10 Gigabit Ethernet WAN PHY and MAC
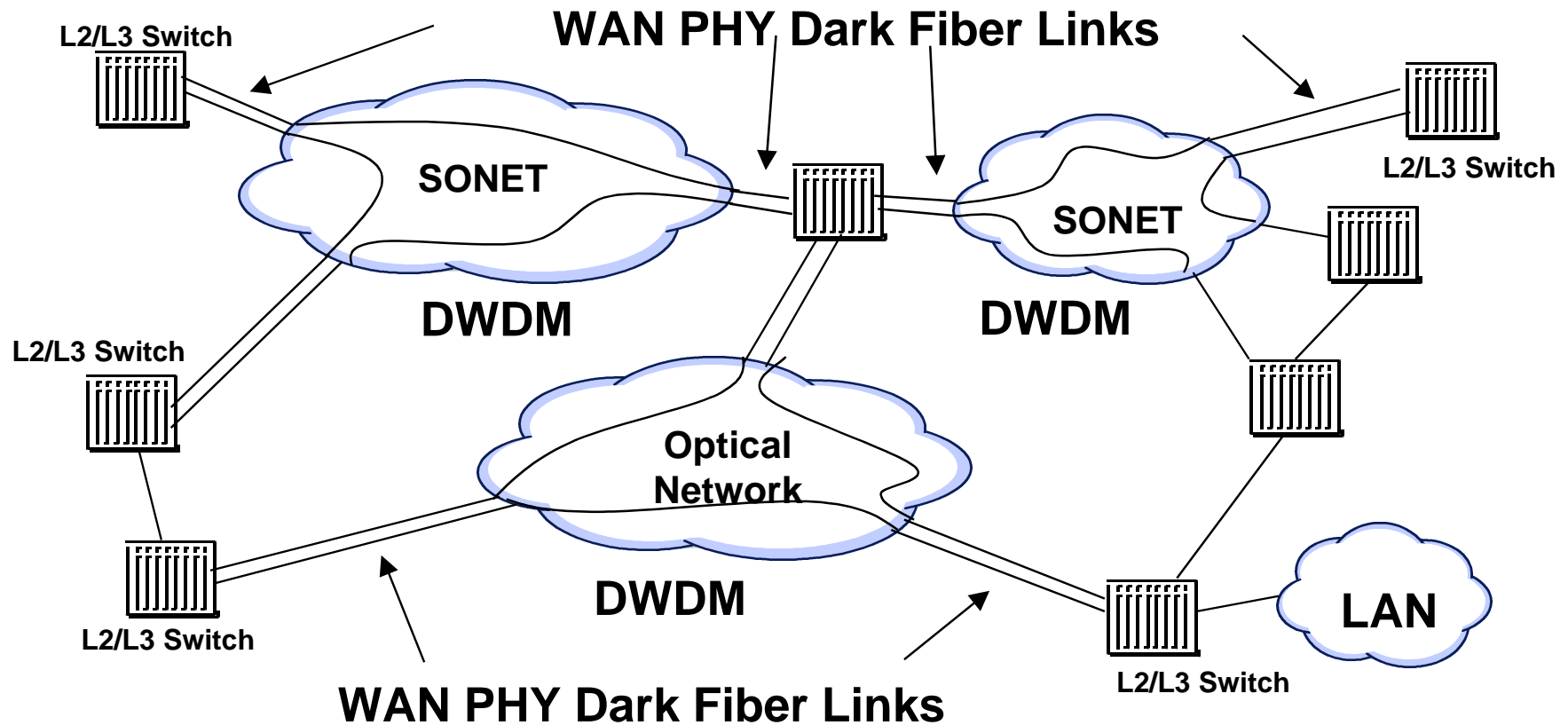
IEEE 802.3
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Nortel Networks

What is a WAN PHY?

- **WAN PHY provides access to WAN facilities**
  - Dark Fiber
  - Dark Wavelengths
  - SONET TDM Networks

- **WAN PHY leverages 10 Gig SONET infrastructure**

- **WAN PHY provides low cost optics**
  - Very short reaches
  - Store and forward network design (no regenerators)
  - No optical amplifiers

- **WAN PHY uses the same MAC as the LAN PHY**

- **WAN PHY operates at a rate that is compatible with the payload rate of OC-192c/VC-4-64c**

A WAN PHY Application

WAN PHY Dark Fiber Links

L2/L3 Switch

SONET

L2/L3 Switch

DWDM

DWDM

L2/L3 Switch

Optical Network

DWDM

LAN

L2/L3 Switch

WAN PHY Dark Fiber Links

L2/L3 Switch

- **WAN PHY provides access to facilities with dark fiber, dark wavelength, and SONET TDM**
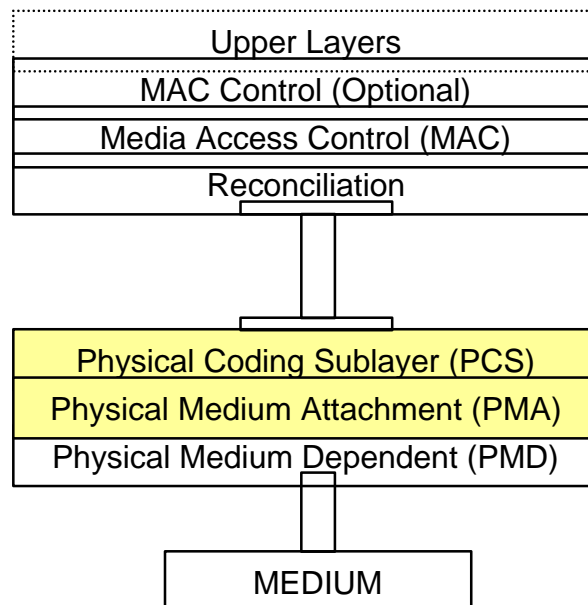
MAC Pacing for WAN PHY

