



The Truck Roll; why it shouldn't be
the first choice response to trouble

408 972-3600

www.calient.net

Abstract

Triple play, quad play, and even sextuple play converged services are bandied about in the trade press and by vendors seeking competitive advantage as the “next wave” in technology. Service providers are driven to offer converged services to remain or gain competitive advantage. The combination of forces is driving a complete re-architecture of carrier networks based on Internet Protocol (IP) over fiber. The sheer volume of new fiber necessary to carry these services will force network operators to explore ways to eliminate manual fiber management and devise more efficient troubleshooting practices, especially the high cost of dispatching technicians to the Outside Plant (OSP), a practice commonly referred to as a “truck roll.”

The Troubleshooting Truck Roll

Passive Optical Networks (PONs) and other FTTx technologies threaten to bring a massive fiber management crisis to access networks. Unfortunately, FTTx technology has not been designed to minimize operational costs; it is focused on reducing the capital cost of deploying fiber, leaving operational considerations to the future. The impact can be seen in a number of areas, but probably most egregious is the continued reliance on the truck roll, sending skilled, well equipped technicians to the field.

As competition and commoditization of services continue to drive down profit margins, the practice of routinely resorting to truck rolls in order to ensure service availability becomes increasingly more troublesome to operations managers trying to control costs. According to OSP Magazine, “Telecom industry analysts estimate the cost of the average truck roll at anywhere from \$150 to \$600, depending on your location, the work being done at the site, and the technician’s skill level and salary. The bulk of that price tag is the personnel cost of paying a trained telecommunications technician to drive from Point A to Point B. It gets more expensive if the truck roll is at night and the technician is paid overtime. Union contracts sometimes specify a minimum number of hours that on-call technicians are paid for every truck roll, regardless of how long the site visit actually takes.” (Bob Berry, *Road to Nowhere*, OSP Magazine, July 2005)

If the technician is responding to a service call at a Central Office (CO) the impact is minor. Technicians manually locate the desired fiber among hundreds, possibly thousands, of fibers. Once the fiber is located, it is manually unplugged and reconfigured—including fiber tip cleaning to insure no contamination is introduced with its resulting impact on light power loss. Hard-copy records typically located on the patch-panel are updated (or more typically, a post-it note attached to the fiber is updated) indicating path changes. Record-keeping is so inaccurate that manual audits of all the fibers in a given network configuration are often required to determine the extent of how efficiently equipment resources are utilized.

However, if the fault is in the OSP, there are miles of fiber route that must be traversed, often in uncertain traffic conditions. One or two technicians are required in the field to

perform a single fiber test, fault localization, or fiber monitoring operation. Availability outages are generally measured in hours, many of which are wasted in “windshield time” as technicians travel to or from the various sites necessary to perform their troubleshooting tasks. Any loss of availability produces a high risk of breaching Service Level Agreements (SLAs) resulting in financial penalties, damages customer relationships, and harms subscriber growth through negative perception of service and availability.

Most efforts to address this challenge have been focused on making the truck roll more efficient:

- Split work crews where easily diagnosed and corrected problems are dispatched to a lower wage and rudimentary equipped truck. This has had the effect of sending high wage and expensively equipped trucks to all problems that cannot be remotely diagnosed, which includes many fiber cuts, a simple repair job.
- Equipping trucks with hand-held power meters and OTDRs. This has increased the repair rate on test equipment due to the wear and tear of the harsh OSP environment and even some loss of test equipment.
- Increased use of appointments for repair activity to avoid traffic and optimize routes.

However, rather than simply improving truck rolls, there are now opportunities to eliminate them entirely through the use of remote automated troubleshooting and repair. For example, installing an automated optical switch at the CO allows Network Operations Center (NOC) personnel to isolate, troubleshoot, and make all fiber path reconfiguration changes remotely using software control. NOC personnel remotely perform testing, monitoring and troubleshooting—reducing the time to perform such operations from hours to minutes. The few remaining physical personnel dispatches still required are now targeted at sending an appropriately skilled technician to the identified fault location, along with the right tools to do the job. NOC personnel can call up any test equipment, from OTDRs to IP Packet Analyzers (see Figure 1). Flexible fiber management with test and monitoring applications also enables pro-active monitoring in which all fibers can be continuously polled and compared to historical data in order to identify deterioration of availability before outages occur.

Eliminating manual fiber handling means that the fiber path integrity is not jeopardized by the introduction of contamination during manual handling. NOC personnel have an instantaneous view of all fiber paths and a real-time inventory of all fiber paths and path changes by means of a real-time software control. In addition, new revenue streams can be supported if optical-layer protection switching is implemented on the switch, providing a new premium service opportunity (see Figure 2).

