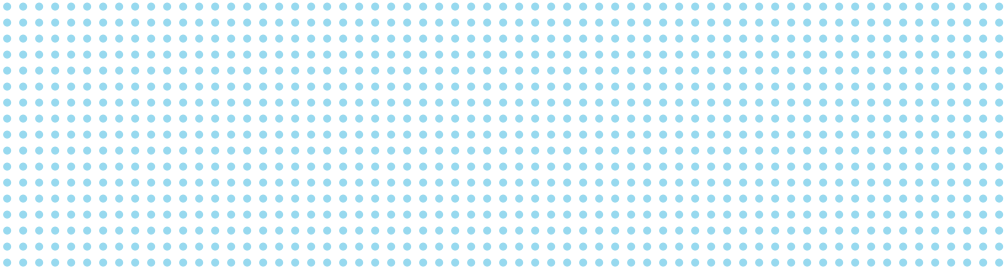


Alcatel-Lucent 7330 ISAM FTTN

Intelligent Services Access Manager
Fiber-to-the-Node

Alcatel·Lucent 





The Alcatel-Lucent 7330 Intelligent Services Access Manager (ISAM) Fiber-to-the-Node (FTTN) takes the best of Alcatel-Lucent's DSL developments, and provides a unique set of capabilities that enables you to deliver the most competitive triple play service offerings. Building on Alcatel-Lucent's leadership in broadband access, the Alcatel-Lucent 7330 ISAM FTTN addresses your growing requirement for a deep-fiber access solution. This innovative platform enables you to offer IPTV and other ultra-high bandwidth applications while leveraging your existing copper plant. As a member of the ISAM family, the Alcatel-Lucent 7330 ISAM FTTN shares technology with the Alcatel-Lucent 7302 ISAM, the industry's first IP-based platform capable of delivering 100-percent triple play services.



The Alcatel-Lucent Fiber-to-the-Node Solution for Deep-Fiber Access

Power and Flexibility for Your Unique Needs

Alcatel-Lucent has been the world leader in DSL deployments since the early development of the technology. To date, Alcatel-Lucent has shipped more than 143 million DSL lines worldwide.

Market requirements for bandwidth to the subscriber have increased tremendously since the initial deployments of DSL services. Each change in market demand has been anticipated and met with a new technological breakthrough from Alcatel-Lucent. The Alcatel-Lucent

7330 ISAM FTTN is part of Alcatel-Lucent's continued worldwide leadership in broadband innovation.

To meet the challenge of bringing more bandwidth closer to the subscriber, many of you are already deploying the next wave of DSL deployments by increasing fiber penetration in your access networks. This new deep-fiber access delivers non-blocking, ultra-high bandwidth to each subscriber, enabling the delivery of rich communication and entertainment services. Indeed, as an evolutionary step toward a full fiber network, FTTN provides the most competitive service.

IP services in the home are the key to winning the battle against your competition.



Taking the Battle to a New Level

Halting the Siege

If you are a traditional ILEC service provider, you are likely under siege. Cable operators have attacked you in the broadband and voice market. By offering voice services, they have begun to capture voice customers at an accelerating rate. Competitive local exchange carriers (CLECs) are continuing to be a major factor, too. So, in order to compete, you need to take the battle to a new level and introduce new technologies.

Broadband technology, and the many IP services that it enables, are creating a new battleground. Those companies that deploy high-bandwidth connectivity to the customer and effectively develop and market IP services will win the war.

So, if you are a telecom service provider, you will need to offer bundled services that typically include IP television (IPTV), as well as other interactive services - in addition to high-speed Internet (HSI) and voice. The combination of IP services needed to meet this strategic requirement can increase the required bandwidth to the subscriber from 2 or 3 Mb/s to 20 Mb/s, or more. With Alcatel-Lucent's VDSL2, 20 Mb/s can be delivered simultaneously to each port. Moreover, greater bandwidths on individual ports can also be delivered depending on total system load and loop lengths. Just as important, the ability to bond allows more bandwidth for customers deeper into the network.