- **Use a clock rate of 10.000 Gbps on the MAC/PLS interface**

- **MAC pacing mechanism reduces data rate to fit in OC-192c/VC-4-64c payload**

  – Payload Rate: 9.584640 Gbps

  – Word-by-word HOLD over XGMII

  – IPG stretch system

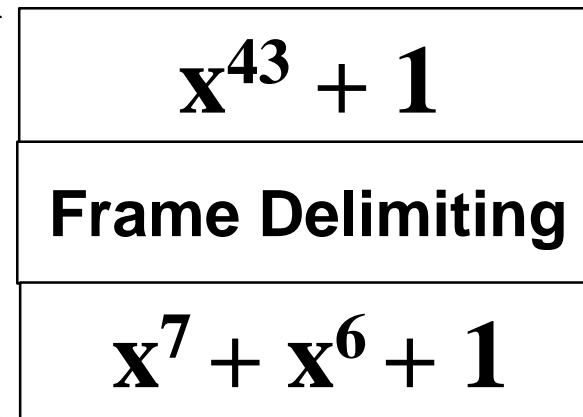- **Allows LAN PHY and WAN PHY to share the same MAC**

Encoding Alternatives for WAN PHY

- **2 Polynomial Scrambler System**
- **1 Polynomial Scrambler System**
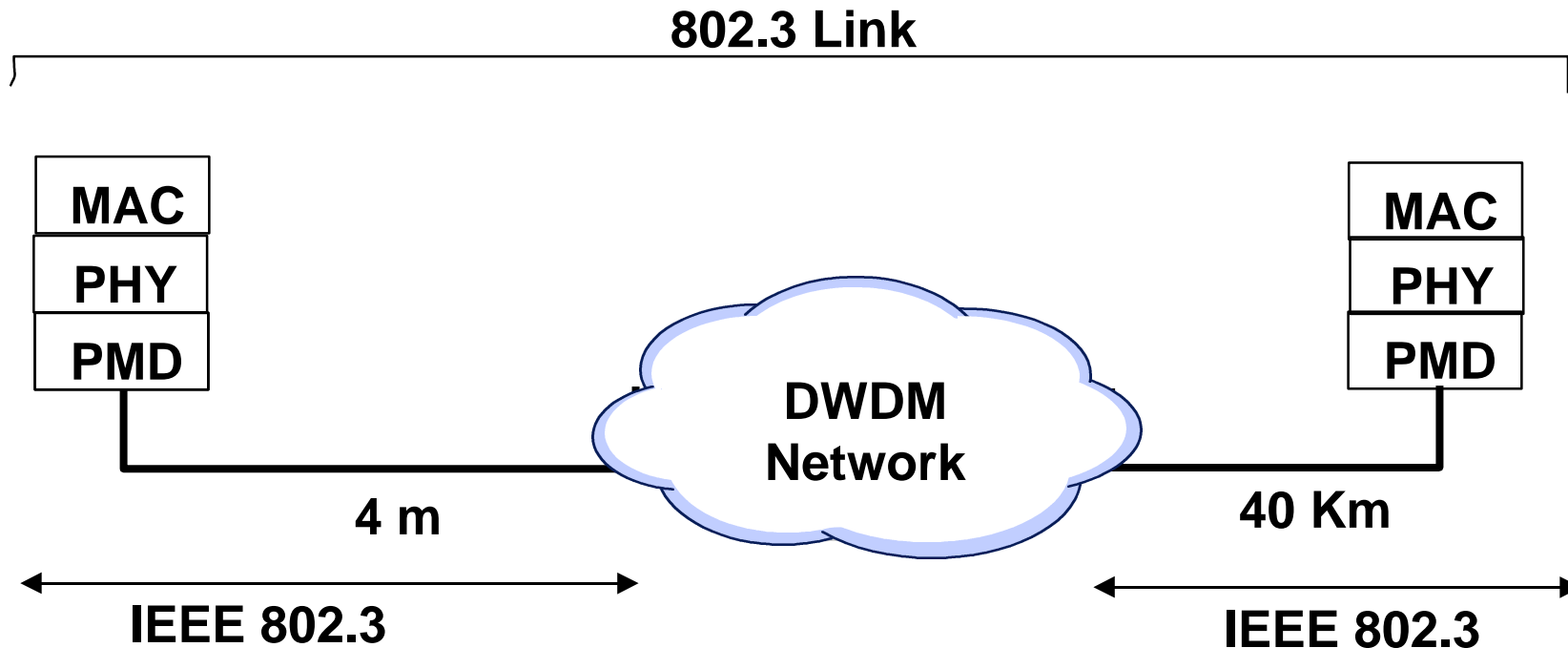- **MB810 Block Code System**
- **8b/10b Block Code System**

10 Gigabit Ethernet Reference Model

Upper Layers
MAC Control (Optional)
Media Access Control (MAC)
Reconciliation

Physical Coding Sublayer (PCS)
Physical Medium Attachment (PMA)
Physical Medium Dependent (PMD)

MEDIUM

Scrambler

$$x^{43} + 1$$

Frame Delimiting

$$x^7 + x^6 + 1$$

WAN PHY PMDs

802.3 Link

MAC
PHY
PMD

DWDM
Network

MAC
PHY
PMD

4 m

40 Km

IEEE 802.3

IEEE 802.3

- • **The distances between switching equipment using the WAN PHY and the DWDM facility is commonly less than 2 Km**

Summary

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