



PRESENTS

**NETWORLD INTEROP**

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# Point to Point GbE and OAM for EFM

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REV3.0



# IEEE Standards Work in Process

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- **IEEE 802.3 Ethernet Working Group**

- IEEE 802.3ae 10 Gigabit Ethernet Task Force
- IEEE 802.3ah Ethernet in the First Mile Task Force Point to point Ethernet over copper and fiber
  - Point to multipoint Ethernet on SM fiber (PON\*)
  - IEEE802.3af DTE Power Task Force
    - Electrical power over Cat 5 cabling

- **IEEE 802.17 Working Group**

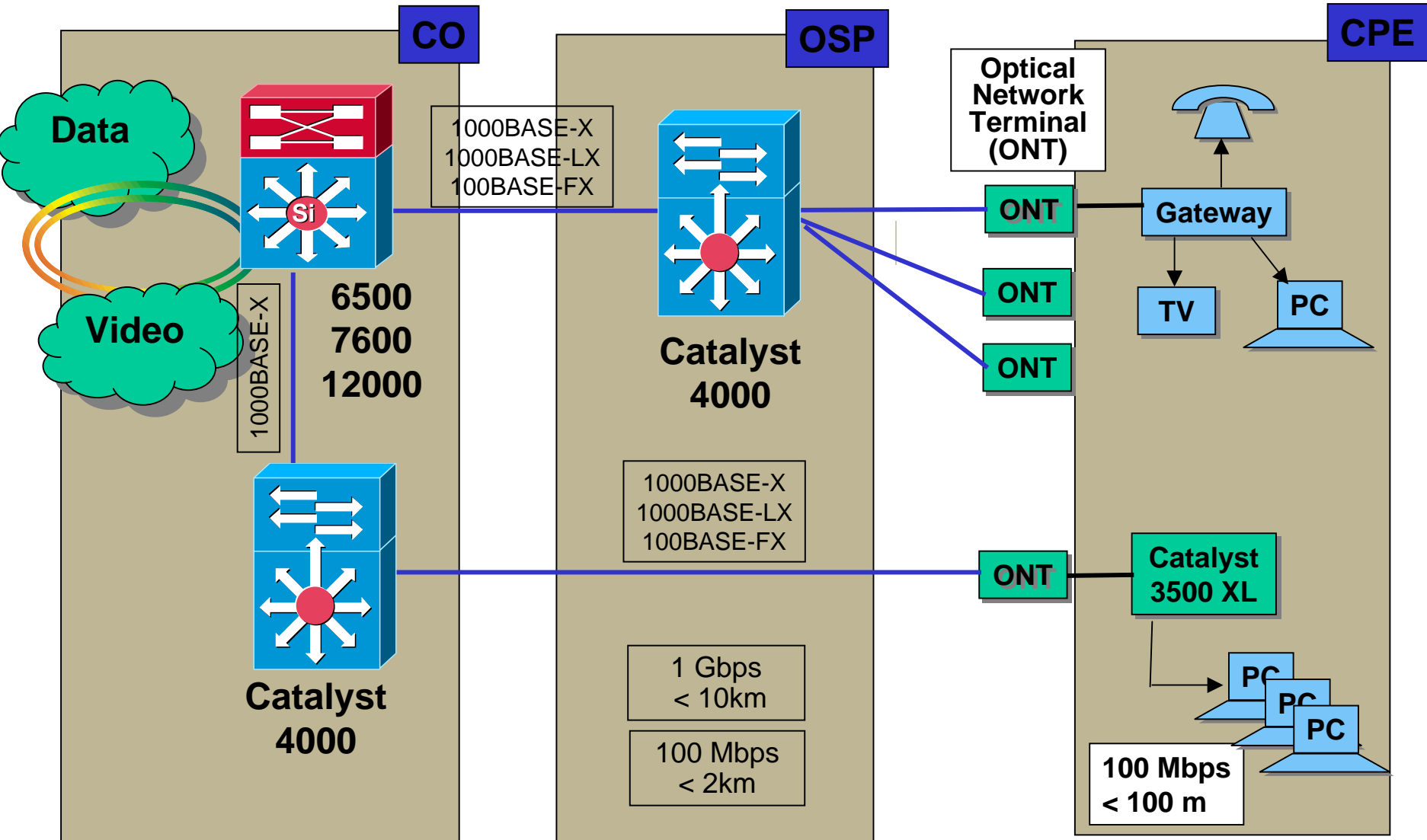
- Resilient Packet Ring (RPR)
  - Defines media access control protocol for SM fiber rings
  - Uses optical interfaces (PHYs) defined by IEEE 802.3z and 802.3ae 10 Gigabit
  - RPR networks can deliver “Ethernet services”

