Equipos

Area de Ingeniería Telemática
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Redes de Banda Ancha
5º Ingeniería de Telecomunicación

Equipos PDH y SDH

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Redes de Banda Ancha
5º Ingeniería de Telecomunicación

Equipos PDH y SONET/SDH

- CSU/DSU

- Interfaz E1 para Router

- Puerto POS STM-4c para Router

- STM-1/4 Multi-Service Node

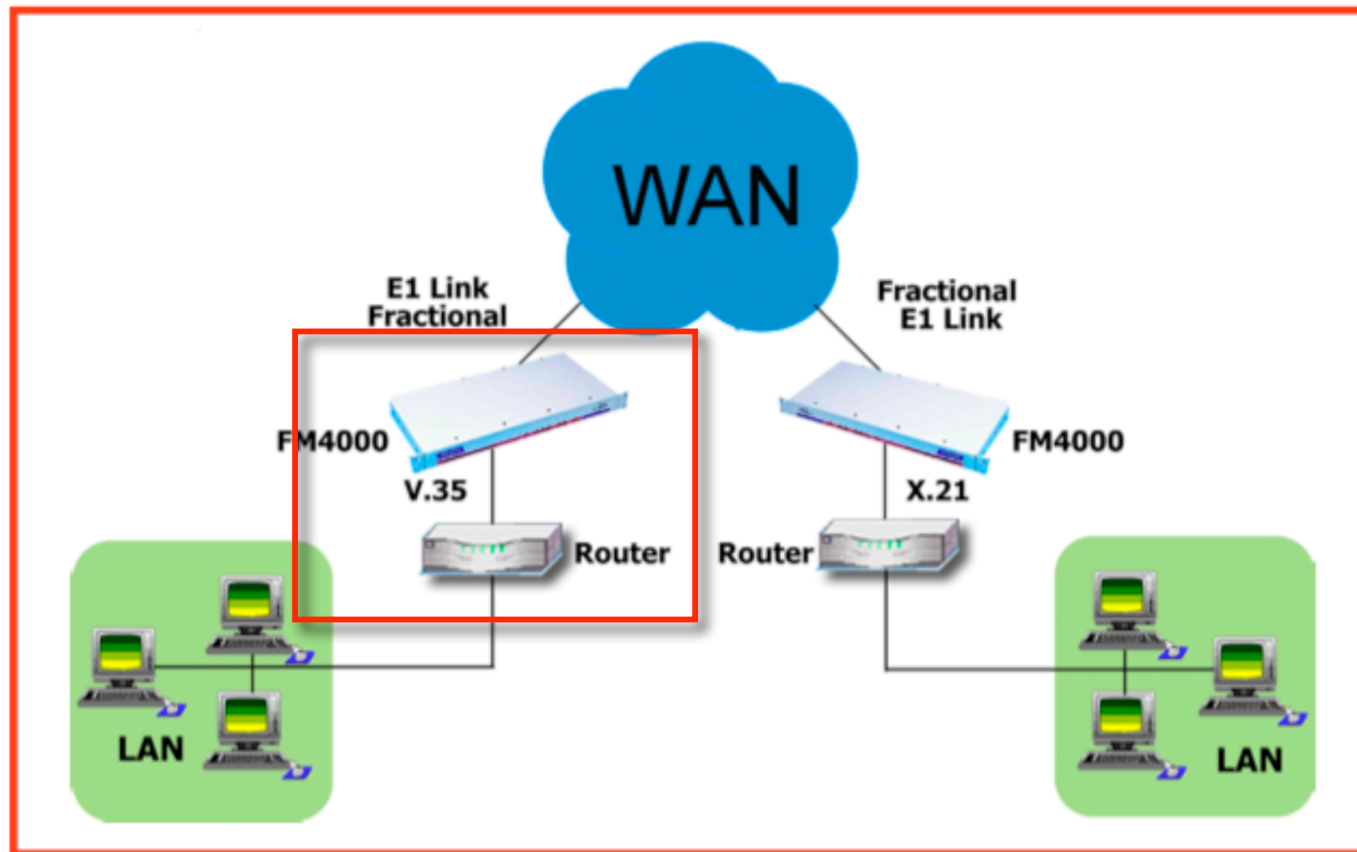- MultiService Platform

- MSPPs

Equipos PDH y SONET/SDH

- **CSU/DSU**

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CSU/DSU

CSU/DSU

FM4000

**E1 (n*64k) G.703/G.704
X.21/ V.35 Converter**

- High Speed E1 G.703 2.048 Mbps interfacing
- Fractional E1 by allowing n*64Kbps channels
- X.21 or V.35 ports
- External Alarm relay port
- Remote configuration and testing of units across the network
- Comprehensive performance monitoring of both device and line
- Optional SNMP management
- Optional -48 volt DC supply
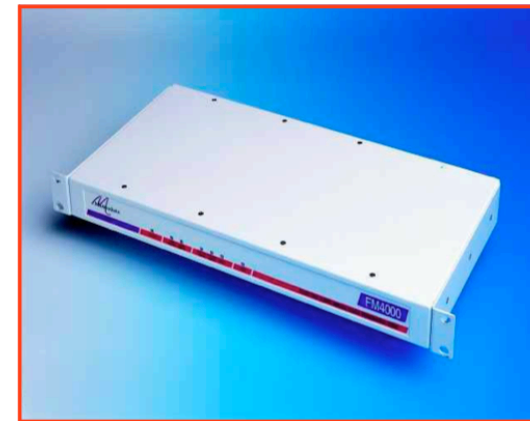
CSU/DSU

The Metrodata FM4000 DSU is used to interface high performance DTE equipment such as bridges or routers to 2.048 Mbps E1 services. The fractional E1 service is allocated on an n*64Kbps basis. The DTE equipment may present an X.21 or a V.35 interface. FM4000s are used in pairs with one unit at either end of the Wide Area link. Error conditions and usage statistics are gathered and stored by the FM4000. Unit set-up is done via a comprehensive menu system which is accessed via a local or remote terminal. The optional Metrodata LM1100 SNMP Enabler permits management via a LAN using an SNMP system.

About Metrodata

Metrodata are experts in network connectivity solutions. Based near London Heathrow Airport, we are leading designers and manufacturers of high performance communication hardware for the Fixed line, Satellite, Wireless, Systems integration, Service provision and Corporate networking communities.