Your challenge, put simply, is to provide additional subscriber bandwidth - cost-effectively and efficiently.



Increasing Bandwidth to the Subscriber for Deployment of New Interactive Services

The good news is that FTTN economically increases the available bandwidth to the subscriber while leveraging the existing copper plant to keep costs down.

Technological Hurdles

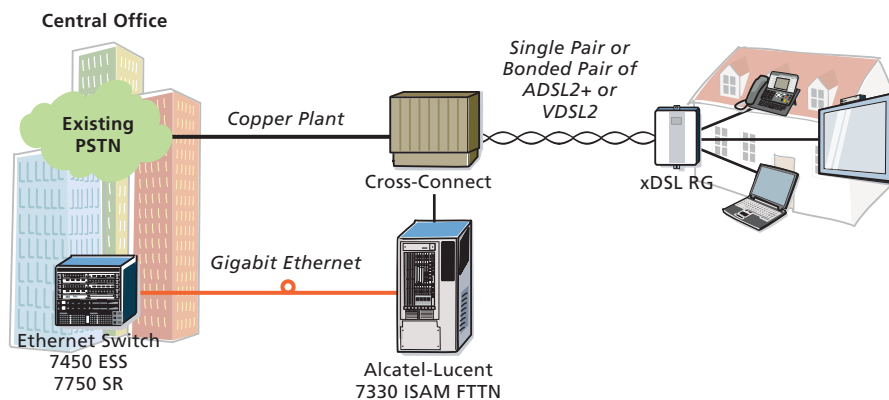
The existing DSL network was engineered to provide HSI access with downstream bandwidth between 0.5 and 2 Mb/s. Competition and increasing usage of the broadband connection have driven HSI bandwidth requirements into the 3 to 8 Mb/s range. However, the deployment of IPTV service calls for a deep-fiber solution in the access network. Bandwidth requirements for a competitive triple play service require 20 Mb/s or more.

FTTN Leverages the Existing Copper Infrastructure

For many customers, the long-term solution is to deploy fiber-to-the-user (FTTU). This will enable the delivery of virtually unlimited subscriber bandwidth. While this solution is available today and practical in many cases, time-to-market and short-term economic pressures are driving a more incremental access strategy — FTTN. As illustrated in Figure, 1, by leveraging the existing copper infrastructure and by deploying fiber deep in the outside plant, FTTN reduces copper loop lengths, cuts trench costs, and increases bandwidth with DSL.

As a member of the ISAM family, the Alcatel-Lucent 7330 ISAM FTTN delivers a full suite of triple-play services to all customers regardless of the population density and central office (CO) reach. Designed to be flexible and standards-based, the Alcatel-Lucent 7330 ISAM FTTN assures simplified operations, minimized operating expenditures (OPEX), less training requirements, and faster time-to-market for new services.

Figure 1. Leveraging the Existing Copper Plant





Indeed, FTTN networks have several key advantages, including:

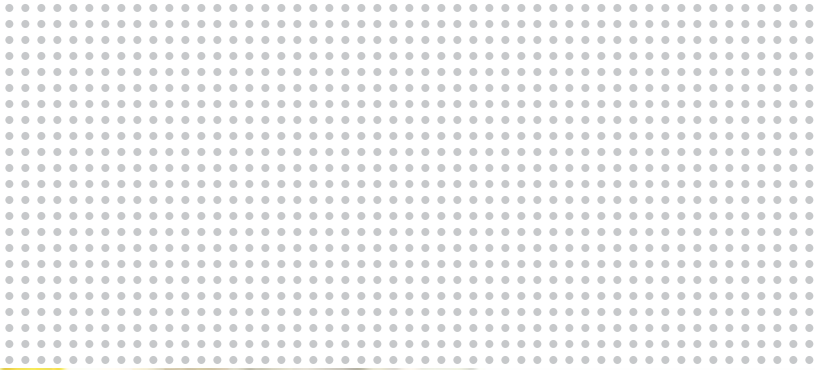
- Triple play service capabilities
- Small footprint and minimal power requirements
- An incremental step toward FTTU enabled by an investment in deep fiber
- Seamless integration into existing operations processes, reducing training costs
- Accelerated deployment, reducing costs and time-to-market while increasing revenues
- Allowing the migration of voice services to new IMS-based architectures

