Methods For Adding Service Provider OAM Overhead To Existing GbE PCS

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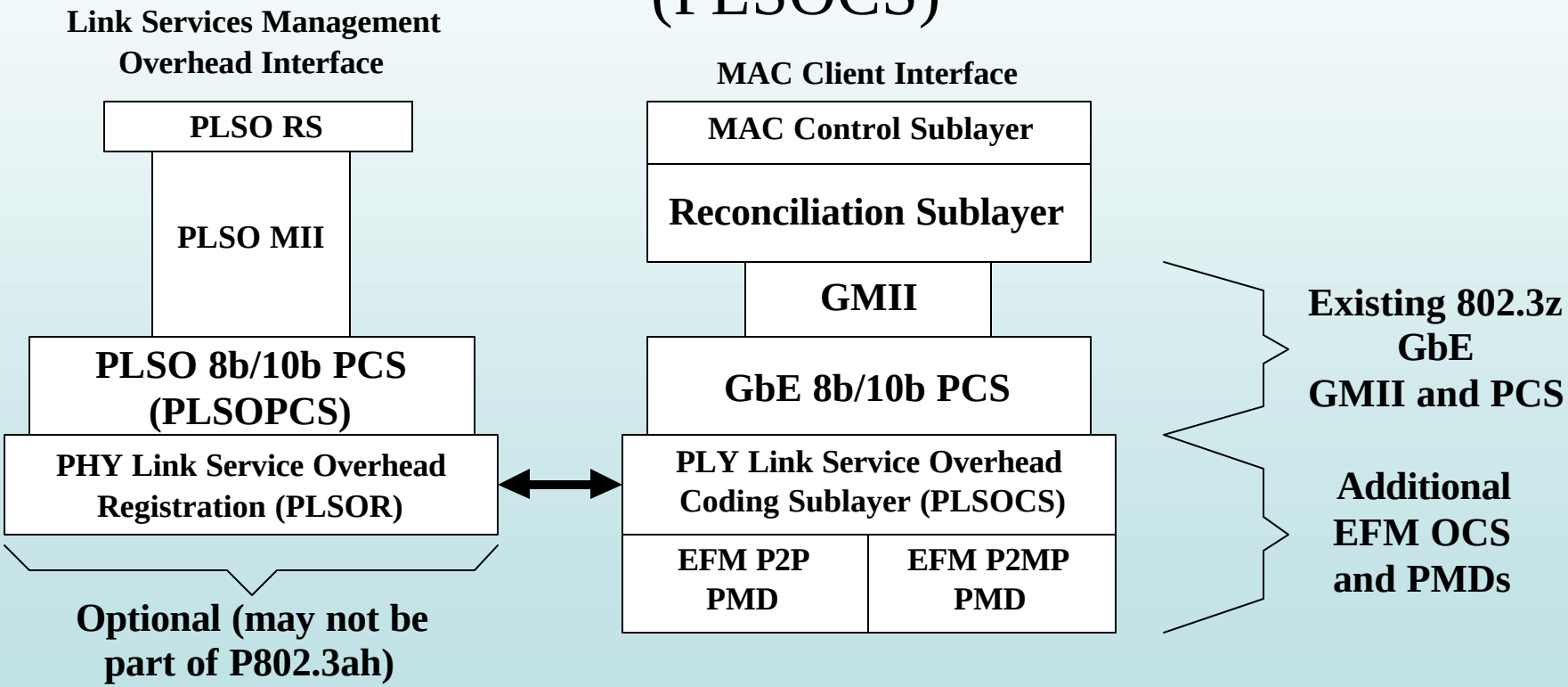
Existing Service Provider Infrastructure Adds OAM Functionality at the Physical Layer