Metrodata connectivity products provide solutions for interface conversion, interface extension and ATM networking from n*64Kbps through to Sonet/SDH.

Metrodata's sound technical and commercial understanding of international data networking issues ensures that we have the solutions for current and future networking needs. Our continuous development program means that Metrodata solutions are state of the art and provide an economic cost of ownership to our customers.

CSU/DSU

Specifications

Line E1 Interface

Port	G.703, 75 ohm unbalanced, 120 ohm balanced
Framing	G.704 (CRC4 or No CRC4) or Unframed
Interface	BNC (75 ohm), RJ45 (120 ohm)
Line coding	HDB3
Bit rate	2.048 Mbps +/- 50ppm
Cable length	E1 BNC RG59 = 600m
	E1 BNC UR202 = 750m
	E1 RJ45 Belden 8132 = 175m
	E1 RJ45 Belden 9841 = 300m

DTE Interface

Port	X.21 or V.35
Interface	X.21: ISO4903, 15-way D type
	V.35: ISO2593, 34-way M-rack
Bit Rate	n*64Kbit/s, n = 1 to 31, or 2.048Mbps

Configuration & Management

Type	Menu driven
Access	System console, telnet, SNMP
Interface	V.24. Ethernet 10baseT via RJ45
Security	Access by 2-level password
System	Non-volatile set-up
Clock modes	Internal, E1 loop or DTE (CCITT cct 113)

Power supply

AC Mains	100-250 VAC, 50-400 Hz, 50mA
-48 VDC Supply	-36 to -72 VDC, 200-100mA

Status LED & Diagnostics

Loopbacks	Local loop, Remote loop
BERT	2^{15}-1 PRBS
Statistics	Per G.821, 15min, 24 hour totals
Major Alarms	LOS, LOF, SQ
Minor Alarms	AIS, RAI
Data	DTE Tx Data, DTE Rx Data, DTE fault
Test	Test via menu, Test LED on front panel

Compliance & Approvals

Performance	G.703, G.704., G.706, G.823
BNC version	OTR.001 2DS, BABT# NS/4043I/i/P/603813
RJ45 version	CTR12, CTR 13, BABT# AA606631
Safety	EN41003, EN 60950
EMC	EN55022, EN50082
Statistics	G.821, AT&T 54016:15 min, 24hr totals
Management	RFC1213 (MIB II), RFC1495 (telnet), RFC1157 (SNMP), RFC1406 (DS1/E1), MetroDte MIB (DSU), RFC1215 (Traps)

