

Catalysts for Change: FTTx Breakthroughs and Breakaways

Now that fiber-to-the-home electronics have proved viable and the services they enable have proved marketable, vendors have started pouring more creative energies into bringing down the costs of deployment. The industry appears to be in a “virtuous circle,” with the strong demand for FTTH encouraging more innovation, and innovative products lowering deployment costs and further stimulating the market.

At the Broadband Summit session entitled “Catalysts for Change: FTTx Breakthroughs and Breakaways,” moderator Kermit Ross of Millennium Marketing selected five vendors to present recent “breakthrough” products that were enabling more cost-effective fiber deployment.

SPEEDING OSP DEPLOYMENT

Corning’s FlexNAP solution, which is designed to speed the deployment of outside plant, was introduced by FTTx product line manager Josh Wilken. FlexNAP consists of fiber distribution cable with network access points pre-installed at locations specified by the user. Because it uses preterminated splice

Five vendors’ breakthrough products that enable more cost-effective fiber deployment.

closures, FlexNAP can reduce a typical installation from 14 hours elapsed time and 16 person-hours to 2.75 hours elapsed time and 4.75 person-hours. Site surveys take a little longer



Carlson offers a wide variety of duct styles for deploying fiber cable.

Distribution Cable and Tether Attachment Points

Replaces

And this...

And this...

Preterminated splice closure installed on traditional distribution cable at customer-specified points

FlexNAP™ vs. Standard Outside Plant

Standard Distribution Installation

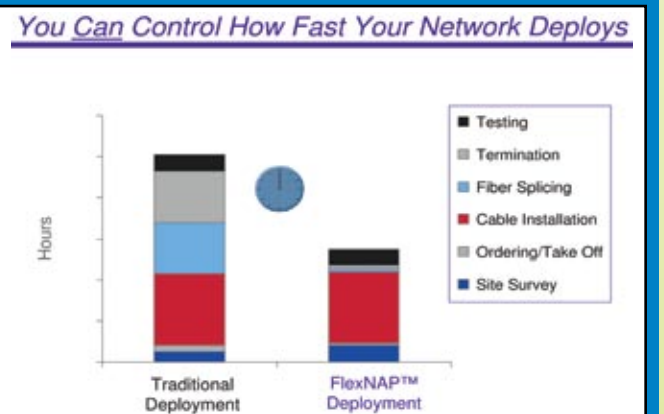
- Install Cable = 2 hours (4 man-hours)
- Access & Splice = 3 hours per handhole (9 man-hours)
- Terminal Placement = 1 hour per handhole (3 man-hours)

Total Standard Installation Time = 14 hours (16 man-hours)

FlexNAP Installation

- Install Cable = 2 hours (4 man-hours)
- Terminal Placement = 15 minutes per handhole (0.75 man-hours)

Total FlexNAP Installation Time = 2:45 hours (4:45 man-hours)



Corning Cable Systems’ FTTx product line manager Josh Wilken said FlexNAP fiber distribution cable with pre-installed network access points and connectors can substantially reduce installation time and labor, with a small penalty in site survey time.

- Fluid Injection
 - Strategic placement/flows/pressures
 - Thoroughly researched - natural fluids
- Extraction
 - Critical speeds





Where most people see an old copper cable, Joseph McIntire of Kabel-X sees an in-place ready-made duct for new fiber. The company injects a lubricant, slides the old copper out, and blows in the new fiber. Most customers up to now have been in Europe.

than with the standard method, while actual installation and testing takes about the same; the savings is in termination and splicing time.

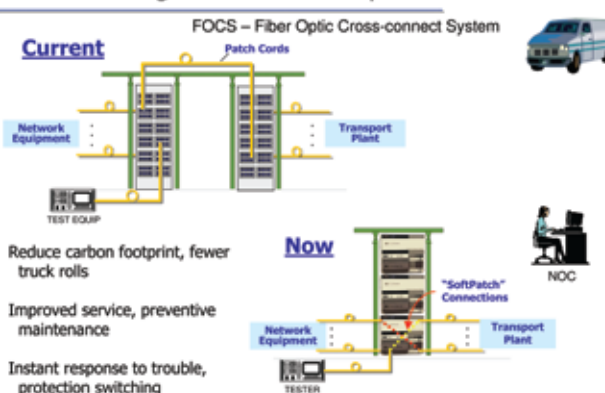


Special TeraSpan micro-trench duct developed for Verizon has extra channels and enough mechanical strength to withstand substantial lateral ground movement when laid in soil.

