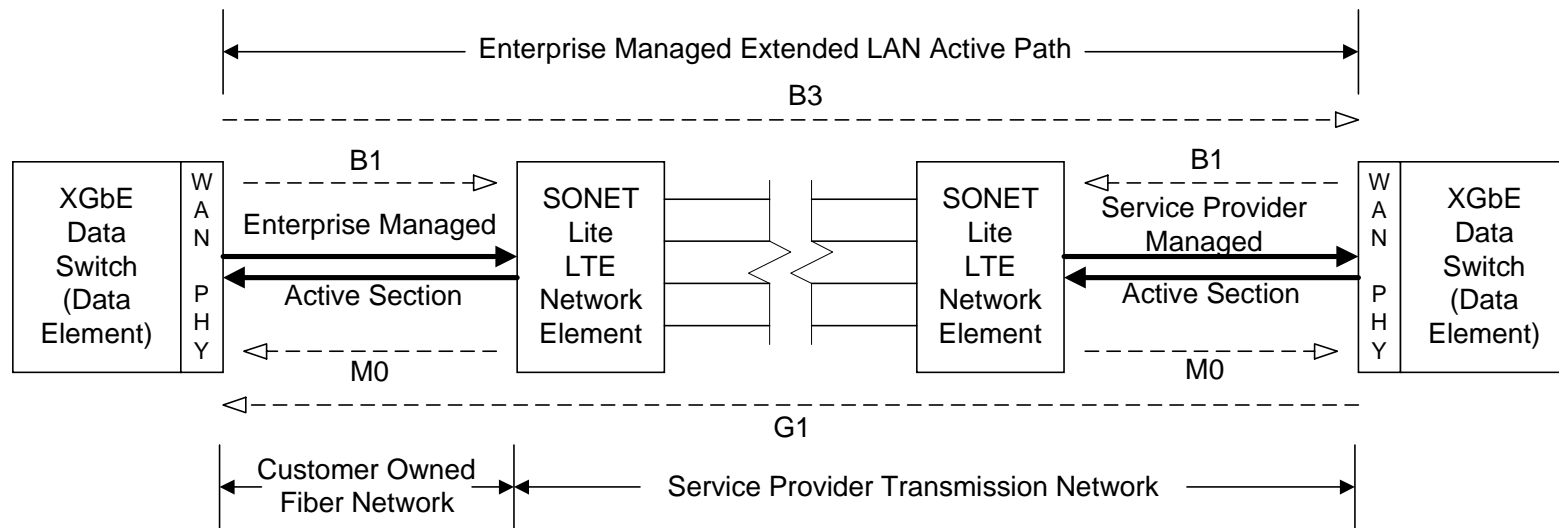


Recommendations For
Operational Maintenance Functions
Within
The 10GbE WAN Compatible PHY

This simplified model of an implementation using the 10GbE WAN Compatible PHY will be used as reference for this presentation.