Environment

Temp	0 - 50 deg C
Humidity	0 - 95% RH, non-condensing
Pressure	86 - 106 KPA

Packaging

Type	1U, 19 inch rackmount
Dimensions	435 x 213 x 44 mm (W x D x H)

REDES DE BANDA ANCHA
Área de Ingeniería Telemática

Equipos PDH y SONET/SDH

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Interfaz E1 para Router

CISCO ONE AND TWO PORT T1/E1 MULTIFLEX VOICE/WAN INTERFACE CARDS

Flexible multiservice solution supports multiple voice, data and integrated voice/data applications, facilitating the migration from data only or channelized voice and data to packet voice solutions and simplifying deployment, management and sparing.

INTRODUCTION

The Cisco 1 and 2-port T1/E1 Multiflex Voice/WAN Interface Cards ("Multiflex VWICs") support voice, and data applications in Cisco 2600, 2800, 3600, 3700, and 3800 multiservice routers. The Multiflex VWIC combines WAN Interface Card (WIC) and Voice Interface Card (VIC) functionality to provide unparalleled flexibility, versatility and investment protection through its many uses. Customers who choose to integrate voice and data in multiple steps preserve their investment in a T1/E1 WAN interface since the Multiflex VWIC can be reused in packet voice applications.

The T1/E1 Multiflex Voice/WAN Interface Cards are offered in single and dual port versions which can be used and then re-deployed as network requirements change, thereby addressing several applications:

- *Data*—As a WIC for T1/fractional T1, and E1/fractional E1 applications. The 1- and 2- port E1 versions include models that support unframed G.703. To simplify remote management issues the T1 version integrates a fully managed data service unit/channel service unit (DSU/CSU) and the E1 version includes a fully managed DSU.
- *Packet Voice*—As a VIC for the Digital T1/E1 Packet Voice Trunk Network Module (NM-HDV), IP Communication Voice Network Module (NM-HD-2VE), and IP Communication High-Density Voice Network Module (NM-HDV2) to provide T1 or E1 connections to Private Branch Exchanges (PBXs) and central offices (COs) enabling new services and reducing voice/fax toll charges.
- *Multiplexed Voice/Data*—As a dual port T1 or E1 Drop and Insert Multiplexer with integrated DSU/CSUs, reducing the complexity and number of network components and facilitating a graceful migration to bandwidth efficient packet voice.

Interfaz E1 para Router

- Reduces training, deployment, management and sparing inventory over single purpose interfaces Maximizes investment protection
- Multifunction support for LAN to LAN routing, multiplexed voice and data, and packetized voice
- Modules shared between Cisco 2600, 2800, 3600, 3700 and Cisco 3800 series
- E1 versions support both balanced and unbalanced modes
- Specific models to support E1 G.703 unframed for utilizing the full 2.048 Mbps (Note: The G.703 models can also be configured for framed mode where they support all the features of the other VWIC models). Improves branch-office network manageability and reliability
- Eliminates costly external third party CSU/DSUs and drop and insert multiplexers
- Simplifies remote network management by allowing a single management tool such as CiscoView or CiscoWorks to support router, CSU/DSU, drop and insert multiplexer

Maximizes system resources

- Increases T1/E1 port density supported on Cisco 2600, 2800, 3600, 3700 and 3800 multiservice access routers - up to 4 T1/E1 with integrated CSU/DSU in a single Network Module slot or up to two T1/E1 connections in a single WIC slot
- Easy Migration to bandwidth efficient packet voice, enabling new services

Customers who choose to integrate voice and data in stages preserve their investment in WAN interfaces. For example, the Multiflex VWIC can support data only applications as a WAN interface, then be re-used to integrate voice and data with the Drop and Insert multiplexer functionality and/or configured to support packetized voice (Voice over IP [VoIP] or Voice over Frame Relay [VoFR]) when in the NM-HDV, NM-HD-2VE, or NM-HDV2.

APPLICATIONS

Packet Voice Solutions: PBX and CO Connectivity

The Multiflex VWICs supply private branch exchange (PBX) and public switched telephone network (PSTN) connectivity for the NM-HDV, NM-HDV-2VE, or NM-HDV2 via digital T1/E1 ports. The NM-HDV, NM-HDV-2VE, and NM-HDV2 support industry standard H.323 based VoIP, industry standards FRF.11 and FRF.12 based VoFR, and AAL5 based VoATM.