In addition to faster deployment, Wilken says FlexNAP offers many other advantages: less disruption, less street-closing time, less time for installers outdoors in harsh weather, lower

Fiber Management: what is possible

FOCS – Fiber Optic Cross-connect System



Current

- Network Equipment
- Transport Plant
- Patch Cords
- TEST EQUIP

Reduce carbon footprint, fewer truck rolls

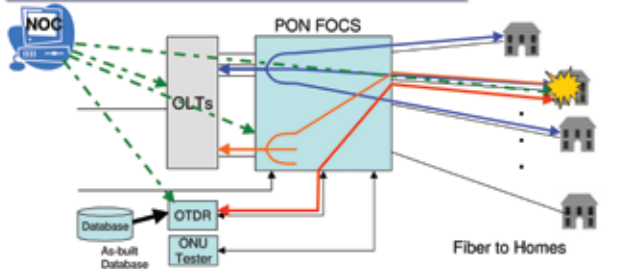
Improved service, preventive maintenance

Instant response to trouble, protection switching

Now

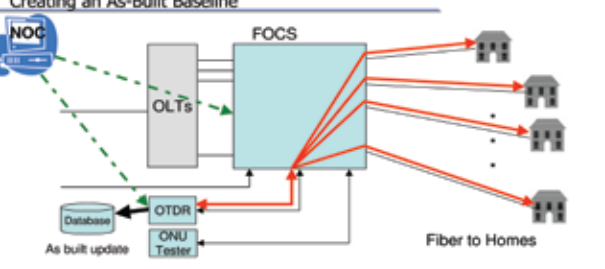
- Network Equipment
- Transport Plant
- SoftPatch Connections
- TESTER
- NOC

FOCS: Troubleshooting



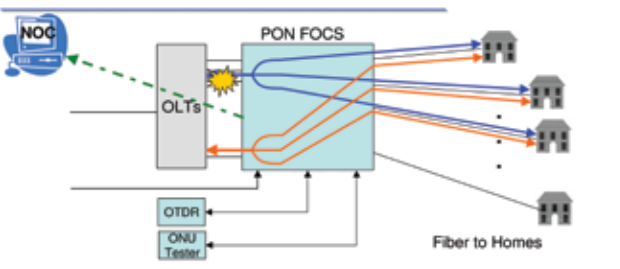
- 1) Customer reports problem
- 2) NOC: Attempts to ping Customer and Checks OLT
- 3) NOC: Switch customer over to another OLT interface
- 4) NOC: Connect OTDR
- 5) NOC: Run fiber test & compare against As-built database
- 6) NOC: Restore state or dispatch technician, if needed

Construction Certification: Creating an As-Built Baseline



- 1) OTDR connected to test port of FOCS
- 2) Database enabled to build up an "As built" database
- 3) NOC: Connect to FOCS & OTDR
- 4) NOC: Sequence through fibers to build data base port

FOCS: 1:N OLT Port Protection



- 1) Identify one OLT port as a "Protect" OLT port
- 2) FOCS: Detects failure of an active OLT port
- 3) FOCS: Automatically re-routes homes to Protect OLT port
- 4) FOCS: Notifies the NOC of the problem and action taken

Jim Diestel, director of marketing and business development for Calient Networks, presented Calient's Fiber Optic Cross-connect System (FOCS), a software-controlled switching system that allows automated testing and instant response to problems. Providers can advance-test fiber that's not yet connected to customers.

hiring and training costs, and fewer installation errors.

Wilken also discussed Corning's ClearCurve products for MDU deployments. Made with Corning's bend-insensitive fiber, ClearCurve drop cables are proving to be "more palatable to building owners," Wilken said, because installation is faster and there are fewer return trips to fix problems. While professional installers are still required, the product is "approaching do-it-yourself" and can be installed by workers with lower skill levels, he said.

MICRO-TRENCHING AVOIDS DISRUPTION

Gary Stahlbrand, director of product sales at TeraSpan, presented his company's Vertical Inlaid Fiber system, which is deployed in micro-trenches. In brownfield areas, aerial deployment of fiber is not always possible and conduits may be full, leaving only the option of digging up streets. Trenching is costly and disruptive, while boring is difficult in rocky soil. TeraSpan offers a third option: micro-trenching, or making a deep and narrow saw cut (half an inch to an inch wide) through paving or rocky soil.

