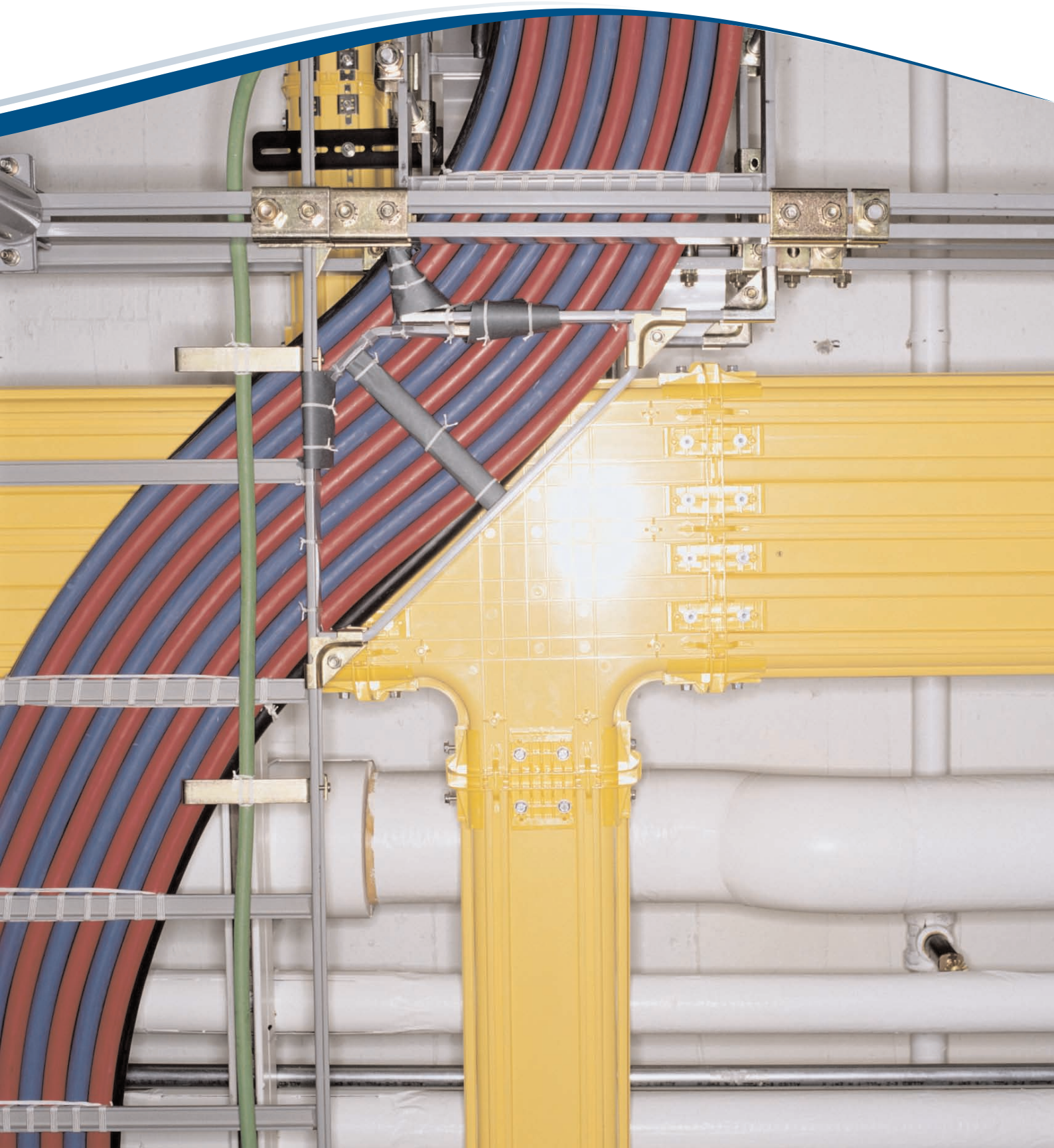
Allied Telesis™

FTTx Solutions for Service Providers



FTTx is a Strategic Asset

Burgeoning demand for higher speed broadband by consumers is creating mounting pressure on service providers. As high definition video and video sharing multimedia gobbles up bandwidth, the legacy copper access network is struggling to keep up. The limitations in expanding capacity over copper to support bandwidth demanding service application places FTTx in the forefront of solutions for service providers worldwide.

Extending the fiber network to the premise is financially proven in a business case through a number of quantifiable factors. Higher ARPU (Average Revenues Per User) through the new services made possible. There is also the significant reduction in operations costs as old copper plant is retired, much of which has become costly to maintain. FTTx requires little or no local powering and is nearly maintenance-free. Having the bandwidth FTTx enables provides a strong competitive weapon in the battle for customer retention.

The costs to deploy fiber to the home or premise have steadily declined, making today's costs economically attractive. Service providers have options to choose either point-to-point active fiber or use PON for a shared fiber connection. A wide range of fiber gateway options exist as well, from indoor and outdoor units, and from very basic to advanced models with integrated home networking.

As a global leader in delivering FTTx solutions for service providers, Allied Telesis has the technology and expertise necessary for every type of network and application. Since 1987, Allied Telesis has earned tremendous customer loyalty and satisfaction through reputation for delivering a combination of technology innovation and value across its entire product portfolio.

Allied Telesis delivers the perfect combination of scalability, advanced IP functionality, performance and of course reliability to optimize investment and thereby reduce the cost of ownership.