Please note that for each of these packet voice applications (VoIP, VoFR, or VoATM), an appropriate WAN interface card is also required.

Interfaz E1 para Router

Data Solutions: 1 and 2-port T1/E1 WIC with Integrated DSU/CSU

The Multiflex VWICs simplify branch office connectivity by integrating the functionality of a router, T1/E1, fractional T1/E1 serial interface with a fully managed DSU/CSU.

When used for "data-only" WAN connectivity, the Multiflex VWICs support numerous functions, including Cisco IOS® command line interface initiated loopback control, similar to the popular WIC-1DSU-T1. Additionally the Multiflex VWIC is also offered in a dual port versions, including dual E1 configurations, enabling increased WAN port density in Cisco 26/28/36/37/3800 series multiservice access routers. The E1 VWIC versions include integrated DSUs, while the T1 VWIC versions integrate CSU and DSU functionality, simplifying remote network management.

The 2-port Multiflex VWICs increase configuration flexibility on Cisco multiservice access routers eliminating the need for 2 single-port T1/E1 WAN interface cards. Increasing the T1/E1 port density in a single WIC slot enables applications such as local serial aggregation with the WIC-2T or WIC-2A/S, or ISDN backup with the WIC-1B-S/T or WIC-1B-U.

The VWICs also support a channelized capability where the T1 or E1 service can be flexibly split into two or more fractional channel groups. Thus a single physical port can provide connection to multiple sites. (Note: when choosing this mode only a single port can be supported in each WIC slot.)

The VWIC-1MFT-G703 and VWIC-2MFT-G703 not only support unframed G.703 but also support all the features of the other VWICs including Drop and Insert on the VWIC-2MFT-G703. Additional flexibility is provided on the VWIC-2MFT-G703 with the capability to configure one port for unframed G.703 while configuring the other for standard framed E1.

Interfaz E1 para Router

Figure 2. Drop and Insert to Share a T1/FT1 or E1/FE1 Service
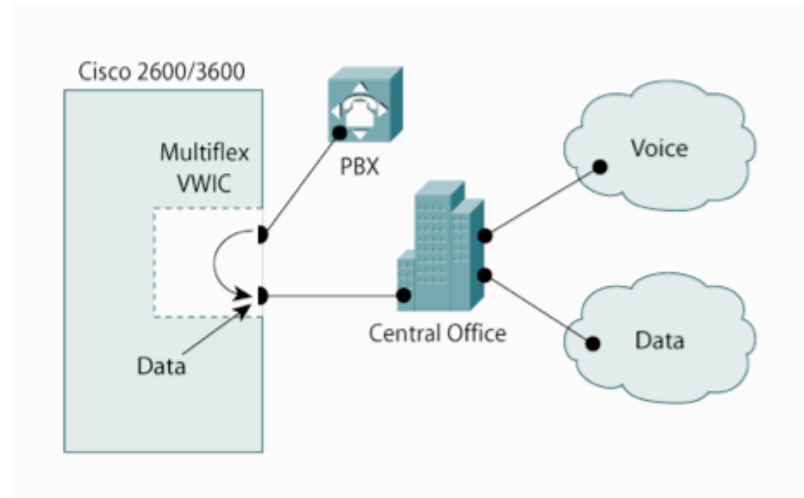
To illustrate, consider the example of a PBX with a T1 interface that needs to support a maximum of 10 simultaneous calls. With 24 DS0s in a T1 Service (1.544 Mbps) this leaves 14 DS0s or 896 Kbps of bandwidth for data from the router (14 x 64 Kbps). The number of DS0s assigned for PBX calls and the remainder that are available for use with router data are fully configurable (statically, not dynamically). In the case of an E1 service 30 DS0s are available for division between voice and router data.

In this example one port of the 2-port Drop and Insert Multiflex VWIC is connected to the PBX and the other port is connected to the CO. The 10 DS0s from the PBX are TDM switched to the "CO port" and this switching is done on the VWIC itself. The configuration of this TDM switching is flexible so that DS0s on the "PBX port" do not have to be mapped to DS0s with the same timeslots on the "CO port". The remaining 14 DS0s on the VWIC "CO port" terminate through the VWIC's backplane connector on the router as a single aggregate channel group. The 14 DS0s are not individually addressable by the router as a channelized service, but can be split into two or more channel groups. (See Table 2 for specifics.)

