

Passive optical LAN: Sales playbook

Playbook overview

To keep pace with local area network (LAN) bandwidth demands, organizations worldwide will pay more than US\$28 billion in 2016 for switches and routers — equipment they will need to refresh about every three years. This global market spans a wide range of sectors, from hospitality and higher education to government and healthcare. The Nokia Passive Optical LAN (POL) enables organizations to break the upgrade cycle, reduce network complexity and cut operating and capital expenditures (OPEX/CAPEX).

Why passive optical LAN

Integrating voice, video and data services on a single optical backbone, POL easily supports future bandwidth growth without disruptive changes to a customer's cable infrastructure. It is a scalable high-capacity, future-proof solution that provides:

- Industry-leading, ultra-broadband fiber technology with the bandwidth to meet enterprise user demands for years to come — with a one-time investment in fiber infrastructure and no forklift upgrading
- A single integrated, centrally managed network for all current and future services

- Coverage for campuses up to 40 km in area
- A completely passive network yielding massive savings in space, power consumption, air conditioning and maintenance — supporting green building initiatives and standards
- Carrier-grade reliability on a highly secure digital network.

Why we should win

Nokia POL is based on technology built for telecom service providers, whose networks have very demanding requirements. This technology brings to your network one of the most reliable, high availability systems in the market today:

- Five 9s carrier-grade reliability with military-grade 128-bit Advanced Encryption Standard (AES) data encryption as part of the Gigabit Passive Optical Network (GPON) standard
- Comprehensive element management and provisioning
- Robust quality of service (QoS) features for granular management of service quality
- One of the highest capacity control cards supporting dual 480 Gb/s switching matrix and 8 x 10G high-capacity uplinks to the Ethernet network

- Completely non-blocking, redundant backplane architecture for high-capacity throughput at each line card
- Seamless same shelf upgradeability to Next-Generation Passive Optical Network 2 (NG-PON2) that is capable of 40 Gb/s symmetrical
- A strong brand, with over 100 years of history.

Why Nokia

Nokia is the industry leader in fixed access technologies, with more than 20 years of broadband experience. We have shipped more than 18 million GPON ports worldwide as part of more than 180 fiber projects. Our technology powers some of the most advanced fiber networks deployed by leading telecom service providers as well as for municipalities, utilities, hospitals, hotels and resorts.



Quick links

- [Nokia passive optical LAN Web page](#)
- [Nokia partner portal](#)

Customer need

As bandwidth demands continue to skyrocket, many customers are caught in costly and time-consuming cycles of replacing older grade Cat cables with the latest upgrades and swapping out their switches. These organizations stand to benefit significantly from a solution that will break this upgrade cycle, future-proof their networks, deliver secure and reliable services and cut their costs.

Customer profile

Nokia POL provides a means to integrate voice, video and data services on a single optical backbone. It is ideal for large buildings and campuses where changing the cable infrastructure on a routine basis is expensive and disruptive. Different stakeholders in different segments also have their own particular needs and drivers with respect to their access technology solutions.