# IEEE 802.3ah Task Force Goals

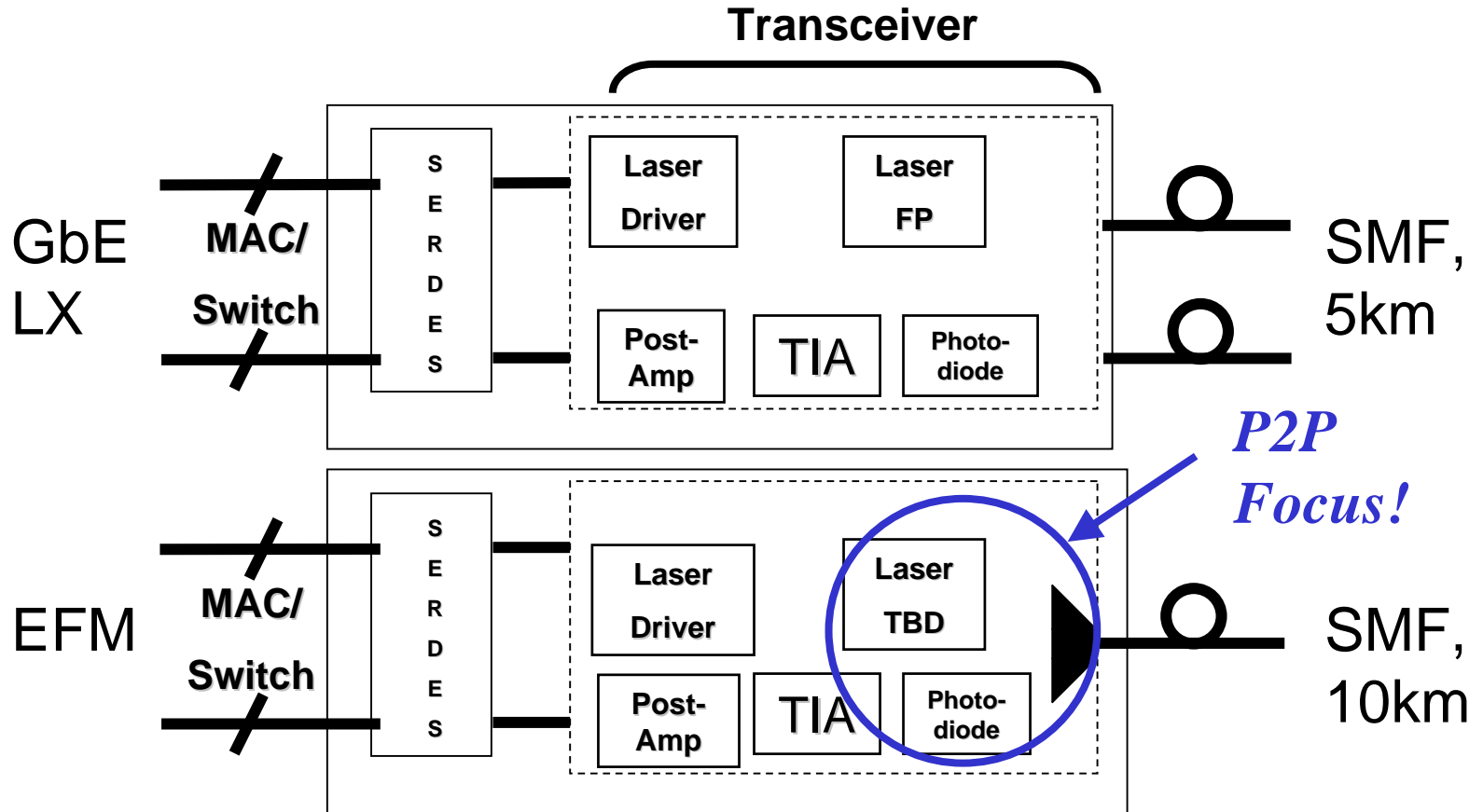
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- Provide a family of physical layer specifications
  - 1000BASE-X  $\geq$  10 km over single SM fiber
  - 1000BASE-X extended temperature range optics
- Support far-end OAM\* in subscriber access networks, which includes
  - Remote failure indication
  - Remote loopback
  - Link monitoring

