

QuestFiber

Remote Fiber Testing for Full Service, Emerging
and Next Generation Networks



research
& design



manufacturing



installation
& maintenance



network
monitoring



optical
components



Benefits and Applications

Benefits:

- Proactively manage network quality and reliability
- Remote Web assessment of network quality
- Service Level Agreement compliance monitoring
- Immediately identify and react to network security breaches
- Problem prevention, detection and reaction

Applications:

- Customer Service Management
- Network Security
- Optical Network Maintenance
- Fault Detection and Isolation
- Network Status Monitoring

In today's fast-paced, global economic environment, the value and security of network data along with customer expectations for excellent service have never been greater. Network operators, service providers and enterprise organizations must proactively monitor the health of their fiber optic networks in order to ensure excellent QoS, meet Service Level Agreement commitments and maintain the revenue streams being generated by their networks. All of this must occur while working with fewer financial and human resources. It is essential that both public and private networks employ tools that will enable them to attract and retain their customers, and maximize the efficiency of their networks while reducing operational expenses.

Many network operations managers are well acquainted with the network monitoring tools designed to monitor the status of applications on their networks; however, few monitor the health of their optical network, yet this can often be the cause of network performance degradation. Reactive network troubleshooting is not sufficient as this approach may require too much time to identify and isolate problems; thus

damaging an organization's reputation, diminishing customer service expectations and ultimately reducing an organization's revenue stream in the time needed to make necessary repairs.

Designed for full service, emerging and next generation public and private networks, QuestFiber is the only Remote Fiber Testing System that allows the network operations manager to proactively monitor the fiber optic network through use of Domains, thus enabling delivery of the highest level of QoS and ensuring network security and reliability to the greatest degree.

The key benefits to the QuestFiber system include:

- **Superior customer service management by quickly and easily identifying and isolating network problems.**
- **Quick and easy fault identification and isolation.**
- **Identification of network security breaches before they become recognizable.**
- **Proactive, non-intrusive network monitoring to ensure network reliability.**

Superior Customer Service Management

Quickly and Easily Identify and Isolate Network Problems

In order to be successful in today's competitive, economic environment it is absolutely necessary that both public and private networks provide their customers with excellent service. Failure to do so can easily lead to lost revenue arising from customer churn and performance penalties. To be competitive, public and private network operators need to guarantee network availability and offer differentiated services all while managing their networks with limited resources. Public operators must also deal with customer SLA commitments and government regulators overseeing strict enforcement of service availability.

QuestFiber enables the delivery of excellent QoS in many ways.

First, QuestFiber's ability to immediately send an alarm and isolate the location of a fiber problem allows you to take corrective action before it becomes mission critical. It proactively monitors your network in a non-intrusive manner and immediately identifies problem situations. This significantly reduces Mean Time to Repair, saving time, money and your reputation with your customer.

Second, QuestFiber's use of Domains enables you to ensure that you are meeting your SLA commitments. Domains allow you to partition your network data into customized views that meet the needs of

both you and your customers.

You can create domains to view network status by geography, maintenance teams, services and customers - simultaneously. Domains enable you to clearly and easily see in real-time, those areas of your network that are operating smoothly, and those that may be experiencing problems. In conjunction with QuestFiber's automated reporting capabilities, Domains allow you to provide your customers with targeted and timely reports concerning their Quality of Service. Domains also provide the information needed to differentiate yourself from the competition by providing timely and accurate information about any SLA commitment and network performance requirement.

Third, QuestFiber is easy to use, providing real-time access to the network at anytime, from anywhere through the use of a Web interface. For convenience, the Web interface allows full system access and control through use of managed user accounts.

Fourth, when it comes to deploying new services, up to date information from QuestFiber allows rapid turn-up of new services as there will be no *optical surprises* facing the provisioning team arising from use of outdated optical data. This helps ensure that the network will be operating at optimal performance, satisfying customers as they adopt your new services.