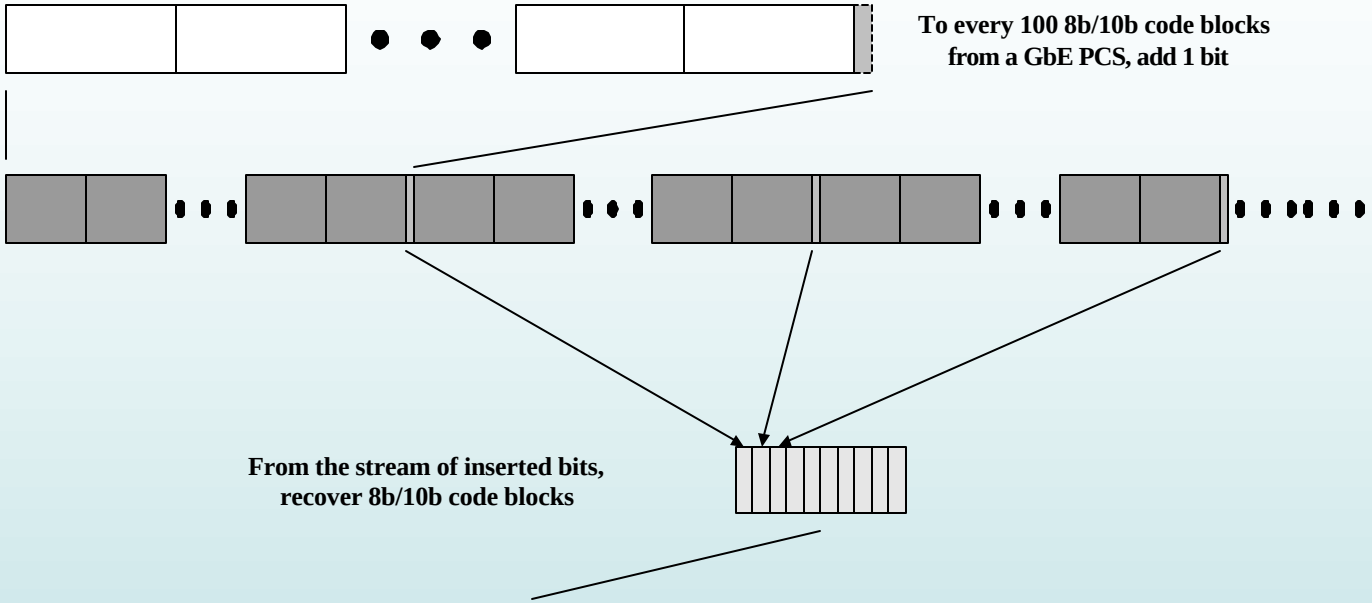
- T1 framing inserts 1 bit of “out of band” overhead for every 192 bits of bearing traffic
- SONET and SDH framing adds “out of band” Payload/Section/Line/Path overhead using a synchronous block frame every 120µs
- Traditional Services are based on Modulo 64 bandwidth rates
- P802.3ah is based on Modulo 10 bandwidth rates

Use Much Of Existing GbE

Add New Sublayer for Service Provider OAM Overhead – "Physical Link Service Overhead Coding Sublayer" (PLSOCS)



Method 1: Overhead Inserted as Bits Into GbE PCS 8b/10b block Stream



Sync	Sync	DOID/ SOID	ONU Control/ Responce	"Order Wire"
Comm Channel	Comm Channel	Comm Channel	Comm Channel	Comm Channel
Comm Channel	Comm Channel	Comm Channel	Comm Channel	Comm Channel
Remote BER	Remote FER	BIP1	BIP2	BIP3
Data FEC?	Data FEC?	Data FEC?	Data FEC?	OH CRC/FEC

