

NOKIA



Nokia 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. Nokia Optical LAN 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 Optical LAN delivers significantly better performance than a traditional copper-based 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 Optical LAN 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. Optical LAN'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. Optical LAN's single distribution platform also significantly reduces network complexity, the amount of equipment needed, and power consumption.

GPON: the technology behind Optical LAN

Optical LAN 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 Optical LAN, 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.



Nokia Optical LAN solution highlights

Blueprint driven

Nokia delivers a pre-validated set of services applicable to Optical LAN along with the hardware and software specifications. The Nokia Optical LAN blueprint covers interoperability with various other eco-system components like VOIP Phones, Voice PBX, Wi-Fi Access Points, Authentication Servers etc. The service definition and underlying equipment part of the Nokia Optical LAN blueprints are validated at Nokia labs to ensure the system supports smooth roll-out and operation of the defined services.

A sample set of services defined in the Nokia Optical LAN blueprint:

- Desktop Data Service
- IP Voice Service
- Wi-Fi Access Point Service
- Security Access Control Service
- Digital Signage Service
- Surveillance Service
- Public Announcement/Intercom Service
- IPTV Service
- Analogue (POTS) Voice Service

7360 ISAM FX OLT

The foundation of the Nokia Optical LAN solution is the 7360 ISAM FX OLT with:

- Line cards that support GPON, XGS PON and TWDM PON
- Features to support Layer-2 and Layer-3 network deployments
- 802.1x based user authentication supporting port/MAC/MAB
- DVLAN or dynamic VLAN assignments for user services

- QoS architecture to support the QoS guarantees for user services
- Type-B PON protection

ISAM 7368 ONT

The solution comprises of ONTs that meet every need:

- GPON and XGS PON uplink
- various port densities (1p, 4p, 8p, 16p, 24p)
- 1G/2.5G/10G user port rates
- PoE support providing up to 30W power to connected end devices (VOIP phones, Wi-Fi APs)
- LLDP-MED protocol support for discovery and setup of connected devices
- integrated POTS ports
- integrated Wi-Fi AP

5571 POL Command Center (PCC)

The 5571 POL Command Center (PCC) provides a web-based and intuitive environment that makes day-to-day operations quick and simple:

- Realistic network view using your floor plans
- Easy navigation to network elements and their physical locations
- Predefined service definitions for each usage type
- Discovery and automatic activation of new optical line terminals (OLTs)
- Automatic activation of new ONTs
- SNMP trap forwarding interface to OSS



Benefits of the Nokia Optical LAN solution

The Nokia Optical LAN solution outperforms traditional copper-based 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 ONT into a network (advanced encryption with two-way key exchange, advanced intrusion detection, ONT 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

Optical LAN 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 Optical LAN and traditional LAN. This tool shows that Optical LAN 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 Optical LAN is a proven "green" solution. Considering the total power consumption of all active components in a LAN, ventilation and air-conditioning for equipment, Optical LAN 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 copper-based Ethernet switches, bringing space cost savings of 60%
- **Service contracts.** Optical LAN has significantly fewer active electronics resulting in maintenance cost savings of over 50%
- **Fault management.** Again, because of fewer active components, Optical LAN reduces fault management costs by up to 50%

Scalability

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

- Optical LAN signals can run for up to 20km 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 Optical LAN and Nokia's QoS mechanisms ensure the delivery of all services in use today and the support of new services in the future
- Our ONT 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 Optical LAN solution

7360 ISAM FX

The Nokia Optical LAN 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, 2.5 Tb/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 two size variants (small FX-4 and medium FX-8) 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 passive optical LAN 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 and 10G PON technology
- Different shelf sizes, containing 4 or 8 line cards
- Flexible density: a GPON card can have 8 or 16 ports for high-density
- The 10G PON card has 8 ports, each supporting up to 10 Gb/s bit-rates
- Each port can connect up to 64 ONTs
- 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 Command Center)

Benefits

- Meets increasing LAN demands with high capacity
- Capable of serving 8,000 (on ISAM FX-4), and 16,000 (on ISAM FX-8) end-points from a single location (with a 1:32 split ratio, common for optical LAN)
- 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 (XGS-PON and TWDM-PON) using the same platform
- Converges all applications (voice, data, video, wireless backhaul, surveillance, etc.) onto a single platform



7360 ISAM FX-4



7360 ISAM FX-8



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 7368 ONTs are available:

