Introduction to Passive Optical LAN and APOLAN

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Association for Passive Optical LAN

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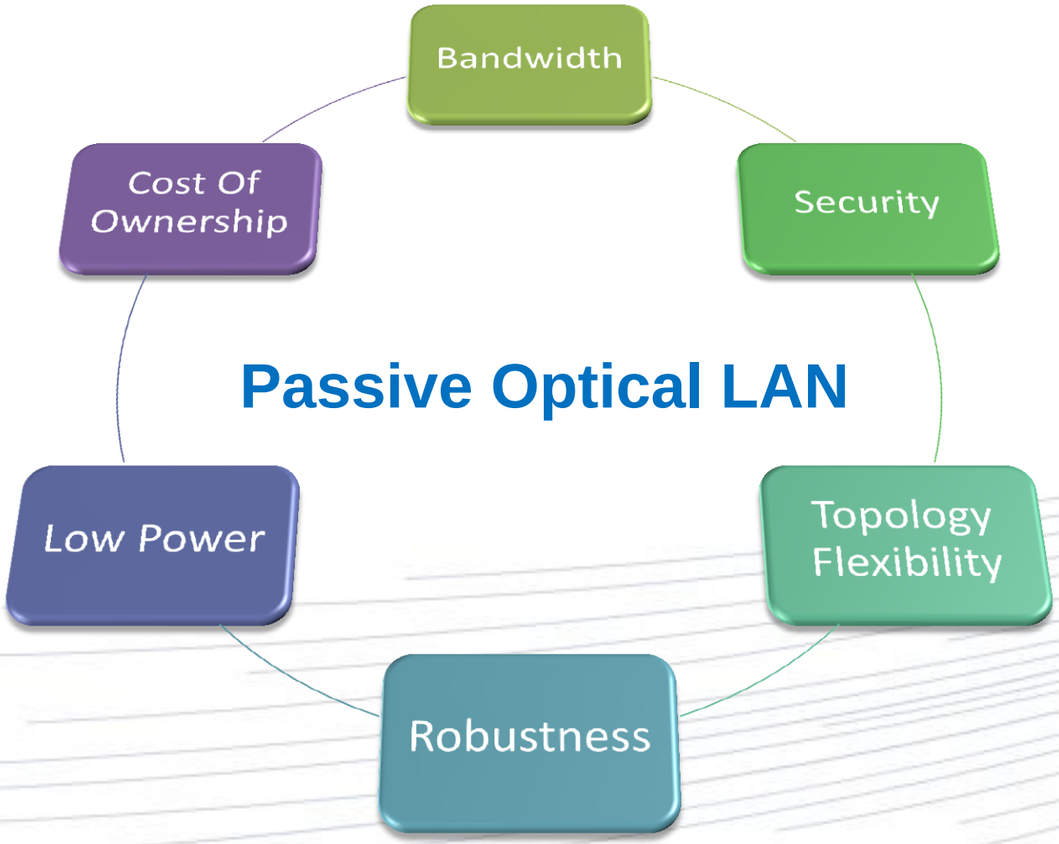
What is Passive Optical LAN (POL)?



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What is Passive Optical LAN (POL)?

A Passive Optical Network is a proven GPON architecture that shares a single mode fiber to offer **point-to-multipoint** network connectivity to subscribers using passive optical components.

The results are:

- Higher security
- Better reach
- Better bandwidth
- Lower CAPEX and OPEX
- Future proof infrastructure

