



UniPHY

10 Gb/s LAN/WAN PHY Proposal

IEEE P802.3ae
10 Gigabit Ethernet Task Force
7-March-2000
Albuquerque, NM

Howard Frazier - Cisco Systems, Inc

Goals For This Presentation

- Propose a PHY architecture suitable for serial transmission on both LAN and WAN
 - Operating in a LAN at a data rate of 10.0000 Gb/s
 - Operating in a WAN at a data rate which is compatible with the payload rate of OC-192c/SDH VC-4-64c

Why do a LAN PHY?

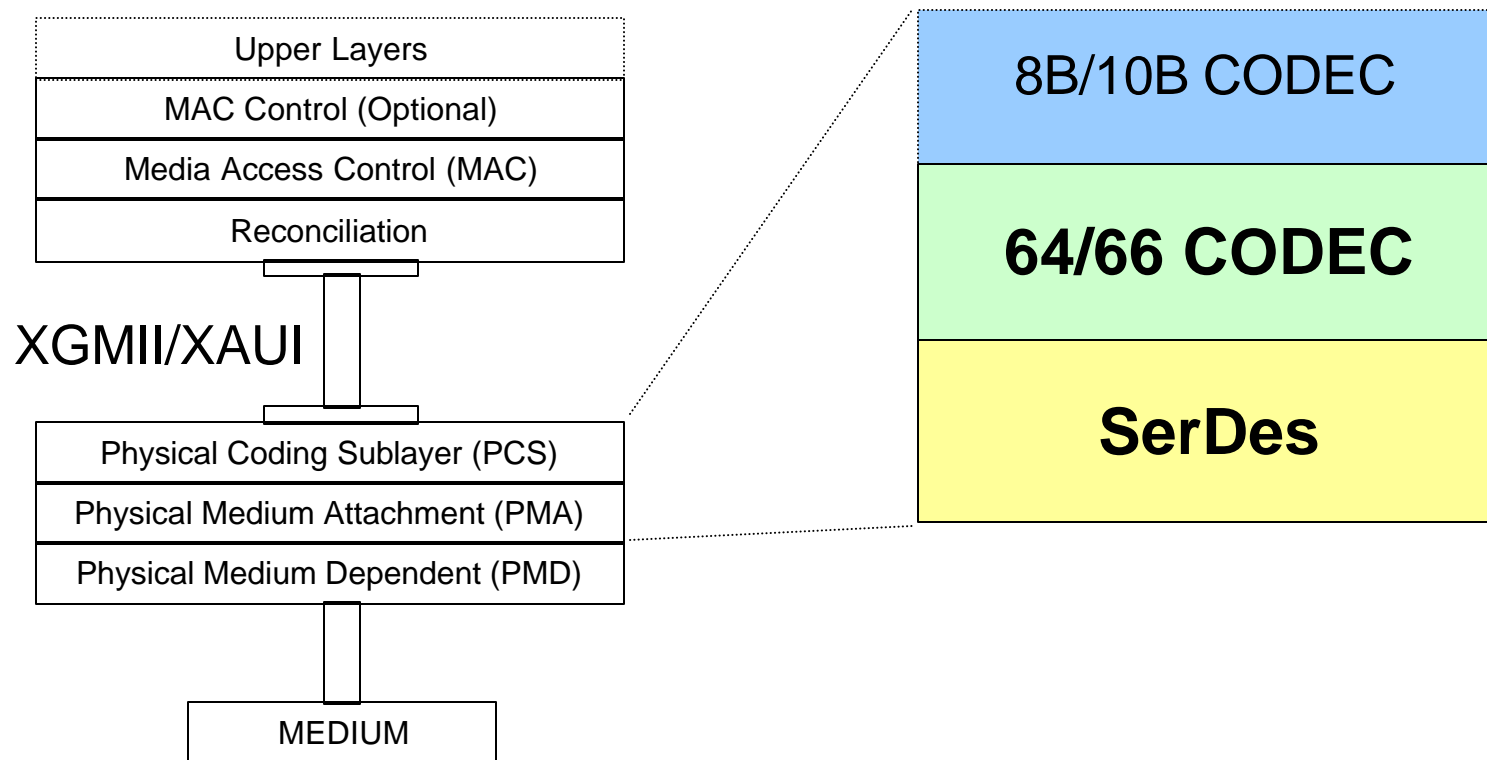
- Upgrade existing enterprise networks with:
 - Minimal cost
 - Minimal complexity
 - Maximum compatibility with 10/100/1000 Mb/s

Why do a WAN PHY?

