

**NOKIA**



Nokia Passive Optical LAN solution

As businesses contemplate how to introduce a new generation of services, improve productivity, lower costs and build a competitive advantage, they are faced with tough decisions about the performance and capacity of their existing local area networks (LAN). As connectivity demanded by devices and users increases from megabits to a gigabit, new copper cables and switches are often recommended for better performance. However, this upgrade is labor and cost intensive. In addition, the capacity requirements will continue to grow and eventually move toward 10 gigabits per second.

The logical alternative is to install a fiber-based network that can handle speeds well beyond a gigabit. The Nokia Passive Optical LAN (POL) is a fiber-based solution that meets the needs of the modern-day business while providing a cost-effective evolution as speeds continue to increase. Nokia POL delivers significantly better performance than a traditional Ethernet LAN, enabling network convergence, simpler operations, greater speeds per user, and up to 50% savings in operating costs.

## Bringing the LAN up to light speed

Today's local area networks use a copper architecture and often separate networks are used to carry different services. The copper deployment model creates an environment that is wasteful and inefficient to maintain, leading to crowded equipment rooms, complex wiring closets and increased high-volume air conditioning (HVAC) requirements.

Nokia POL brings the LAN up to light speed. The advanced performance means all voice, data and video services can be supported on a single fiber distribution architecture with the right user experience. POL's Quality of Service (QoS) and high bandwidth allow organizations to converge voice, video and data all onto the same fiber network allowing more efficient maintenance, cabling and overall performance. POL's single distribution platform also significantly reduces network complexity, the amount of equipment needed, and power consumption.

## GPON: the technology behind POL

POL is based on a technology called Gigabit Passive Optical Networks (GPON). GPON has already been deployed by many of the world's largest telecommunications carriers and serves millions of users worldwide. It has quickly established itself as the worldwide standard for delivering a new generation of services. Among other benefits, GPON provides an enormous amount of bandwidth — 2.5 Gb/s downstream and 1.25 Gb/s upstream — over a single strand of glass.

GPON architecture uses purely passive components such as splitters between the optical line terminal (OLT) and optical network terminal (ONT), reducing the chance of equipment failure. In POL, the core underlying technology is still Ethernet, with GPON Encapsulation Mode (GEM) used as the packaging format. GEM packages the IP packets efficiently with minimum overhead as they transit between the OLT and ONT.

Each fiber optic cable can be shared by up to 64 ONTs, minimizing the amount of fiber cabling required. Although multiple users share the same passive optical network (PON), robust QoS and bandwidth mechanisms ensure that the traffic is correctly prioritized and peak bursts enabled, so that each user or devices gets the bandwidth they need.



# Benefits of the Nokia POL solution

The Nokia POL solution outperforms Ethernet LAN in all the key criteria.

## Robust security

Our solution provides a very secure environment for transporting sensitive data.

- Fiber is inherently harder to tap into, has no crosstalk and, unlike copper, is not affected by electromagnetic interference
- The Nokia solution has multiple security schemes preventing the interception of another user's data or introducing a fraudulent OLT into a network (advanced encryption with two-way key exchange, advanced intrusion detection, OLT unique identification, etc.)
- The Nokia solution has protection mechanisms and pro-active monitoring to ensure high availability (link protection, logical layer protection, controller and line card redundancy, etc.)

## Lower operating costs

POL has significantly lower operating costs thanks to savings in maintenance, power, space, management, service contracts, testing, certification and upgrades. Nokia Bell Labs has developed a modeling tool that compares these costs for POL and traditional Ethernet LAN. This tool shows that POL provides total savings of 35%-55%, depending on the specific network configuration.

- **Energy.** With cutting edge technology and continuous efforts to improve power efficiency, Nokia POL is a proven "green" solution. Considering the total power consumption of all active components in a LAN, ventilation and air-conditioning for equipment, POL power savings can be greater than 50%
- **Floor space.** Our centralized, high-density OLT platform enables deployment in a smaller footprint relative to multiple distributed Ethernet switches, bringing space cost savings of 60%
- **Service contracts.** POL has significantly fewer active electronics resulting in maintenance cost savings of over 50%
- **Fault management.** Again, because of fewer active components, POL reduces fault management costs by up to 50%

## Scalability

The Nokia POL solution enables flexibility in the network design and can easily scale.