Features

- Non-intrusive, 24/7 network surveillance
- Ability to conduct tests such as OTDR
- Automated Alarms for immediate notification and identification of fault locations
- Flexible Domain management
- Multiple user easy-to-use interfaces, including NOC, Administrator, Operator and Reporting
- Automated reporting - Real-Time and Statistical
- Remote Web access
- Dark and Active fiber monitoring
- Designed for GIS and OSS integration

Ensure Network Security

Target Audience

Public Networks

- Dark Fiber Providers
- Utilities
- Metropolitan Area Network Providers
- Cable Companies
- RBOCs, ILECs, IXCs, CLECs, MSOs, ASPs, ISPs
- Submarine Networks
- Systems Integrators

Private Networks

- Banking and Financial Institutions
- Insurance Companies
- Government Agencies
- Airports
- Emergency Services Organizations
- Company and University Campus

Identify Security Breaches Before They Become Critical

Public and private networks alike must deal with a myriad of security issues, which can lead to denial of service, reduced quality of service or the theft of critical information. QuestFiber is a proactive, non-intrusive monitoring system that allows network operators to implement a **Prevention, Detection and Reaction** scheme in the event of a fiber network security breach. Network security can be comprised in a variety of ways, some of them optical. In an ideal situation, network security breaches are preventable.

However, when this is not possible, immediate detection and reaction must take place. Through deployment of QuestFiber, operators create an optical signature of the network from which future intrusion attempts are easily and precisely detected, allowing for immediate reaction. QuestFiber can be deployed directly onto live fibers carrying secure information providing an extra level of comfort for security conscience network users.



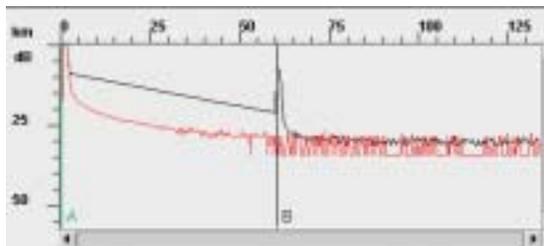
Network Maintenance and Reliability

Proactive, Non-Intrusive Network Monitoring

Maintaining your network and ensuring its reliability is a daunting task, especially as networks become increasingly more complex and resources more constrained. Reactive troubleshooting tools cost you time, money and customer satisfaction. QuestFiber lets you proactively monitor the health of your network anytime, anywhere. The system identifies situations such as fiber degradation before they become service affecting. In the event of a network fault, the system provides immediate notification with all the information needed to completely isolate the exact fault location. Thus, it is possible to reduce the Mean Time To Repair, saving time and money by being able to dispatch repair crews to the exact location of the problem. In this manner it is possible for the QuestFiber user to meet SLAs set up with its customers.

Multiple Test Platforms

QuestFiber enables you to conduct a variety of tests including OTDR which enable you to accurately track and correlate network performance to optical characteristics. With OTDR testing, fiber degradation and fault location are automatically and immediately identified.



Domains

Flexible Domain management and automated reporting further aid in the rapid identification and isolation of fiber faults. Domains enable you to organize network information into easy to understand, customizable segments to meet the needs of your organization. For example, a Domain can be defined as a city, a company, a department, a customer or a group of customers. Domains can include any combination of monitored optical elements. Creating a Domain that contains all optical elements allows for immediate and easy access to the health of the entire organization. Domain management further enables the delivery of excellent Quality of Service by allowing for focused network performance tracking on key segments, regions, rings and customers. In this manner, proactive maintenance activities can be directed where most needed, thus avoiding critical and costly network faults.



Domain Examples

Active Fiber Monitoring

The QuestFiber Remote Fiber Test System gives you the ability to test both active and dark fibers. The ability to test traffic carrying fibers, allows you to monitor circuits that carry critical network bandwidth. Therefore, the direct impact of fiber degradation on revenue generating circuits can be measured and tracked over time. Having the ability to test both active and dark fibers also gives you the flexibility to better deal with a variety of network circumstances which can impact the appropriateness of the type of test conducted. Such circumstances can include the number of "spare" fibers available, the capacity available on fibers that are presently active, increased capacity demands of new services, planned upgrades of terminal equipment and the testing philosophy of the operating company. Coupled with Domains, active fiber monitoring provides a unique approach to customer management as key service level metrics can be tracked over time and provided to your customers automatically.