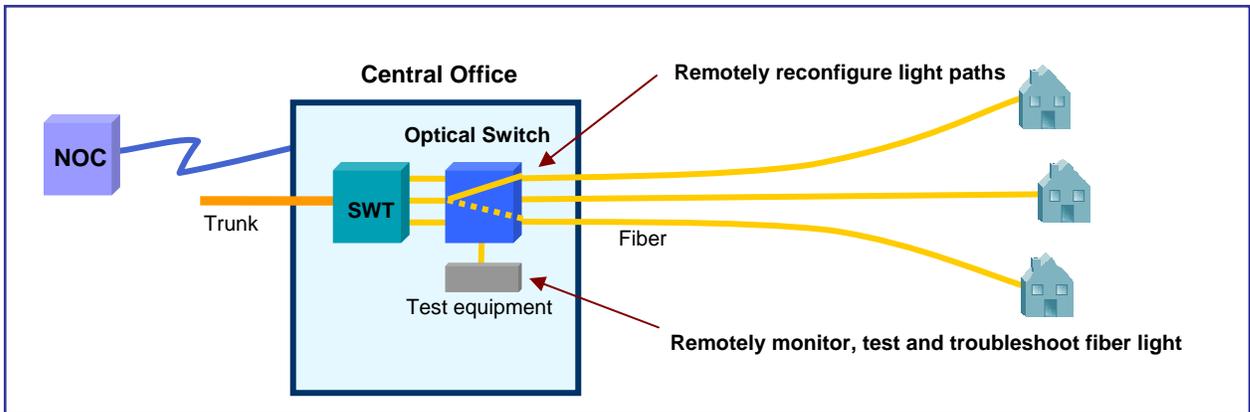


Figure 1: FTTx Network utilizing an intelligent optical switch.

Optical-switch-enabled remote test and monitoring is the natural evolution for fiber testing, fault localization and fiber monitoring requirements because numerous inefficiencies produced by essentially overlaying legacy business processes onto fiber initiatives can be eliminated.

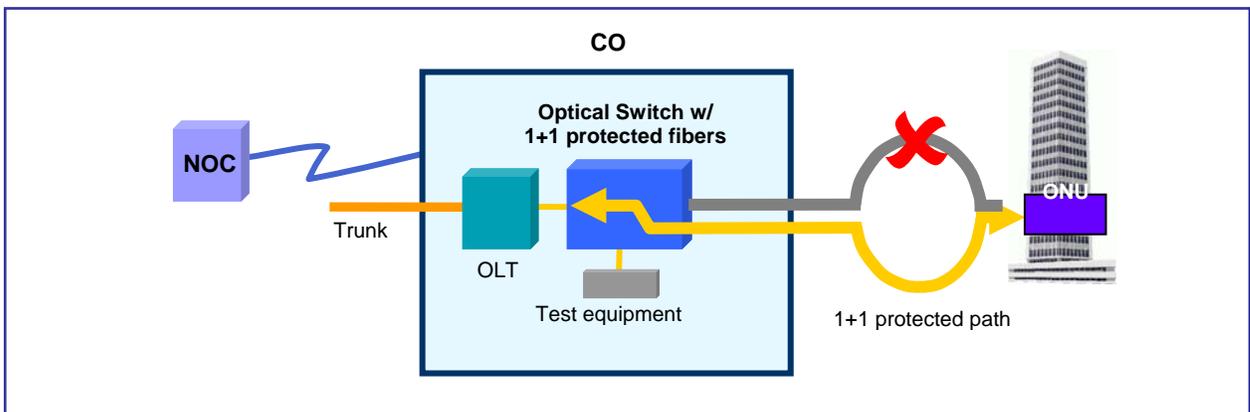


Figure 2: 1+1 protection provided by an optical switch for premium business customers

Economics

Automated fiber management and real-time monitoring applications result in specific quantifiable productivity improvements in network operations efficiency. This is achieved by automating previously manual procedures, reducing the time required to perform manual tasks by orders of magnitude.

Figure 3 graphically demonstrates the substantial gains in labor productivity achievable by performing fiber reconfigurations using software control instead of manual reconfiguration. In this example, an extremely aggressive time of 15 minutes per manual fiber reconfiguration task was assumed (it can often take even longer) and compared against 1 minute to perform (this is primarily operator setup time; the actual switch event takes milliseconds to complete) the same task using software. After only 6 tasks, the 90 minutes of manual labor required could be reduced to 6 minutes.

