

Link Signaling Sublayer (LSS) Proposal

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Goal of this presentation

- Evolution of XGENIE proposal
 - XGENIE: 10 Gigabit Ethernet Network Interface Extension
http://grouper.ieee.org/groups/802/3/ae/public/mar00/ishida_1_0300.pdf
 - Alignment with the proposed 802.3 Layer Model
 - Clarification of scope
- Propose LAN OAM&P signaling
 - OAM&P: Operations, Administration, Management, and Provisioning
 - Signaling Break Link (BL) and Remote Fault (RF) for LAN
 - Extend SONET-compatible OAM&P signaling over the LAN

Outline

- Does the LAN need OAM&P signaling?
- Where is the Link Signaling Sublayer (LSS)?
- How does the LSS work?

OAM&P = Operations, Administration, Management, and Provisioning

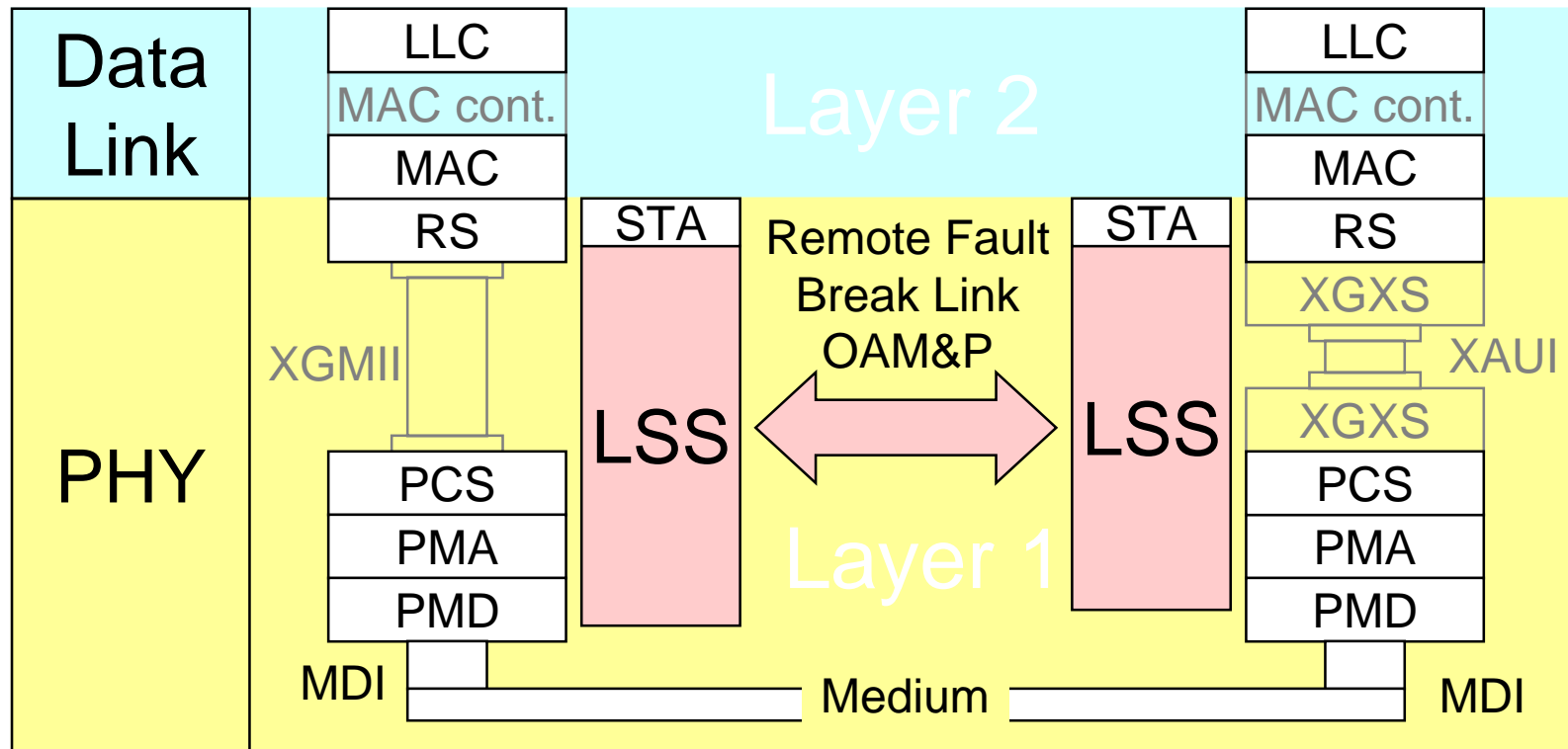
Does the LAN need OAM&P signaling?