Reporting

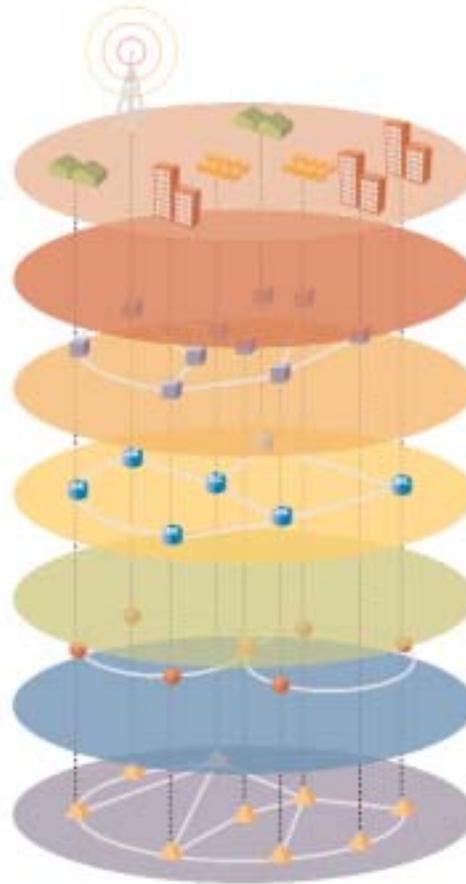
QuestFiber provides a comprehensive set of reports that allow precise tracking of network faults, QoS and optical performance characteristics. These reports can provide historical as well as real-time network assessment. Reports can be generated for single or multiple Domains, fibers or events. Report types that can be generated include:

- Alarm History Reports
- Network Properties Reports
- Quality of Service Reports
- Domain and System Status Reports

Reporting is entirely automated within QuestFiber. On a scheduled basis, the system collects the necessary data, analyzes it, compiles the requested report type and then distributes electronic copies, all automatically. In this manner, technical staff do not have to waste time running reports by hand, but can focus on analyzing the results.

QuestFiber and CMA 5000

In its commitment to provide its customer with completely flexible solutions to address all layers of the network, NetTest is technologically converging QuestFiber and its CMA 5000 Multi-Layer Tester onto a common platform. Utilizing a common technology platform enables NetTest to provide you with testing solutions to meet all of your needs. As the industry's leading Remote Fiber Test System, QuestFiber will enable you to automatically monitor multiple layers of the network anytime, anywhere using the common platform. As a portable solution, the CMA 5000 is designed to provide you with the most complete testing information available when in the field. Given that both products use the same technology platform, you now have all the tools you need to meet your testing needs. Best of all, given that these tools are built on a flexible platform, NetTest can grow their functionality as the market requires.



NetTest, a pioneer in multi-layer testing technology offers solutions to test all layers of the networks

Example of Time Saved Using QuestFiber in the Location and Repair of a Fiber Fault

The Catastrophic Event

12:00 AM

Service failure is a network operator's worst nightmare; and scariest of all is that it is completely unpredictable. A typical nightmare scenario begins at the Network Operations Center where scrambling technicians rush to a computer terminal, only to discover a catastrophic network failure. The millisecond response time of the transmission system prevents thousands of calls from being interrupted but now the vulnerable re-route path is the only physical link from point A to point B. A second failure on this link could lead to complete loss of service for a whole section of the network.

12:05 AM

The network technicians begin to troubleshoot the fault by sifting through the logged alarm data. After a careful search a transmission alarm logged for a link in the network is identified as a sign of the failure. Now the technicians have this link as a target for the restoration process. From the NOC they attempt to re-establish communications only to realize that the fault is physical in nature, this means a person has to inspect the site to determine the cause of failure.

12:30 AM

The technicians have been in constant contact with supervisors and maintenance technicians since the start of this scenario, and now that the troubleshooting has identified this link, the local maintenance crew is dispatched. The maintenance crew has to gather their test equipment and travel to the nearest possible point of presence with visibility of the affected link. Waiting for a crew to arrive on-site can feel like a lifetime.