FTTx for Every Service Provider Application

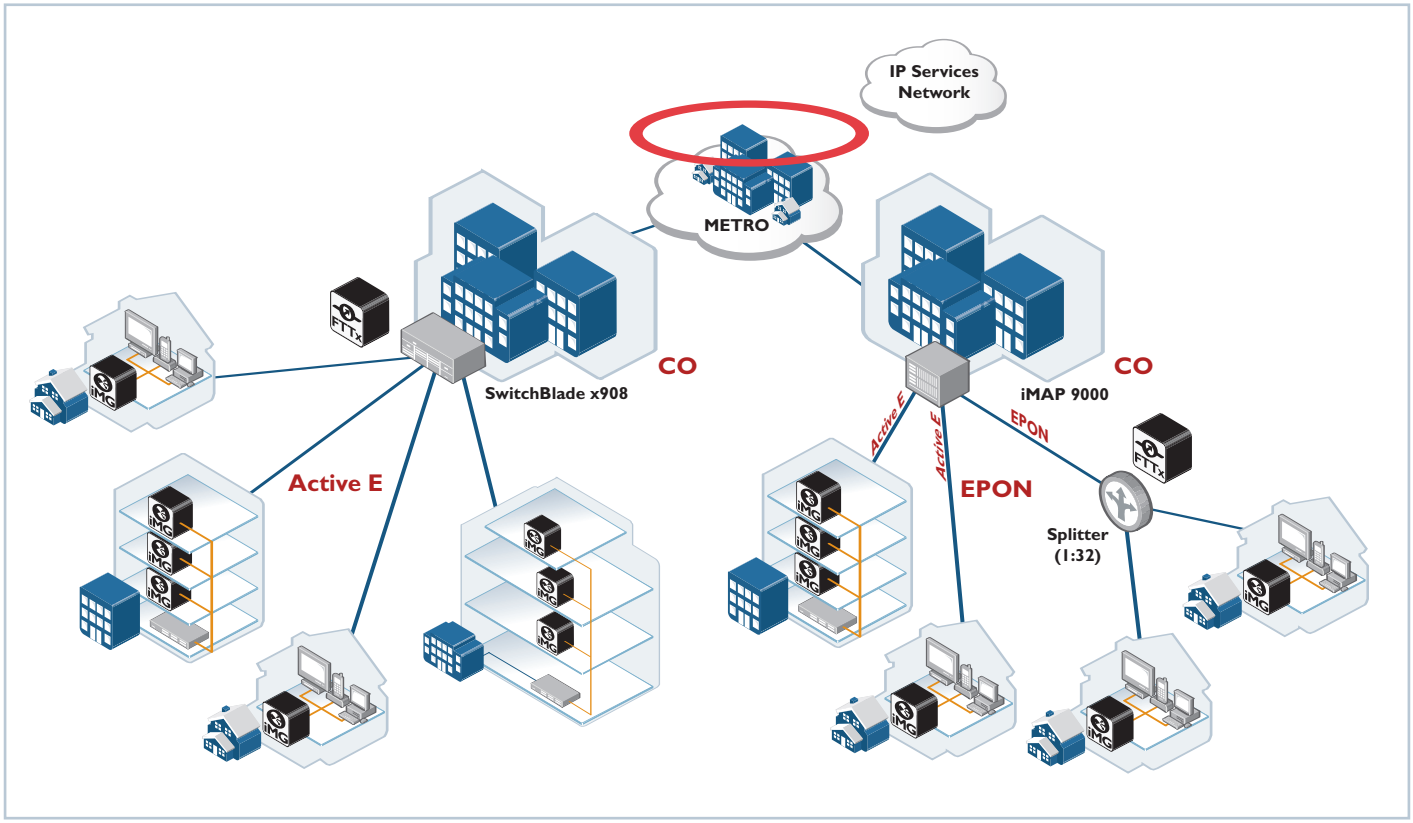
FTTx is commonly associated with residential FTTH services, and this is certainly one of the fastest growing applications worldwide. In addition to FTTH, there are a number of other network and service applications where FTTx becomes a strategic imperative.

- *Fiber to the Home:* Active and PON-based FTTx launched from a central office location to single family residences.
- *Fiber to the Building:* Active fiber deployments to Multi-Dwelling Units (MDU's) from a central office or NOC center to the telecommunications room of the MDU, even fully distributed throughout the building to each living unit. Examples include apartments, condominiums, hotels, dormitories and barracks on military bases.
- *Fiber to the Cabinet (or Curb):* Fiber is often deployed to a neighborhood outdoor electronics cabinet where subscriber services are then distributed over fiber or copper to nearby residences or businesses.
- *Fiber to the Business:* Active fiber to a business data room where service is distributed to users. Applications extend to retail/malls, service providers, end-users, and large corporate business campuses.

The types of service providers deploying Allied Telesis FTTx solutions is wide-ranging. Allied Telesis offers viable technology for incumbent carriers as well as a variety of alternative service providers. Allied Telesis FTTx solutions are used by:

- *ILEC's and PTT's*
- *Utilities and licensed alternative service providers*
- *Facility-based CLEC's*
- *Municipalities and EMC's*
- *Military and government*
- *Hotels and resorts*
- *Education and dormitories*
- *Retail shopping malls*
- *Transportation and transit systems*

With such a diverse customer and application base, Allied Telesis is uniquely positioned to bring its experience to bear in assisting any customer in its FTTx infrastructure and service requirements, with knowledge and expertise on the unique needs for every type of market and application.