The Alcatel-Lucent 7330 ISAM FTTN is capable of various forms of expansion that utilize the switching fabric and network uplinks of the host shelf. As a result, you can extend the host shelf in a distributed way, optimizing the network infrastructure and reducing the number of fiber connections to the CO. This optimization of the fiber connectivity is what provides the self-aggregation concept that allows reuse of the host shelf resources. This expansion capability provides increased coverage and better utilization of the bandwidth. Fewer fiber connections means fewer ports

required on the aggregation switch. The result is a cost-efficient and gradual evolution toward deep-fiber penetration.

As a service provider, migrating your voice services to new VoIP (Voice over Internet Protocol)/IMS (Internet Protocol Multimedia Subsystem)-based network architectures becomes a vital part of your network transformation. Voice transformation to VoIP has already started in the home with ATAs (analog terminal adapters). FTTN allows you to broaden that network path by offering integrated ATA devices in the DSL modems. These are commonly called Residential Gateways (RGs). With this transformation in mind, Alcatel-Lucent also offers a POTS line termination card for those customers that may be left on your traditional voice network but have not chosen to upgrade to newer DSL-based services. The POLT card allows you to convert those remaining customers to an IMS-based network.

An additional advantage of this distributed access platform is that it optimizes your network management because the distributed system is viewed as one node.



Alcatel-Lucent 7330 ISAM FTTN — World-Class Technology for World-Class Solutions

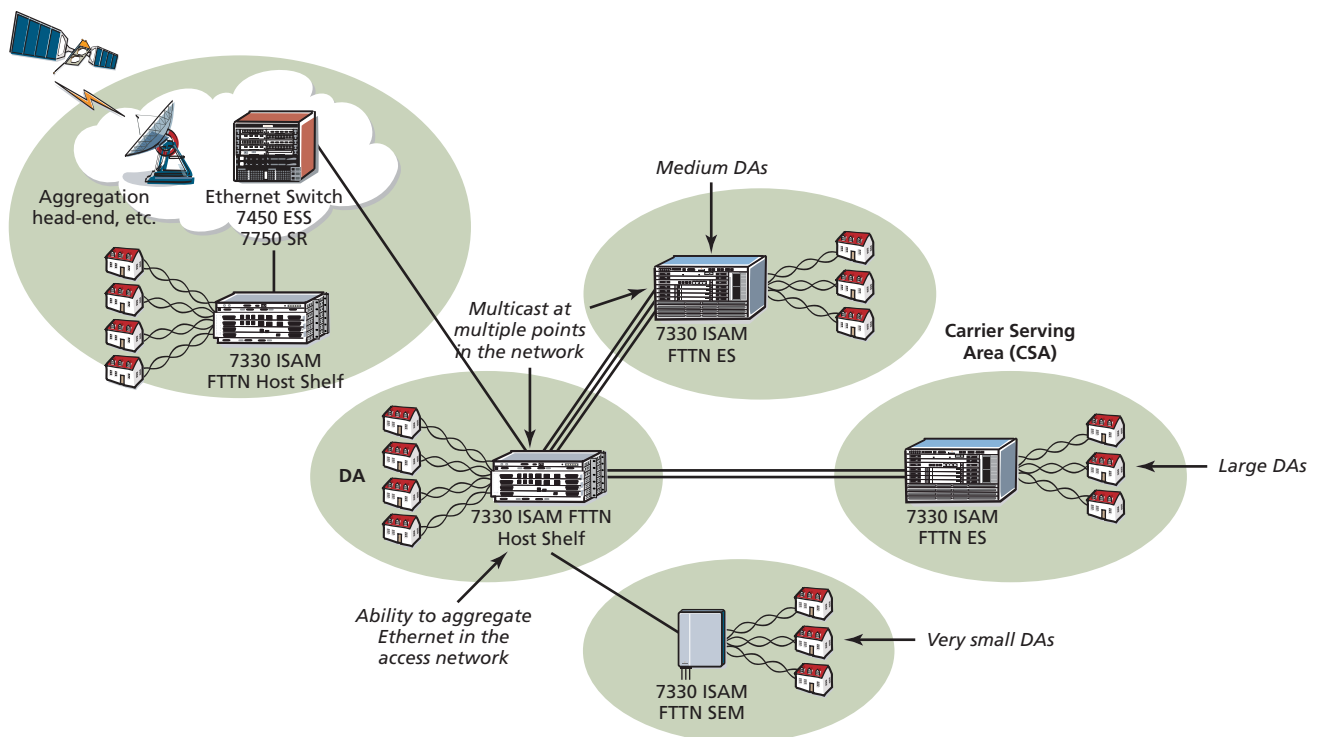
The Alcatel-Lucent 7330 ISAM FTTN builds on Alcatel-Lucent's worldwide DSL expertise by integrating the best technology available from the Alcatel-Lucent 7302 ISAM into a more compact remote digital subscriber line access multiplexer (DSLAM), which is tailored for the unique requirements of FTTN networks.