# Pt-Pt Architecture: Residential and Business

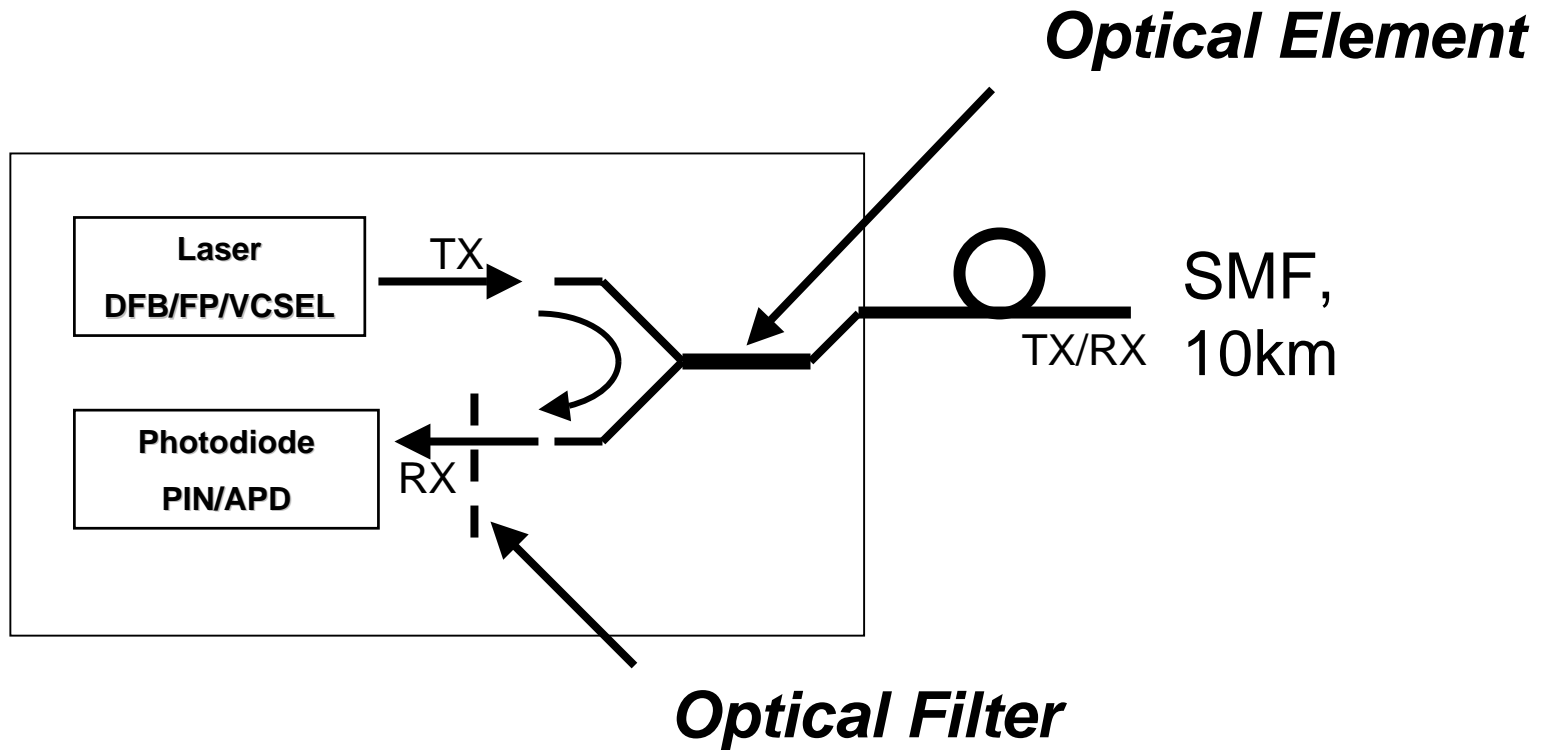


# GbE LX vs. Single Fiber P2P



Source: P. Kelly, IEEE 802.3ah

# P2P Focus



Source:P. Kelly, IEEE 802.3ah

# P2P Transceiver Wavelength Candidates

Option	Upstream	Downstream
1	13x0 nm	
2	13x0 nm+ $\Delta$	13x0 nm- $\Delta$
3	13x0 nm	15x0 nm
4	15x0 nm	
5	15x0 nm+ $\Delta$	15x0 nm- $\Delta$

Source: IEEE 802.3

# P2P on Single SM Fiber Transceivers

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- Value to customer: fiber relief
- Various options under consideration
- Technology already exists in other applications, e.g. HFC
- Different up- and downstream wavelengths lead to difference transceivers at each end of link
- Single wavelength solutions are not straightforward
- IEEE 802.3ah will investigate cost/volume/manufacturability tradeoffs