- POL signals can run for up to 30km without needing any boosters or repeaters. This means the centralized access node (OLT) can be placed anywhere in the building or campus. There are no blind spots and no need for additional switches to reach every endpoint
- The market-leading capacity of the Nokia solution makes it simple to extend the network with more end points or to new buildings from the existing OLT
- This capacity of POL and Nokia's QoS mechanisms ensure the delivery of all services in use today and the support of new services in the future
- Our OLT portfolio allows any type of deployment (ceiling, wall, desk mounted), provides Gigabit Ethernet interfaces in single or multiport configurations, and supports different powering options
- Capacity can be easily upgraded in the future using the same cabling and with minimal changes in the OLT

# The Nokia POL solution

## 7360 ISAM FX

Nokia's POL solution is based on the 7360 Intelligent Services Access Manager (ISAM) FX OLT platform, widely regarded as the industry's most innovative and comprehensive solution for fiber networks.

The 7360 ISAM FX is a centralized access point for the entire LAN, capable of serving from hundreds to thousands of users and devices. It has market-leading capacity: a backplane architecture that delivers up to 200 Gb/s to each slot, 960 Gb/s switching capacity and 360 Gb/s uplink capacity. The 7360 FX supports GPON to give every user gigabit speeds today and can smoothly evolve to next-generation fiber technologies to meet the demands of tomorrow.

The 7360 ISAM FX is available in three size variants (small FX-4, medium FX-8 and large FX-16) suitable for all types of deployment: office buildings, large enterprises, hospitals, hotels and resorts, university campuses, sports arenas, or any other environment requiring a LAN.

The Nokia approach to POL allows organizations to evolve their LAN in a gradual and cost-efficient way, using the same access node and in-building cabling, while making minimal changes in electronics.

- The market leading capacity of the 7360 ISAM FX, enables organizations to:
  - meet service demands with a premium user experience
  - lower operational costs through savings in power, floor space and simpler management
  - get long term value

## Features

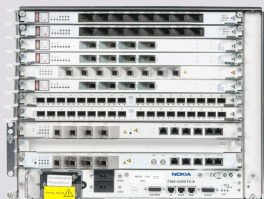
- Supports GPON technology
- Different shelf sizes, containing 4, 8 or 16 line cards
- Flexible density: a GPON card can have 8 or 16 ports for high-density
- Each port can connect up to 64 connection points
- IP/Ethernet access platform supporting Multiprotocol Label Switching (MPLS)
- Advanced traffic management for premium video delivery
- Carrier-grade redundancy: controller and card redundancy, uplink redundancy, Type-B link redundancy
- Managed by the Nokia 5571 PCC (POL Control Center)

## Benefits

- Meets increasing LAN demands with high capacity
- Capable of serving from 2000 (on ISAM FX-4), 6000 (on ISAM FX-8) and 8000+ (on ISAM FX-16) users/desktops from a single location
- Allows peak bursts up to 1 Gb/s per user/device with Dynamic Bandwidth Allocation (DBA)
- Shelf-size options that support any building/campus size or deployment model in a central indoor or outdoor location
- Uses common software, line cards and deployment practices across all ISAM FX shelves
- Power-efficient green technology
- Provides a smooth evolution path to next-generation fiber technology (TWDM-PON) using the same platform
- Converges all applications (voice, data, video, wireless backhaul, surveillance, etc.) onto a single platform



7360 ISAM FX-16



7360 ISAM FX-8



7360 ISAM FX-4



## ISAM 7368 ONTs

Nokia Optical Network Terminals are the user access point controlled by the OLT. The Nokia ONT family delivers superior services with high bandwidth to every user. The variety of ONTs meets every need: they can be deployed in a variety of locations and support wired and wireless gigabit connectivity, power over Ethernet, and a selection of user interfaces.

### Features

- Gigabit Ethernet (GE) interfaces
- Ceiling, wall or desk mounted
- Choice of using local power or PoE
- Optics support Received Signal Strength Indication (RSSI) for troubleshooting

### Benefits

- Delivers gigabit connectivity to Ethernet devices
- Enables deployment flexibility, combining fixed and wireless connectivity for 100% coverage
- Prioritizes services per user with the ability to burst up to the full line rate through advanced dynamic bandwidth management
- Guarantees very high quality of service (QoS) and security
- Optimizes the use of electronics, fiber optics and distribution facilities

The following Nokia ISAM ONTs are available:



Name	G-080P-P	G-040P-Q	G-240G-C	G-010G-A
User interface	8x GE	4x GE	4x GE	1 GE
PoE	Y	Y	N	N
RGW (L3)			Y	

# 5571 POL Command Center (PCC)

The Nokia 5571 Passive Optical LAN Command Center (PCC) is an advanced management solution optimized for performance and usability in enterprise environments. As part of the Nokia POL solution, the Nokia 5571 PCC provides a highly intuitive environment for configuration, auto-activation, fault reporting, troubleshooting, maintenance and much more. The 5571 PCC shields the network manager from the network's complexity and gives an efficient tool for every aspect of day-to-day operations.