									
Name	G-010S-A/B	G-010P-A	G-010G-A	XS-020X-A	G-040P-Q	G-240G-C/E	G-240W-B/C/F	U-090CP-P	U-00160CP-P
Type	SFP	Fix ports	Fix ports	Fix ports	Fix ports	Fix ports	Fix ports	Modular	Modular
Uplink	GPON	GPON	GPON	XGS-PON	GPON	GPON	GPON	GPON or XGS-PON	GPON or XGS-PON
User interface (data)	1 x GE	1 x GE	1 x GE	1 x 1/2.5GE or 1 x 10GE	4 x GE	4 x GE	4 x GE	8 x GE expandable to 12 x GE or 1 x 10GE	16 x GE expandable to 24 x GE
User interface (voice)	1 x GE	1 x GE	1 x GE	1 x 1/2.5GE or 1 x 10GE	4 x GE	4 x GE	4 x GE	8 x GE expandable to 12 x GE or 1 x 10GE	16 x GE expandable to 24 x GE
PoE	N	Y	N	N	Y	N	N	Y	Y
LLDP	N	N	N	N	Y	N	N	Y	Y
POTS	N	N	N	N	N	2 x POTS	2 x POTS	N	N
Wi-Fi	N	N	N	N	N	N	Y	N	N

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 Optical LAN 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.

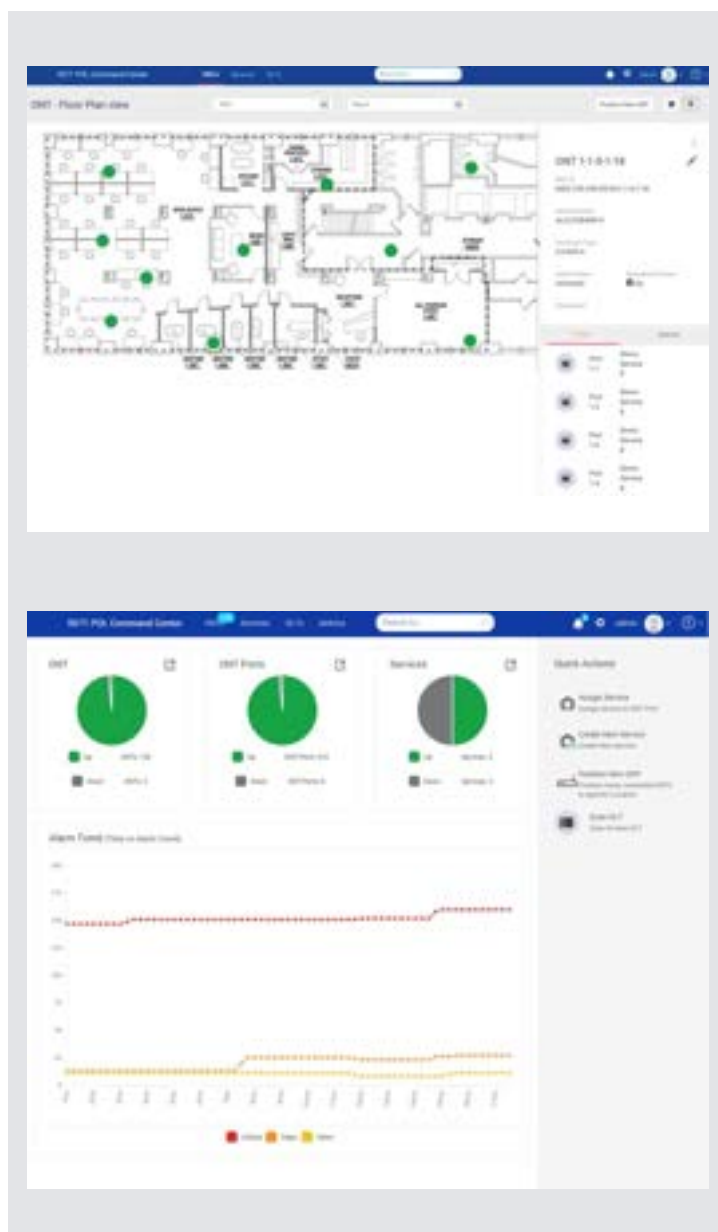
The Nokia 5571 PCC takes our experience of managing over 160 million access lines and applies it to the unique needs of the LAN. Pre-defined tasks tailored for specific usage types make it easy to activate new services. Adding new endpoints to the network is simple thanks to ONT auto-activation. If any 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 Optical LAN services into PCC that were configured using command line interface (CLI)
- 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 Optical LAN solution is designed to help you enhance your productivity and slash costs. Contact your nearest Nokia partner today.