Market segment	Challenges	What internal stakeholders and users want
Hospitality	<ul style="list-style-type: none"> Highly competitive market requires constant effort to differentiate properties. Hotels can rarely charge for Wi-Fi these days, so the connectivity costs need to be very small and infrastructure has to last a long time. Need to focus staff resources more on the guest experience than on managing IT and systems Large properties, such as resorts, require connectivity spread over a large area away from the central IT room. 	<p>IT manager</p> <ul style="list-style-type: none"> A low cost solution that will last a long time and doesn't need replacement as often as Ethernet, so total cost of ownership (TCO) over time is much lower A solution that easily separates guest and staff Wi-Fi access A solution that can extend far from the central IT room (Ethernet is limited to 100 m) <p>Business stakeholders</p> <ul style="list-style-type: none"> A solution that aligns with the needs of the business (i.e., happy guests, lower costs) <p>Guests</p> <ul style="list-style-type: none"> Fast, easy and reliable connectivity for a better guest experience — able to use multiple devices, whether for work or pleasure <p>Hotel staff</p> <ul style="list-style-type: none"> A network that requires low maintenance and troubleshooting is easy in times of failure Minimal need to replace any parts in the IT infrastructure. The rare failure is easily accessible and quick to repair.
Higher education	<ul style="list-style-type: none"> Tight budgets and restricted resources, but still need to be perceived as using leading technology Growing student demands for seamless communications and services Large campuses that require connectivity a long way from the central IT room Need for e-learning services and remote collaboration to establish more flexible learning/teaching environments Certain users on special research projects may need more than 1 GB bandwidth 	<p>IT manager</p> <ul style="list-style-type: none"> A reasonable cost for the solution A solution that will last a long time A solution that easily separates student and staff access One solution that can extend far from the central IT room, because campuses are often on large properties. Prefer one solution rather than requiring multiple infrastructures to support. <p>Education stakeholders</p> <ul style="list-style-type: none"> A solution that aligns with the needs of the institution: <ul style="list-style-type: none"> Perceived as leading technology Happy students; vibrant campus Increased enrolments Reduced costs. <p>Students</p> <ul style="list-style-type: none"> Fast, easy and reliable internet connectivity — wired or wireless <p>University/School staff</p> <ul style="list-style-type: none"> A network that requires no maintenance and is easy to troubleshoot in times of failure Minimal need to replace any parts in the IT infrastructure. The rare failure is easily accessible and quickly fixed.

Market segment	Challenges	What internal stakeholders and users want
Enterprise	<ul style="list-style-type: none"> Outdated IT infrastructure is unreliable and costly to maintain. Multiple networks are required to support multiple services. Constant pressure to increase productivity and reduce costs. Meeting employees' connectivity demands and expectations based on their experiences outside the workplace Growing requirement to demonstrate sustainable business practices 	<p>IT manager</p> <ul style="list-style-type: none"> A solution that does not interfere with network security policies A solution that does not require expensive IT staff to support it A solution that integrates with existing investments in PCs, applications, servers, device infrastructure (IP/security cameras), etc. <p>Business stakeholders</p> <ul style="list-style-type: none"> A solution that aligns with the needs of the business: <ul style="list-style-type: none"> Optimal security/protection of customer data Support for the highest level of customer service Support for increasing revenue and/or reducing costs High reliability and availability <p>Staff</p> <ul style="list-style-type: none"> Fast, easy and reliable network connectivity Focus on getting their job done, not sorting out IT and system issues <p>Customers</p> <ul style="list-style-type: none"> Fast, reliable access to customer support facilities Fast response times for any calls into customer service centers (with agents able to access information quickly)
Government	<ul style="list-style-type: none"> Drowning in the amount of data being managed across multiple department-siloed networks Need to meet citizens' demands for more reliable and efficient e-government services; sharing data across departments Ongoing requirement for highly secure data and transactions Need to increase productivity while reducing costs to save public expenditures Leading in green and ecofriendly sustainable practices 	<p>IT manager</p> <ul style="list-style-type: none"> A solution that supports connectivity between government sites on a common centralized infrastructure: <ul style="list-style-type: none"> Local government: libraries, sports facilities, town halls, main office Federal or state government: between ministries and parliament A solution that does not require sophisticated and expensive IT staff to support it A solution that integrates with existing investments in PCs, applications, servers, device infrastructure (IP/security cameras), etc. <p>Government stakeholders</p> <ul style="list-style-type: none"> A solution that aligns to the needs of the business: <ul style="list-style-type: none"> Supports increasing revenue and/or reducing costs Increases efficiency for citizens, such as users of public transport <p>Staff</p> <ul style="list-style-type: none"> Fast, easy and reliable internet connectivity Focus on getting their job done, not sorting out IT and system issues <p>Citizens</p> <ul style="list-style-type: none"> Effective use of any government facilities: <ul style="list-style-type: none"> Smart technology for transport Fast access for doctors and records when visiting medical facilities Fast response times for any calls into citizen/public service call centers (agents need to be able to access information quickly)



Customer barriers

The main barrier to POL is that customers are deeply familiar with Ethernet, and as a result, are concerned about functional disruptions and any change in performance that could come from different switching technologies. Specific customer barriers include:

- **Resistance to a new technology in the LAN space**

The market is tied to the Ethernet, although frustration occurs because of the recurring costs. The key is to educate customers about the benefits of fiber over copper: higher speeds, future-ready capacity, simplified management and, most importantly, cost savings.

