Breakaway Fiber Connector Protects Traffic Signals, Management Systems and Travelers

When a vehicle shears a traffic light cabinet, it can rip up fiber cable all the way into the backbone, causing extensive costs and risk exposure. An inexpensive breakaway cable connector eliminates all that.

By Michael Newman, Vice President International Sales, Optical Cable Corporation

Although today’s intelligent, fiber optic-based traffic control systems have become increasingly powerful and popular, too many still have an inherent Achilles Heel [vulnerability]. That is, when a vehicle accidentally runs into the traffic light control cabinet at an intersection, the situation can quickly become disastrous – and stay that way for too long.

The reason for this dilemma is all too well known: When impact shears a cabinet from its pad, it can also rip the fiber optic cable far beyond the cabinet’s branch segment all the way into the network backbone, bringing down the traffic control system, causing extensive repairs, and introducing risk to travelers and technicians. On top of costs of up to $30,000, miles of traffic flow may be knotted for days.

It is somewhat paradoxical that one of the causes of all this pandemonium is the durability of the fiber optic cable. Because these cables are built to withstand harsh conditions, they don’t break. As a result, when impact carries an enclosure away from its base, the cable will move with it . . . unless the cable connection is designed to do otherwise.

Engineering a triggered breakaway

Designing a fiber optic cable connector rugged enough to last, yet would not wipe out network asset connections, required a bit of creative engineering. “As a manufacturer of fiber optic devices for the telecommunications industry we are naturally involved in ITS (intelligent transportation systems) application,” says Jeff Dominique, TrueView president. “So we got together with Tom Hazelton to discuss the need for a cable connection device that would disconnect positively upon impact, or when triggered by some mechanical force.”

In the event of a vehicular impact, the IRIS connector assembly - which is under positive spring tension - disengages automatically to protect the electronics of the cabinet as well as downstream fiber optic drop cabling.

Working together with a manufacturer of advanced fiber optic cable, TrueView engineers developed the IRIS™ connector, the first “failsafe” breakaway fiber optic cable connector ever developed for traffic light control cabinets and highway network nodes. In the event of a vehicular impact, the IRIS connector assembly - which is under positive spring tension - disengages automatically to protect the electronics of the cabinet as well as downstream fiber optic drop cabling.

The connector made its debut at a March 2009 Intelligent Traffic Engineers Conference, held at the Phoenix, Arizona Convention Center. At the conference, officials from the city of Surprise and the surrounding Maricopa County’s Department of Transportation (MCDOT) first saw the connector in action.

“We recognized that it could offer valuable protection to the new intelligent traffic control system we were installing along a five-mile stretch of West Bell Road, a primary Surprise access road that carries about 60,000 vehicles on a work day,” explains Israel Lopez, who was then a MCDOT manager on the project.

“This project was already specified at the time, but the manufacturers agreed that we could have the connector on a beta test basis. So we were able to install the device in the traffic signal cabinets at 12 intersections without changing the spec,” says Lopez.

The connector looked very promising to Lopez not only because it would save extensive damage and related costs that were incurred when a vehicle clobbers one of these cabinets, but would also reduce the related hazards that occur when extensive damage is done to a traffic communications network that supports message boards, traffic

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sensors and TV observation cameras connected to the MCDOT traffic management system.

Dominique explains that the avoidance of “collateral damage” to backbone cabling is the main benefit of the new breakaway connector. The fiber optic cable feeder line runs underground alongside the city streets, he says. At about 250 feet from the traffic light control cabinet at an intersection, a drop cable is connected to the backbone. Without a breakaway connector at the front end of the drop cable (in the control cabinet), a severe impact can shear the cabinet off its pad and cause collateral damage by jerking the drop cable so hard that it destroys the connection with the backbone cabling, possibly disabling some of the traffic control systems sensors, cameras and communications devices in the process.

“You are dealing with cable composed of 96 or 144 pieces of glass fiber that is about the diameter of the human hair,” says Dominique. “So, when a cabinet is moved by the impact of a vehicle, the resulting mechanical strain can physically take out the backbone connection. And if that happens, it could cost as much as $25,000 to repair.”

Recently, a vehicle struck one of the traffic light cabinets along West Bell Road, pushing it off its pad with force enough to tug the drop cable and engage the breakaway connector, which functioned perfectly, eliminating collateral damage while also making reconnection quick and simple.

Minimizing restoration time and costs
Lopez estimates that it takes 2 to 12 hours just to get the cabinet back in service.

“Restoration of service can be delayed because many jurisdictions do not keep fiber optic cable on hand, and there is a backorder time of four to eight weeks for cable from many sources,” he says. “If a cabinet is knocked out and you have sufficient slack cable in the pull boxes, you may be alright. But if additional cable is needed or qualified technicians are not available, you may be out of service for a much longer period. And that would be a painful experience.”

“There are periods when an outage in a traffic management system is especially disastrous,” says Marty Soulard, ITS Program Manager at CS Technologies, the network specialist that installed the Surprise system. “In most areas there are special events, such as ballgames, concerts and school programs, when traffic can be unusually heavy. And when you have even one signal cabinet out – let alone the main system – the resulting traffic can be very dangerous.”

Soulard adds that auto insurance companies should love the benefits of the breakaway connector, considering that this relatively inexpensive device could save repair costs of $5,000 to $20,000 per incident, for which the insurance company of the driver who did the damage is ultimately liable.

The City of Surprise beta installation was overseen by Fiber Network Training and Consulting Services (FNT). FNT, which provides installation and maintenance training for IRIS, as well as customer application and design consulting, supported this project with complimentary customer and installation crew training.

The connector is easily configurable to any new or existing traffic cabinet. Its unique mounting design enables it to be installed over the top of existing drop cables without taking the intersection down until the final cutover is ready. The connector offers up to twelve individual high-speed fiber optic information channels from multiple intersection cameras, signal status, detectors, traffic management center commands and other data collection devices.

In the event of a traffic signal controller cabinet knockdown, the connector isolates fiber damage to the stricken cabinet. Because of the built-in safety disconnect point installed at the base of the cabinet, the fiber optic cable no longer gets ripped out of the ground by the crashing vehicle.

Made in the USA, the breakaway connector is composed mainly of hardened steel components, making it a ‘green’ product that is recyclable.

“The next generation of the breakaway technology promises to be even more exciting”, says Jeff Dominique. “We will soon be releasing the total cabinet breakaway system, which will include breakaway connection technology for all cabinet connections including power, control, RJ45 and BNC connections. When this occurs, I believe that we will finally meet the full intent of the Traffic Incident Management Report, authored by the U.S. Department of Transportation in January of 2009.”

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