- Carry native Ethernet packets over the WAN infrastructure, which has an installed base with a specific architecture and specific signaling requirements

Serial LAN PHY Proposal

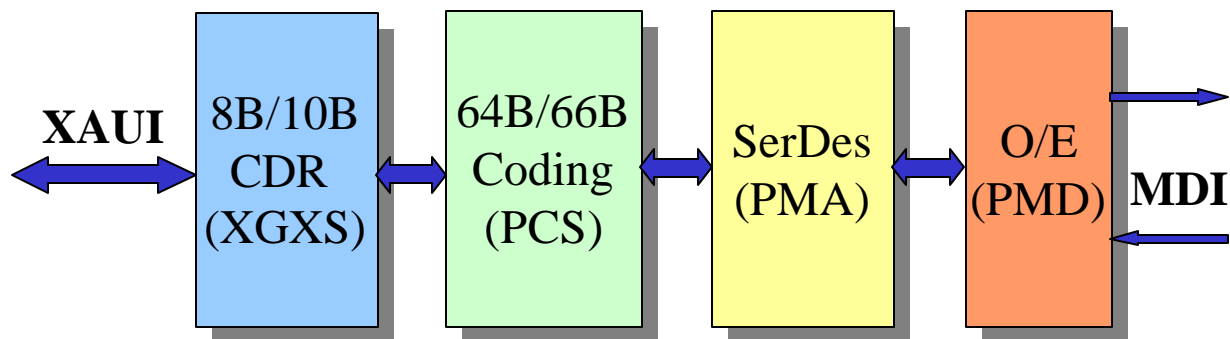
10 Gigabit Ethernet Reference Model



64/66 Serial LAN PHY Benefits

- Low Overhead - 10.3125 GBaud signal rate
- Robust frame delimiters
- Excess code space for special codes
- Low complexity encode/decode
- Good BLW characteristics

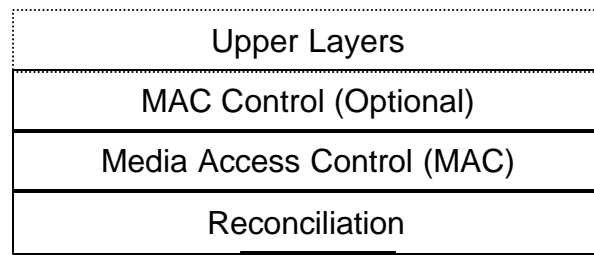
Serial LAN PHY Block Diagram



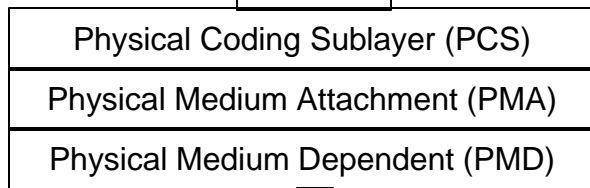
Serial LAN PHY Proposal - Bhatt, Taborek, et al - March 2000