The 2-port Drop and Insert Multiflex VWIC is the model included in the 2-port versions of the Digital T1/E1 Packet Voice Trunk Network Module. The term "drop and insert" is normally used when router data (or data from another data device) is multiplexed with voice calls. A more generic term for "drop and insert" is "digital cross connect". Digital cross connecting of voice channels only is supported by the 2-port Drop and Insert Multiflex VWIC when in the NM_HDV, NM-HD-2VE, or NM-HDV2. For example, a single T1 connection from a PBX to the "PBX port" on the VWIC can be divided up between DS0s that go to the NM-HDV for packetized voice (e.g. VoIP), and DS0s that are TDM switched to the "CO port" of the VWIC for standard circuit switched voice connectivity.

Interfaz E1 para Router

SPECIFICATIONS

Product Number	Description
VWIC-1MFT-T1	1-Port RJ-48 Multiflex Trunk-T1
VWIC-2MFT-T1	2-Port RJ-48 Multiflex Trunk-T1
VWIC-2MFT-T1-DI	2-Port RJ-48 Multiflex Trunk-T1 With Drop and Insert
VWIC-1MFT-E1	1-Port RJ-48 Multiflex Trunk-E1

Product Number	Description
VWIC-2MFT-E1	2-Port RJ-48 Multiflex Trunk-E1
VWIC-2MFT-E1-DI	2-Port RJ-48 Multiflex Trunk-E1 With Drop and Insert
VWIC-1MFT-G703	1-Port RJ-48 Multiflex Trunk-E1 G.703
VWIC-2MFT-G703	2-Port RJ-48 Multiflex Trunk-E1 G.703
CAB-E1-RJ45BNC	E1 Cable RJ-45 to Dual BNC (Unbalanced)
CAB-E1-RJ45TWIN	E1 Cable RJ-45 to Twinax (Balanced)

Equipos PDH y SONET/SDH

- CSU/DSU

- Interfaz E1 para Router

- **Puerto POS STM-4c para Router**

- STM-1/4 Multi-Service Node

- MultiService Platform

- MSPPs

Puerto POS STM-4c (OC-12c)

The Cisco® I-Flex design combines shared port adapters (SPAs) and SPA interface processors (SIPs), leveraging an extensible design that enables service prioritization for voice, video and data services. Enterprise and service provider customers can take advantage of improved slot economics resulting from modular port adapters that are interchangeable across Cisco routing platforms. The I-Flex design maximizes connectivity options and offers superior service intelligence through programmable interface processors that deliver line-rate performance. I-Flex enhances speed-to-service revenue and provides a rich set of QoS features for premium service delivery while effectively reducing the overall cost of ownership. This data sheet contains the specifications for the Cisco 1-Port OC-12c/STM-4c POS Shared Port Adapter (Cisco 1-Port OC-12 POS SPA; refer to Figure 1).

Figure 1.   Cisco 1-Port OC-12 POS SPA with SFP Optics

PRODUCT OVERVIEW

The Cisco 1-Port OC-12 POS SPA is available on high-end Cisco Systems® routing platforms offering the benefits of network scalability with lower initial costs and ease of upgrades. The Cisco SPA/SIP portfolio continues the Cisco focus on investment protection along with consistent feature support, broad interface availability, and the latest technology. The Cisco SPA/SIP portfolio allows different interfaces (packet over SONET/SDH [POS], ATM, Ethernet, etc.) to be deployed on the same interface processor.

The Cisco 1-Port OC-12 POS SPA provides a single Small Form Factor Pluggable (SFP) interface. SFP modules are available in multiple optical reaches from 2 to 80 km.