Copper

300 Feet / 100 Meters

Fiber

Up to 60KM / 60,0000 Meters

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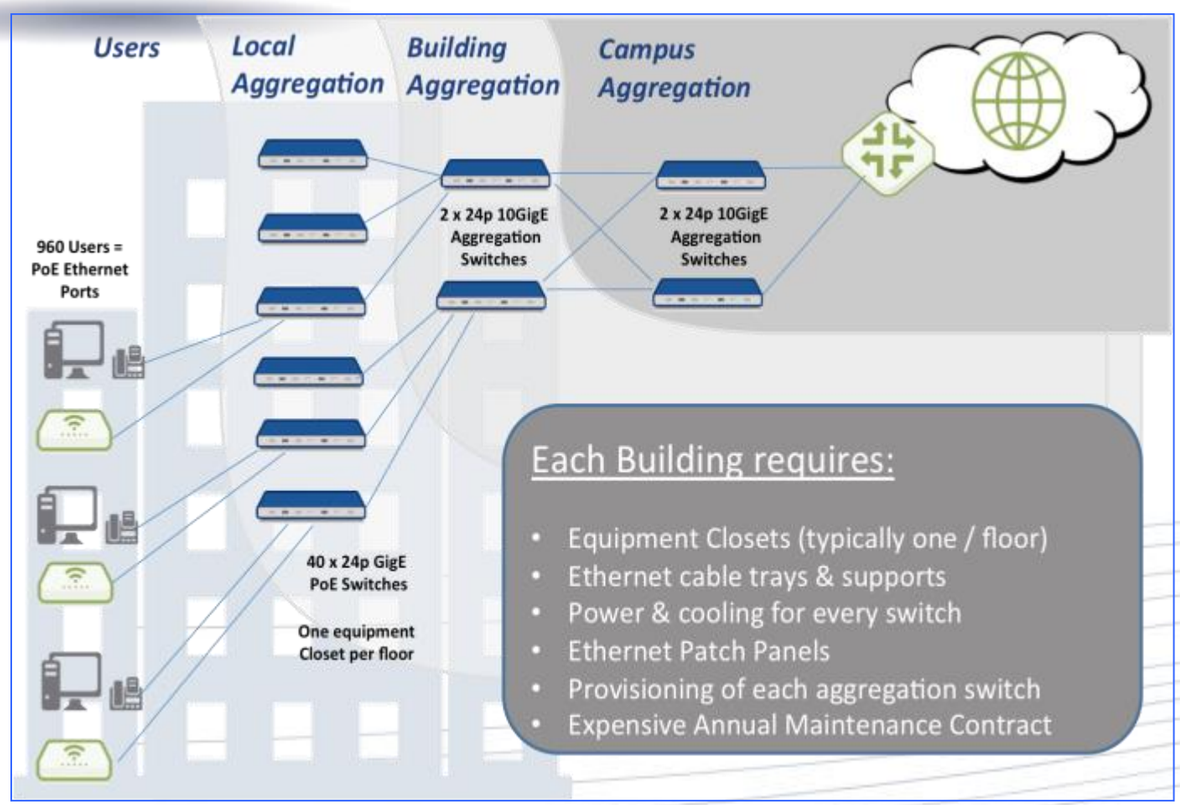
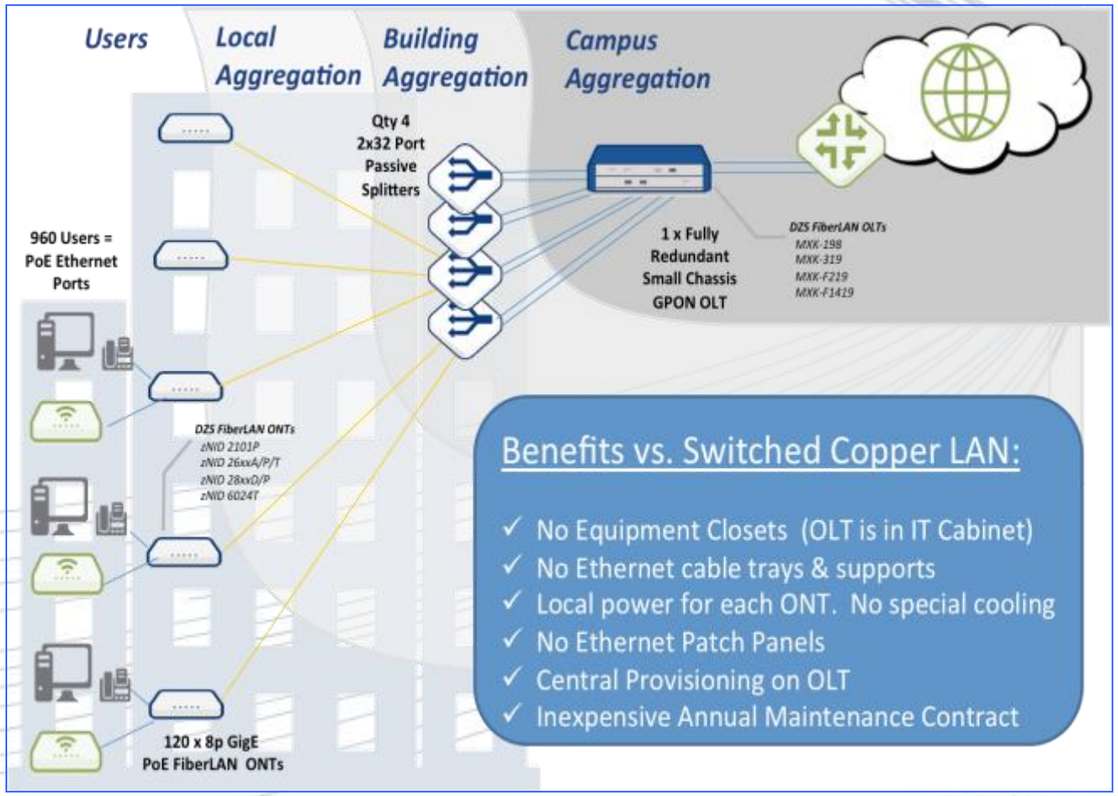
POL Architecture