UniPHY Proposal

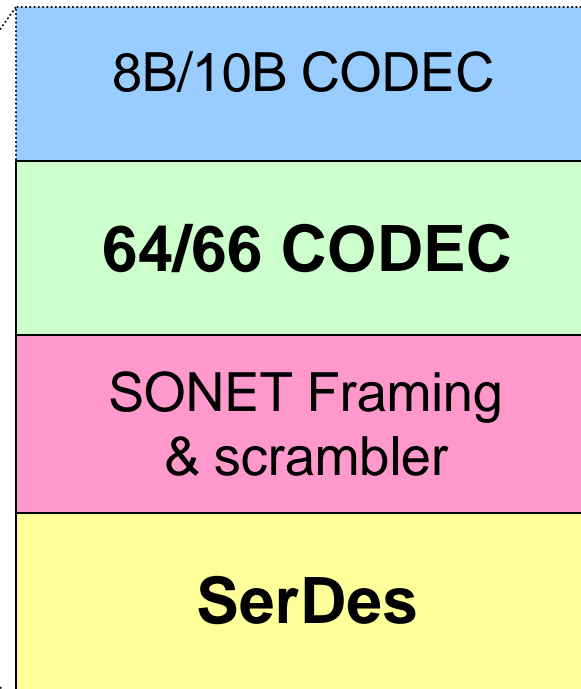
10 Gigabit Ethernet Reference Model



XGMII/XAUI



MEDIUM



} WIS

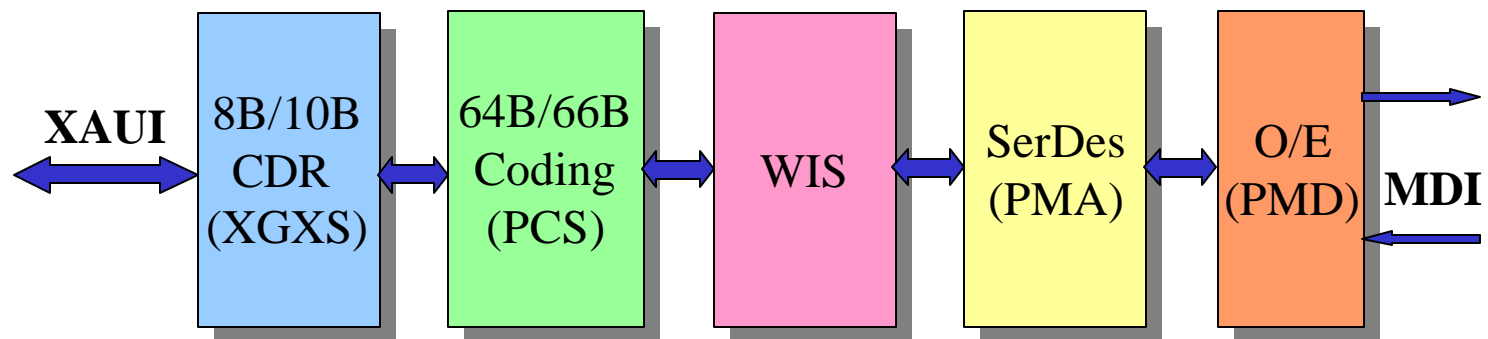
WAN Interface Sublayer (WIS)

- Enabled when attached to a WAN
- Disabled (bypassed) when attached to a LAN
- Performs:
 - SONET Framing
 - SONET Overhead processing
 - $x^7 + x^6 + 1$ scrambler
- In short, everything you need to adapt the 64/66 Serial LAN PHY to a WAN interface