Figure 2 illustrates an Alcatel-Lucent 7330 ISAM FTTN network layout, depicting a standard service provider coverage area. In the CO, the Alcatel-Lucent 7330 ISAM FTTN host shelf is being used to serve lines that are within the CO's serving area distance. At one remote site, a remote host is connected to an Alcatel-Lucent 7330 ISAM FTTN expansion shelf (ES) while at another remote site, a sealed expansion module (SEM) is being used. This extends your serving area in a cost-efficient way, allowing modular growth and the quick deployment of new services. Moreover, the host shelf can be extended with an Alcatel-Lucent 7330 ISAM FTTN ES or SEM.

To meet the challenging requirements of an FTTN network, the Alcatel-Lucent 7330 FTTN has been engineered to support:

- A non-blocking Ethernet architecture to enable 100-percent IPTV take rates
- Expansion shelves and sealed expansion modules to match network population densities
- Full Internet group management protocol (IGMP) support for multicasting
- Gigabit Ethernet (GigE) network interfaces
- Multiple ADSL line termination (LT) options:
 - ADSL
 - ADSL2
 - ADSL2plus, with bonding
 - READSL2
- VDSL LT options
 - VDSL
 - VDSL2 with bonding
- POTS through the POTS LT (POLT)
- Integration with the Alcatel-Lucent 5526 Access Management System (AMS) for element management

Figure 2. Alcatel-Lucent 7330 ISAM FTTN Network Layout





Alcatel-Lucent FTTN: Multiple Options, One Solution

At the heart of the Alcatel-Lucent 7330 ISAM FTTN is an Ethernet switch fabric and distributed network processors. The high-capacity Ethernet switch fabric is hardened for outside plant deployments and is leveraged across a four-slot host shelf (the same shelf is used as an expansion shelf) and one or more sealed enclosure modules (SEMs) for a total of up to 768 lines (See Figure 2).

Alcatel-Lucent 7330 ISAM FTTN (Host Shelf)

The Alcatel-Lucent 7330 ISAM FTTN host shelf contains a high-capacity Ethernet switch. The host shelf supports northbound interfaces to the Ethernet aggregation network. It also provides Ethernet expansion links to expansion modules.