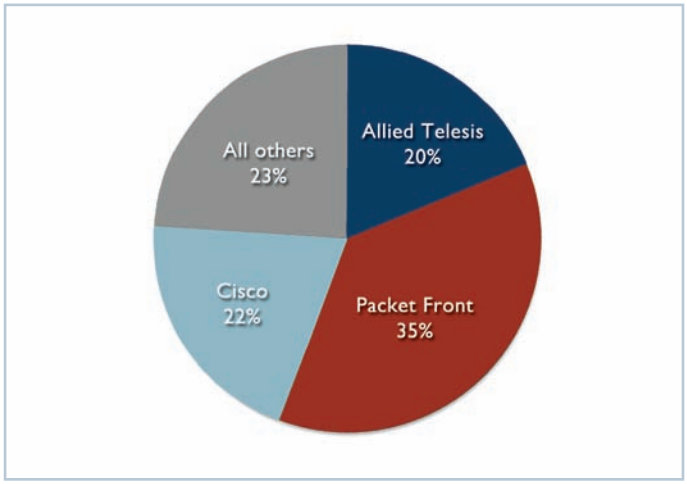
Allied Telesis FTTx Solutions Portfolio

Allied Telesis Market Leadership

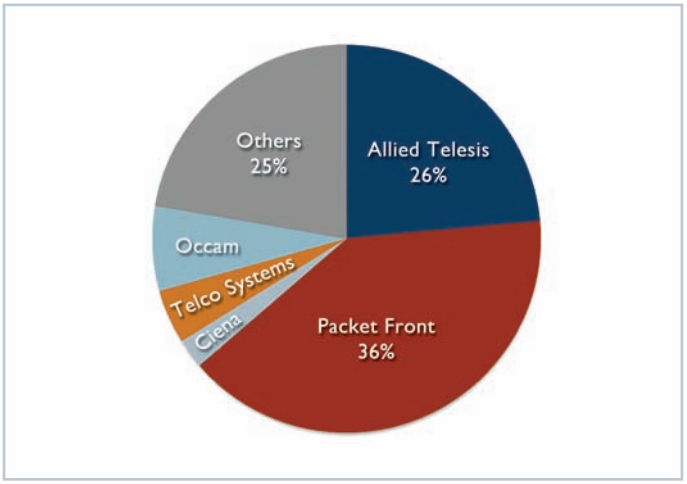
Allied Telesis is a Global Leader in Ethernet FTTx

Few suppliers in the world match the experience and success of Allied Telesis in delivering comprehensive Ethernet solutions over fiber across a multitude of applications and regions globally. Since 1987, Allied Telesis has pioneered Ethernet services for enterprise and service providers, developing the most advanced switching, multiservice access and home gateway products offering the best combination of end-to-end solutions, with the most advanced features, and designed for high reliability to meet a broad range of services and applications worldwide.

Allied Telesis market leadership extends to Ethernet FTTx gateway products as well. Allied Telesis is #2 worldwide in products shipped for both indoor and outdoor iMG home gateways. Unlike many FTTx system vendors who OEM CPE products, Allied Telesis designs and builds its own – adding the features and advanced management capabilities service providers prefer as a complete, managed service solution from 'core-to-door'.