Copper LAN Technology



Passive Optical LAN Technology



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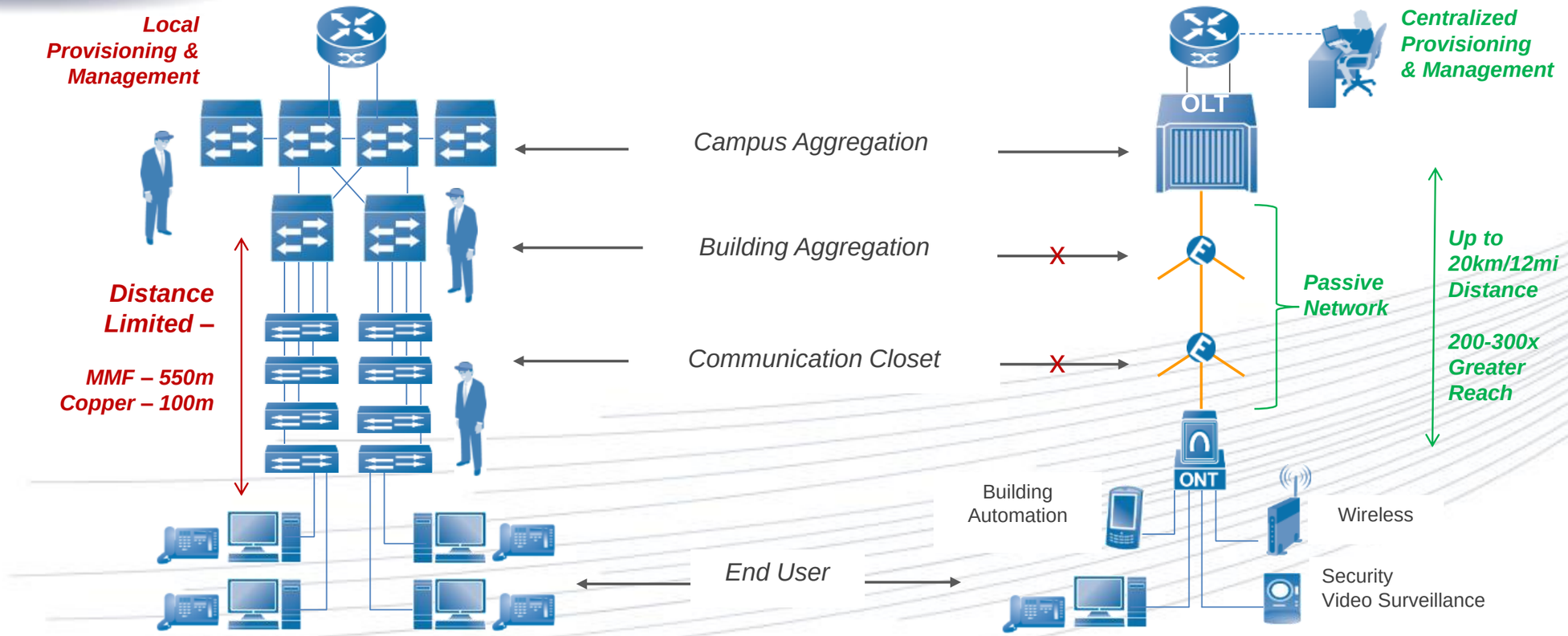
POL: Architecture Comparison