- **Lack of references for POL**

While there are many proof points for PON in the telco space, POL is lesser known and less widely deployed in the enterprise market. We need to promote the enterprise case studies we do have, and should emphasize Nokia's experience in the high stakes carrier space.

- **Lack of Nokia visibility in the end-user space**

Again, emphasizing Nokia's history and track record in the carrier market will go some way toward building credibility. In parallel to sales activities, the company is also engaging in awareness-raising efforts in the enterprise market.

- **Qualification/Certification needs for hospitals, banks and sensitive applications**

POL can provide all the performance assurances and compliances that Ethernet does for the full mix of traffic: video, voice and data. Nokia is willing to participate in qualification and certification exercises specified by the customer with adequate details provided.

Market segment	Challenges	What internal stakeholders and users want
Property developers and real estate consultants	<ul style="list-style-type: none"> • Highly competitive market requires constant effort to differentiate properties. • Growing urban trends of sustainable living and smart homes impose new networking requirements. • New managed service business models are needed to improve earnings and returns. 	Consultants <ul style="list-style-type: none"> • Want to be professionally linked with an iconic, prestigious property that delivers smart green technology and improved features
Hospitals and aged-care facilities	<ul style="list-style-type: none"> • Growing gap between customer demand and available resources requires remote diagnostics and e-health services. • Need to improve efficiency and customer service by sharing patient data across departments quickly and simply, and support medical staff mobility • Ongoing pressure to increase productivity and maintain reliability of key systems supporting patient care and reduce costs • Support high-capacity medical imaging equipment 	IT department <ul style="list-style-type: none"> • Simpler maintenance, reconfiguration and upgrades Chief information officer (CIO) <ul style="list-style-type: none"> • Reduced network cost and complexity • Delivery of a secure and reliable service Facilities manager <ul style="list-style-type: none"> • Simplified and more effective maintenance schedule • Minimized impact on existing systems and applications Chief medical officer <ul style="list-style-type: none"> • Delivery of high-quality patient care • Minimized disruptions to staff, medical equipment and systems • Support for state-of-the-art medical care Patient data/records manager <ul style="list-style-type: none"> • Assured security of patient data Chief financial officer (CFO) <ul style="list-style-type: none"> • Reduced operational and capital expenditures Chief executive officer (CEO)/MD <ul style="list-style-type: none"> • Increased business productivity

Qualifying questions

Ask the following questions to help you determine if a customer has a need for POL:

- What type of LAN are you using today; e.g., Ethernet, speed, type of copper cable deployed, etc.?
- How often have you had to maintain and upgrade your Ethernet network?
- When is the next scheduled date to refresh your switch and router equipment?
- Do you have multiple network types (cable/coax, Ethernet, analog copper) in your network?
- Are you running several types of services/applications over your LAN, such as surveillance, IP phones, video, data, access control systems, digital signage and public address?
- Do you have plans to expand the type of services running over your LAN?
- Do you feel challenged to meet user demands for speed and bandwidth?
- What is your network OPEX today? Do you want to reduce it?
- Do you have space constraints in your equipment room or cable ducts?
- Do you want a modern network technology that can easily support future bandwidth demands without having to change your cable infrastructure?

Our solution

The Nokia POL allows organizations to communicate and interact with employees and customers by voice, video and data over a single integrated optical backbone. It provides carrier-grade, high bandwidth connectivity and IT security for a fraction of the cost of current Ethernet network infrastructures.

POL uses industry-standard GPON (ITU-T G.984) technology to provide an ultra-high-capacity LAN backbone that can carry all types of data and media traffic, replacing costly, high maintenance Ethernet networks running predominantly over Cat 5 and Cat 6 cables.