2008 Cumulative Shipments of Ethernet FTTx Ports Worldwide
(Source: Infonetics PON and FTTx Report 04/09)

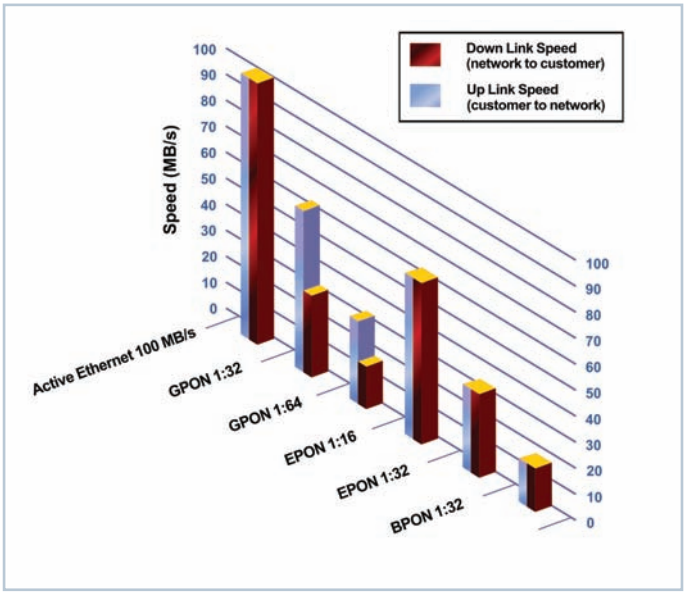


2008 Cumulative Shipments of Ethernet FTTx CPE Worldwide
(Source: Infonetics PON and FTTx Report 04/09)

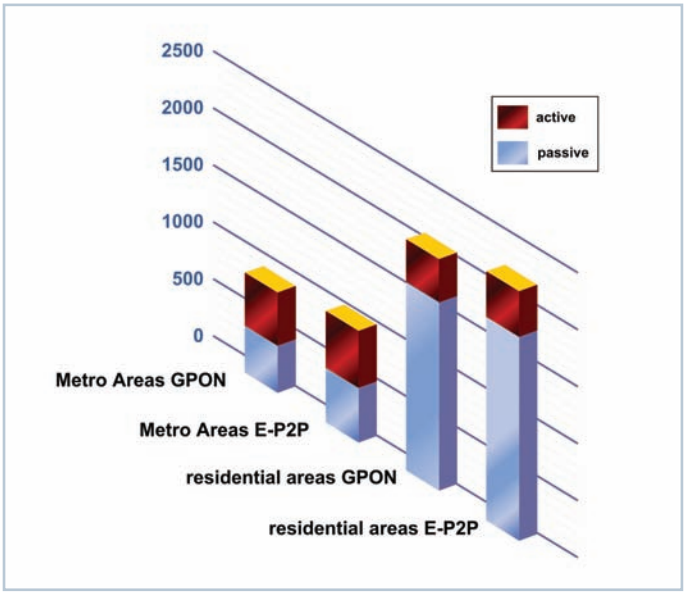
Solutions Means Having Choices

Allied Telesis knows 'one size' doesn't fit all, and offers a wide range of technology choices to enable a service provider to build the right network and the most optimized solution for its needs. Service providers can choose advanced Layer 2 and 3 Ethernet switching solutions or carrier-grade multiservice access platforms for FTTx delivery. They can choose between Ethernet Passive Optical Network (EPON) or active Ethernet fiber distribution architectures and between a family of indoor FTTx service gateways or modular outdoor home gateways. Service providers can make choices based on service needs, network requirements, feature needs as well as the most economic designs from the wide array of Allied Telesis solutions.

One of the frequently asked questions many service providers raise is the difference in economics between point-to-point active Fiber or PON. There are a variety of factors influencing the overall installed costs; and the demographics and types of areas served can have an impact on costs. However, actual studies of installed costs between point-to-point and PON FTTx distribution indicates there is relatively close parity in costs. This means a service provider can weigh bandwidth and service benefits rather than being forced into a decision based soley on capital costs.



PON Rates



Comparison of GPON and P2P Technology Costs
($ per home passed)