UniPHY Benefits

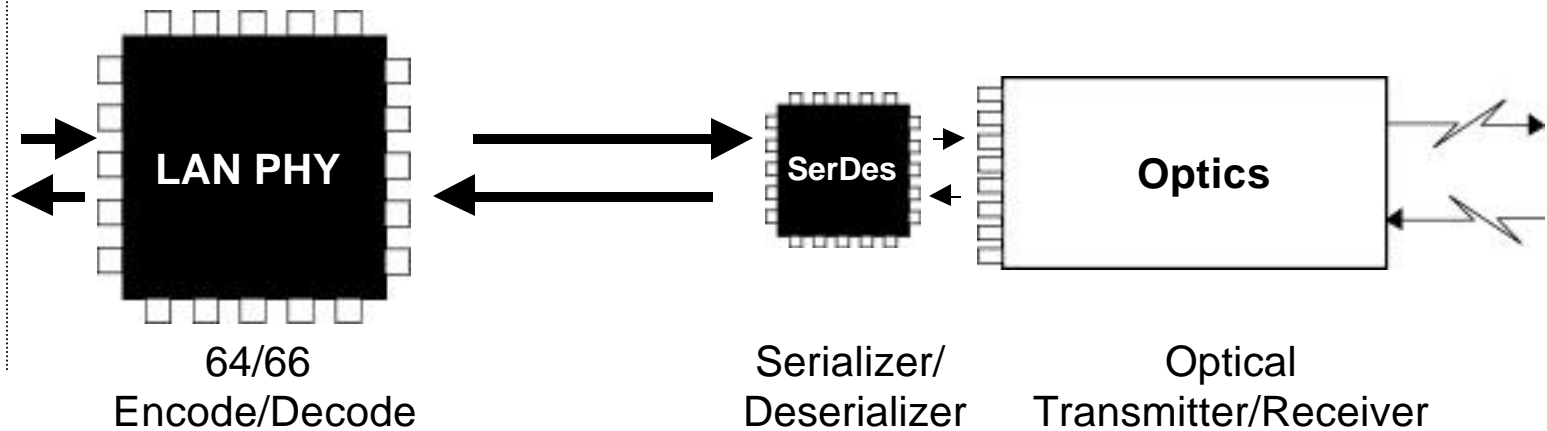
- Robust frame delimiters
- Robust scrambler
- Excess code space for special codes
- Low complexity encode/decode
- Commonality between LAN and WAN PHY silicon
- PHY doesn't need to know the length of the frame
- PHY doesn't need to overwrite preamble

UniPHY Block Diagram



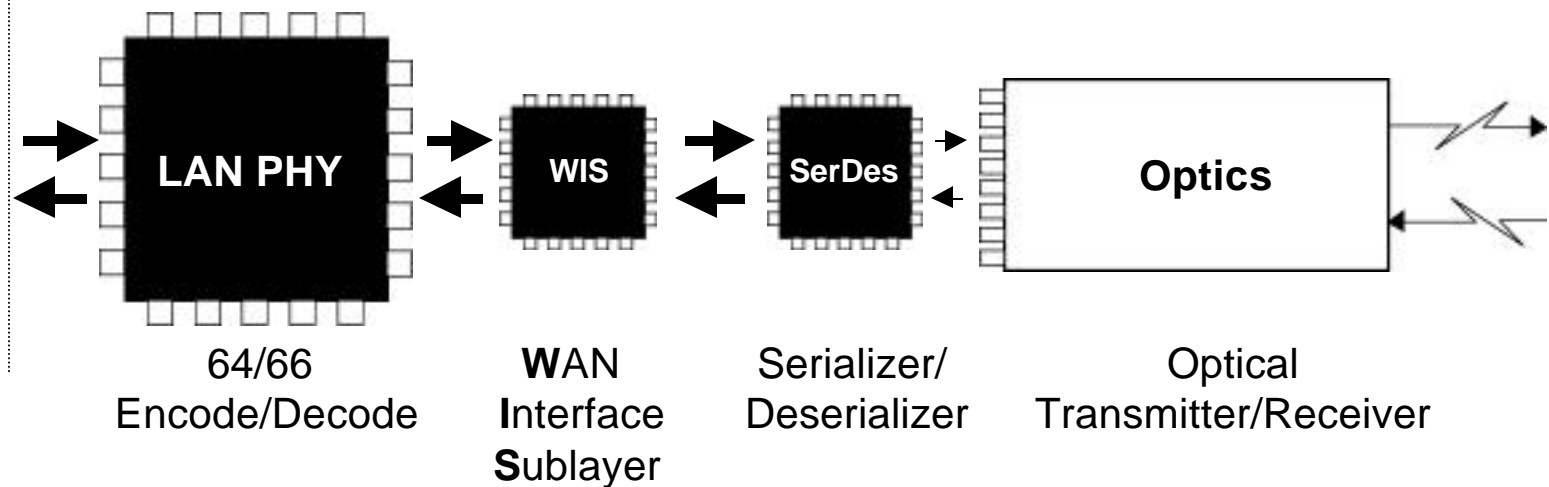
Serial LAN PHY

XGMII/XAUI
(Sali/Hari)