1:15 AM

After arriving, the maintenance crew verifies the working condition of the transmission equipment to rule out any possible transmission faults. Discovering that the transmission gear is functioning properly they can turn their attention to the optical connections between transmission gear and the optical cables that transport the signals. Checking each and every optical jumper takes time, but guarantees that every connection is properly made. Now the maintenance crew knows that the fault lies in the outside plant, and a cable break is the most likely cause.

2:00 AM

The maintenance crew has brought their OTDR, with which they can very accurately find the distance to the fault on the cable. First they must find the proper port, disconnect the transmission jumper and connect the test unit. Disconnecting the wrong jumper would instigate a whole new barrage of transmission alarms and could take down an entire section of the network. The instrument is quickly configured, powered up and patched into the network; the test should only take a few minutes to be completed. Hopefully no problems occur at this point; meaning the unit has power or the battery is fully charged, the crew brought the right patch cord, the test unit has enough dynamic range to seek out the fiber fault, etc. Assuming all is well with the test unit, an OTDR trace signature is available within three minutes. The maintenance crew can now evaluate this trace and relay the optical distance to the network technicians at the NOC.

2:10 AM

At the NOC, the technicians there have just heard the worst news possible; the fiber is cut. The good news is that they have an extremely accurate distance to that fault from the maintenance crew.

The bad news is that they have to correlate that optical distance to an actual physical location. The extensive records that the network operator created during the outside plant installation phase of the network build-out will help pinpoint the fault. The technicians quickly review the build maps and trace the optical distance to the fault, now the exact location of the break is discovered.

2:45 AM

Again the technicians dispatch the maintenance crew to the fault location, the build maps have illustrated the exact location of the fault including landmarks for finding the fault between telephone poles. The outside plant crew is speeding to the fault.

3:45 AM

The restoration crew is on-site and the downed pole is evidently the cause of the fault. Slack must be released from a nearby slack loop and the two cable ends mated together. Another maintenance crew is enroute to this site, bringing the splicing trailer. The cables must be prepared and each fiber fused in order to restore service.

4:15 AM

The splicing crew has arrived with the splicing trailer. The cable is cut back to undamaged fiber and the laborious task of fusion splicing each fiber has begun. The first maintenance crew has left for the nearest CO (Central Office), they will have to test the cable after splicing to verify the quality of the splice.

4:45 AM

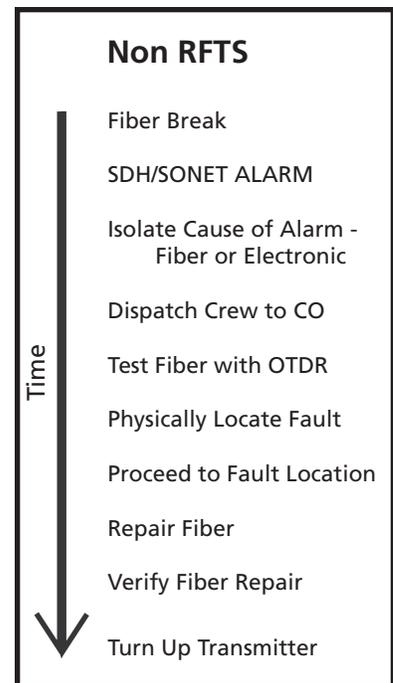
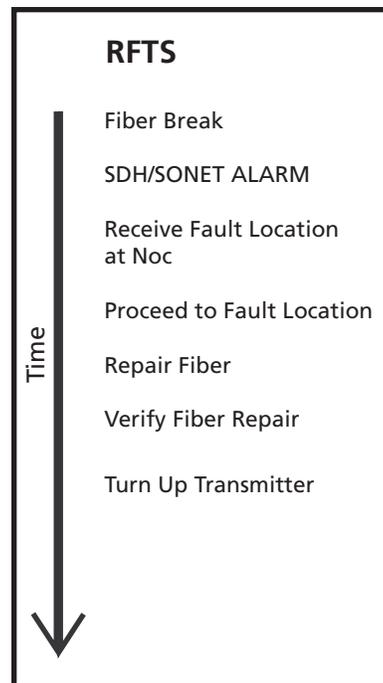
The splice crew has just finished fusing the cable together and the crew at the CO is testing each of the 24 fibers. Barring any unforeseen problems the cable should be repaired soon.