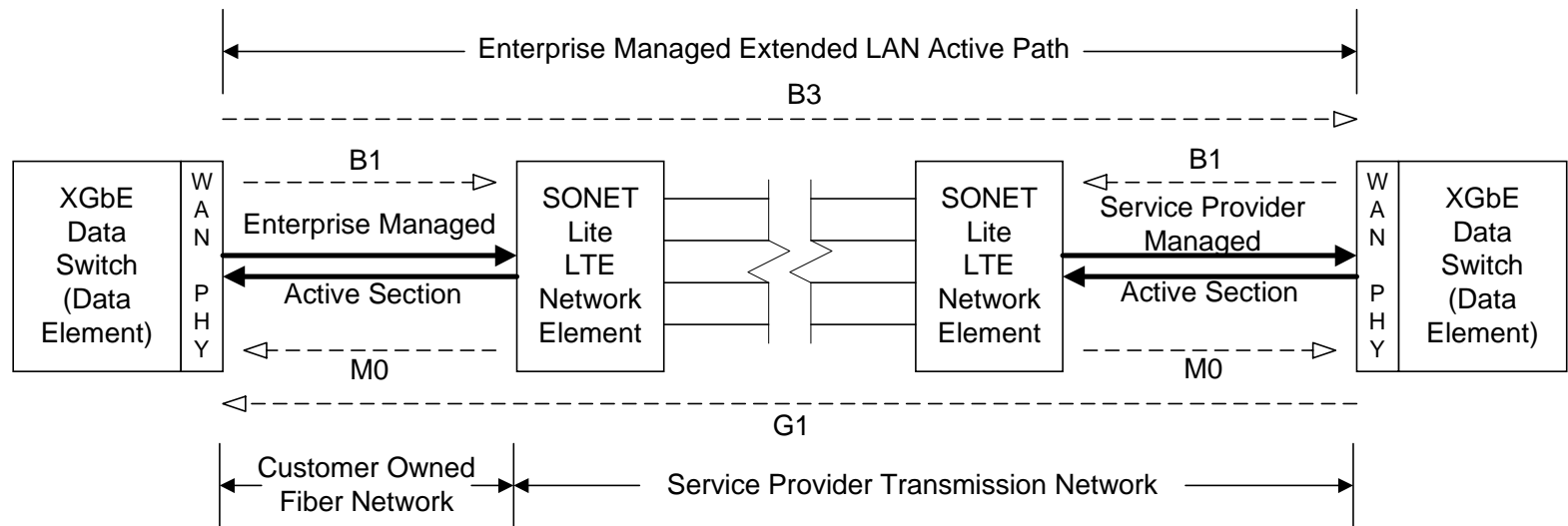


This model includes the different implementations of service provider owned and managed and enterprise owned and managed fiber systems.

It also shows the relationship of the SONET/SDH overhead bytes to the fiber transmission operational management domains starting from the data switch on the left side of the model.

Roy Bynum

May 2000 P802.3ae Interim Meeting



In this model, the enterprise customer owns a fiber extension from the left side data switch to the service provider point of presence (POP). The service provider has installed fiber to, or transmission equipment in the enterprise customer premise facilities where the data switch on the right is located. The service provider owns and manages all of the SONET transmission equipment (Network Elements).

For the purposes of this presentation the operational management and repair of the data switches, fiber, and network elements belongs to its respective owner. Verification of levels of service provided by the service provider belongs to the enterprise customer. Verification of enterprise customer equipment interface operability belongs to the service provider

Roy Bynum

May 2000 P802.3ae Interim Meeting

Transport Overhead Bytes



Section Overhead Bytes	Framing A1	Framing A2	Section Trace J0	Trace J1	Payload Capacity
	BIP-8 B1	OW E1	User F1	BIP-8 B3	
	DCC D1	DCC D2	DCC D3	Label C2	
	Pointer H1	Pointer H2	Pointer H3	Status G1	
Line Overhead Bytes	BIP-8 B2	APS K1	APS K2	User F2	
	DCC D4	DCC D5	DCC D6	Multiframe H4	
	DCC D7	DCC D8	DCC D9	Growth Z3	
	DCC D10	DCC D11	DCC D12	Growth Z4	
	Sync S1/Z1	FEBE M0/M1/Z2	OW E2	TCM Z5	

Path Overhead Bytes

- Sync and Active Section Overhead Bytes
- Active Line Overhead Bytes
- Active Path and Path Overhead Bytes
- Overhead Bytes That Are Not Active

Every 125us, Sync Frame Transport Overhead Bytes are inserted in the signal stream.

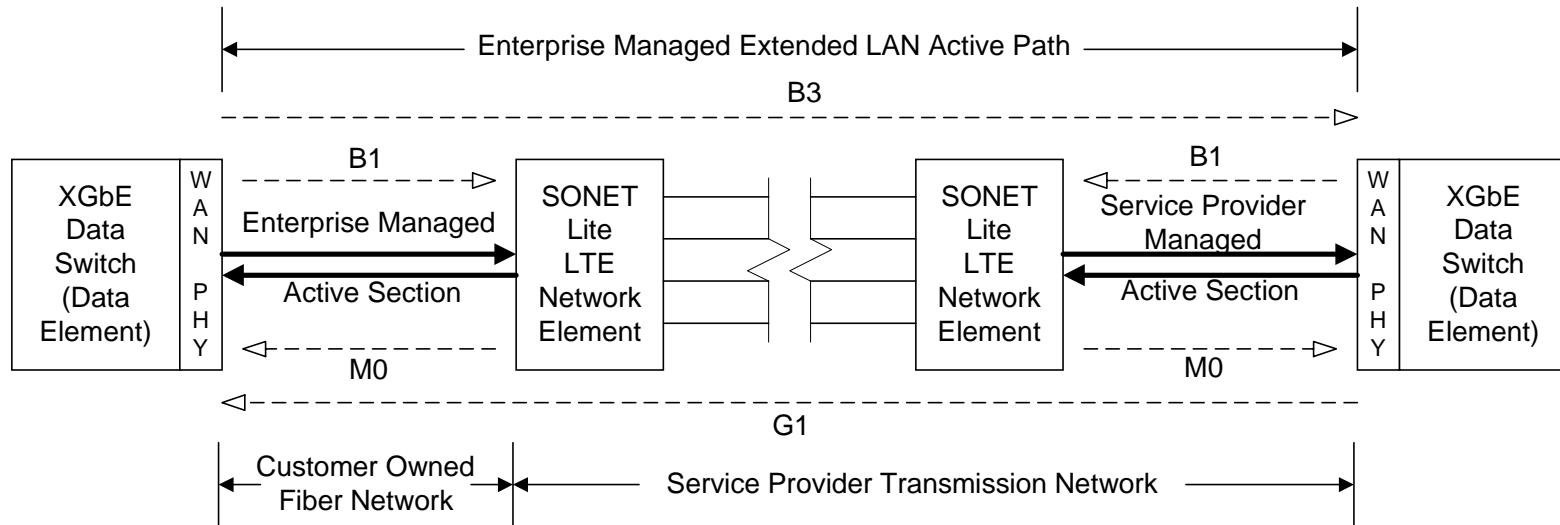
Each overhead byte has some assigned function.