Puerto POS STM-4c (OC-12c)

Features	Descriptions
Product Compatibility	• Cisco 7304 Router • Cisco 7600 Series Routers
Port Density per SPA	1 port

Physical Interface	• OC-12c/STM-4c SFP optics module (refer to optical parameters in Table 2)
	• Visual status indicators (LEDs):
	    – SPA status LED
	    – Per-port LEDs
	        • Carrier and alarm
	        • Active and loopback

Protocols	• High-Level Data Link Control (HDLC), RFC 2615 • Point-to-Point Protocol (PPP), RFC 1662 • Frame Relay, RFC 2427 • IPv4/IPv6

Features and Functions	• Synchronization
	    – Local (internal) or loop timed (recovered from network)
	    – Pointer activity monitoring
	• Local (diagnostic) and line (network) loopback
	• Section data communications channel (SDCC)---Platform-dependent feature
	• Payload mapping
	    – POS with $1 + X^{43}$ self-synchronous scrambler
	• SONET/SDH compliance
	    – Telcordia (Bellcore) GR-253-CORE (as applicable)
	    – ANSI T1.105, T1.231
	    – ITU-T G.707, G.957, G.825 (as applicable)
	• Supported SONET/SDH alarm and signal events
	    – Signal failure bit error rate (SF-ber)
	    – Signal degrade bit error rate (SD-ber)

Puerto POS STM-4c (OC-12c)

Table 2. OC-12c/STM-4c POS Optical Specifications

SFP Optics	Maximum Distance
Multimode (MM) Short Reach (SR)	Up to 0.25 mi (500 m)
Single-Mode (SM)	Up to 1.2 mi (2 km)
SM Intermediate Reach (IR-1)	Up to 9 mi (15 km)
SM Long Reach (LR-1)	Up to 25 mi (40 km)
SM Extended Reach (LR-2)	Up to 50 mi (80 km)

Equipos PDH y SONET/SDH

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- **STM-1/4 Multi-Service Node**

- MultiService Platform

- MSPPs

STM-1/4 Multi-Service Node

Broadband Optical Connectivity To The Business

Medium/large enterprises and corporates rely more and more on optical connectivity to the Metro network for their mission-critical applications.

By extending fiber optics to the business, Service Providers' telecommunication infrastructures can effectively support end-customers' business profitability, ensuring reliable services ranging from voice and data storage replication to high speed Internet Access and Ethernet Virtual Private Networks.

Alcatel 1640 FOX (Fiber Optics eXtension) is an ideal carrier-grade Optical Multi-Service CPE capable of delivering a flexible range of different services – ATM, Ethernet, Voice, TDM – supported by next generation SDH technology. Its is a compact (desktop or wall-mount) and scalable multi-service platform, which enables Service Providers to extend their service offerings and create new revenue opportunities – delivering optical access connectivity for enterprises and large businesses to the Metro.

Alcatel's Optical Multi-Service Nodes (OMSN) provide world-class next generation SDH functionality and capacity through aggregation of broadband multi-protocol traffic patterns.

Designed for metro and backbone applications, the OMSN product family offers telecom carriers and service providers the powerful solution to build intelligent optical networks and achieve the optimal balance between new competitive service offerings and traditional revenue-generating services.

The Alcatel 1640 FOX is the Optical Multi-Service Node addressing Customer Premises applications.
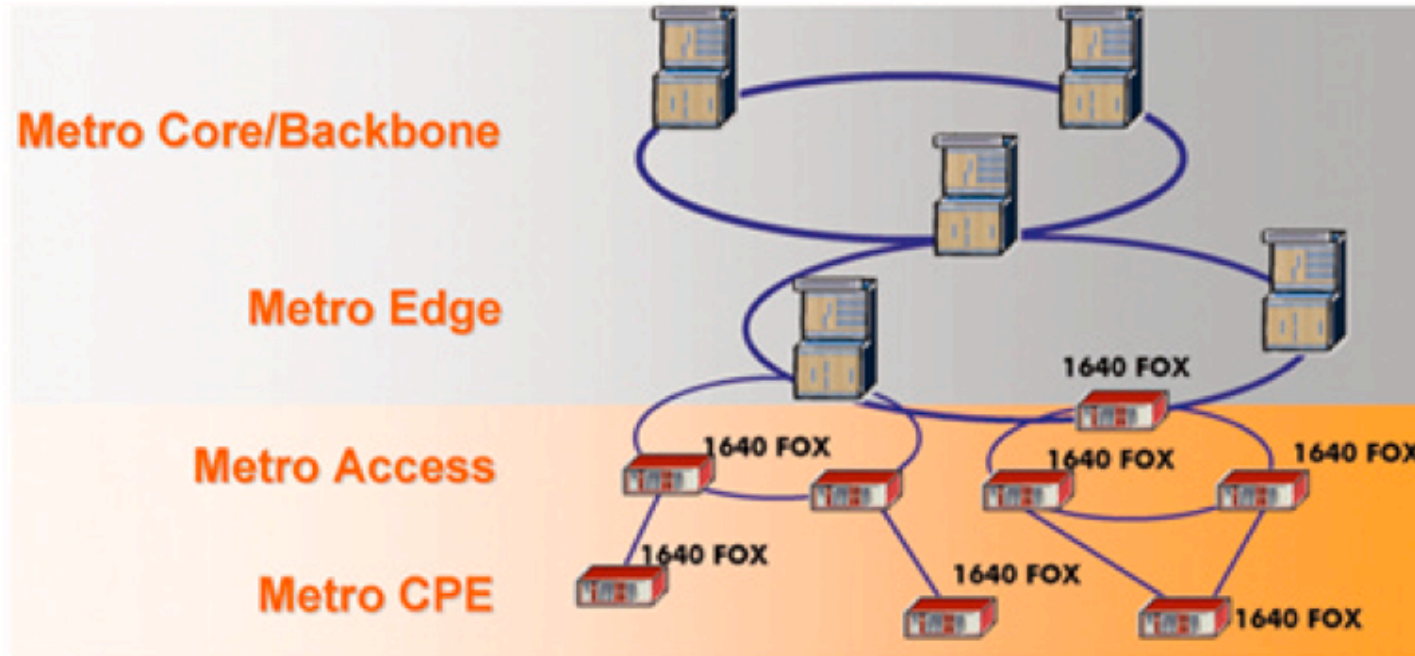
STM-1/4 Multi-Service Node