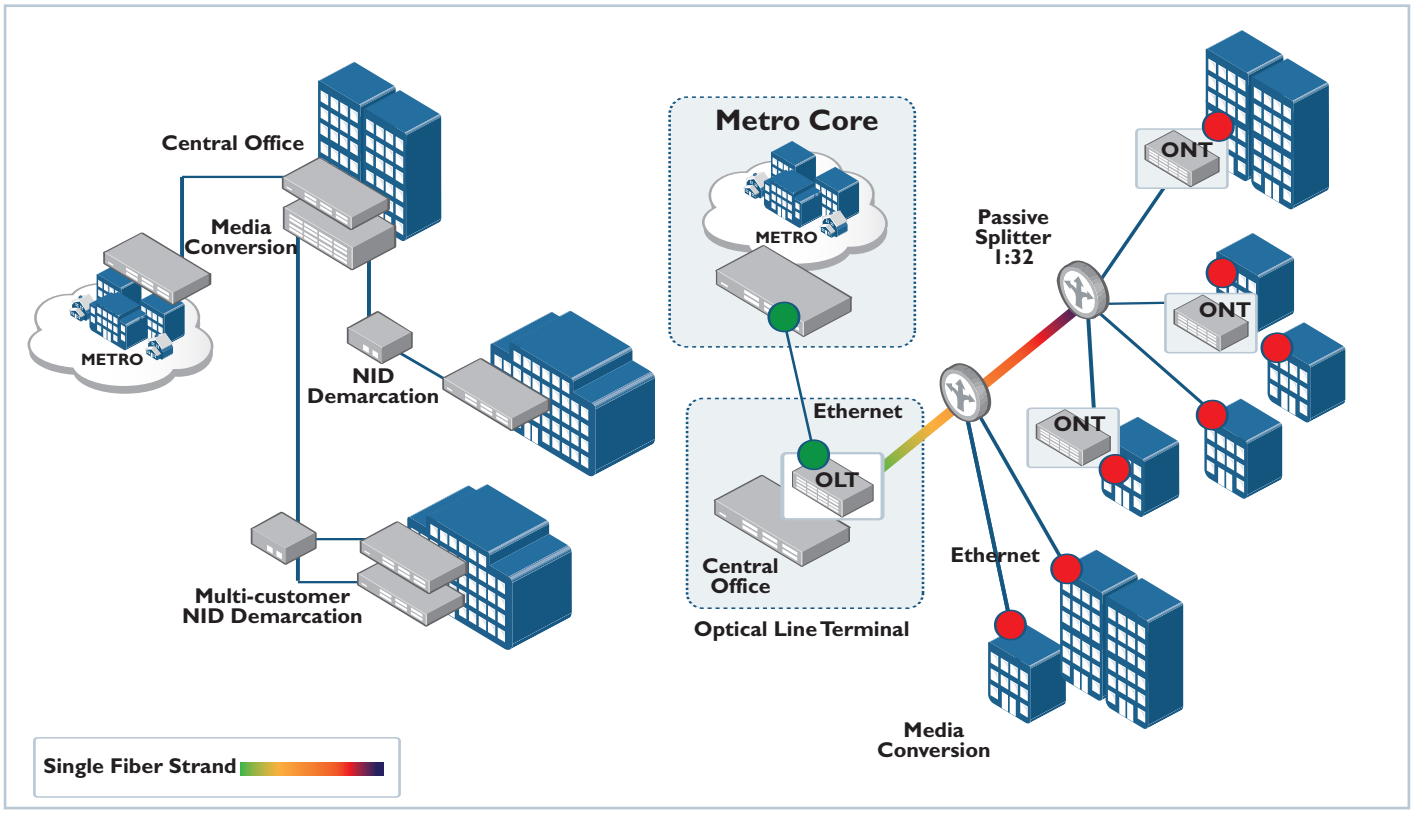
Active Ethernet and GEPON

Active Ethernet Fiber

Active Ethernet is a point-to-point fiber solution using the well known IEEE 802.3ah Ethernet standards. The fiber network design is the same star architecture as legacy copper networks, with the same types of security, management and control. Active Ethernet delivers the greatest bandwidth per subscriber of any commercially available FTTx options today, with 100Mbps symmetrical bandwidth upstream and downstream. Active Ethernet fiber can operate up to 40km, twice the normal reach of PON networks.

GEPON

Gigabit Ethernet PON, or GEPON, is, like active Ethernet, based on the IEEE 802.3ah Ethernet standards. GEPON is a point-to-multipoint architecture whereby passive optical splitters distribute traffic from the distribution fiber to a number of subscribers simultaneously, making it a 'shared bandwidth' system. GEPON can be either asymmetrical upstream and downstream or symmetrical, depending on the number of PON splits engineered (1:32 or 1:16). Typical deployments use 1:32 splits delivering approximately 31Mbps in the downstream direction and 31Mbps in the upstream direction symmetrically. The use of passive splitters generally limit the distance to about 26km.



Courtesy Metro Ethernet Forum

Features for Services: Today and Tomorrow

The Allied Telesis philosophy of combining technology innovation with value-based design sets the industry benchmark for investment protection. Allied Telesis maintains on-going development programs to keep pace with evolving technology and standards. Extending product life cycles and offering smooth migrations paths assures today's investment does not become a stranded investment in the future. The trend towards real-time streaming video, interactive IPTV, content sharing requires more intelligence and more advanced IP functionality. Allied Telesis anticipates the needs of service providers and incorporates features for today, with an eye to the future.

- *Designed to be IPv6 ready*
- *Supporting DHCP with option 82*
- *Supporting Service Level Agreements (SLA's)*
- *Integrating IGMPv2 multicast for IPTV applications*
- *A complete IP QoS and CoS capability*
- *Delivering managed services over IP*

FTTx Services and Applications

Today's competitive service requirements are multi-faceted. FTTx, with its high bandwidth potential, has been closely coupled with Triple Play – bundled voice, video and data services. Yet the world has now evolved beyond Triple Play, to a converged multi-play services environment with a high bandwidth requirement. Allied Telesis designs for and supports broadband multi-play services over fiber for a worldwide market with a variety of needs.

- ***IPTV:*** Allied Telesis incorporates the IP functionality to support standard and high definition broadcast TV, VoD and multi-room DVR, as well as support for middleware, conditional access and various encoding techniques.
- ***RF video:*** Allied Telesis offers RF video overlay over active Ethernet fiber, and supports two-way RFoG over GEPON. With many service providers offering traditional RF cable services along with data and voice, the flexibility to use the power of the FTTx network to integrate services provides economic efficiencies.
- ***Interactive, online gaming:*** New services and applications continue to emerge for peer-to-peer online gaming with fast response and streaming graphical capabilities. Delivering high bandwidth in both directions enables such services to work just as from a game console in the home.
- ***Security:*** The availability of low-cost IP cameras enables consumers to have online, real-time security monitoring for their residence anywhere in the world. Likewise, government agencies, transportation systems and municipalities are increasing use of real-time high-quality security monitoring for crime prevention and anti-terrorism, also enabled over a FTTx IP network.
- ***Internet web hosting:*** People today do more than 'surf the web'. The advent of You Tube, Facebook and MySpace has transformed Internet usage into a web hosting and content sharing model, where people upload video content and others download it – creating a service model where the home is now becoming a broadcast studio for content. The demand for higher bandwidth to support fast uploads and downloads is re-shaping the definition of broadband and the nature of the Internet.
- ***Traditional Internet:*** Even traditional Internet use requires high bandwidth to satisfy consumer expectations and meet competitive needs. Adding to bandwidth demands is the increased amount of SOHO work-at-home demand, which requires the bandwidth necessary for large file transfers.
- ***VoIP:*** As evolution to an all-IP service network is occurring, voice is increasingly becoming an IP service as well. Integrated VoIP with video and data multi-play is another aspect of the IP FTTx network. Allied Telesis has performed interoperability for its FTTx solutions with the leading soft switch manufacturers for both SIP and MGCP.
- ***Smart grid and smart home:*** Increased applications for utility monitoring and management are being integrated into FTTx networks. Plus, as the new 'smart appliances' find their way into the home; FTTx will become the convergence media for smart homes of the future.