Some overhead bytes are active in P802.3ae, some are not.

Roy Bynum

May 2000 P802.3ae Interim Meeting

Full Path Span Bit Error Indicators

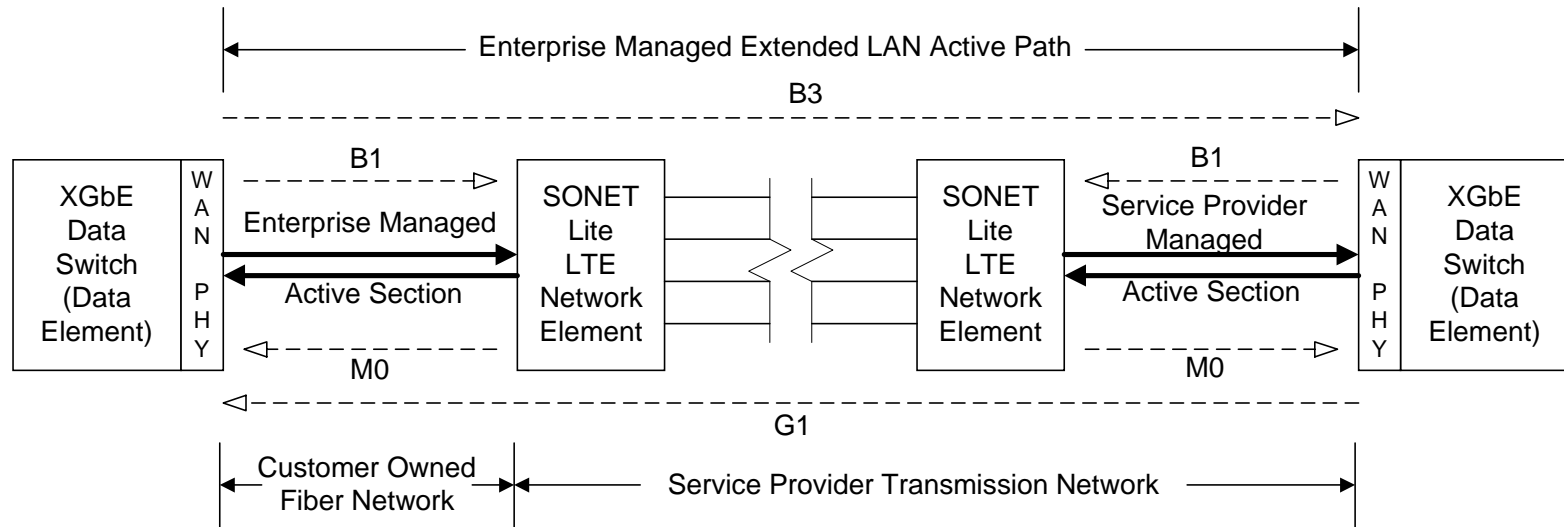


The Near Data Switch Sends B3 (Path Bit Interleaved Parity)
and Receives G1 (Path Remote Error Indicator)