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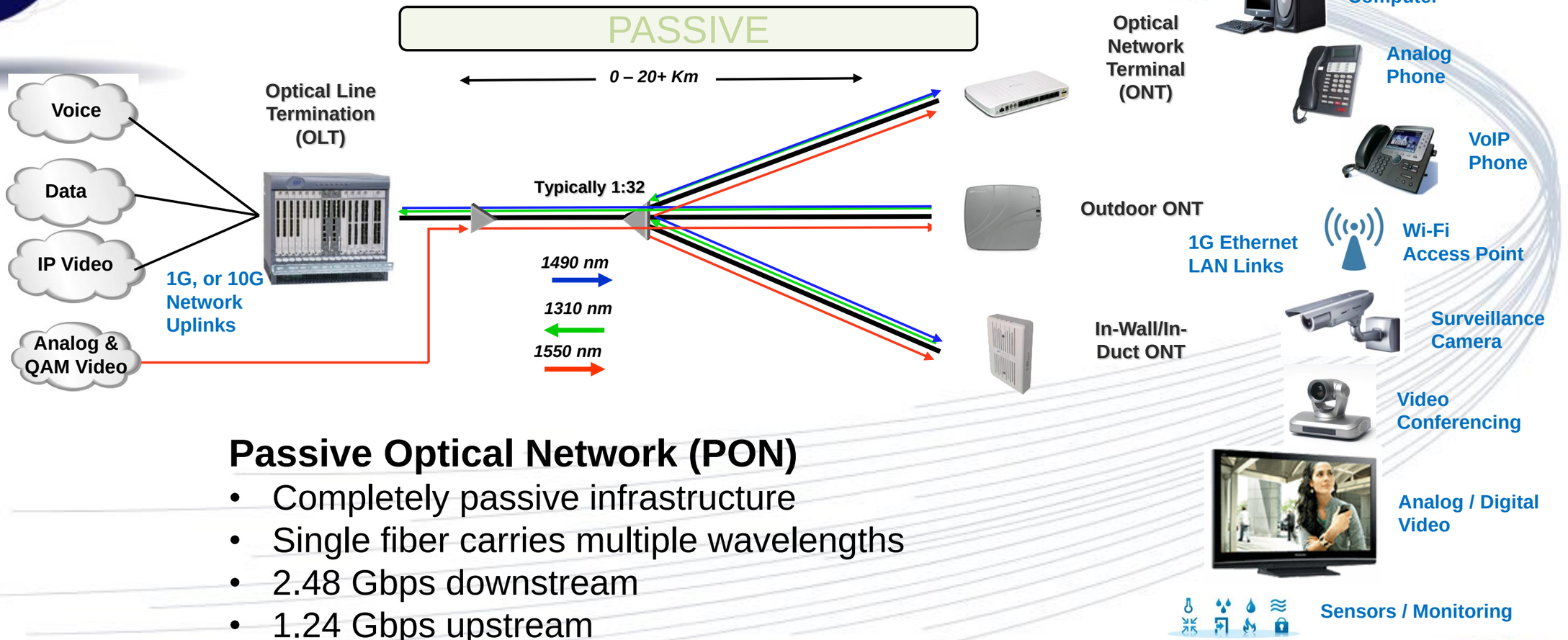
Key Ideas Behind POL

- Introduction of **point-to multipoint** (p2mp) into LAN instead of/together with legacy point-to-point (p2p):
  - GPON technology
  - Telecom operators are using the same (mature) technology for ages for very pragmatic reasons
- Extending the use of **fiber in the LAN**:
  - Arrive as close as possible to the Ethernet end devices:
    - Fiber to the room
    - Fiber to the office
    - Fiber to the desk
    - Fiber to the beach bar, tennis court, production line device, …
  - Use (single mode) **fiber** not only in verticals but also **in horizontals**
  - Use **less copper**: means use less space, less weight, less dissipation (heat), less electromagnetic radiation, less sensitivity on external interferences
- **Totally passive infrastructure**: active devices only at the central (server) room and very close to end-user devices
- LAN transformed into single switch with distributed remote parts

Gigabit Passive Optical Network (GPON)



Passive Optical Network (PON)

- Completely passive infrastructure
- Single fiber carries multiple wavelengths
- 2.48 Gbps downstream
- 1.24 Gbps upstream
- Serve Remote Buildings Up to 20Km

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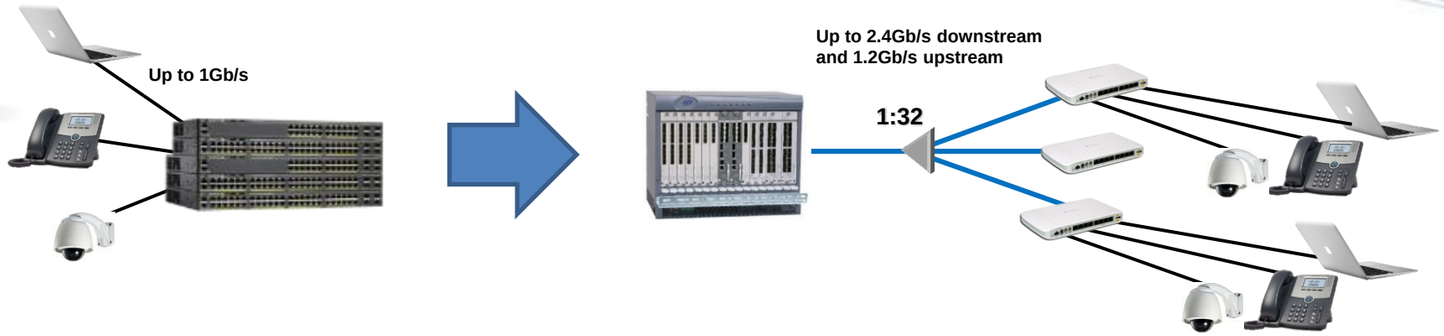
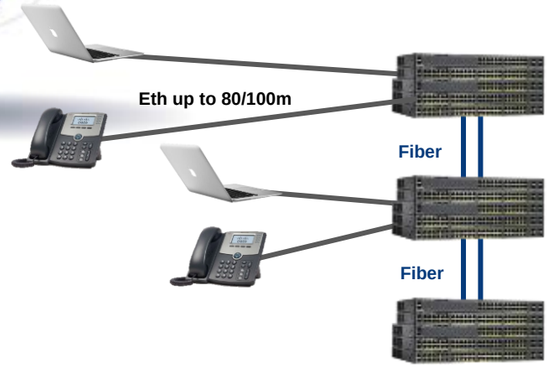
Why POL? – 1. Save Resources