	TXP Retrofit	New Cabinet
Equipment		
EIT (w/CBA, Fan Tray, etc.)	\$54,000	\$0
CABINET (including CBA, etc)	\$0	\$23,000
SOLUTION ENGINEERING	\$450	\$7,200
SHIPPING	\$400	\$3,200
TAX	\$900	\$1,300
EQUIPMENT TOTAL	\$17,900	\$36,600
Site		
PERMITS	\$0	\$1,000
POWER	\$0	\$6,000
RIGHT OF WAY		
Survey	\$0	\$3,000
Potholes	\$0	\$2,000
Engineering (Other)	\$0	\$1,000
ROW (40 line)	\$0	\$3,000
Conduits	\$0	\$9,000
SIDEWAY / SUPERVISOR	\$0	\$1,000
FAD / FAD WORK	\$0	\$2,000
CRANE / RENTAL	\$0	\$2,000
TEMPORARY CABINET	\$3,000	\$4,000
ENGINEERING	\$400	\$400
SITE TOTAL	\$2,400	\$36,600
EF&I		
PROJECT MAINTENANCE	\$900	\$1,000
INSTALLATION	\$6,400	\$3,240
FIELD ENGINEERING	\$400	\$400
EF&I TOTAL	\$7,700	\$6,040
ADMINISTRATION		
	\$3,470	\$12,906
GRAND TOTAL	\$31,470	\$92,846

Save Thousands of Dollars!


65% savings!

	TXP Retrofit	New Cabinet
Total Budget	\$750,000	\$750,000
OSP Cost per Site		
EQUIPMENT TOTAL inc. CBA	\$17,900	\$36,600
SITE TOTAL	\$2,400	\$36,600
EF&I TOTAL	\$7,700	\$6,040
ADMINISTRATION	\$3,470	\$12,906
	\$31,470	\$92,846
System Costs		
Common Equipment (except CBA)	\$10,000	\$10,000
Total startup cost per site (200/400 line)	\$41,470	\$102,046
Total startup cost per site (800 line)	\$54,470	\$115,046
Cost per POTS/DSL card	\$2,400	\$2,400
Cost per customer - 200 customers	\$315	\$618
Cost per customer - 400 customers	\$206	\$357
Cost per customer - 800 customers	\$170	\$246
Sites Possible per Budget		
200 customer sites	22	15
400 customer sites	9	5
800 customer sites	6	4

Increase upgrade footprint with same budget


Paul Forzisi, TXP's vice president for sales and marketing, showed multiple kits for retrofitting old cabinets, at a saving of up to 65 percent and with no new permitting or right-of-way issues.

- AFC 240 options**
 - Roof fan kit
 - Cabinet E5 mounting kit
 - Power system replacement
 - Heat exchanger door kit
- AFC 120 options**
 - Roof fan kit with and without cross-connect
 - Cabinet E5 mounting kit
 - Power system replacement
- NextLevel 320 / 420 / 810 options**
 - Cabinet E5 mounting kit
 - Power replacement kit
 - RHX or new RHX door



E5-110 in AFC 120 cabinet

Example Kit: DMS-1 Urban 600
Includes everything from AC load center to zip ties

Data sheets Thermal Reports MOPs Schematics

Micro Trenching vs. Open Cut Trenching

Micro trench— narrow & deep cut which is easily restored, low disruption

Open Cut Trenching - major excavation, expensive restoration, massive disruption



vs.



Fiber “zippered” into conduit



Gary Stahlbrand, director of product sales at TeraSpan, showed how micro-trenching can offer major deployment advantages. Fiber is inserted into the clamshell ducts and “zipped” before insertion into the grooves, which are typically an inch or less wide, but deep enough to stay out of the way of weather and repaving work.

Blowing Head and Fiber Tray



Saw Cut Along Curb



Micro-trenching can reduce the time and cost of trenching by 50 percent, according to Stahlbrand. Even better, it doesn't disrupt traffic – cars can drive over the narrow slits – and once the fiber is laid the micro-trench can be more easily patched. Cuts made for a micro-trench are much less likely to hit existing utilities. Because there is less chance of damage, the cost of trenching is more predictable. Deployers also have more choices of routes for their trenches.

The Vertical Inlaid Fiber system that TeraSpan provides for micro-trenching includes a zippered conduit that can interface with traditional fiber conduit and carry several telecom fibers over long runs without splicing. It is placed 6 to 9 inches below grade, along with a tracer wire to help locate it. Highly

resistant to impact, it can be moved if necessary when the road is resurfaced. It is easy to repair and more secure than aerial fiber, Stahlbrand said.