From Remote Data Switch To Learn Of Any Full Span Path Bit Errors

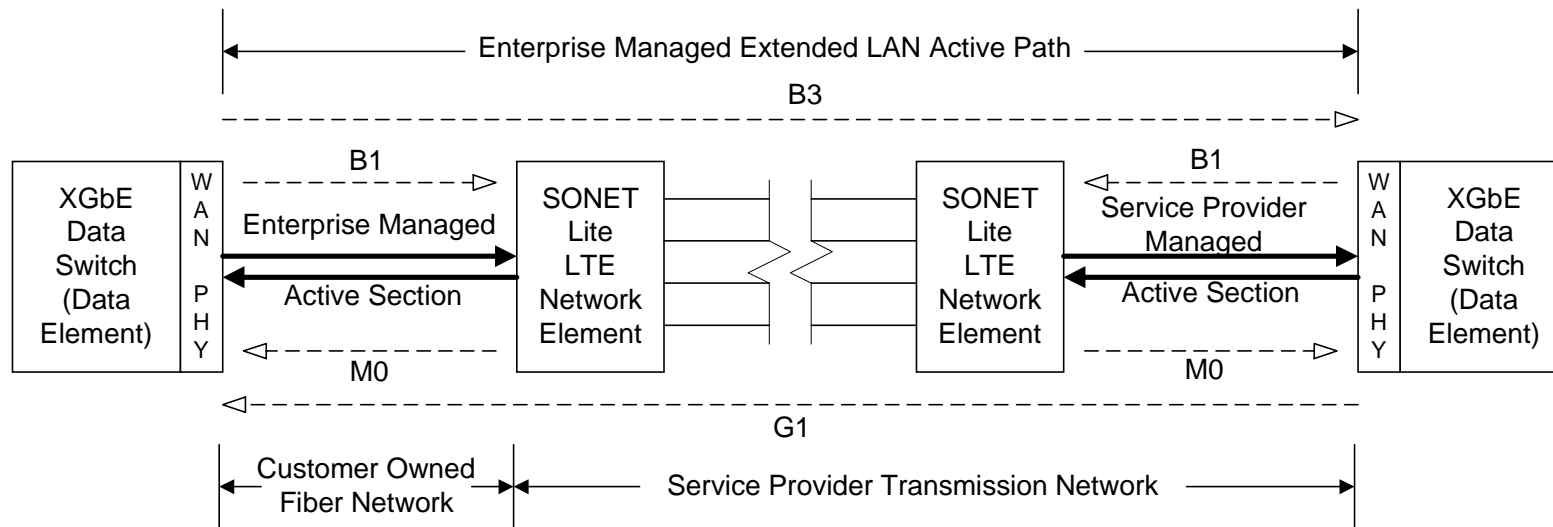
This gives the enterprise customer network management operational performance information for the full link span

Enterprise Customer Owned Fiber Section Bit Error Indication



If there are bit errors in the full span path, the enterprise customer needs to be able to be sure that the errors are not because of a problem that is in the fiber that they own and maintain. B1, (Section Bit Interleave Parity), and M0 (Section Remote Error Indicator) provides the that functionality.

Service Provider Owned and Managed Fiber Section Bit Error Indication



When a service provider owns and manages the fiber to the customer premise, the enterprise customer needs to be able to verify the reliability of that fiber. B1, (Section Bit Interleave Parity) and M0 (Section Remote Error Indicator) provides the functionality for that also.

Local And Remote Optical Link Failure Indication

When the local interface does not have optical link power, it will send a full path payload envelope (125us) of HEC frames with a control code indicating local optical link failure.

When the local interface receives a path payload envelope of HEC frames with a control code that indicates optical link failure it is an indication that the remote end is not properly receiving optical power to provide a link.

Local And Remote Sync Failure Indication

When the local interface does have optical link power but does not have a valid signal which it can synchronize with, it will send a full path payload envelope (125us) of HEC frames with a control code indicating local sync failure.

When the local interface receives a path payload envelope of HEC frames with a control code that indicates sync failure it is an indication that the remote end is not properly receiving a data signal.

Local Path Data Link Operational Indication

When the local interface receives a path payload envelope of HEC frames with a control code indicating an idle state, then the full path round trip data link is operational even without valid MAC frames being sent.

Recommendations for Operational Maintenance Functions Between the MAC and the PHY

Local Optical Link Up/Down (from PHY to MAC) - reports condition of optical signal into the local interface

Remote Optical Link Up/Down (from PHY to MAC) - reports condition of optical signal into the remote interface

Local link Sync Valid/Invalid (from PHY to MAC) - reports condition of signal sync into the local interface

Remote link Sync Valid/Invalid (from PHY to MAC) - reports condition of signal sync into the remote interface

Local Path BIP/Second (from PHY to MAC) - reports the bit error rate of signal into the local interface for the end to end path

Remote Path BIP/Second (from PHY to MAC) - reports the bit error rate of signal into the remote interface for the end to end path

Local Section BIP/Second (from PHY to MAC) - reports the bit error rate of signal into the local interface for the directly connected fiber facilities

Remote Section BIP/Second (from PHY to MAC) - reports the bit error rate of the signal into the remote interface of the directly connected fiber facilities

Local Path Trace (16 octet alpha) (from MAC to PHY) - writes a user defined path identifier into the path trace byte for identification of the local interface to the remote end

Remote Path Trace (16 octet alpha) (from PHY to MAC) - reports the user defined path identifier from the path trace byte to identify the interface at the remote end

Remote Data Link Valid/Invalid - (from remote MAC to local MAC through remote path error indicator) - reports condition of data link between interfaces at the end to end path level