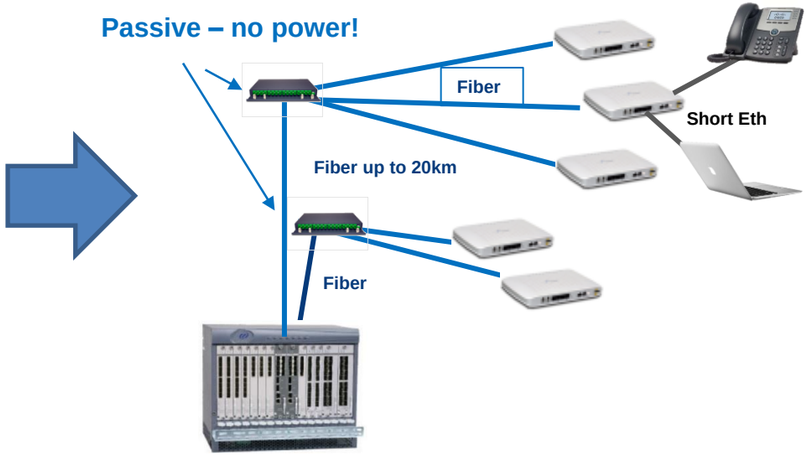


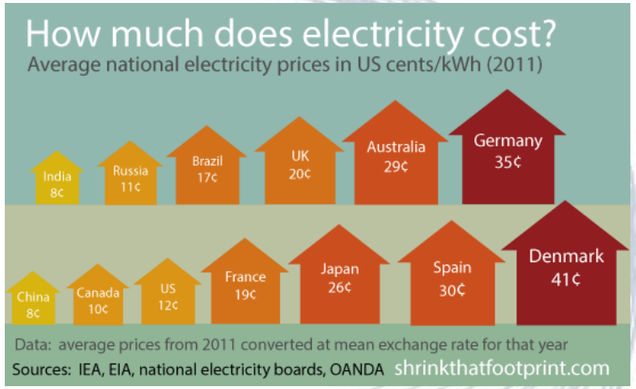
Innovation in the LAN topology: Point-to-multipoint (p2mp) instead of or together with current point-to-point (p2p):

- More intelligent sharing of resources
- P2p: if bandwidth not used – wasted
- P2mp: bandwidth not used by one user could be used by the other on the same OLT port
- Network topology more distributed, without (or with less) bottlenecks

Why POL? – 2. Save Energy







Arrive with the fiber as close as possible to the Ethernet end-devices:

- Fiber to the room, fiber to the office, fiber to the desk, …
- Fiber also in horizontals, not only in verticals in the buildings
- **Less copper – less energy wasted** in unnecessary heating of environment, especially if long cables and PoE are used
- No aggregation and centralized access switches
- Less heating and distributed heating devices – **not necessary to use air-conditioning**

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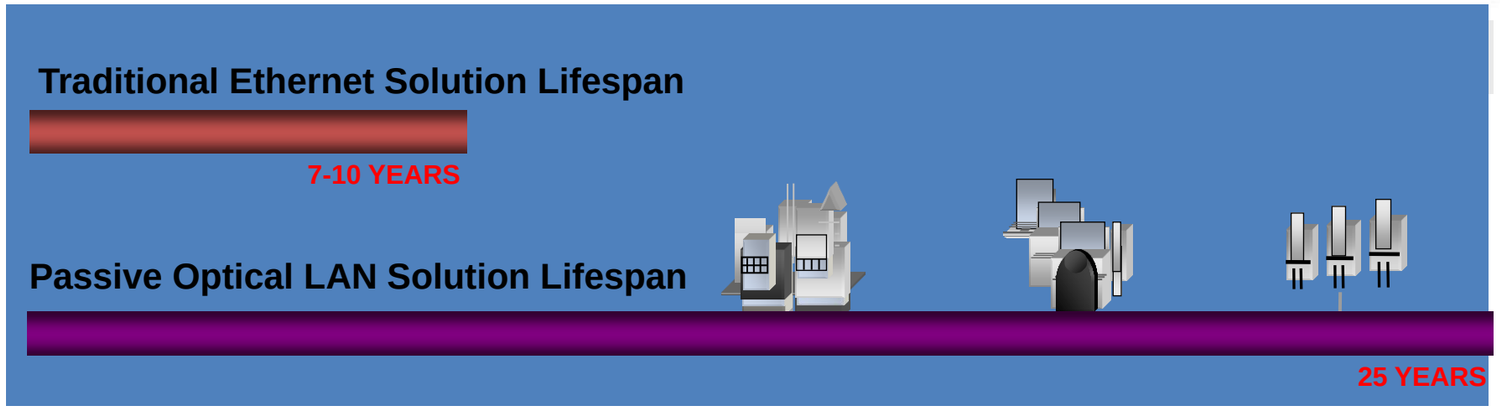
Why POL? – 3. Save Environment

It's Green!

