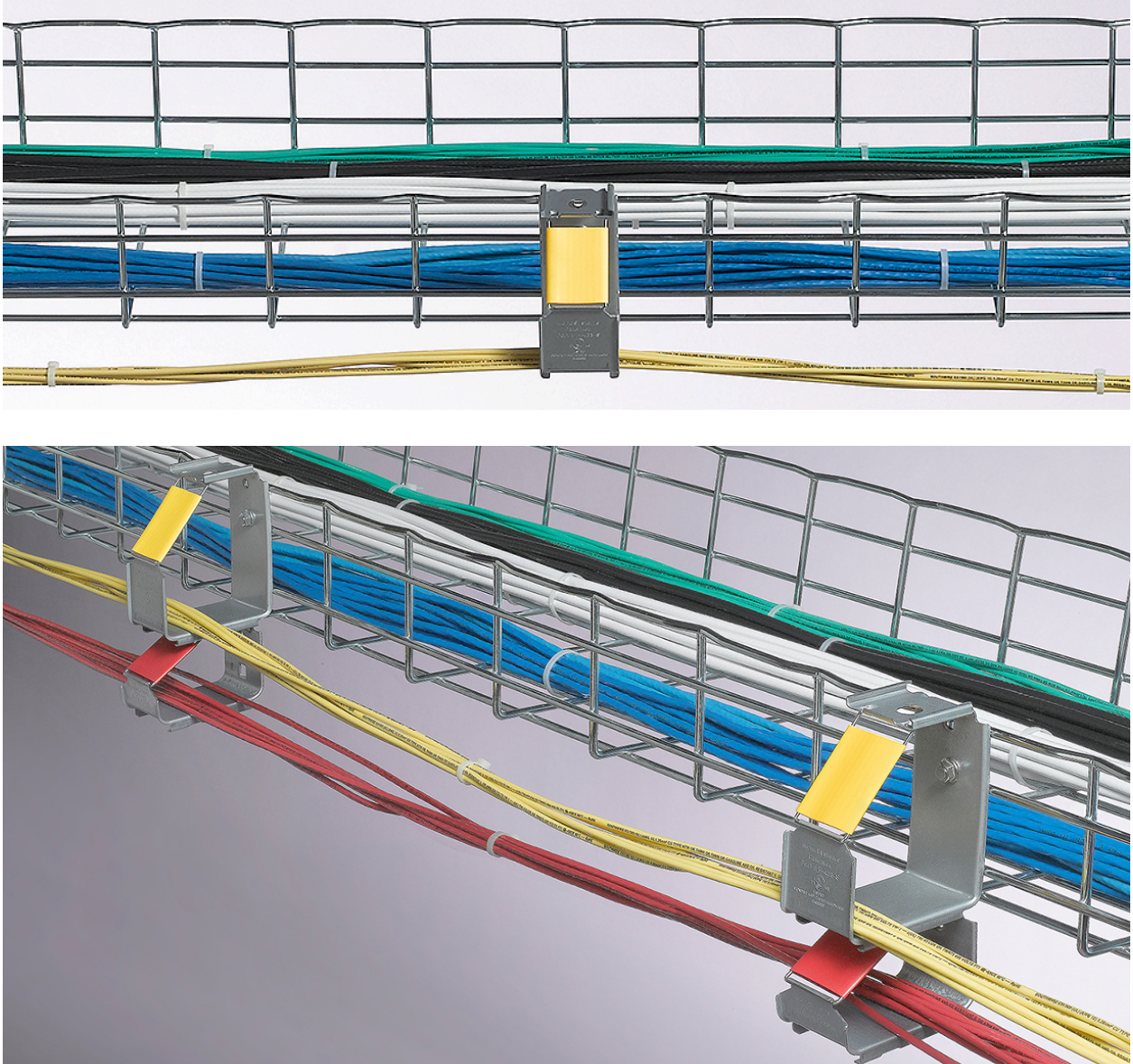


Figure 5: Attached to an existing basket tray, snap-on J-hooks can add dedicated pathways in seconds.