5:30 AM

The OTDR has verified the quality of the splices joining the two halves of cable together; another crew has the responsibility of returning the repaired cable to its location on the new pole. As soon as the test data is checked into the reference file by a supervisor, traffic can be rerouted back along the repaired fiber optic link.

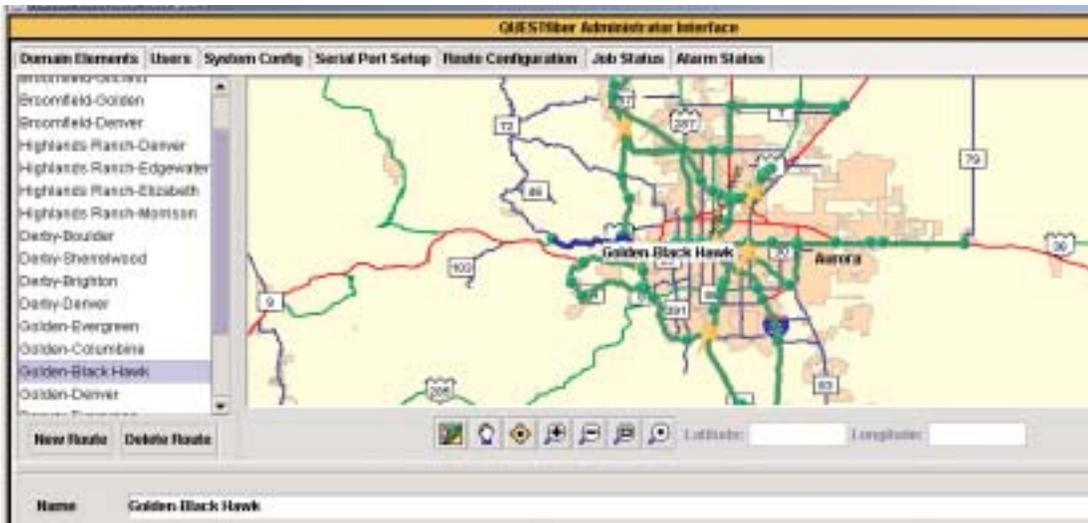
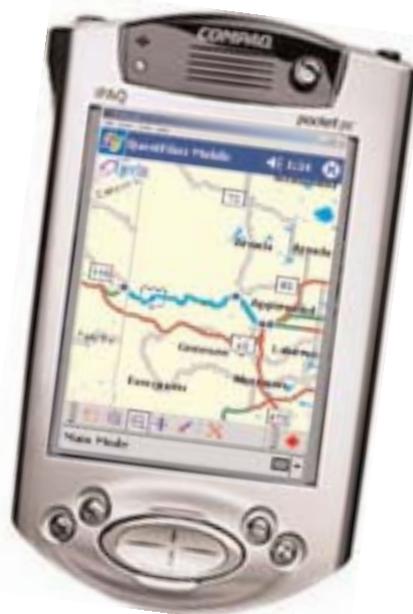
6:30 AM

The link is fully repaired and traffic has been rerouted to the default arrangement.



Network Monitoring for Small Optical Networks

Managers of smaller, metropolitan area networks can now obtain QuestFiber's excellent feature functionality in MetroWatch, a system specifically designed to meet their needs. MetroWatch is the industry's first standalone, automated fiber monitoring system that automatically sends an alert to the network manager and fiber maintenance contractor when there is a problem in the network. Thus reducing the mean time to repair. Remote Web access capability allows the network operator to access MetroWatch data at any time from anywhere. To further promote ease of use, MetroWatch software can also be loaded onto a Personal Digital Assistant (PDA), providing the ability to request and query optical maps, conduct fiber status tests, remotely assess the network and automatically receive alarms.





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