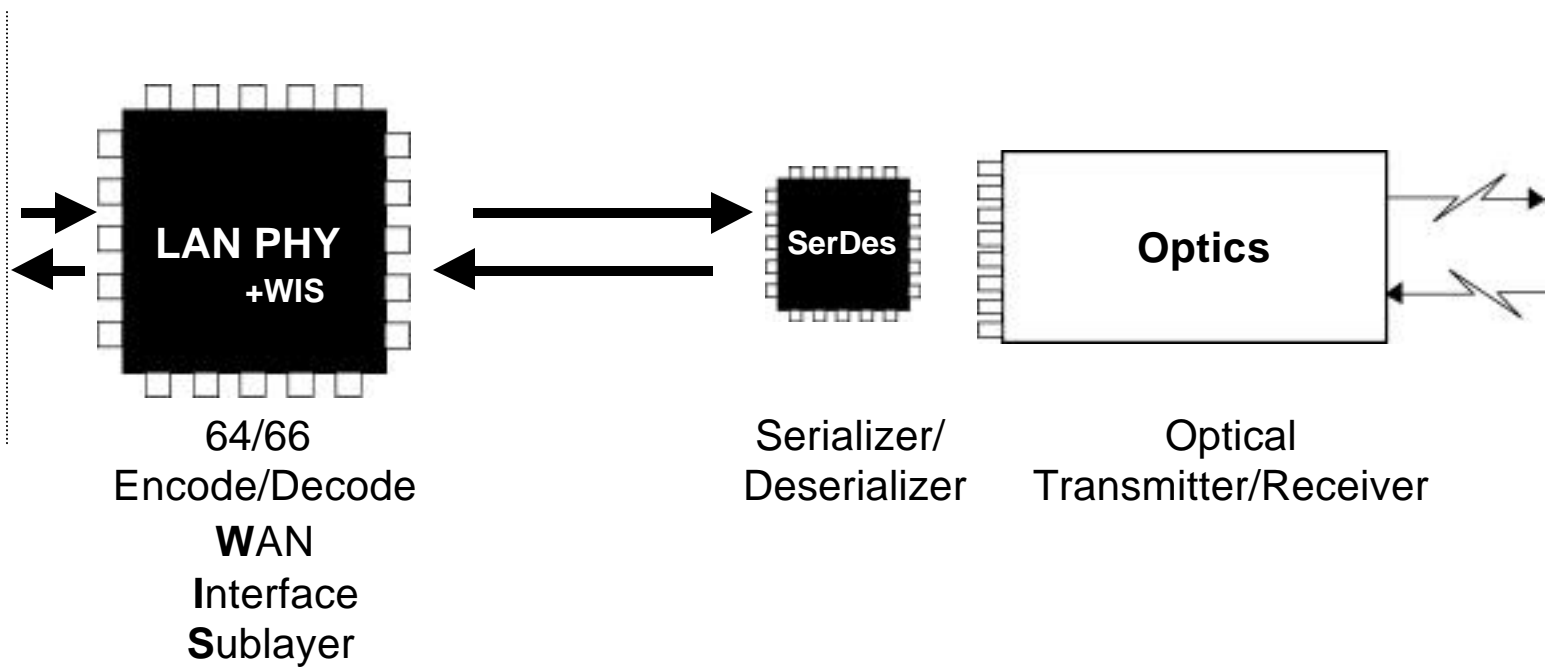
UniPHY = LAN PHY + WIS

XGMII/XAUI
(Sali/Hari)