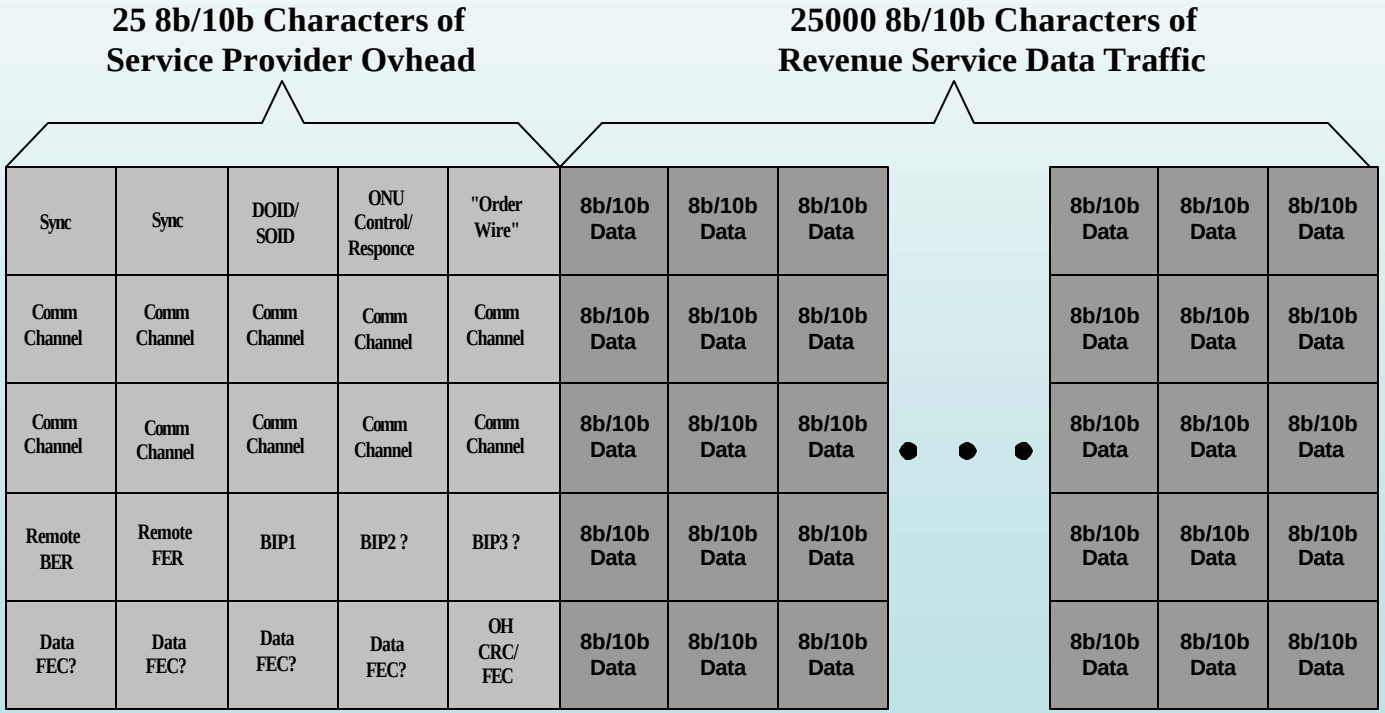
With the stream of recovered 8b/ 10b code blocks form 25 characters of an OAM Overhead blocks

Overhead blocks will repeat every 200us, 5000 times per second

(Character OH fuctions show are representative, not specific)

Method 2: Overhead Inserted as Synchronous Framing of GbE Steam

A synchronous frame of 25 8b10b blocks can be inserted every 200µs instead of inserting individual bits for every 100 blocks.



Overhead Stream Insertion

- Uses existing GbE PCS as much as possible
- Requires adding a few functions to existing state machines – New state machine for overhead PCS
- Provides fixed bit rate base for performance monitoring
- Does not invade Ethernet service traffic
- Adds 0.1% to signal overhead
- Uses 8b/10b encoding of inserted OH
- Provides 23 octets of usable overhead
- Overhead cycles every 200ìs – 5000/second

Inserted Overhead Usage

- First two overhead characters use reserved FC code frames for frame synchronization
- Other overhead characters are used as encoded OAM data octets
- Overhead needs to have a few octet locations defined for common usage regardless of service
- Other octet locations can be service/vendor specific as defined by P802.3ah

PHY Layer Overhead Provides Required Functionality For Diversity of Services

- Follows existing paradigm of “out of band to revenue traffic” for service OAM overhead
- Adds link level channel for management of upper layer services transparent to the services
- Provides customer transparent control of “slave” CPE system and service demarcation
- Provides for remote troubleshooting functionality without interference to upper layers