# Extended Temperature Range Optics

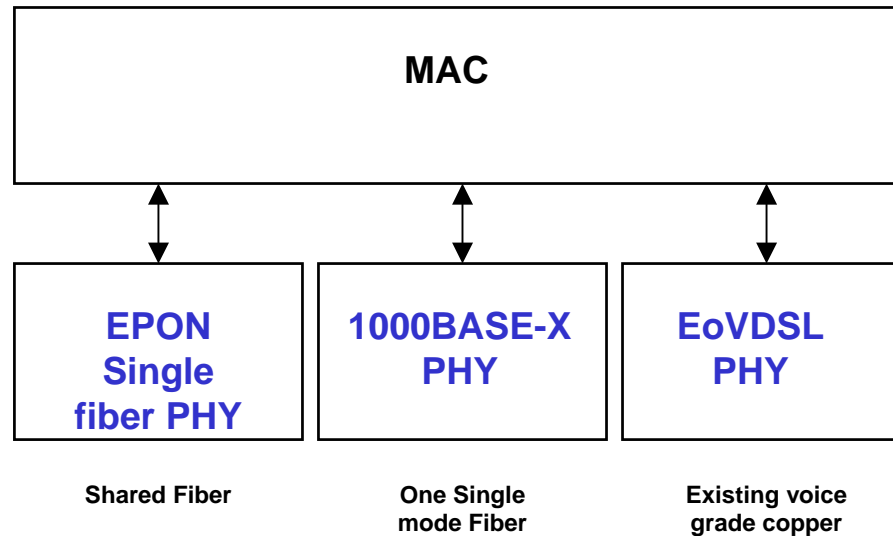
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- -40 to +85<sup>0</sup> Celsius an absolute requirement for residential EFM applications where ONT has to sit outside house or MXU
- Applies to EPON, 1000BASE-LX, and bidirectional 1000BASE-X
- Task force will investigate system vs. optics module tradeoffs and temperature ranges

# Common OAM for all EFM PHYs

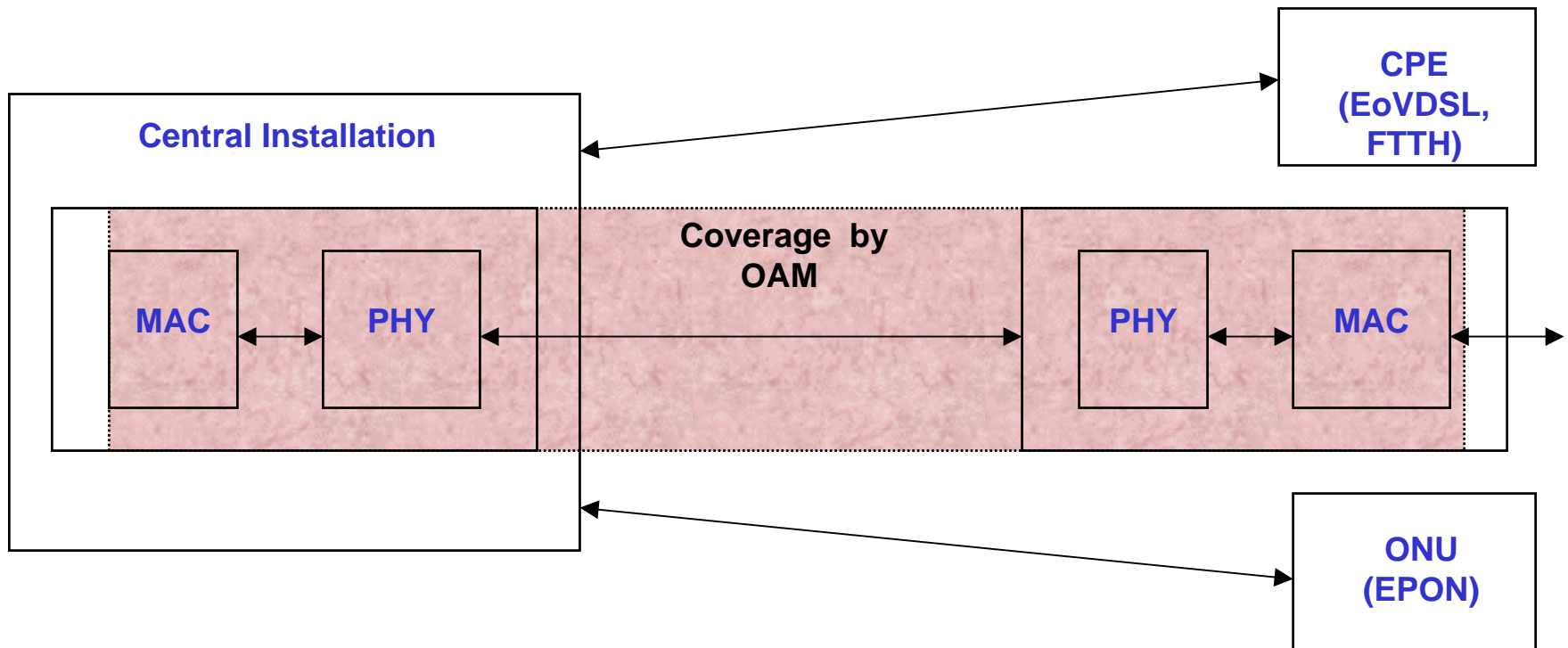
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- Goal: Common OAM capability for all EFM PHYs



