OAM in EFM

Five criteria and objectives

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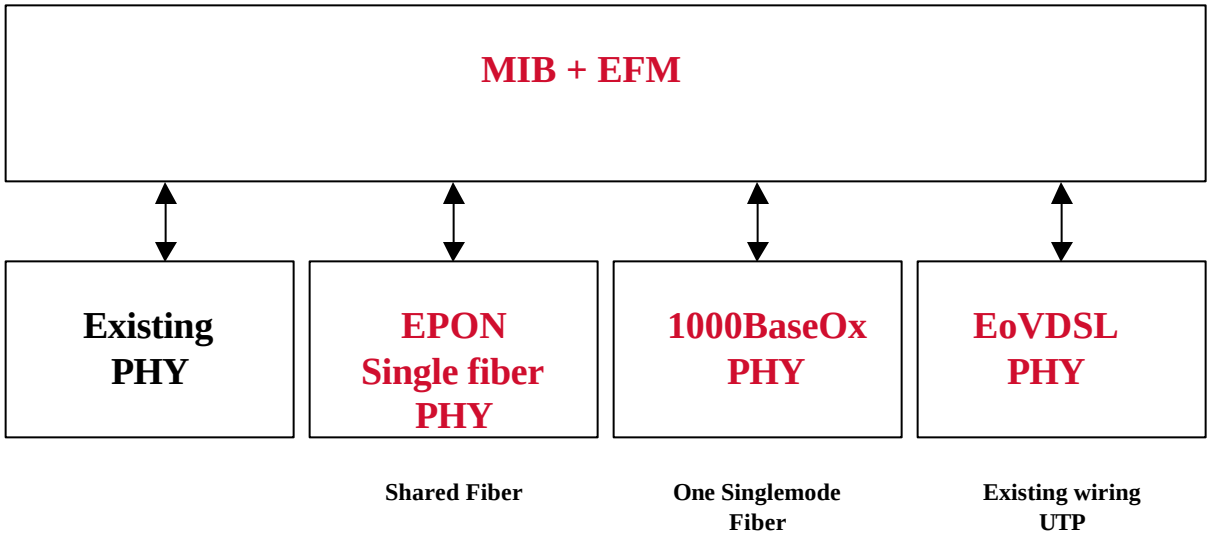
Why OAM in EFM?

- **Ethernet in the First Mile is about access.**
- **How is this different to Enterprise Ethernet?**
  - **The user is not employed by the switch owner.**
  - **The user may be hostile!**
  - **There is no recourse against “dumb” users.**
- **The SP MUST be able to provision and manage remotely.**
- **Link health and performance monitoring are required for SLAs.**

OAM Projects

- Ensure OAM capabilities are built into new PHY definitions.
- Define EFM additions to MIB.
- Make recommendations for existing PHYs.