Deployment of the Vertical Inlaid Fiber system is fast and inexpensive – running about 1,600 feet per day per crew, at a cost of between \$10 and \$20 per foot.

REPLACING COPPER WITH FIBER

Joseph McIntire, chief engineer of Kabel-X USA, offered yet another method of putting fiber underground without the difficulty and expense of trenching. The Kabel-X method, which involves extracting copper from its sheath and replacing it with fiber cable, offers the added advantage of recovering the copper, worth anywhere from \$24 to \$36

per foot in today's market. Selling the copper can help subsidize the build, McIntire pointed out.

Kabel-X provides a biodegradable lubricating fluid that is injected between the core wrap and the sheath, allowing the copper to be winched out and fiber to be blown in. Any type or size of copper cable – whether telephone, coax or power cable – can be replaced with fiber. The surface is damaged only at each splice point, where digging takes place. Kabel-X has successfully pulled and replaced as much as 1,500 feet of copper cable from a single splice point.

In addition to being fast and inexpensive, the Kabel-X method reduces the administrative overhead of deploying fiber: No new rights of way are required, and permitting is minimal or nonexistent.

RETROFITTING CABINETS

Field cabinets represent another major expense of installing fiber. TXP is offering a retrofit solution that allows deployers to save 65 percent of the cost of a new cabinet by re-using old ones. Like the Kabel-X solution for fiber installation, TXP's cabinet retrofit solution also does away with permitting and right-of-way issues.

Paul Forzisi, TXP's vice president for sales and marketing, explained that while it has always been possible to retrofit field cabinets for fiber, doing so was not usually cost effective. TXP created a standardized kit and procedure that makes retrofits simple, repeatable and well documented – lowering costs not by introducing new technology but by making the retrofit a production process instead of a one-of.

The kit includes mounting brackets, cooling, power, cabling and mechanicals. It commoditizes the retrofit service by making the price predictable. (Previously, Forzisi quipped, "the price depended on how far away the hardware store was.")

In addition to the kit, the offering includes step-by-step instructions, schematics, and documentation, along with warranty and support. "It's all about the repeatable experience," Forzisi said.

AUTOMATING FIBER DISTRIBUTION


While the first four presentations were focused on reducing the capital costs required for fiber optic networks, the final one offered operational savings as well. As moderator Kermit Ross commented, "Capex is now; opex is forever."

Jim Diestel, director of marketing and business development for Calient Networks, presented Calient's Fiber Optic Cross-connect System (FOCS), a software-controlled switching system that reduces the labor required to test and maintain fiber optic patch panels. "The fiber distribution system is the last unmanaged entity," Diestel said. "The typical fiber optic patch panel is labor-intensive to change, but if you replace the fiber distribution panel with an optical switch, it can all be remotely managed from the network operations center."

FOCS allows automated testing, instant response to problems and service requests, and fewer truck rolls. It enables providers to test in advance fiber that won't actually be connected to customers for another year or two – ensuring that all problems can be identified before the contractor is out of the picture.

For troubleshooting customer calls, the technician at the NOC can switch the customer to another optical line terminal if necessary, trace the problem, and switch the customer back again – all in real time, with the customer still on the phone. Network engineers can reserve one port as a "protected" port and use it on a temporary basis whenever it's needed.

Another potential application for FOCS is load balancing for passive optical networks. Generally, in a distributed architecture, if there is too much or too little bandwidth demand on a splitter, the provider will balance the loads by sending a truck out to the field and moving the leads. With FOCS, load balancing can be performed from the network operations center. **BBP**



VALUE
 INNOVATION

Draka BendBright^{®XS}
 Value Innovation
 for real-world situations

Value Innovation is a way of looking at the world. How can we help our customers do more, make more, save more, achieve more? Like Draka BendBright^{®XS}, it combines the unlimited transmission capacity of optical fiber with copper-like flexibility and handling. It delivers premium bending-loss performance at every single-mode-fiber transmission wavelength. It can withstand repeated bending to incredibly small radii. It's backwards compatible. And it enables the use of space-saving components. The result is an optical fiber that makes easy work of bending, connecting and storing fibers in real-world FTTH and business situations. That is perfect for use in even the most demanding access network environments. And which delivers a smaller footprint for lower operational costs. That's value innovation in action. Find out more about Draka BendBright^{®XS} at www.drakaamericas.com

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