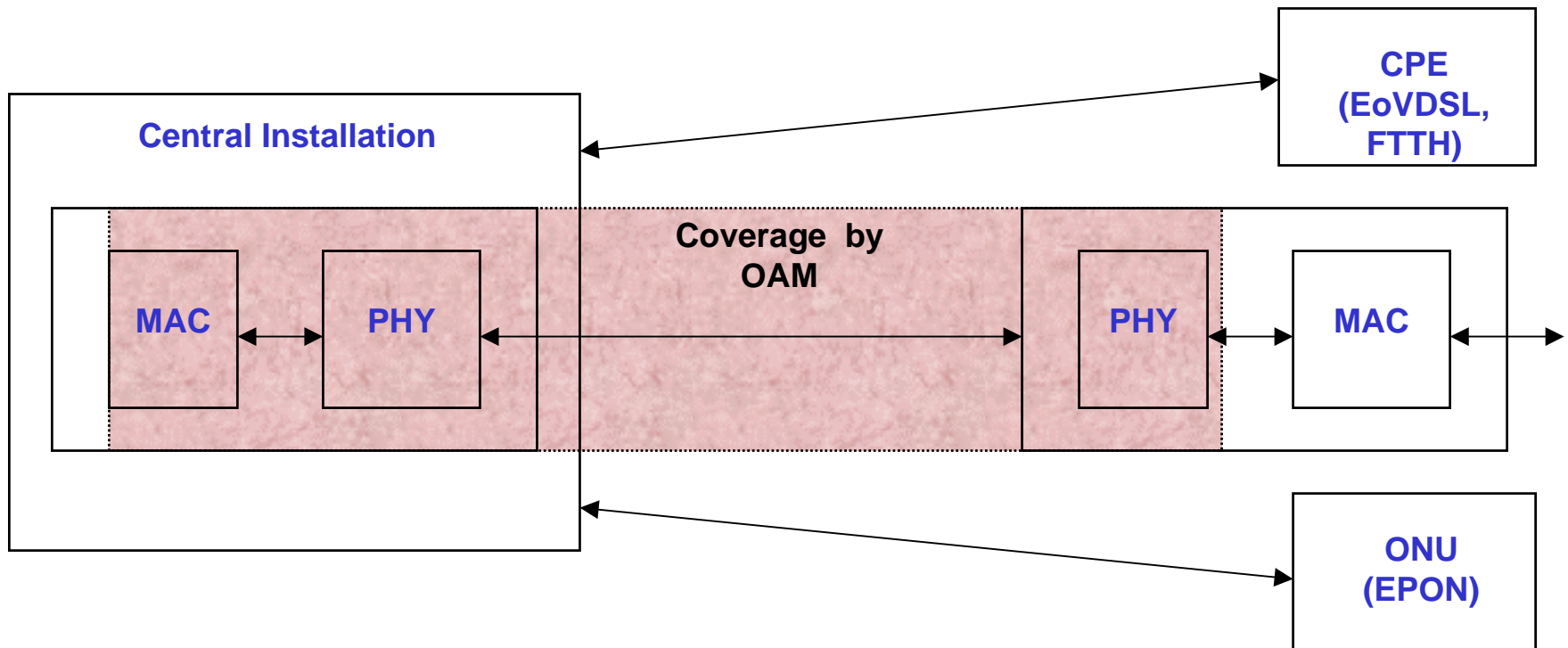
# MAC/PHY Demarcation Point

- Both CPE MAC and PHY are owned by the service providers



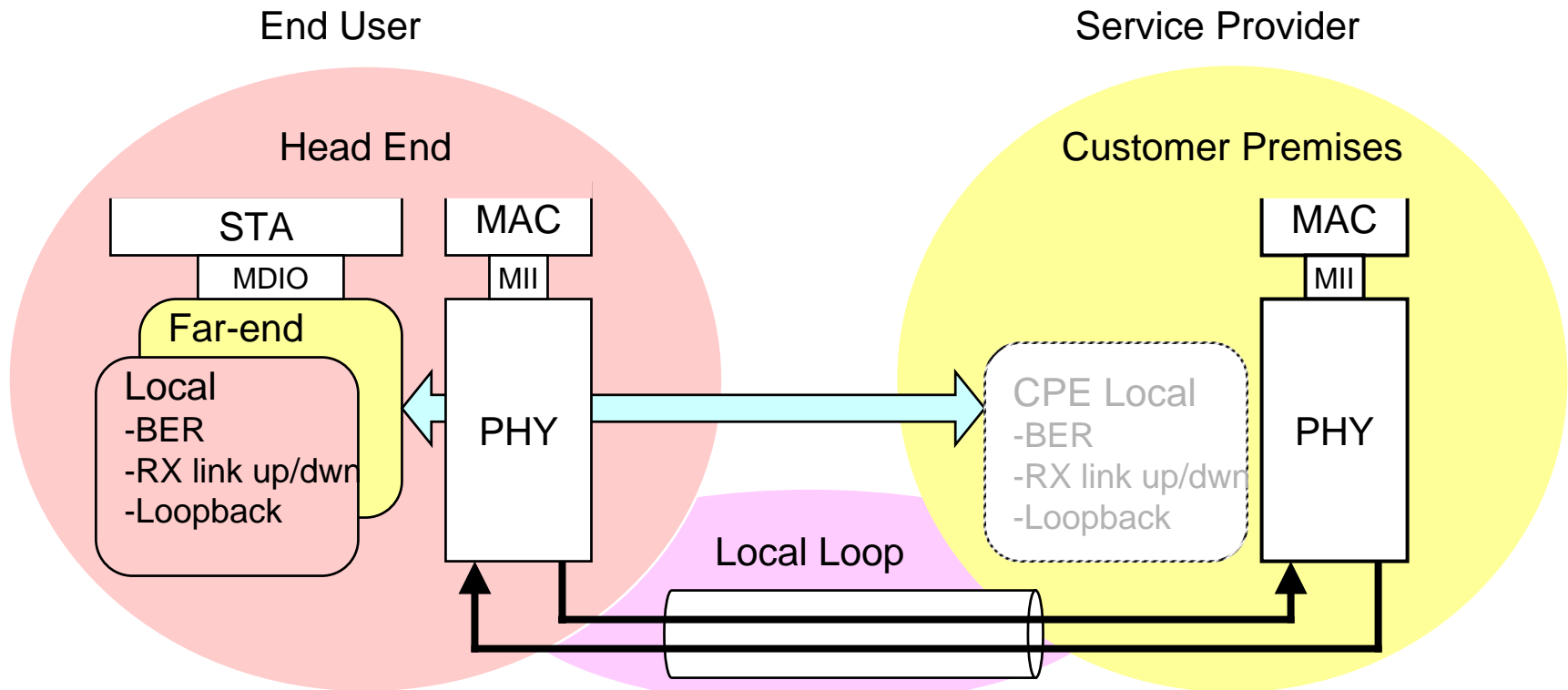
# PHY-Only Demarcation Point

- Only PHY is managed at customer premises
- E.g., media converter model

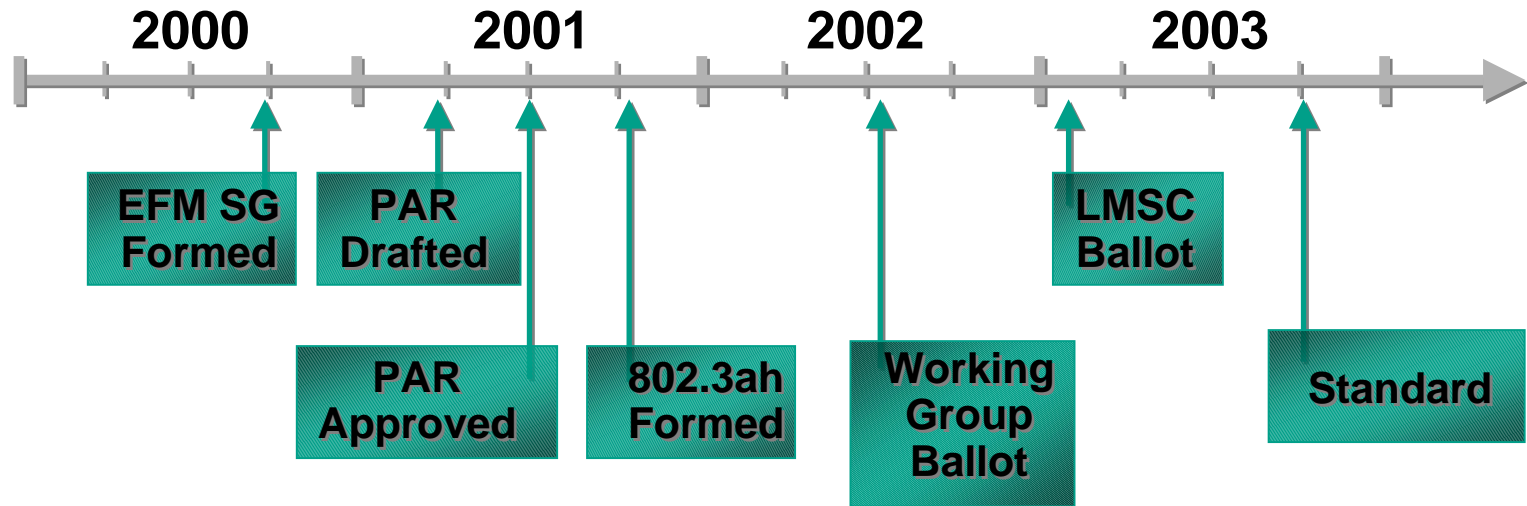