FTTx Product Solutions

Switching Platforms

Allied Telesis carrier Ethernet Layer 2/3 switching platforms deliver point-to-point active Ethernet. They provide a highly scalable and economic platform to deliver advanced multi-play services in MDU's, on campuses or in business applications. They offers choices of 1G or 10G WAN connectivity, and support ultra-high capacity switching fabric designed for fiber services.

x900 Series
Layer 2/3 Managed Ethernet Switches

Offering scalability, flexibility and market leading FTTx performance in a compact 1RU chassis, the x900 family delivers unmatched value

AT-x900-24XS

The x900 series of 12 port to 48 port Layer 3 managed Ethernet switches are well proven in both performance and reliability. For FTTx service provider applications, the AT-x900-24XT and FS models are the most frequently chosen for their advanced features and added value capabilities. They feature two high-speed 30Gbps expansion bays for a high degree of port flexibility in scaling services, unmatched by any other 1RU Gigabit Ethernet switches in the market. The expansion modules offer 10Gbps fiber, 1Gbps fiber or copper interface options, allowing a wide range of configurations and applications to meet a service provider's needs. 24 or 48 fiber SFP ports support active Ethernet for either residential or business FTTx needs. The x900 series also supports EPSR ring protection in the event of a fiber cut or other failure. The power supplies, common control and interface cards are shared between all members of the x900 family. It also incorporates a full range of Layer 3 managed service functions along with enhanced QoS, and is supported by Allied Telesis' AlliedWare Plus™ operating software. Because of their advanced features such as IPv6 support, the AT-x900-24XT and FS models are ideal for supporting bundled IP Triple Play services for FTTx applications.

SwitchBlade® x908
Layer 3 Stackable Ethernet Switch

When it comes to advanced services over fiber, the SwitchBlade x908 sets the benchmark through its stackable architecture, high capacity and range of features

SwitchBlade x908

The SwitchBlade x908 offers service providers deploying FTTx optimum flexibility and scalability, a key to economic performance, through its modularity. That, coupled with its advanced design and features, makes it one of the most widely used FTTx switching platforms in the world. Each chassis can support up to eight high-speed 30Gbps expansion bays and is also capable of being stacked. Each expansion bay supports Gigabit and 10 Gigabit uplinks with EPSR protected ring options. It has a 640Gbps high performance switching fabric for IP video and other bandwidth-demanding services.

Allied Telesis' VCStack™ technology is incorporated into the SwitchBlade x908 providing outstanding resiliency by allowing the service provider to create a single 'virtual' chassis from two physical devices. This enables protection switching and traffic routing seamlessly should one stacked device fail, preventing service disruption. VCStack delivers a resilient core at a fraction of the cost of a full chassis-based system, and at the same time allows the stack to be managed as a single node on the network. As a FTTx delivery platform, the SwitchBlade x908 is designed for high reliability demanded by service providers, with dual power supplies, fan modules and hot swappable expansion modules. It uses Allied Telesis' AlliedWare Plus operating software with a full range of advanced Layer 3 features and functions, including IPv6 and enhanced QoS. It supports a user friendly GUI as well as industry standard CLI management interface. For FTTx services, it offers an ideal level of performance, reliability, ease of management and robustness to reduce a service provider's operating costs.

Multiservice Access Platforms

Allied Telesis' carrier-grade iMAP access platforms are designed for use in central offices, outdoor cabinets or in non-environmentally controlled buildings. The iMAP family are all temperature hardened and NEB3 compliant for use in both central office and cabinet locations. The iMAP 9700 and iMAP 9810 models provide both redundancy and protection, including automatic failover protection and EPSR ring protection assures network outages are minimized. As a pure packet IP access platform, the iMAP supports any mix or combination of fiber or copper services. The iMAP supports POTS and VoIP, DSL, T1/E1 a well as fiber service cards including 1G, active Ethernet and EPON all from a single chassis. The iMAP is the ideal platform for a mixed services environment, for use in migrating from copper to fiber, and is optimized for delivery of Triple Play.

iMAP 9000 Series
Carrier-grade Multiservice Access

The iMAP was the first access system in the market to deliver IP Triple Play services, designed from the ground up as a pure packet multiservice platform

The iMAP 9000 series is comprised of three chassis models, a 9RU large capacity, 3RU medium capacity and 1RU low capacity, but sharing the same common control and line cards as well as software. Of the three models, the iMAP 9700 is the choice of FTTx service providers, with 16 service module slots and redundant controllers, power supplies and 1G or 10G uplinks. All models are temperature hardened and NEBS level 3 compliant for use in controlled as well as uncontrolled environments. With the FX20 active Ethernet module, the iMAP 9700 supports up to 320 subscriber ports, and the two port EPON blade provides a system capacity of up to 1,088 subscribers at a 1:32 split. The GE8 modules provide up to 138 1G interfaces. Copper service blades including POTS, ADSL2+, VDSL2 and T1/E1 can also be used or mixed if service needs dictate. The system is DC powered and has ETSI compliant front cabling access and provides a complete suite of enhanced IP functionality, including advanced QoS and CoS.