Many Passive Optical LAN features are essential to green building initiatives including Leadership in Energy and Environment Design (LEED)

- Reduced Power Requirements: Savings between 40% to 60%
- Reduced HVAC Requirement: A Fortune 500 company saved about $450K on the Power distribution network (HVAC, backup etc) for a bldg project with 2000 Eth ports
- Reduction in Non-renewable materials: Reduction of up to 8000 pounds of plastic and copper versus a Cat 6 install for building of 4000 Ethernet ports
- Floor and Cable Pathway Space Savings: Traditional layer-2 solutions are bound by the 300ft Ethernet limitation
- No electromagnetic pollution

Why POL? – 4. Save From External Interferences and Frequent Infrastructure Replacement



- Fiber could be deployed together with electrical/power cables; for copper cables this is forbidden
- No degradation of the fiber performance even in extreme environmental conditions
- POL infrastructure is built to last 50+ years:
  - Fiber infrastructure is capable of supporting future generations of POL (GPON -> 10G PON -> 40G PON -> 100G PON, …); it is sufficient to change active components
  - Single-mode fiber has practically no limits (69Tbps+)
- No more replacing copper cables/infrastructure to increase speeds (CAT5 -> CAT5e -> CAT6a -> CAT7 -> …)

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Why POL? – 5. Save Privacy, Increase Security

- Military Grade
- Outdoor Hardened
- Rapid Deployment
- Highly Secure
  Secure GPON/S-GPON/802.1X
- Joint Interoperability Test Certification
- DOD Approved

JITC

- Fiber could not be tapped/spied without cutting it, unlike copper
- P2p fiber if cut, could be simple spied without being detecting
- GPON (p2mp), because of downstream transmission in broadcast has built in 128-bit AES encryption on the physical layer
- Since using TDM in upstream, thus sensitive on delays and aware of fiber length, spying very complex and expensive
- US government request use of GPON in military and government applications – POL solutions are certified

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Why POL? – 6. Save Space

POL Riser

Supports 4 Floors

>2000 Ports

- No need for aggregation and access switches (often doubled)
- Remove need for communications closets (on every floor):
- Instead of the switch, patch panel, power, air-conditioning in the closet or room – just a small passive splitter (not powered!)
- Dramatically reduces horizontal cabling (90%): cables and ducts
- More space for revenue generating usage (extra hotel rooms, hospital beds, more desks, more productive use of space)
- Architect's vision is not compromised by the IT necessities (also industrial ONTs could be placed "invisibly")