# Operations Model: Head-End Manages CPE

- CPE local stats/status is read/written by OLT or head end

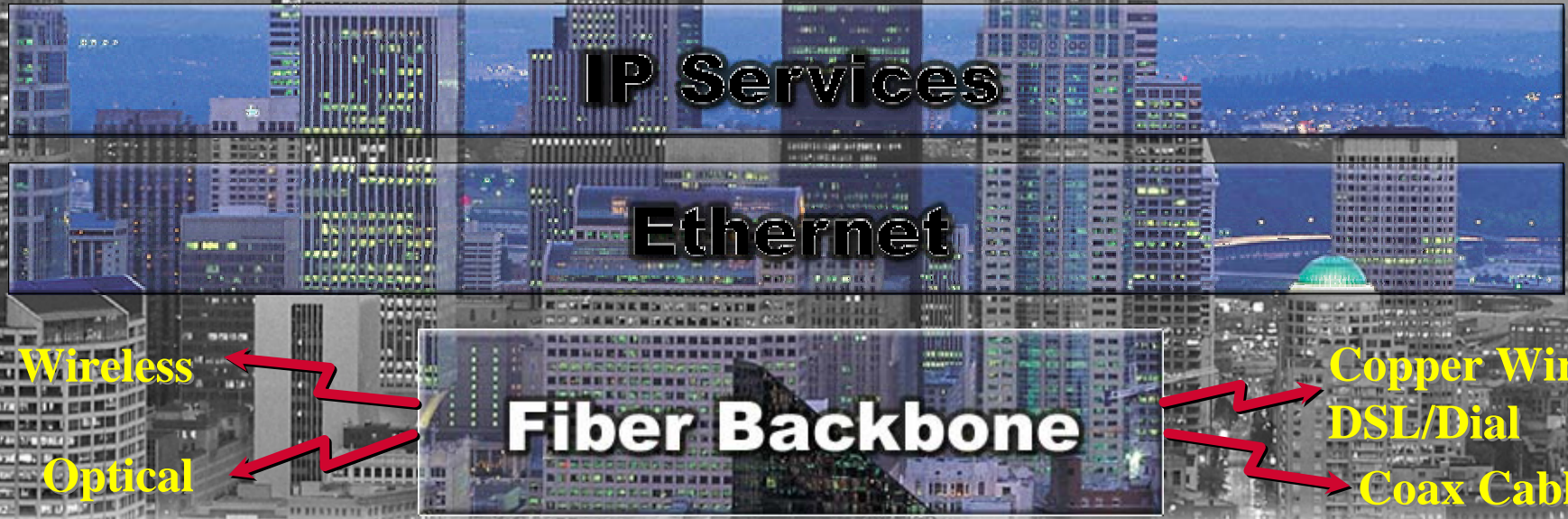


# Possible Schedule for IEEE 802.3ah Task Force



- **EFM SG** (Ethernet in the First Mile Speed Study Group)
- **PAR** (Project Authorization Request)
- **802.3ah**—the name of the project and the name of the sub-committee of IEEE 802.3 chartered with writing the Ethernet in the first mile standard
- **Working group ballot**—task force submits complete draft to larger 802.3 committee for technical review and ballot
- **LMSC**—LAN/MAN Standards Committee ballot; any member of the superset of 802 committees may vote and comment on draft