Non-Goals

- **Provisioning is excluded.**
  - **OAM at MAC/PHY level only.**

OAM Objectives: Function Viewpoint

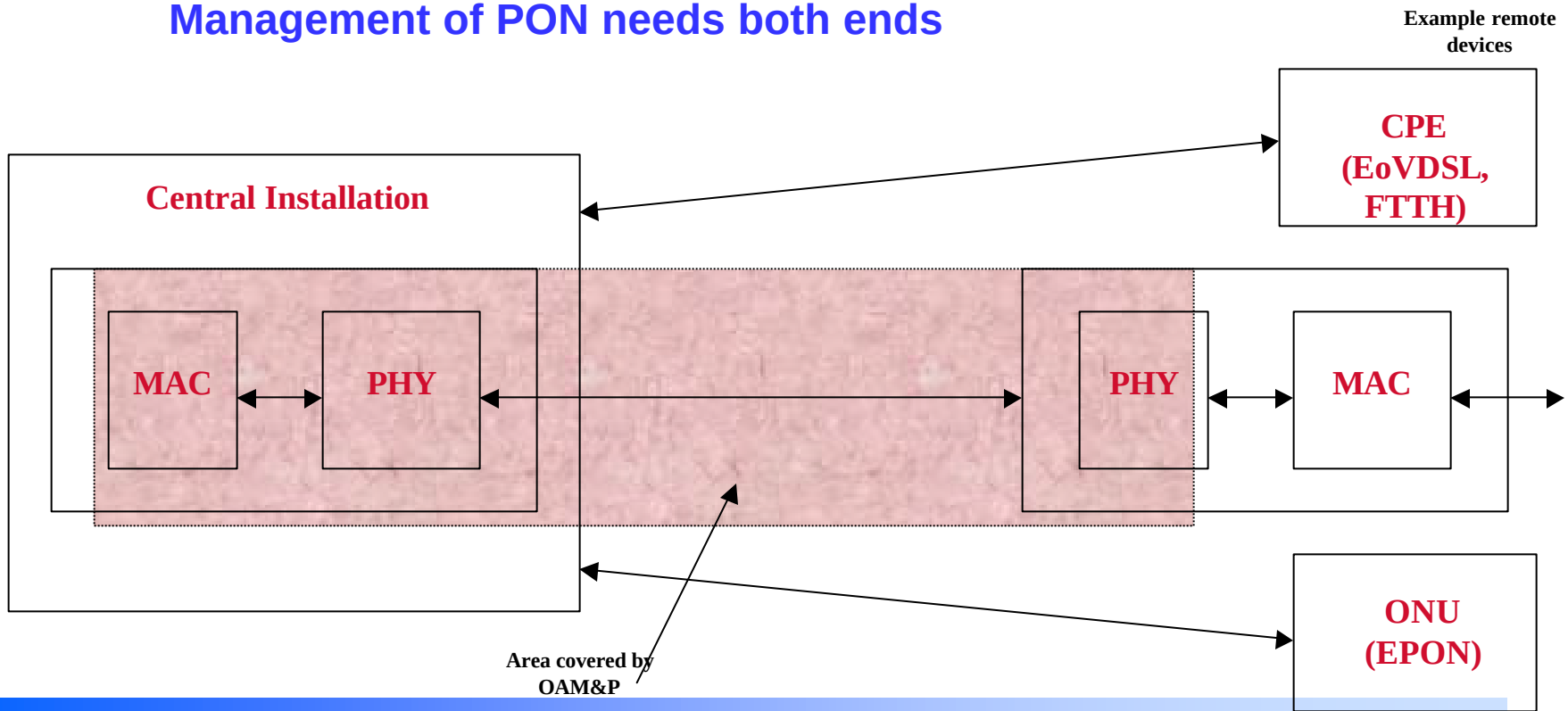
- **Remote Fault Indication**
  - PHY (Logic) Level
  - Protection would be implementation option
- **Link Monitor / Performance Monitor**
  - Both Local and Remote Side Monitor
    - -MAC (CRC error packets)
    - -PHY-PCS/PMA (Code Violation)
    - -PHY-PMD level (Optical / Analog Receiver Level)
  - Dependant on PHY technology
- **Remote Loopback**
  - PHY (Logic Level) Loopback
- **Management Channel for Remote OAM**
  - PHY Dependent / Independent

OAM Objectives: Layer Viewpoint

- **MAC layer**
  - Local already specified, remote MAC Stats to be added
- **PHY - PCS/PMA sublayer (Digital / Logic Domain)**
  - Performance Monitors
  - Failure Detection / Indication
  - Remote Loop Back
  - (Multiple Access Control Status (EPON))
- **PHY - PMD sublayer (Optical / Analog Domain)**
  - VDSL/EPON/P-P Optical will have different PHY/PMD monitoring
  - e.g. Analog Receiver Level (Up / Down)
- **Optimize complexity vs functionality**

Demarcation Point

- **Key concept for management of service:**
  - **Need to draw a line between SP responsibility and customer responsibility**
  - **Management of PON needs both ends**



1. Broad Market Potential

- **Service providers demand OAM as entry criteria.**
- **Optimal cost balance must include CPE costs and operating costs.**
- **The group liked it!**

  EFM study group voted 70-0-12 to include OAM&P.

2. Compatibility

- **OAM can be added with minimal change to the MAC.**
- **Project group to discuss details of implementations.**
- **Make recommendations to 802.1 iff necessary.**
- **Follow existing format and structure for MIB**

  Aim for maximum commonality within EFM additions to MIB

  Cover pt-pt copper, pt-pt fiber and shared fiber physical layers

3. Distinct Identity

- No current standard for PHY level management channel.
- Remote control/monitoring of link to peripheral device.
- Monitoring of physical layer link state.
- PHY layer loopback not currently defined.

4. Technical Feasibility

- **Low bandwidth control "easy to implement – hard to standardize."**
- **Already built into VDSL, APON, etc.**
- **Aim to utilize "spare" bandwidth available in the physical layers.**
- **Minimal changes = minimal risks.**

5. Economic Feasibility

- Maintenance and operating costs must be minimized.
- Addresses “weakness” of Ethernet for access.
- Must consider complexity (cost) of entire system
  - ONU
  - DSU/CSU
  - CPE
- Multiplying cost of remote equipment.

Conclusion - proposals

- **OAM in EFM**
  - **meets 5 criteria**
  - **enables new Phys to meet 5 criteria**
- **<u>Propose objectives for OAM:</u>**
  - **1) Define EFM additions to MIB**
    - **Remote Fault Indication**
    - **Link Monitoring**
    - **Remote Loopback**
  - **2) Ensure EFM PHY definitions include support for MIB**
    - **Management Channel**
    - ***General requirements for all phys**
    - ***Specific requirements according to media**
  - **3) Make recommendations for addition of OAM for other phys**
- **Discussion of details left to project group.**
  - **Explicit list of parameters , Where it's "hidden" – PHY or MAC…**

EFM OAM Objectives

- **Support Far-end OAM in EFM, which includes :**
  - **Remote Failure Indication**
  - **Remote Loopback**
  - **Link Monitoring**
  - **Management Channel**