- P802.3ae includes new Ethernet objectives
 - Support 40 km fiber links
- Provide LAN compatible SONET OAM&P signaling
 - Assess OK/NotOK link status (might be mandatory)
 - Manage the LAN cable plant
 - Exchange trace identifiers to ascertain link connections
 - Sensing & reporting link status (BER etc.) for maintenance

Why do we need both the LSS and WIS?

- Link Signaling Sublayer (LSS) is for LAN
- WAN Interface Sublayer (WIS) is for the installed base SONET infrastructure
 - WIS: WAN Interface Sublayer
http://grouper.ieee.org/groups/802/3/ae/public/mar00/frazier_1_0300.pdf
- Both support the same minimal SONET-compatible OAM&P for
 - Reporting Link status
 - Signaling trace identifier
 - Monitoring Bit Error Rate (BER)

Where is the Link Signaling Sublayer?



LLC = Logical Link Control

MAC = Media Access Control

RS = Reconciliation Sublayer

STA = Station Management entity

XGMII = 10 Gigabit Media Independent Interface

PCS = Physical Coding Sublayer

PMA = Physical Medium Attachment

PMD = Physical Medium Dependent

MDI = Media Dependent Interface

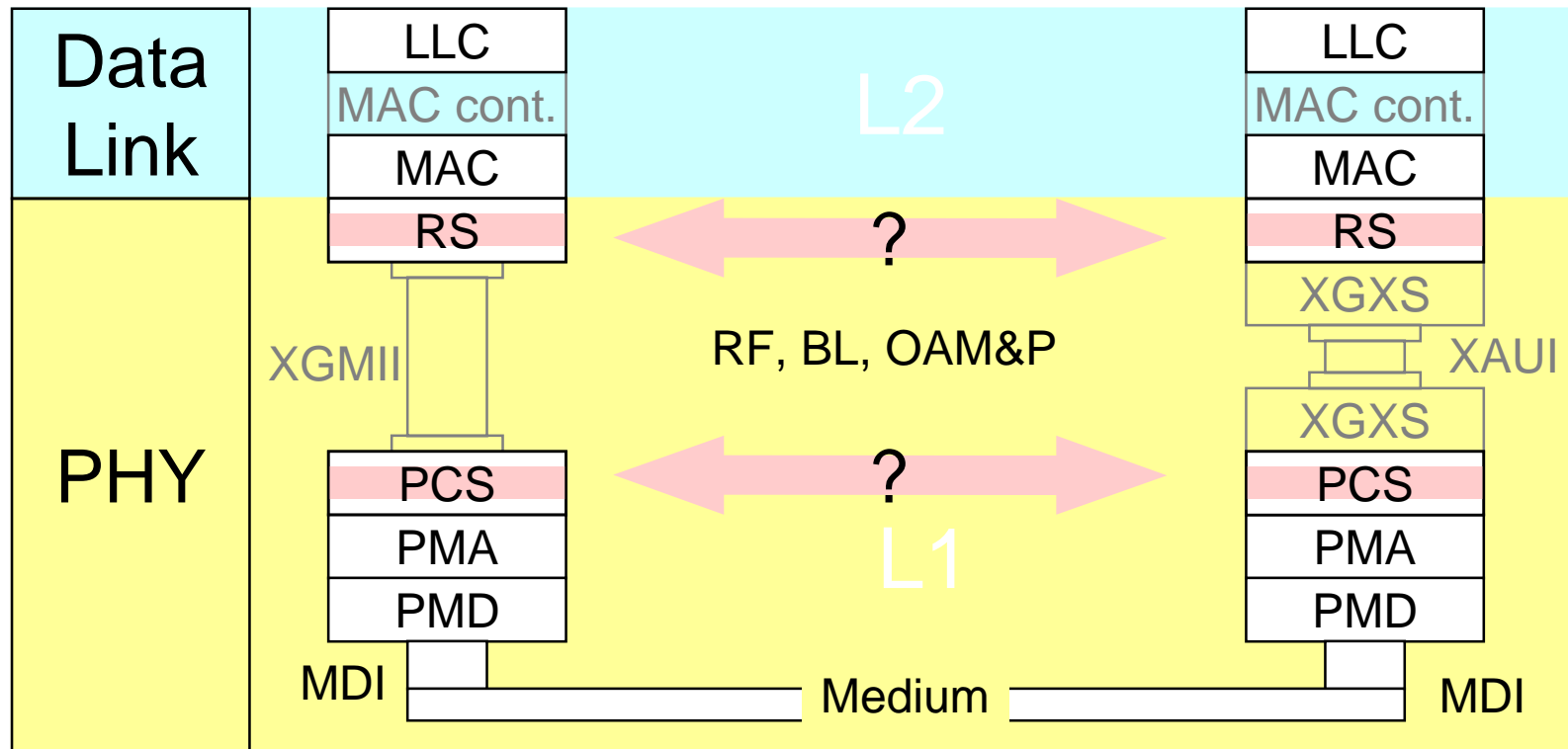
XGXS = XGMII Extender Sublayer

XAUI = 10 Gigabit Attachment Unit Interface

IEEE 802.3ae

Task Force

LSS Instantiation



- Either PCS or RS could be chosen as the LSS instantiation; it would depend on ease of documentation in the standard, not on the operation or concept.

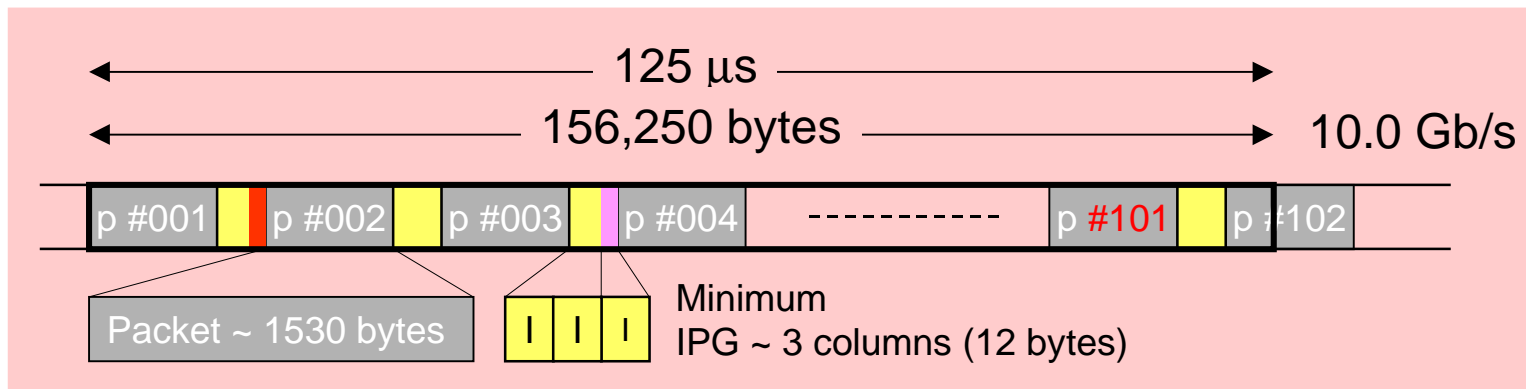
How does LSS work?

- Link signaling by using interpacket gap (IPG) period.
 - Idle column is replaced by Link Signaling column [LS]
 - [LS] = / LS / d1 / d2 / d3 / d1-d3: valid data bytes



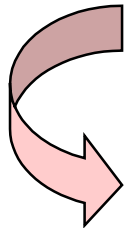
IPG Bandwidth for Link Signaling

- ~ 50 columns per 125 μ s at the worst case
 - maximum 1530-byte Ethernet packet, minimum 12-byte IPG
 - A half of Idles would be reserved for clock tolerance adjustment
 - 125 μ s period is assumed for compatibility to SONET OAM&P