# Ethernet: The Fundamental Layer 2 Infrastructure

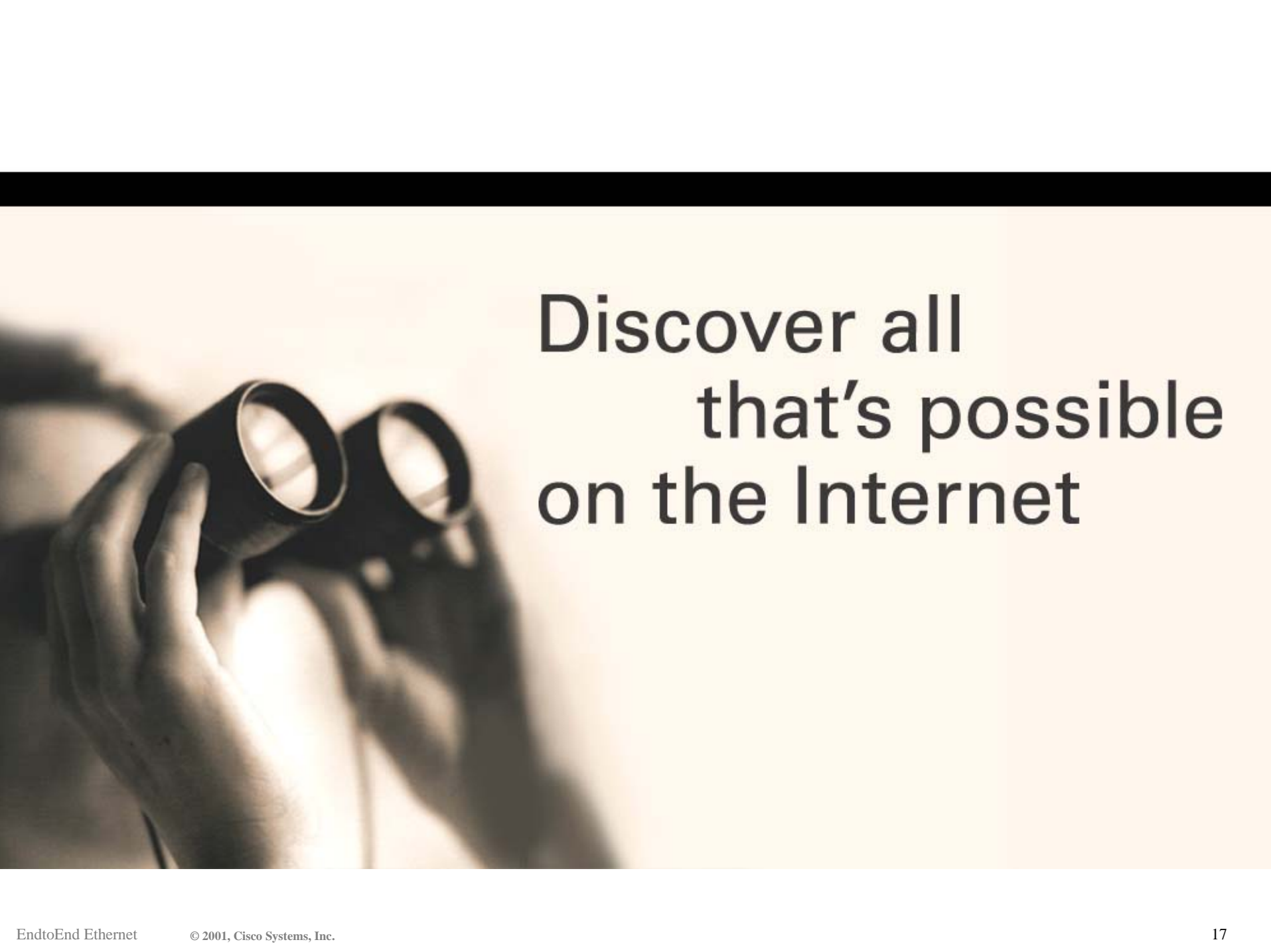


# Summary and Conclusions

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- Customers are building P2P networks today with 1000BASE-LX
- Customer need for fiber relief will drive 1000BASE-X for single SM fiber transceiver
- ONTs at residential customer premises have to be environmentally hardened
- EFM customers require remote loopback and remote failure indication
  - OAM mechanism will be built in PHY and/or MAC layer, EPON needs upstream access control monitoring



A close-up, slightly blurred photograph of a person's hands holding a pair of dark binoculars. The person's face is partially visible in the background, looking through the lenses. The lighting is warm and soft, creating a sense of focus and discovery. The background is a plain, light-colored wall.

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