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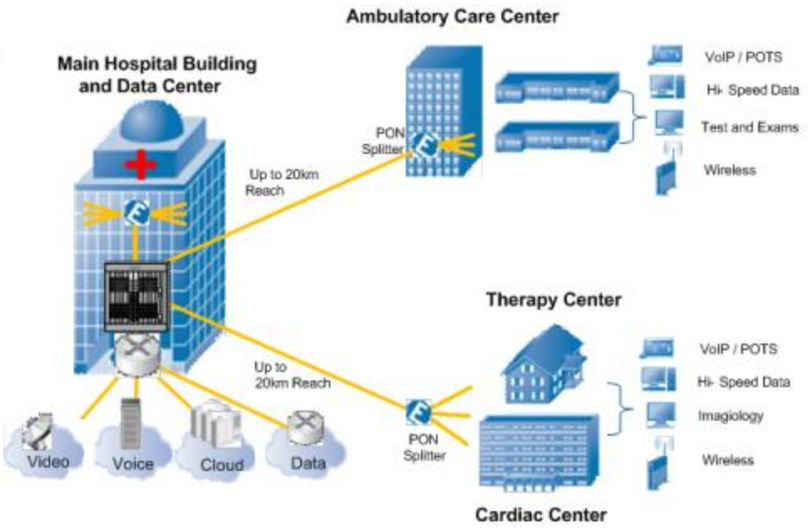
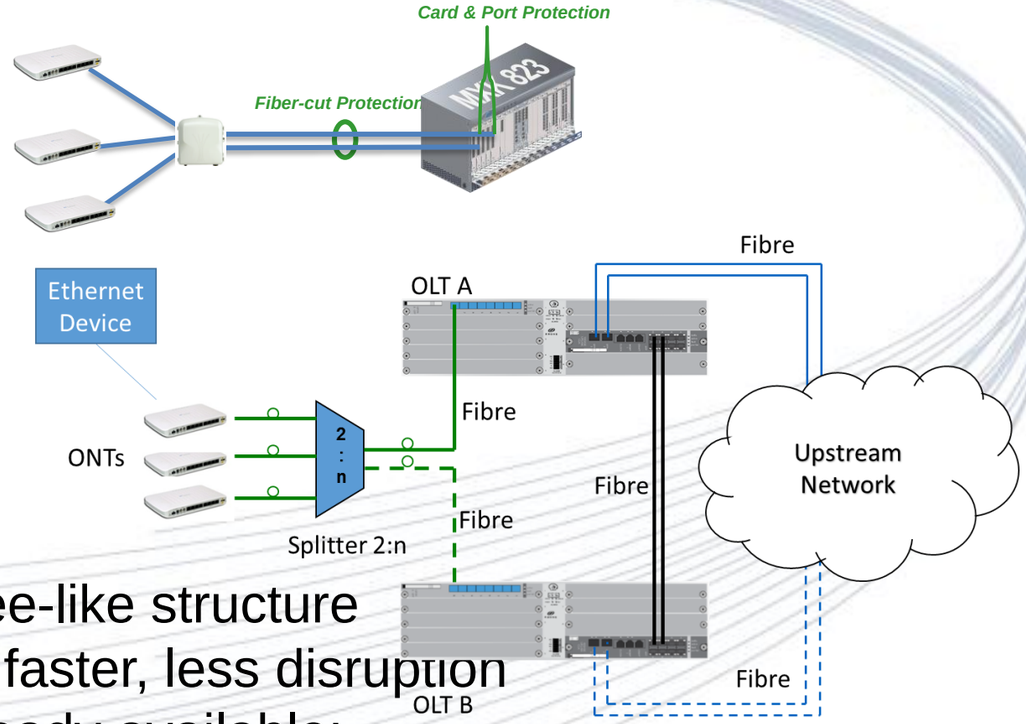
Why POL? – 7. Save and Improve Network Layout Flexibility, Scalability and Reach





- Multiple splitting levels allowed – tree-like structure
- Easy extension/reduction: cheaper, faster, less disruption
- Different redundancy topologies already available:
  - Intra-chassis redundancy (GPON Type-B redundancy):
    - Fiber is protected on long run
    - Hitless recovery
  - Chassis-based redundancy:
    - Geographic redundancy across chassis

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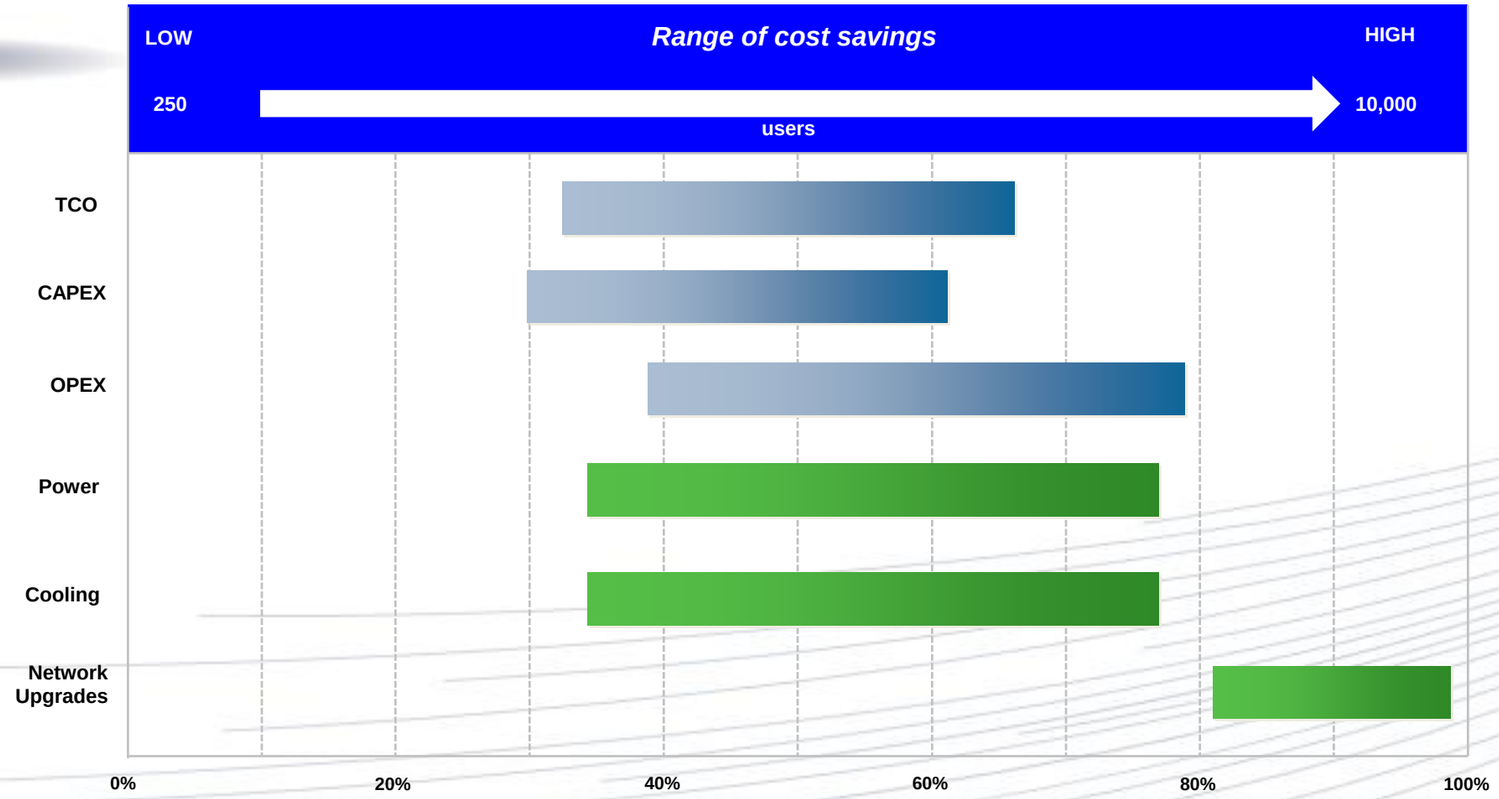
Why POL? – 8. Disruptive TCO Savings