In Figure 3, time for both models is converted to labor costs using a conservative hourly rate estimate of \$60 per hour. The order of magnitude in productivity gains achievable by automating tasks and eliminating the truck roll becomes readily apparent.

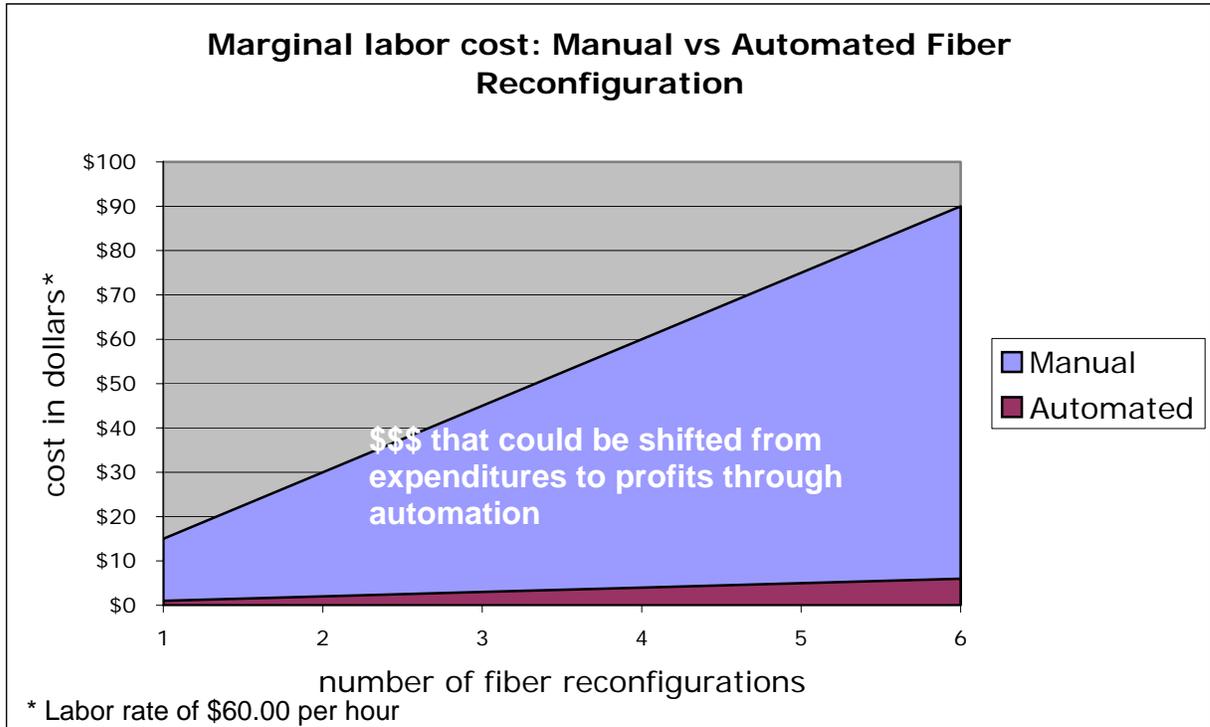


Figure 3: Marginal labor cost Manual vs Automated Fiber reconfiguration

An example helps to put the economics into a carrier troubleshooting example into perspective. Verizon has announced that they have passed 3,000,000 homes with fiber in 2005. If we assume a 20% penetration, or approximately 600,000 fiber subscribers, industry statistics indicate that 20% of the customers will generate trouble complaints annually, resulting in 120,000 trouble tickets. Using a modest estimate that 50% of the trouble tickets result in a truck roll, then 60,000 truck rolls would be required this year for current fiber subscribers alone. At a cost of \$400 per truck roll, just the dispatch cost of servicing 600,000 fiber customers is \$24,000,000, or an annual revenue loss of \$40 per fiber customer. Conversely, every truck roll eliminated represents cash flow that shifts from loss to profit.

Conclusion

Fiber networks built on IP are the future of the telecommunications industry. The actual fiber infrastructure is the weak link of this strategy because fiber management is currently manual. Discovering ways to make profitable business models are today's challenge for the telecommunications industry. Carriers must focus attention and resources on ways to remain competitive while critical changes are occurring: new rules, new competitors, new customers, unprecedented demands, and the emergence of requirements for eBusiness.

However, current attempts improve the bottom line based strictly on “doing more with less” by reducing headcounts are not sufficient. Intelligent, automated fiber management switches must replace the current manual equipment and procedures in order to contain operational costs by eliminating wasteful truck rolls and centralizing control and expertise.