What customers should know about passive optical technology

Telecom operators have deployed GPON for over a decade, providing tens of millions of residential customers with very high-capacity broadband services. The technology is reliable, robust and proven:

- POL is highly scalable, delivering gigabit speeds and potentially unlimited bandwidth. The same cables and access nodes can be reused as new services are introduced and bandwidth is increased.
- POL can reduce TCO by 47 percent in a single year by providing a single simplified, centrally managed network to support all services.
- POL reduces energy costs because passive equipment does not require power or cooling, and POL reduces cabling costs by replacing bulky copper bundles with fiber.
- POL frees up space on customer premises by eliminating the need for telecom equipment closets on every floor. The passive nature of the network requires fewer racks, switches and patch panels than copper-based Ethernet.
- POL is easy and cost effective to upgrade: Simply insert a new line card in the optical line terminal (OLT), patch the fiber to the port where service is needed and change the optical network terminal (ONT) at the user location.

POL architecture

The POL network topology remains the same whether deployed on a floor, throughout a whole building or across an entire campus. In every case, it is managed centrally at an OLT shelf.

Unlike with Ethernet switches, there is no need to manage (perform software upgrades, patches, etc.) each switch and configure it individually. The network ONTs get their configuration and updates from the OLT. POL can reach up to 20 km in one direction.

Access node

An OLT shelf based on the Nokia 7360 Intelligent Services Access Manager (ISAM) replaces the core aggregation switches of Ethernet networks. The OLT connects to a single mode fiber that can handle user traffic in both directions on the same fiber.

Transport

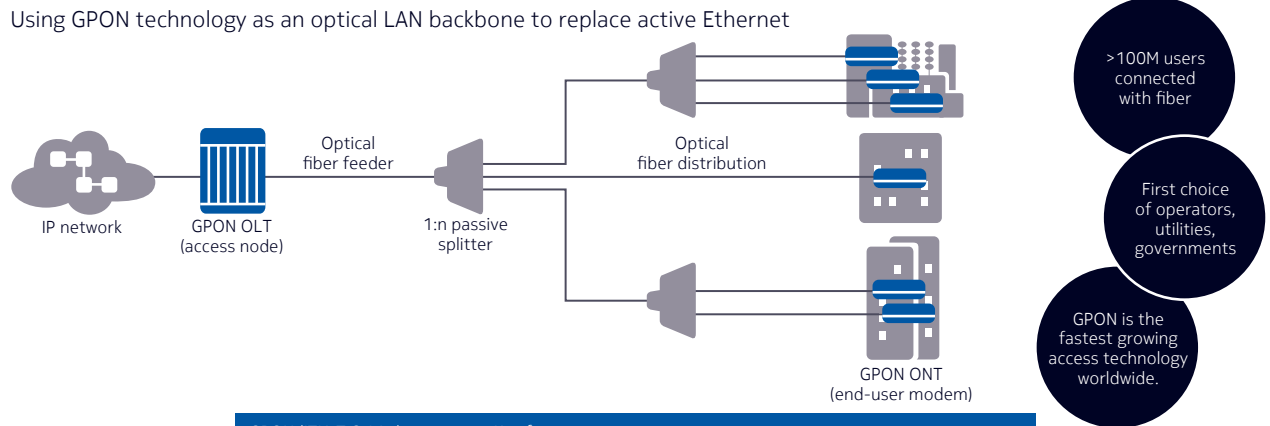
Different wavelengths are used to carry upstream and downstream traffic to avoid congestion or contention between upstream and downstream traffic. Up to 2.5 Gb/s is supported in the downstream direction and 1.2 Gb/s in the upstream direction with robust QoS support.

User connectivity

The fiber network links the OLT to the end user. Fiber can be taken through a series of splitters to distribute the traffic from each port of the OLT to the end-user location. Because the splitter network is entirely passive, it needs no special installation, mounting provisions, power or cooling. Up to 1:128 splits are supported on each port; 1:32 is typically used for enterprise deployments.

End-user ports are provided by each ONT, which takes the GPON input from the network and provides one or more Ethernet, power over Ethernet (PoE), voice, RF and Wi-Fi access points as the user interfaces depending on the type of ONT used.

Figure 1. POL – What is it?



