METROBILITY optical systems

Quality of Optical Amplitude Monitoring

The Problem: Optical Signal Degradation = Customer Unhappiness

Optical amplitude affects both the quality and strength of the signal being transmitted and received at a customer site. Signal degradation may be a result of a crack within the cable, contaminants such as dust or moisture on connectors, or actual degradation of the optical laser transceiver. Service providers need to be alerted to any symptoms of degradation of the optical power and schedule preventative maintenance before incurring a costly truck roll and an unhappy customer. (See Calculating Signal Quality for Fiber Optics, page 3)

The Solution: Eliminate Costly Trips and Test Equipment

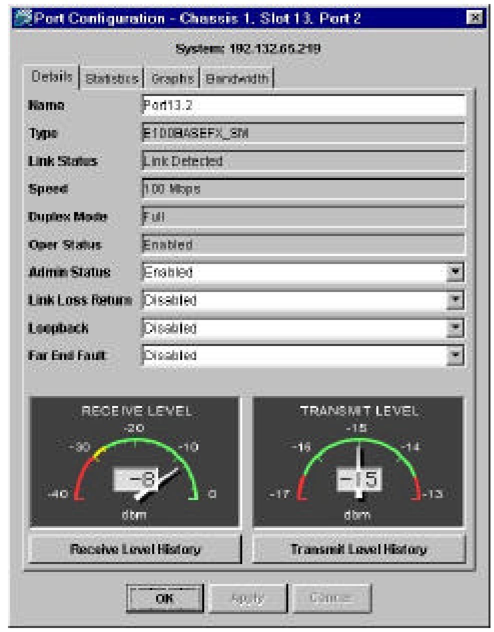
All Metrobility **Access Line Cards** have the ability to monitor optical amplitude. This monitoring feature works like an integral optical power meter by monitoring the transmit and receive power of the optical transceivers.

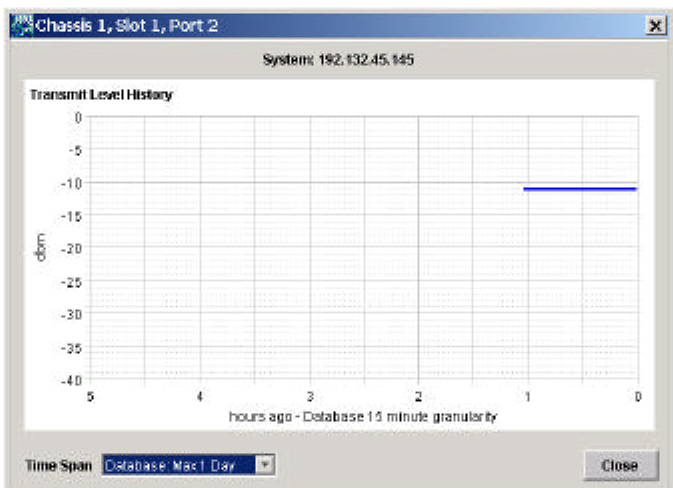
The Benefit: Proactive Service = Happy Customers

Now, instead of sending a crew to test the optical power using an optical power meter, technicians can see, in real-time, all the information about the laser's transmit and receive power remotely without physically opening the link. Risk of damaged connectors or contamination of the link is avoided. By monitoring this data, service providers can proactively look for things such as degradation within the fiber due to cracks, or connector contaminants such as dust or moisture.

The optical amplitude data is sent in real-time through a unique management channel on the Ethernet link without using any of the customer's bandwidth to **NetBeacon Element Manager**ä . NetBeacon will send a trap to the service provider if the laser's power level drops below a set tolerance limit.

A visual indication of the transmit and receive level is available via an easy-to-read "speedometer" type graph.





Because optical lasers tend to degrade over time, rather than failing all at once, NetBeacon also provides a histogram to enable the service provider to identify trends laser strength.

For additional information on NetBeacon and Metrobility's complete line of access products, contact Metrobilility Optical Systems at 1.877.526.2278 or 1.603.880.1833. Visit us on the web at www.metrobility.com.

Access Line Cards

R231-13	100M TX to FX MM/SC
R231-14	100M TX to FX SM/SC
R231-15	100M TX to FX MM/ST
R231-16	100M TX to FX SM/ST
R231-17	100M TX to FX SM/SC LH (40km)
R231-1J	100M TX to FX SM/SC ELH (100km)

Optical Budget Tutorial

Calculating Signal Quality for Fiber Optics
Signal quality is affected by type and quality of fiber, number and quality of connectors, number of quality of splices, distance and signal splits.

Quality and Type of Fiber
Maximum supported network segments are dependent on the *type* of fiber (singlemode or multimode) and the *core diameter* of the fiber (9um/50/62.5…). In optical fiber technology, singlemode fiber is optical fiber that is designed for the transmission of a single ray or mode of light as a carrier and is used for long-distance signal transmission. For short distances, multimode fiber is used. Singlemode fiber has a much smaller core than multimode fiber.

Number and Quality of Connectors
The type of connector used at each device also affects signal integrity. Obviously, better quality connectors yield better quality signals. All connectors are rated in terms of decibels. The average connector will have a rating of .5 decibels.

Number of Quality of Splices
When connecting fiber optic cables, it is critical that the splice be as 'clean' as possible. This means that both ends of the fiber should be polished and that it be free of any contaminants.

Optical Budget
To calculate the optical budget for any specified installation, use the following formula:

Transmit budget - (fiber loss x distance) - (connectors) - (splices) = Receive Level

For example,

The transmitting device has an optical budget of 0db.
The receiving device has an optical receive budget of –20db.
The fiber loss for the fiber type being used is .3db per kilometer.
The distance between the transmitting device and the receiving device is 10km.
There are two connectors that require .5db each.
There is one splice that consumes .5db.

0db – (.3db x 10) – (2 x .5) – (.5) = -4.5

This is well within the receiving device requirement of –20db.