A recently introduced accessory for the J-hook is the cable support extender (Figure 6). This enhancement eliminates point load by increasing the cable support surface from 2-inches (50mm) to 12-inches (300mm). It's a plenum-rated part that reduces the strain on cables, and minimizes the gap between supports. Additionally, the cable support extender's perforated flat bottom allows cables to spread out rather than bunch, reducing heat buildup related to PoE.

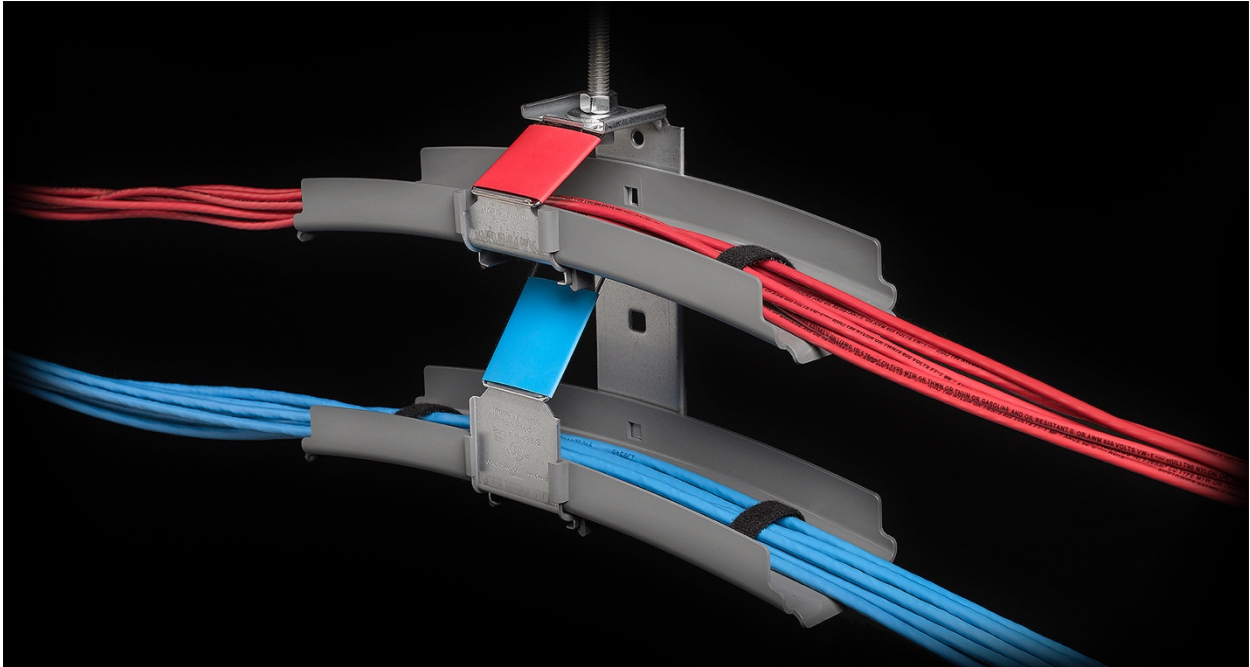


Figure 6: Cable support extenders enable best practice of eliminating point load by reducing the strain on cables between supports.

## Conclusion

As the industry tries to keep pace with growing performance demands on enterprise cable, J-hook wire and cable management systems are the focus of new developments centered on innovation and efficiency. Intuitive new product designs are enabling J-hooks to limit cable degradation and the deleterious effects of increased heat and mechanical stress. Flat-profile J-hook systems utilizing easy, snap-on additions and cable extenders bring the J-hook to the forefront of performance and affordability, while costing less than competitive products. The result: greater functionality at a lower total cost, all in a standards-compliant system for today's most demanding installations.

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Steve Cardone has been writing about the structured cabling industry for more than 20 years. Most recently, he was the editor of ICT Today, the technical journal published by BICSI. He has also served in marketing positions and as a consultant for a number of leading manufacturers working in such areas as optical fiber, wire and cable solutions, and access control.