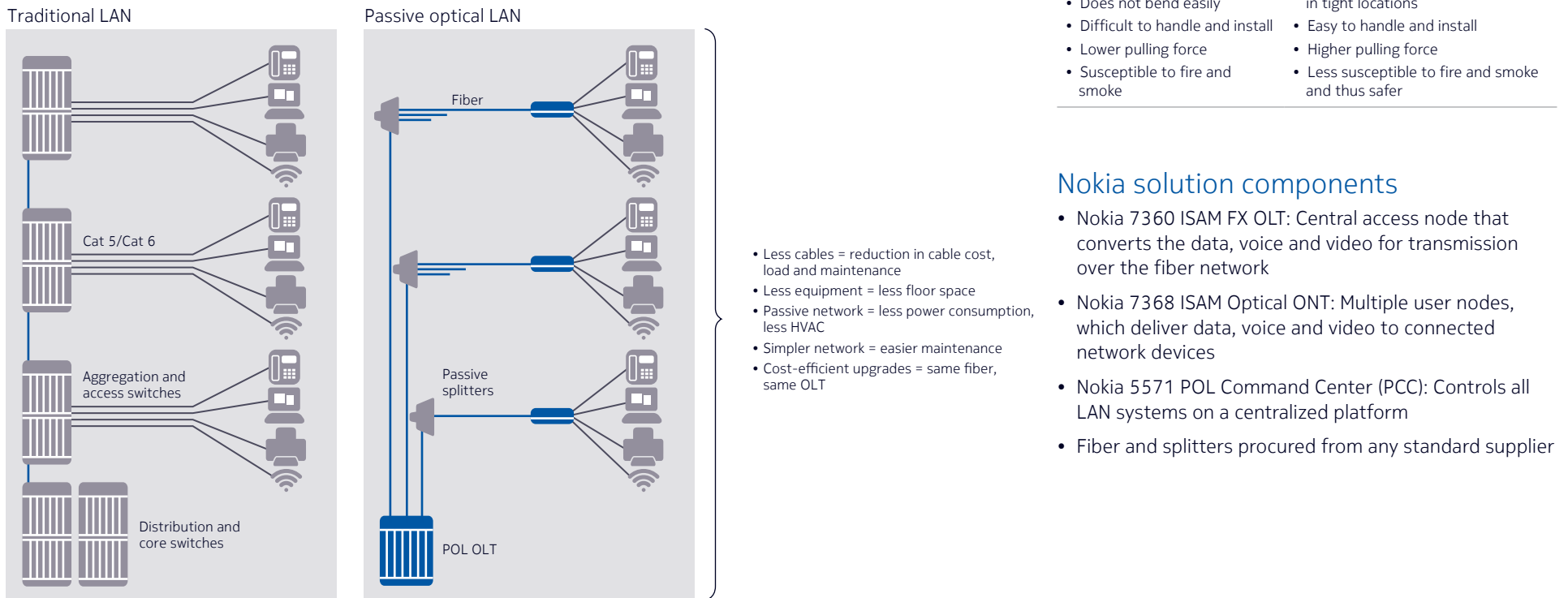
GPON (ITU-T G.984)	Key facts
Bandwidth per PON	Downstream: 2.5Gb/s; upstream: 1.2Gb/s
Bandwidth per user	1Gb/s
Outside plant	Passive; max split 1:128; reach: 20km in one direction
Services	Data, voice, video, Wi-Fi backhaul
Evolution	Graceful migration to TWDM-PON 40Gb/s symmetrical

POL versus traditional LAN

In a traditional Ethernet network, the central computer room needs more equipment, space, power/uninterruptible power supply (UPS), and more heating, ventilation and air conditioning (HVAC) controls. Cat 5 and Cat 6 cables run from intermediate distribution frames (IDFs) or risers to the rest of a networked floor. These IDFs need to be finished properly and provided with HVAC and power.

The POL infrastructure is much lighter. Fiber runs from the OLT in the central room throughout the building. Passive splitters can be located anywhere. ONTs are placed at suitable locations to provide Ethernet ports where required. Nokia POL delivers five 9s carrier-grade reliability along with the inherent military-grade 128-bit AES data encryption of POL.