Key features of the Alcatel-Lucent 7330 ISAM FTTN host shelf include:

- High-capacity 24-Gb/s switching fabric and LT architecture, providing non-blocking service to all subscribers at ADSL2plus and VDSL2 rates
- Up to eight GigE uplinks, supporting service provider migration toward Ethernet managed area networks (EMANs) for DSL aggregation
- Up to twelve GigE expansion links for connecting expansion modules
- Up to four LT cards and four POTS splitter card slots to support up to 192 DSL ports
- Integration with Alcatel-Lucent 5526 AMS, in-band management, as well as support of TL1 parameters

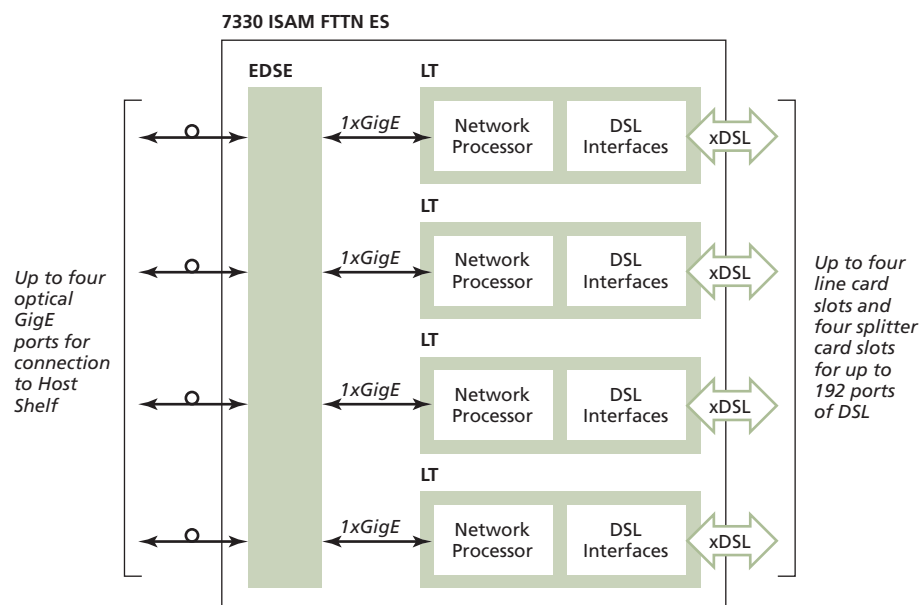


FTTN Expansion for Addition of Subscriber Interfaces

The Alcatel-Lucent 7330 ISAM FTTN supports expansion modules that have been designed for the addition of subscriber interfaces without the need for additional switching capacity. As such, the Alcatel-Lucent 7330 ISAM FTTN host serves as your central hub for expansion modules, expansion shelves and sealed enclosure modules (SEMs) and extends GigE interfaces to these high-density subscriber interfaces. These modules can be either collocated with the host or remotely deployed and connected with an optical interface.



Figure 3. Alcatel-Lucent 7330 ISAM FTTN Expansion Shelf





Enabling Efficient Growth

THE ALCATEL-LUCENT 7330 ISAM FTTN EXPANSION SHELF AND SEALED EXPANSION MODULE

The modularity of the Alcatel-Lucent 7330 ISAM FTTN expansion shelf (ES) enables your efficient growth of services and supports up to 192 DSL lines per shelf (as shown in Figure 4). The same shelf, which is used for the host is also used for the ES. The expansion shelves can be collocated with a host shelf at a common site, or remotely located with the host and expansion shelf at separate sites. In either scenario, the Alcatel-Lucent 7330 ISAM FTTN ES uses GigE links to connect to the host shelf.

For flexibility and convenience, the Alcatel-Lucent 7330 ISAM sealed expansion modules (SEMs) (Figure 4) are sealed enclosures that can be mounted directly on the outside of a cabinet, on a pole or in a pedestal, or hung on a strand. There are two versions: VDSL and ADSL. The VDSL version has 24 VDSL ports, and the ADSL version has 48 ports. Based on the design of the line terminations of the Alcatel-Lucent 7330 ISAM FTTN host shelf, both versions have features and capabilities that are similar to the line cards on the Alcatel-Lucent 7330 host and expansion shelves (See Figure 2).