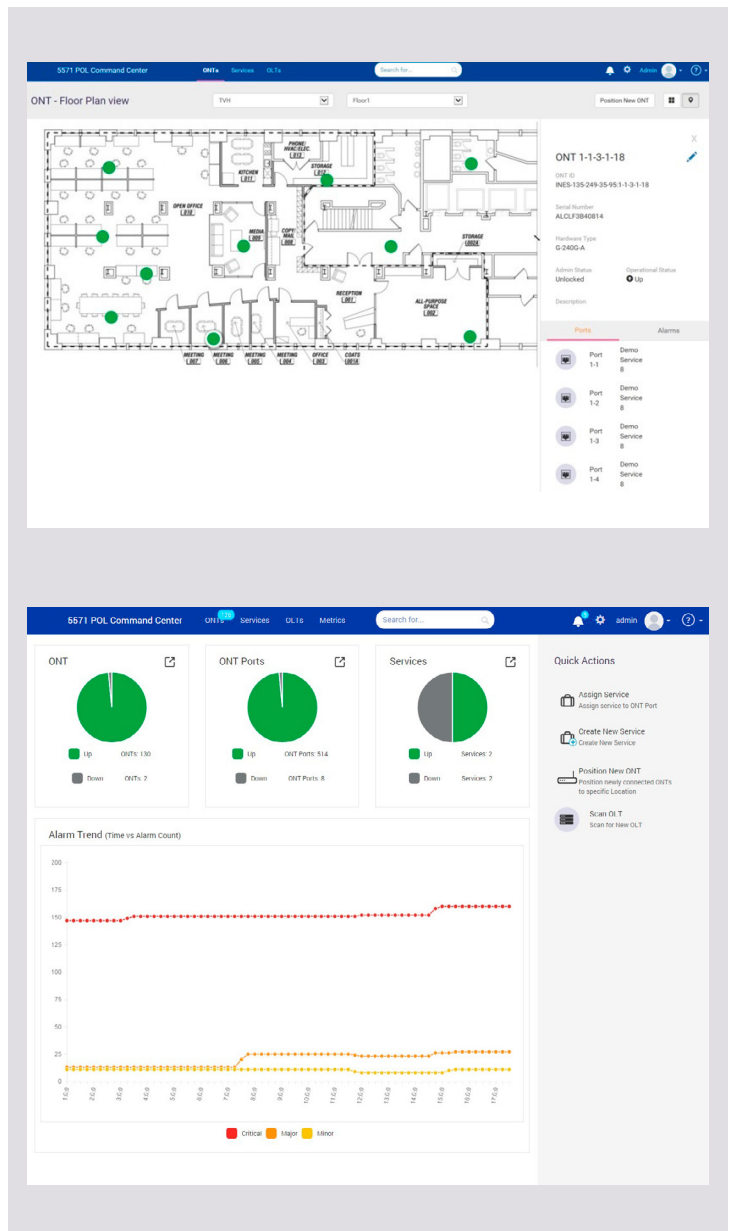
The Nokia 5571 PCC takes our experience of managing over 160 million GPON access lines and applies it to the unique needs of the LAN. Pre-defined tasks tailored for specific usage types make it easy to activate new services. Adding new endpoints to the network is simple thanks to ONT auto-activation. If any issues do arise, our advanced troubleshooting and alarm management tools will get you straight to the root of the problem.

## Features

- Intuitive, feature-rich, web-based user interface
- Realistic network views using your floor plans
- Easy navigation to network elements and their physical locations
- Pre-defined service definitions for each usage type
- Custom service definition and automated provisioning
- Discovery and auto activation of new OLTs
- Bulk copy of provisioned ONTs
- Intuitive alarm views

## Benefits

- Reduces operational costs through ease of use
- Provides clear and up-to-date records of network elements and their physical locations
- Provides reliable and consistent service provisioning through pre-defined service definitions
- Simplifies network growth with automated ONT discovery and activation
- Imports existing POL services into PCC that were configured using command line interface (CLI) or Nokia 5520 Access Management System (AMS)
- Streamlines network changes and upgrades with ONT replacement and move tools
- Verifies your service level agreements (SLAs) using graphed metrics
- Simplifies the search for network issues through intuitive troubleshooting tasks





## Nokia: bringing broadband innovation to the enterprise

Nokia is the world leader in fixed access technologies. We have 20+ years of broadband experience, and our equipment powers some of the most advanced fiber networks in the world. Our field proven and award-winning solutions serve governments, utilities, businesses and telecom operators worldwide.

The Nokia Passive Optical LAN solution is designed to help you enhance your productivity and slash costs. Contact your nearest Nokia partner today.

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