LS Control Codes

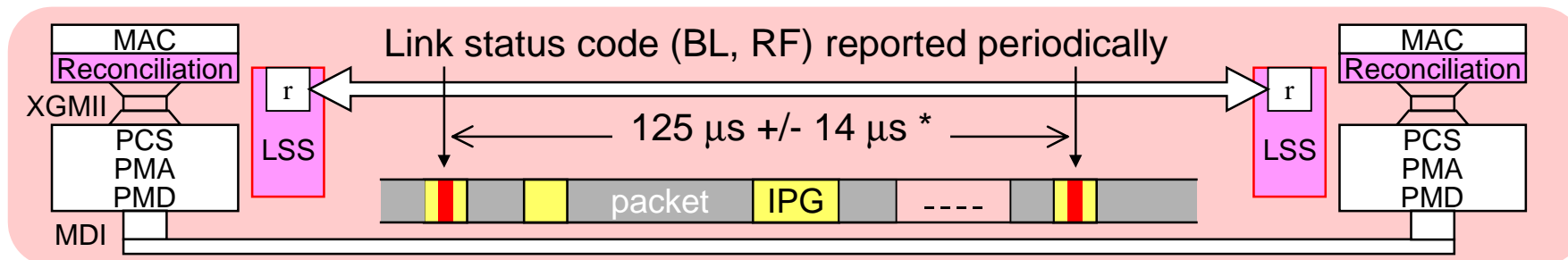
description			control code [LS] bytes			
name		function	Lane0	Lane1	Lane2	Lane3
Link status	[r]	Remote Fault, Break Link	LS	0x52	0x52	r
Section trace	[j0]	Identifier	LS	0xd5	0x49	j0
Path status	[g1]	Remote bit error, etc.	LS	0x49	0xd5	g1
Path BER	[b3]	End-End bit error monitor	LS	0x49	0xb6	b3



- Compatible to WAN-PHY signaling*
 - * http://grouper.ieee.org/groups/802/3/ae/public/mar00/figueira_1_0300.pdf
 - Section BER (b1) is monitored by PCS code violations
 - The lowest-cost LAN might have an option to only use [r].
- [LS] = / LS / ID1 / ID2 / Info /
 - ID1:domain (Link, Section, Line, or Path)
 - ID2: function
 - IDs have 4-bit min. hamming distance for both 8b & 10b

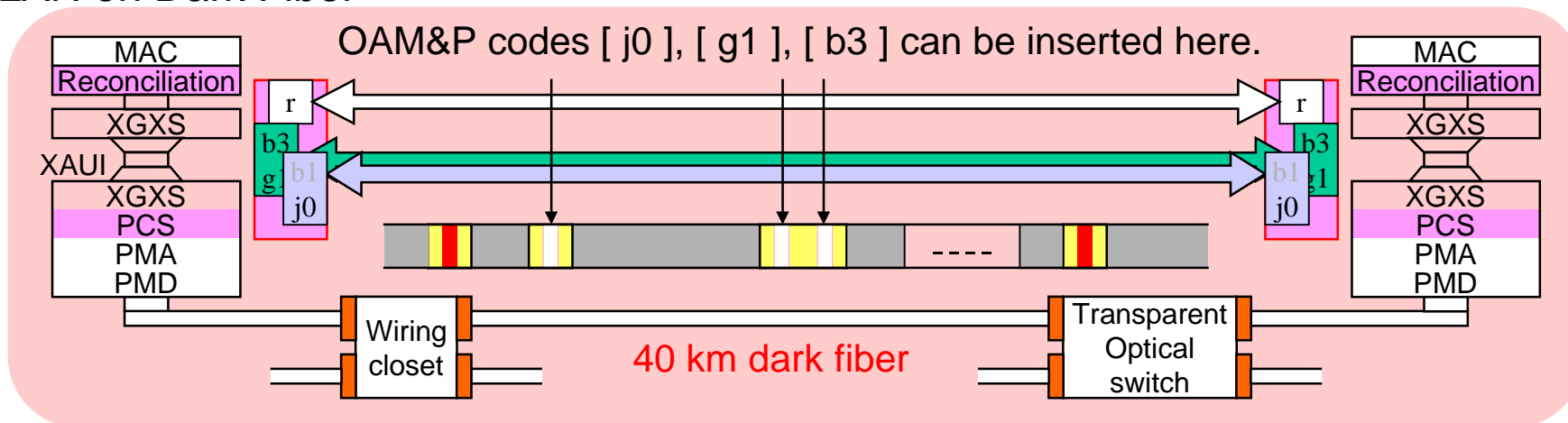
Link Signaling Examples

Desktop LAN



* This interval follows the FLP burst clock pulse spacing in Clause 28.

LAN on Dark Fiber



LSS Benefits

- Unified Link signaling mechanism for
 - Break Link and Remote Fault
 - OAM&P for fiber plant management
- No impact to cost of LAN PHY
- Compatibility with
 - WAN-PHY OAM&P
 - SONET OAM&P

Issues

- Support of Break Link and Remote Fault.
- Whether the LSS should be optional or required on a LAN-PHY implementation.
- How the Bit-Error-Rate (BER) monitor by bit-interleaved parity (BIP) in SONET can be mapped on the LSS.
- Where the LSS should be placed in the layer diagram.