Figure 4. Sealed Expansion Module Architecture

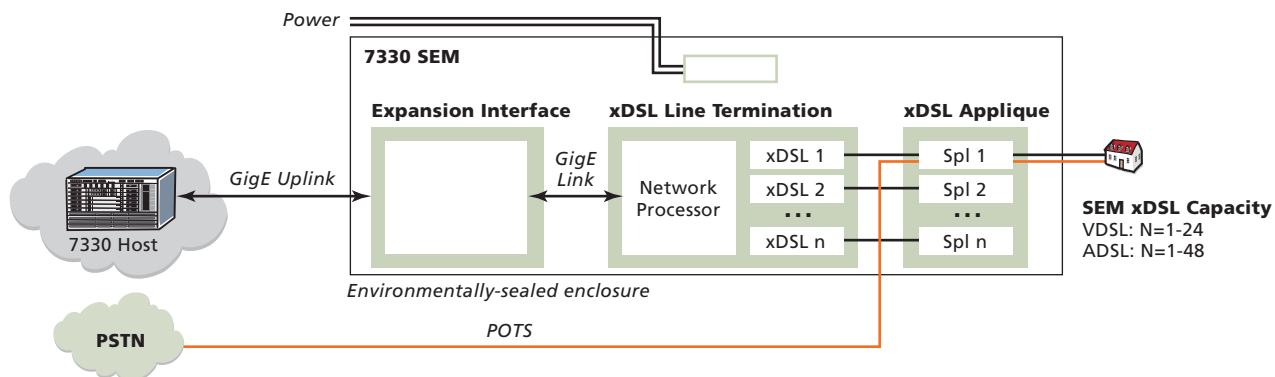


Table 1. Alcatel-Lucent 7330 ISAM FTTN Features and Benefits

FEATURE	BENEFIT
Member of ISAM family	Flexibility and uniformity lead to simplified operations, minimized OPEX, reduced training needs and faster time-to-market for new services
Distributed architecture	Multiple deployment options fit very small to large distribution areas with the ability to aggregate GigE traffic within the access network; capability to deliver all services to all customers regardless of population density and reach from the CO
GigE interfaces	Economical, high-bandwidth interfaces optimized for IP traffic
Multi-ADSL service unit	LT units, supporting ADSL, ADSL2, ADSL2plus (ITU-T G.992.5) with bonding and READSL2, provide maximum bandwidth to the customer over a wide variety of loop lengths
VDSL service unit	VDSL/VDSL2 (ITU-T G.993.1, G.993.2) enables you to increase bandwidth to the subscriber through bonding
Hardened for harsh environments	Operating temperature range of -40 C to 65 C (-40 F to +149 F)
Ethernet bridging	Layer 2 Ethernet bridge capability provides capacity of up to 24 Gb/s
Multicast support	IGMP and proxy functions (IETF RFC 2236) ensure rapid channel change for IPTV while minimizing the burden of transporting the same content to multiple subscribers
VLAN support	Limits broadcast traffic within the same VLAN broadcast domain to enhance performance while increasing security. Q-in-Q ensures businesses can be served efficiently as well
Quality of service (QoS)	Implementation of 802.1p priority queues prioritizes data service types, ensuring QoS across IP services, including HSI, video and packet voice
Alcatel-Lucent 5526 AMS	Support for the Alcatel-Lucent 7330 ISAM FTTN along with all other Alcatel-Lucent DSLAM products, for reduced operating costs and ease of deployment of new services

Alcatel-Lucent's answer to the FTTN challenge is the Alcatel-Lucent 7330 ISAM FTTN.