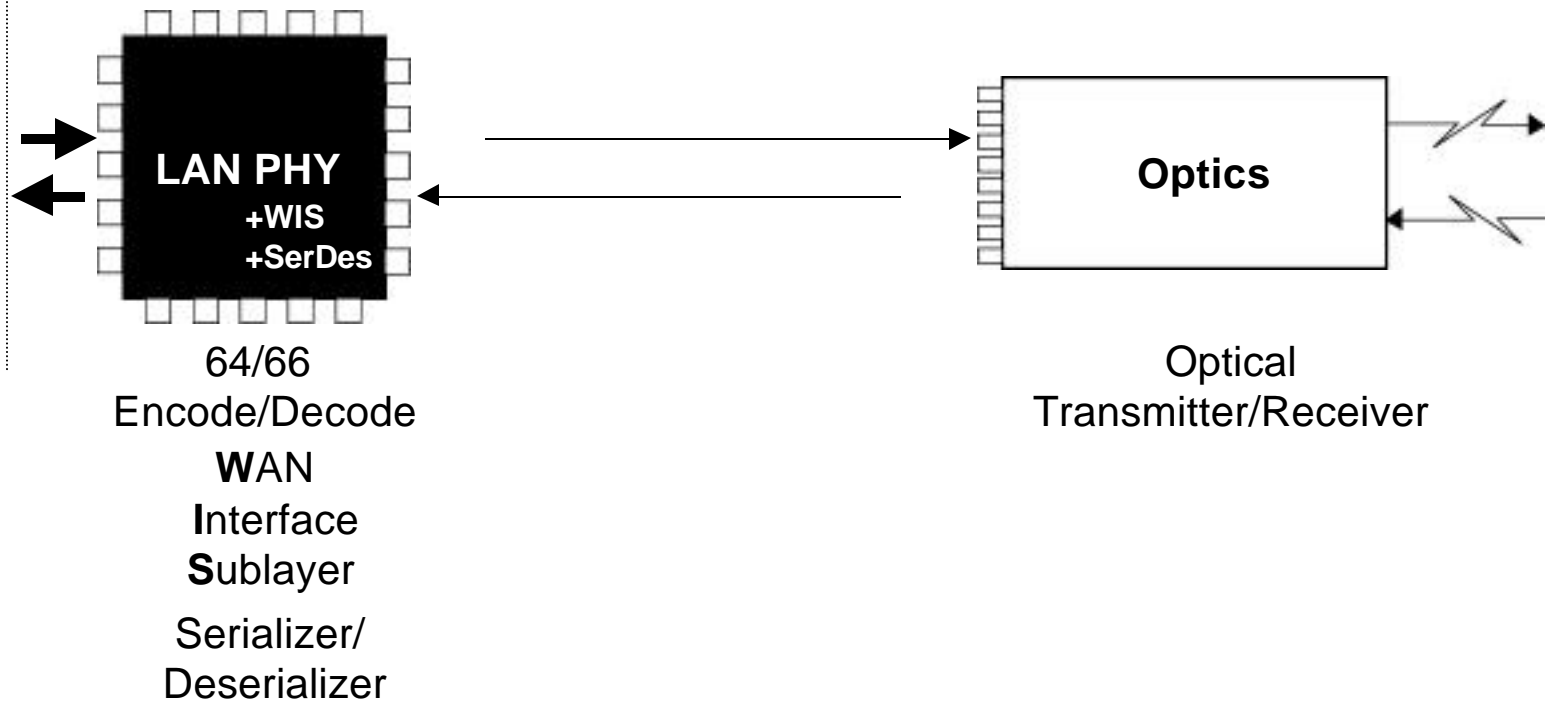
Integrated UniPHY

XGMII/XAUI
(Sali/Hari)



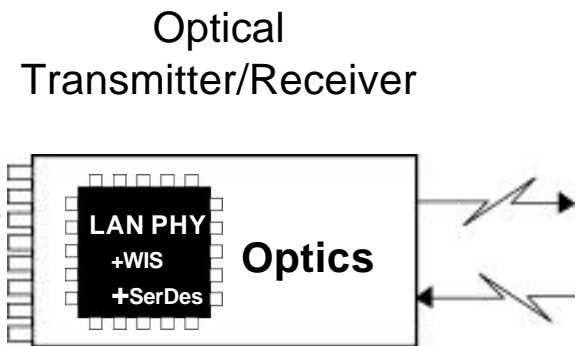
Really Integrated UniPHY

XGMII/XAUI
(Sali/Hari)