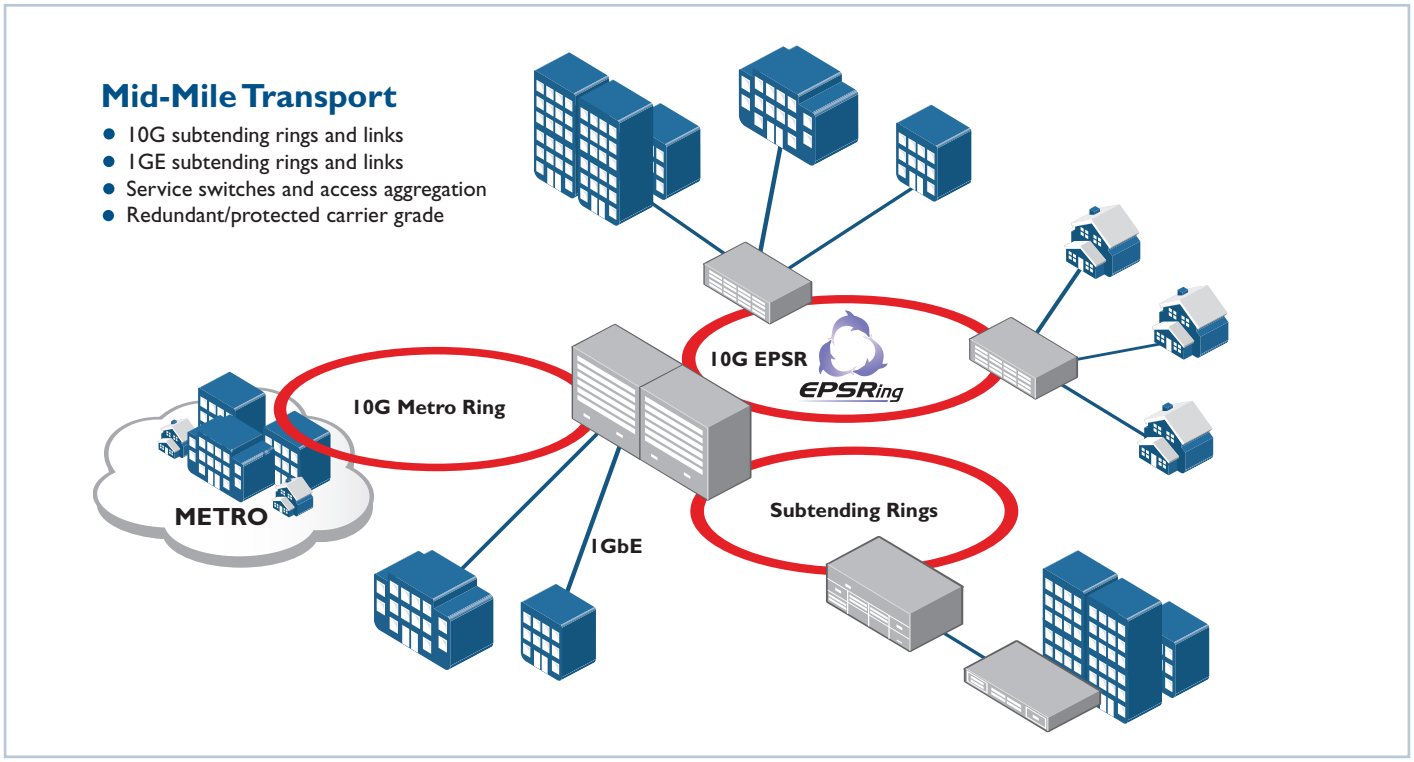
iMAP 9810
Multiservice Access and Transport Aggregation Platform

Delivering wirespeed performance, iMAP 9810 provides non-blocking performance for delivering FTTx services or serving as fiber loop aggregation

The newest member of the iMAP family, the iMAP 9810 is a 3RU/ eight service slot platform combining subscriber service delivery and mid-mile fiber aggregation and transport. With redundant 100 Gigabit controllers (CFC-100) and redundant dual 10G network modules supporting EPSR++ rings, along with redundant power supplies, the iMAP 9810 is a highly reliable carrier-grade platform. It is temperature-hardened, NEBS level 3 compliant and has front cabling access.

For aggregation and transport applications, the iMAP 9810 uses 6 x 10G (XE6) modules or 8 x 1G (GE8) modules for fiber aggregation and subtending. As a services access platform, 20 x FX20 active Ethernet or 2 port EPON modules are used for FTTx in any of the eight available slots with redundancy protection. Up to 160 point-to-point active Ethernet or 512 EPON subscribers can be connected in a compact chassis.

'iMAP 9810 scheduled release is December 2009.'



iMAP 9810 Architecture

FTTx Home Gateway CPE Products

Allied Telesis offers a range of indoor and outdoor iMG media gateway terminals, often referred to as fiber ONT's (Optical Network Terminations). A variety of features and interfaces provides service providers the flexibility of matching the right iMG to a specific service need economically. The iMG product line are feature-rich IP devices with advanced functionality integrated along with complete management capabilities as part of an end-to-end FTTx services platform.

iMG616 Family
Indoor FTTx Gateways

The iMG616 family are designed and built by Allied Telesis – not an OEM product, fully integrated and supported by Allied Telesis NMS

iMG616 family

As the second largest supplier worldwide of Ethernet FTTx media gateway products, Allied Telesis brings expertise in design and function to its iMG616 line of indoor fiber gateways. It begins with its exclusive 'clamshell' design enclosure that allows multiple mounting options and a two-part case for accessibility. The iMG616 families all have a single active Ethernet WAN port, and are designed for true integrated multi-service applications. VoIP is supported and tested with most leading softswitch manufacturers, as well as supporting both IPTV and RF video depending on the model. It supports advanced Layer 3 functions along with QoS, ACL and IGMP multicast functions, including an intrusion detection mechanism.