Alcatel-Lucent Fiber-to-the-Node Answers the Challenge

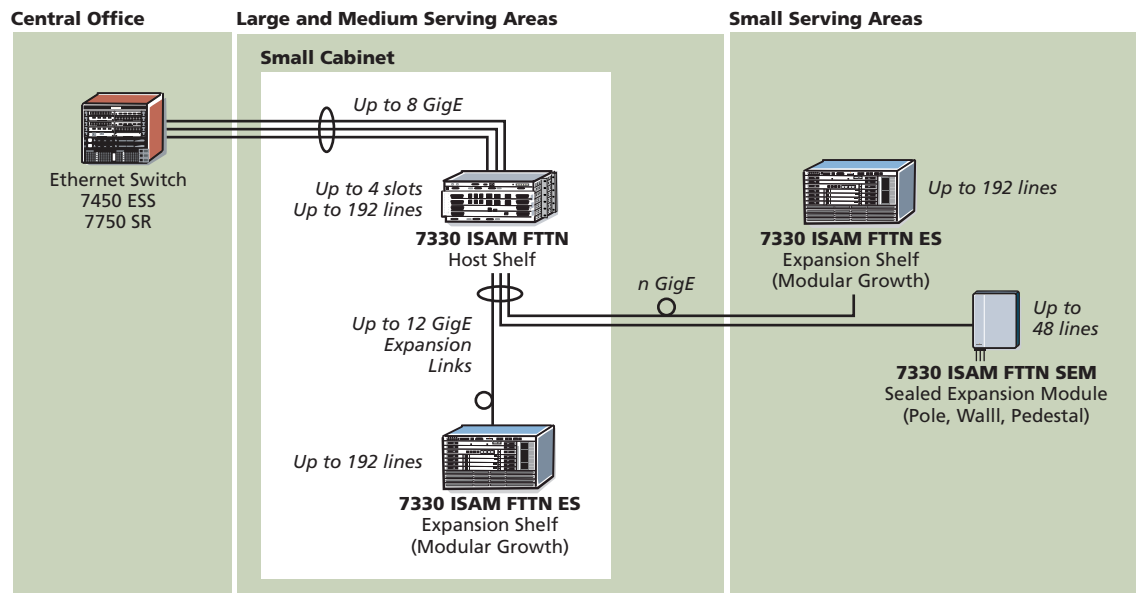
The Alcatel-Lucent 7330 ISAM FTTN architecture meets your challenge by delivering ultra-high bandwidth connectivity to subscribers over the existing copper plant.

With the Alcatel-Lucent 7330 ISAM FTTN in your arsenal, you can halt the competitive siege by rapidly deploying a ubiquitous service offering to your entire subscriber base. Very small to large serving areas can be addressed with the multiple form factors of a single Alcatel-Lucent solution.

Each Alcatel-Lucent 7330 ISAM FTTN supports:

- A non-blocking, Ethernet architecture with a 24-Gb/s switching fabric
- Multi-ADSL (ADSL, ADSL2, ADSL2plus with bonding and READSL2)
- VDSL and VDSL2 with bonding
- Multicast requirements with IGMP snooping
- Priority queuing for QoS
- Full element management through the Alcatel-Lucent 5526 AMS
- POTS services via the POLT

Figure 5. Alcatel-Lucent Fiber to the Node Solution





As you and your competitors worldwide prepare for the next wave of broadband deployment — to offer a full set of user-centric, personalized triple play services — Alcatel-Lucent has the solution to meet your deployment requirements.

The Alcatel-Lucent 7330 Intelligent Services Access Manager (ISAM) is a future-safe, multiservice intelligent access platform for the CO or remote cabinet that gives you the flexibility to deploy all services to each subscriber regardless of the subscriber's access technology.

While the Alcatel-Lucent 7330 ISAM FTTN addresses the growing need for a deep-fiber access solution, Alcatel-Lucent also offers the highest capacity access solutions, including the Alcatel-Lucent 7342 GPON Fiber-to-the-User (FTTU). Service providers typically complement the deployment of the Alcatel-Lucent 7330 ISAM FTTN with the Alcatel-Lucent 7342 ISAM GPON for service in greenfield applications. This approach leverages the cost-effectiveness of deploying fiber in greenfield communities.

**For more information on the
Alcatel-Lucent 7330 ISAM FTTN, visit
www.Alcatel-Lucent.com/fttn**

www.alcatel-lucent.com

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