Nirvana

XGMII/XAU1
(Sali/Hari)



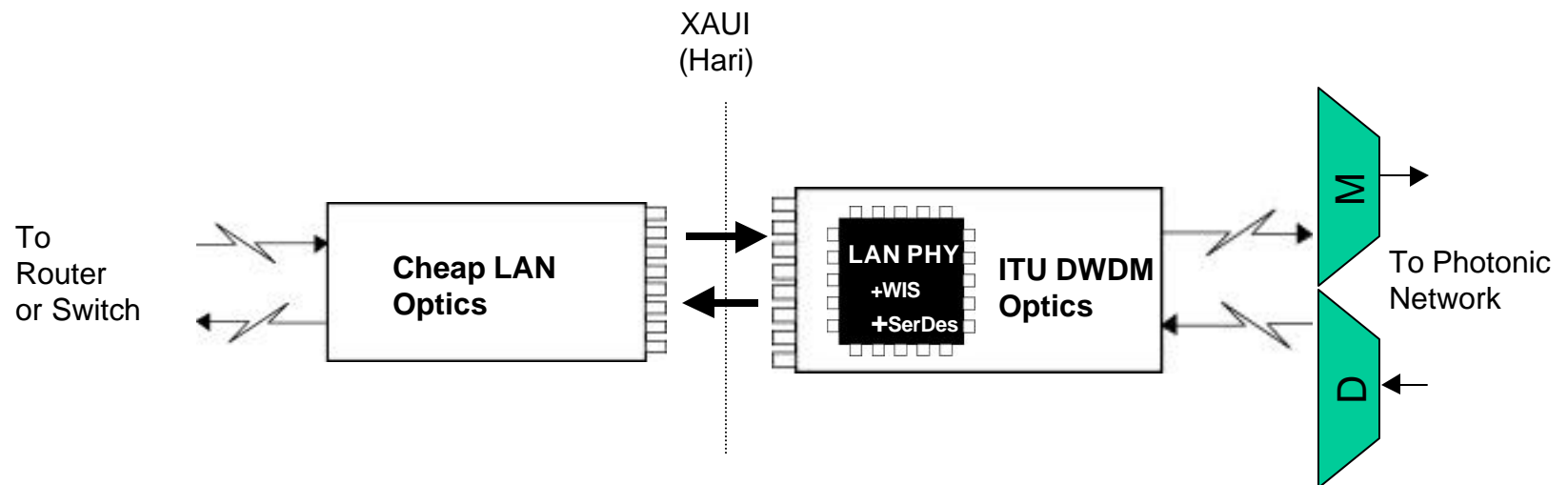
64/66
Encode/Decode
WAN
Interface
Sublayer
Serializer/
Deserializer