Figure 2. Traditional LAN versus POL



Why POL is now a viable solution for enterprises

Fiber outperforms Cat in many ways:

Cat	Fiber
<ul style="list-style-type: none"> • Maximum distance of 90 m to 100 m plus some slack • Must be kept clear of any possible source of interference which limits where they can be deployed • Large diameter and heavy • Does not bend easily • Difficult to handle and install • Lower pulling force • Susceptible to fire and smoke 	<ul style="list-style-type: none"> • Up to 20 km (depending on splitter ratio) • Inherently resistant to sources of interference and can be run virtually anywhere • Small diameter and light • Extremely easy to bend and can run in tight locations • Easy to handle and install • Higher pulling force • Less susceptible to fire and smoke and thus safer

Nokia solution components

- Nokia 7360 ISAM FX OLT: Central access node that converts the data, voice and video for transmission over the fiber network
- Nokia 7368 ISAM Optical ONT: Multiple user nodes, which deliver data, voice and video to connected network devices
- Nokia 5571 POL Command Center (PCC): Controls all LAN systems on a centralized platform
- Fiber and splitters procured from any standard supplier

Selling strategy

POL is best positioned as a cost-effective replacement for Layer 2 to Layer 7 switches and routers within enterprise networks with more than 1,500 ports over an area of more than 100 m. It is applicable to both greenfield and brownfield deployments. Prime targets are customers looking to renovate or upgrade their facilities.

Where not to pitch POL

There is probably no case for POL in condominiums or other types of residential accommodations and communities unless the building/project owners have access rights to offer communications service providers and thereby derive revenue for themselves.

Sales approach

1. Evaluate

Understand the customer's existing technology situation and environment, and what their internal evaluation processes are. While POL can meet requirements from a few Ethernet ports upwards, there is a certain minimum capacity that the solution starts to be effective when an OLT shelf is put in. It doesn't make sense to try and sell POL into small installations (less than 200 Ethernet ports) without a strong non-commercial driver for the sale.

2. Evangelize

Convince customers that fiber, rather than copper, is what they need to cable up a whole building or campus. Typically, IT may be more resistant than C-level targets in a customer organization. A good approach is to promote the cost-saving benefits of POL to management-level customer contacts and let them push the case to IT, who will need to be convinced on the technical front.

3. Offer proof points

Develop vertical-specific pitches and create a business case that starts with the end-user requirement. For example, if the end user is a commercial enterprise, such as a hotel, hospital, corporation or university, the requirement will relate to the multiple operations and services they wish to run on their network, and the usual CAPEX and OPEX considerations. Use the Bell Labs business case modeling tool to demonstrate specific savings based on customers' actual environments.

4. Arrange sales and technical meetings

Bring in an expert who can map use cases for prospective customers and help clarify the advantages of our solution.

Building the POL business case

The business case for POL is different from a typical business case that considers only equipment costs:

- POL delivers peripheral CAPEX and OPEX savings that are, in most cases, much larger than the direct equipment CAPEX savings.
- Don't underestimate the savings from cabling. According to 3M, in a 2,500-port Ethernet case the savings in cable weight alone are as high as 90 percent. On top of those are savings in materials, channels to support cabling, the space that cabling occupies, the difficulty to run and manage cabling, building load, etc.
- If Ethernet ports/switches are distributed closer to the end user by running multimode fiber from aggregation switches to smaller switches (similar to the POL architecture), the cable cost is very close to POL. However, Ethernet switch prices are much higher for supporting optical interfaces and for being managed switches. These additional equipment costs make the POL business case attractive even where the Ethernet distribution is similar to the POL architecture.

Beating the competition

Competitors in this space include active Ethernet vendors, Ethernet, EPON/POL vendors and other GPON/POL vendors.

How we compete with active Ethernet vendors

Cisco	Cisco is the largest and most established player in the enterprise networking space with a dominant and very profitable market share. With its long history, it has established many proprietary features and add-ons to its networking gear, which customers are used to. Often Cisco customers will insist any new networks work similarly and have similar features. This becomes a competitive barrier not only for POL, but also for competing Ethernet vendors. Cisco does not have a well-established POL product, although one is included in the product list. With the high margin sales that they have from Ethernet switches, they will rarely pitch this product.
Hewlett-Packard	Also established in the Enterprise networking space, with servers and switches as well as printing solutions. However, HP does not have as much depth and strength as Cisco in the enterprise networking space. HP is mostly in the lower and small- to medium-sized enterprise networks.