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POL Is Ideal For …

Hospitals

Hotels

Universities

Campuses

High Occupancy Buildings
(Call Centers)

Multi-Tenant Units
(Commercial and Residential)

… but the list doesn't finish here…

Casinos

Government and Military

Sporting Venues

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What is APOLAN?

www.apolanglobal.org

The Association for Passive Optical LAN is a non-profit organization composed of manufacturers, distributors, integrators, and consulting companies who are actively involved in the Passive Optical LAN marketplace. Our members support the growth and education of the Passive Optical LAN industry and are focused on formulating solutions on how best to market, install, educate, and support this burgeoning field.

Mission:
The Association for Passive Optical LAN advocates the education and global adoption of passive optical networks for the local area network marketplace.

Times Square, Aug 6, 2013

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Who are the members?

www.apolanglobal.org

Founding Members

CORNING
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IBM
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CALLISONRTKL
A DESIGN CONSULTANCY OF ARCADIS
GYPSYS
ADVANCED TECHNOLOGY DEPLOYMENT
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VT Group
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Making Vision Reality
AOCC
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NETCOM
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AFL
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CAILabs
Shaping the light
FOA
University at Buffalo
The State University of New York
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Industry Activities

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The Association will work to drive the global adoption of Passive Optical LAN by accomplishing activities such as:

- **Organizing** members' collective voice and messaging to communicate the benefits and advocacy of the technology to the marketplace and customers
- **Executing** marketing and communications strategies to grow opportunity and participate in various verticals
- **Providing** Association representation, attendance, speaking opportunities and collateral submissions on behalf of promoting the technology at industry events and in publications
- **Utilizing** the Association website to provide an up-to-date and central repository of training materials and informational resources related to the technology and member companies' involvement
- **Leveraging** and **organizing** around member companies' world presence to spread technology education and adoption globally

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Benefits for Members

www.apolanglobal.org

Membership in the Association affords the following benefits:

- Helps to **establish** member companies as industry leaders at the forefront of an evolutionary LAN technology
- Allows members to have **input** to help shape advocacy, education, market adoption, industry acceptance and best practices for Passive Optical LAN
- **Network** with individuals and corporations who share interest in Passive Optical LAN success and with whom your company may do business
- **Access** to technical, educational, business case analysis and valuable industry reports sponsored by the Association
- **Participate** in marketing activity that directly influences industry decision-makers and end- customers
- **Provides a channel** for communications of related product, service offerings, case studies and related press information from member companies

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What's New in 2017?

www.apolanglobal.org

- New member companies joining
- International committee growth in Europe and AsiaPAC
- Growing social media community
  - *Follow us on Twitter @APOLANglobal and LinkedIn*
- Email newsletter educating +1000
- Published articles, webinars and news releases monthly
- Online readership reaching over +2,000,000
- +300 professionals trained in the NA gaining BICSI CEC

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Questions?

Thank You

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