A UPS power system is used for locally powering the gateway, with a battery backup option available. All iMG616 models support TR-069. Using Allied*View*™ NMS, additional features such as one-step provisioning enables rapid provisioning and service activation are supported.

With FTTx deployment worldwide spanning a variety of applications and environments, the iMG616 family includes models to satisfy a wide range of needs, ranging from single family homes to apartments or condominiums, to dormitories, malls, transit terminals and even businesses. By offering the same design, software and management in every product in the family, service providers can choose the model best suited to their needs, or mix the models based on every type of service need. All iMG616 models include a single active Ethernet SFP WAN port, 2 FXS voice/VoIP ports and 6 10/100TX Ethernet ports. Models within the family include:

- ***AT-iMG616BD:*** This is the basic model with 2 FXS and 6 10/100 LAN interfaces and a single active Ethernet WAN.
- ***AT-iMG616W:*** This model adds IEEE 802.11b/g wireless capabilities.
- ***AT-iMG616RF:*** This model adds a coax RF port to deliver RF video overlay services.
- ***AT-iMG616SRF+:*** This model is designed to deliver RF video with a high power output for performance, and is also designed to enable a smooth transition from RF to IPTV by the possibility to disable RF video.
- ***AT-iMG606BD:*** This model has the same design and features as the AT-iMG616BD, but without FXS ports and voice support.

iMG7x6 Family
Modular Outdoor FTTx Gateways

Designed to reduce installation time, customer disruption and maintenance, the AT-iMG7x6MOD simplifies residential FTTH implementation and lowers OpEx

iMG7x6MOD family

The AT-iMG7x6MOD is a temperature hardened and environmentally sealed outdoor installed FTTx media gateway that combines fiber termination and home networking with a comprehensive suite of IP management and control capabilities. More than a fiber ONT, the AT-iMG7x6MOD is an intelligent network element for delivering enhanced services throughout the residence. Its primary use is in single-family homes or attached homes.

The modular design of the AT-iMG7x6MOD offers service providers flexibility to configure it for the actual service need rather than having to purchase multiple products, as well as to optimize electronics through modular functional additions. The base unit is a modular enclosure and fiber tray. An electronics unit is added for service installation and provisioning. There are then WAN interface options to add: 1G fiber, 10/100 active Ethernet fiber or EPON fiber. The AT-iMG726MOD comes with 2 x FXS and 6 x 10/100 LAN ports, and the AT-iMG746MOD 4 x FXS and 6 x 10/100 LAN ports. A modular LAN port can be used for either T1/E1 or HPNAv2 over coax, providing up to 320Mbps Ethernet over existing home coax to create a multi-play service LAN for IPTV, HSIA and VoIP without re-wiring the home.

Using an AT-iMG7x6MOD outside the home eliminates having to perform maintenance inside the home and disrupt the customer by having to schedule time. Its advanced features such as IGMP multicast, DHCP relay with option 82, IP QoS and CoS, coupled with TR-069 management integrated with Allied Telesis one-touch provisioning and management increases the reliability and customer satisfaction, and at the same time greatly reduces operational costs.

FTTx Business Gateways

AT-iBG915FX
FTTx Business Gateway

AT-iBG915FX is the ideal FTTx services gateway for delivering voice and data services to SOHO and SMB customers

AT-iBG915FX

For SOHO and SMB business applications where fiber service delivery is needed, Allied Telesis has an economic yet feature-rich business media gateway solution, the AT-iBG915FX. As a broadband intelligent media gateway and router, AT-iBG915FX is a cost-effective solution, with flexible SFP options supporting a choice in SH, LH or BD fiber options. It offers five 10/100TX Ethernet ports along with eight FXS voice ports supporting both analog and VoIP services, and has an imbedded SIP proxy server. The AT-iBG915FX is also available in broadband DSL models should a broadband over copper solution be needed.

Software

AlliedView NMS
Network Management Software

AlliedView NMS

The difference between good hardware and a great solution lays in its network management capabilities. Ease of provisioning, flexibility in configuration, comprehensive diagnostics and overall user friendliness are the attributes of the solution most visible and frequently used by service providers. They become the added value to any technology.

Allied Telesis' AlliedView NMS is the benchmark of management systems for Ethernet access services. It supports all of the Allied Telesis products: switches, multiservice access, CPE and home gateways – thus providing a unified management solution for complete service and system management and control. AlliedView NMS provides an industry recognized CLI and a GUI enabled operator interface to provide the user with options for operations such as provisioning, configuration and diagnostics. It's one-touch provisioning capabilities allow rapid provisioning and turn up of services without repetitive entry of data for each subscriber line. Going a step further, AlliedView NMS provides bulk provisioning using templates as well as automated topology discovery. For service management, features such as advanced security management, Service Level Agreement (SLA) monitoring, rates limiting (service tiers) and service classification and prioritization are combined to assure revenue-bearing services are protected. Real-time performance data along with historical network and performance data are collected through its database.

MEF member

Allied Telesis is a proud member of the Metro Ethernet Forum, supporting and participating in the development of standards and service models to enable Carrier Ethernet deployment for service providers worldwide.

eco friendly

Allied Telesis is committed to 'green' initiatives worldwide, developing and implementing technology advances to create more eco-friendly products as well as manufacturing processes.

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