How we compete with Ethernet and EPON/POL vendors

Huawei	An aggressive competitor in enterprise networking in terms of features and price points. Huawei is the only player with strength in the enterprise Ethernet networking space as well as in POL. They are strong competitors as they have a good product feature set and a wide range of ONTs to support different customer requirements. Huawei will always try to position Ethernet when they can because of better revenues and margins, but could bring in POL if necessary.
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How we compete with GPON/POL vendors

ZTE	An aggressive vendor with a presence in Ethernet networking and POL spaces, though their presence is smaller than the other major players. ZTE is predominantly focusing on the China market, where almost 90% of their GPON sales are and has had limited success elsewhere. ZTE does not have a high-density POL solution or NG-PON2.
Zhone	An enterprise-focused POL vendor with a good presence in North America. Zhone is present in APAC, but only in some countries. In India, it has a strong local partner who has been doing good business, including a few projects with IBM. Zhone has lower density POL products with only 8 ports per OLT. While it has a good feature set for enterprise networks, it is not a carrier-class product.
Tellabs	An enterprise switch player in earlier years, Tellabs has a strong presence in the POL space. The company is most active in North America, though it is expanding to APAC. Tellabs has been a partner with IBM in North America on many projects. The company also has a good presence in the North American enterprise POL space, as well as a wide range of ONTs, a good feature set, and a pizza-box form factor for small networks. What Tellabs lacks is a 16-port, high-capacity line card (OLT card), and as a result, cannot provide as much density as Nokia per shelf (Tellabs' shelves have 16 slots). As well, the company's products are not carrier-grade, as they have developed in the enterprise space exclusively.



Other competitors

Calix	Mostly at the lower end of the market, with a pizza-box form factor anchoring its presence there. Calix is present in Thailand and a few other APAC countries and supplies ONTs to other major GPON vendors on an OEM basis. They are trying to expand in APAC.
ADTRAN	Small market share with a presence in some APAC countries.
Allied Telesis	Mostly a North American player but has some installations in Thailand. Allied Telesis is generally present in the lower end of the market, such as in small budget hotels.
ZyXEL	Mostly present in Taiwan, Hong Kong and a few other regional APAC markets, though it has a global presence.
Dasan	A strong vendor in Korea. Present in some other markets due to available partners.





Tools and resources

External Web pages

- Nokia POL Web page: <https://networks.nokia.com/portfolio/solutions/passive-optical-lan>
- Nokia gigabit networks Web page: <https://www.alcatel-lucent.com/solutions/gigabit-networks>
- Nokia 7360 ISAM FX OLT: <https://www.alcatel-lucent.com/products/7360-isam-fx>
- Nokia 7368 ISAM ONT: <https://www.alcatel-lucent.com/products/alcatel-lucent-7368-isam-ont>

Sales collateral

- Download the latest POL sales brochures and presentations from the Nokia partner portal: <https://my-home.alcatel-lucent.com/portal/web/partnerportal/fixed-access>

Sales tools

- Nokia offers customers TCO assessments, based on Bell Labs modeling. Contact your partner sales manager for further details.

Training

- Access POL training through MyPLE: <http://www3.alcatel-lucent.com/university/my-ple/>

White papers, blogs, articles, infographics and videos

- Nokia Techzine article: <https://techzine.alcatel-lucent.com/enhance-performance-passive-optical-lan>
- Nokia ISAM family infographic: <http://www.alcatel-lucent.com/solutions/wireline/ISAM-Family/infographic>
- Nokia fiber infographic: <http://www.alcatel-lucent.com/solutions/wireline/fiber-access/infographic>
- IBM POL TCO white paper: <https://www-304.ibm.com/connections/files/form/anonymous/api/library/7d7b88cc-a7ad-4358-9fef-cc1ce66fcc9c/document/fc31599c-03a8-46d8-8d33-17e78e9dc879/media/IBM%20Smarter%20Networks%20Whitepaper.pdf>

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