HMF

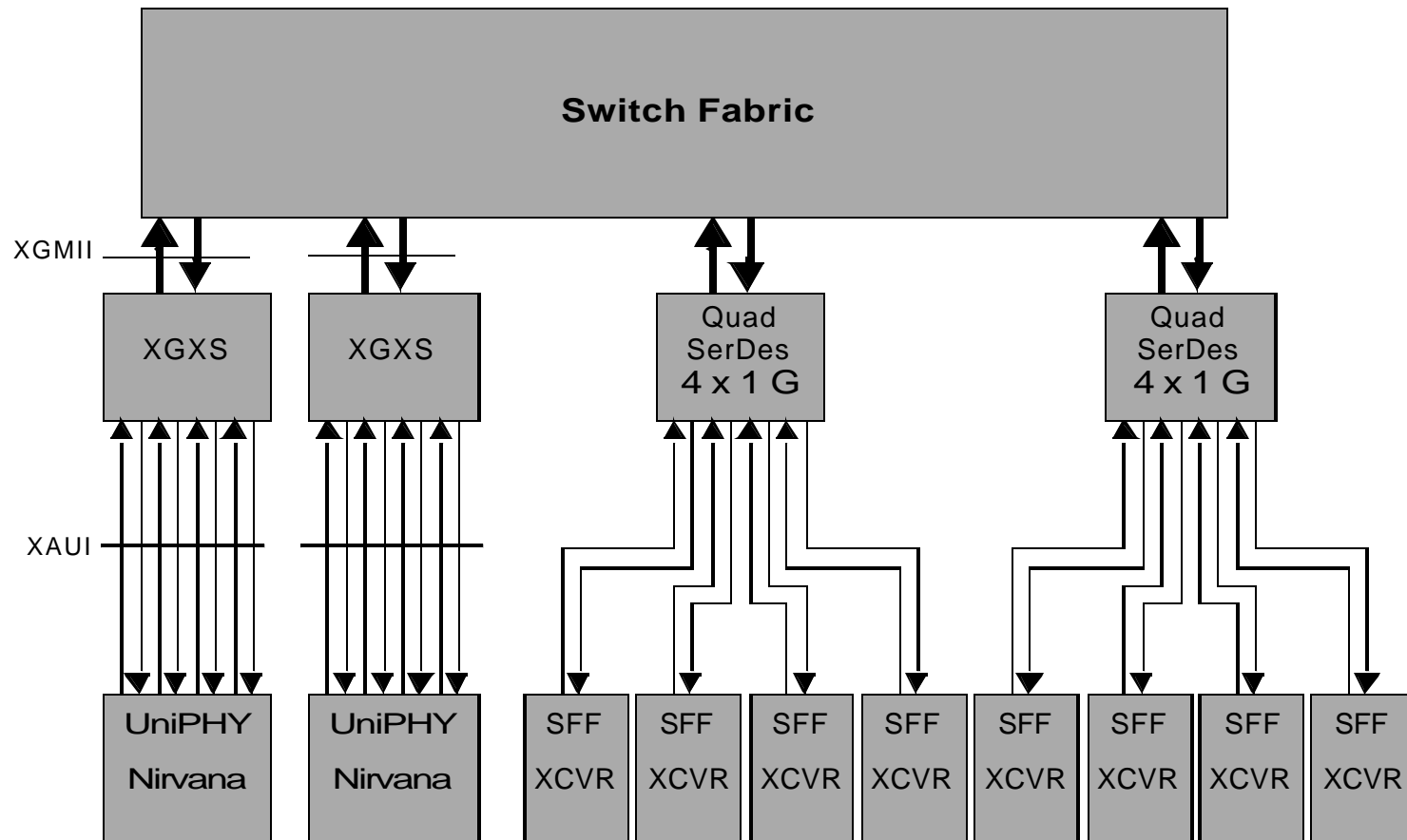
IEEE 802.3
HSSG

16

DWDM Transponder



Switch or Router Using UniPHY



Data and Signal Rate Comparison

	LAN PHY (64/66)	UniPHY (64/66)
MAC Data Rate	10.00 Gb/s	9.29419 Gb/s
XMII signal rate	156.25MHz x 32 DDR	156.25MHz x 32 DDR
XMII Data rate	10.00 Gb/s	9.29419 Gb/s
Encoded Data Rate	10.3125 GBaud	9.58464 GBaud
Serial Signal rate	10.3125 GBaud	9.95328 GBaud

Rate Adaptation

- Several rate adaptation proposals:
 - Open loop
 - Word Hold
 - Busy Idle
- UniPHY will work with any of them

UniPHY Benefits

- Common interface can be used for both LAN PHY and WAN PHY
- Common functions can be shared between LAN PHY and WAN PHY
- Common optics can be shared between LAN PHY and WAN PHY

UniPHY Benefits

- LAN PHY advocates get what they want:
 - Minimal cost
 - Minimal complexity
 - Maximum compatibility
- WAN PHY advocates get what they want:
 - Compatibility with photonic infrastructure
 - Compatibility with OAM&P
- We all get to go home early