Fig. 1: How Alcatel 1640 FOX fits in the network

STM-1/4 Multi-Service Node

A Compact, Data-Oriented, Multi-Service CPE

Alcatel 1640 FOX is a next-generation synchronous Multi-Service Node designed for carrying optical access services to customer premises over the fiber medium.

Ideally suited for wall-mount or desktop applications, thanks to its symmetrical architecture it can be configured as Terminal Multiplexer or Add Drop Multiplexer for deployment in spur, ring or meshed metro access network topologies.

Alcatel 1640 FOX provides STM-1 or STM-4 network interfaces for connection to the access network's central office. It can be equipped with a wide variety of customer interfaces: 2Mbps, 34Mbps, 45Mbps, STM-1 and STM-4 as well as Ethernet 10/100 and Gigabit Ethernet SX/LX interfaces for direct LAN interconnections.

It also supports Packet Ring Edge Aggregator capability, which provides Layer 2 Ethernet/MPLS functions with differentiated QoS.

High-density Support for Large Uplink Capacity

The chassis of the Alcatel 1640 FOX has three card slots. One slot is for a Compact ADM-1 or ADM-4 card, which provides 2 x STM-1 or 2 x STM-4 connectivity to the optical access network, ideally suited for dual homing and high grade protection applications. The other two additional slots may host different interfaces – PDH, SDH or Packet – to serve multiple types of customer services, for example:

> Up to 16 x 2Mbps, 34/45 Mbps
> Up to 22 x Ethernet 10/100 Mbps
> Up to 8 x Gigabit Ethernet SX/LX
> ATM switch or Packet Ring/MPLS switch with elastic bandwidth tuning and traffic policing for diff-QoS

Alcatel 1640 FOX features unmatched performances in terms of both interface density and uplink capacity.

Multi-service optical protected connectivity for large enterprises is achieved – for example – by supporting simultaneously 4 x Ethernet 100Mbps full rate lines, plus 16 x 2Mbps TDM lines, plus one Gigabit Ethernet line, all 1+1 network protected.

Multi-Service Applications

Alcatel 1640 FOX offers to operators the ability to deliver several different types of multi-protocol services and to fit into various network topologies. It can host ISA plug in modules performing Ethernet, MPLS and ATM switching functions.

STM-1/4 Multi-Service Node

The traffic originated and terminated by any customer interface may be directly mapped into SDH Virtual Containers (VCs) and transported transparently across the SDH network, or be processed by the ISA-ATM or Ethernet/MPLS switching modules for optimal aggregation and delivery of broadband data services, such as:

> Leased Lines Services (PDH, SDH)
> Voice Services
> Metro Ethernet Services (Ethernet Private Lines, Ethernet L2-VPN, Internet Access)
> DSL, LMDS, UMTS aggregation services

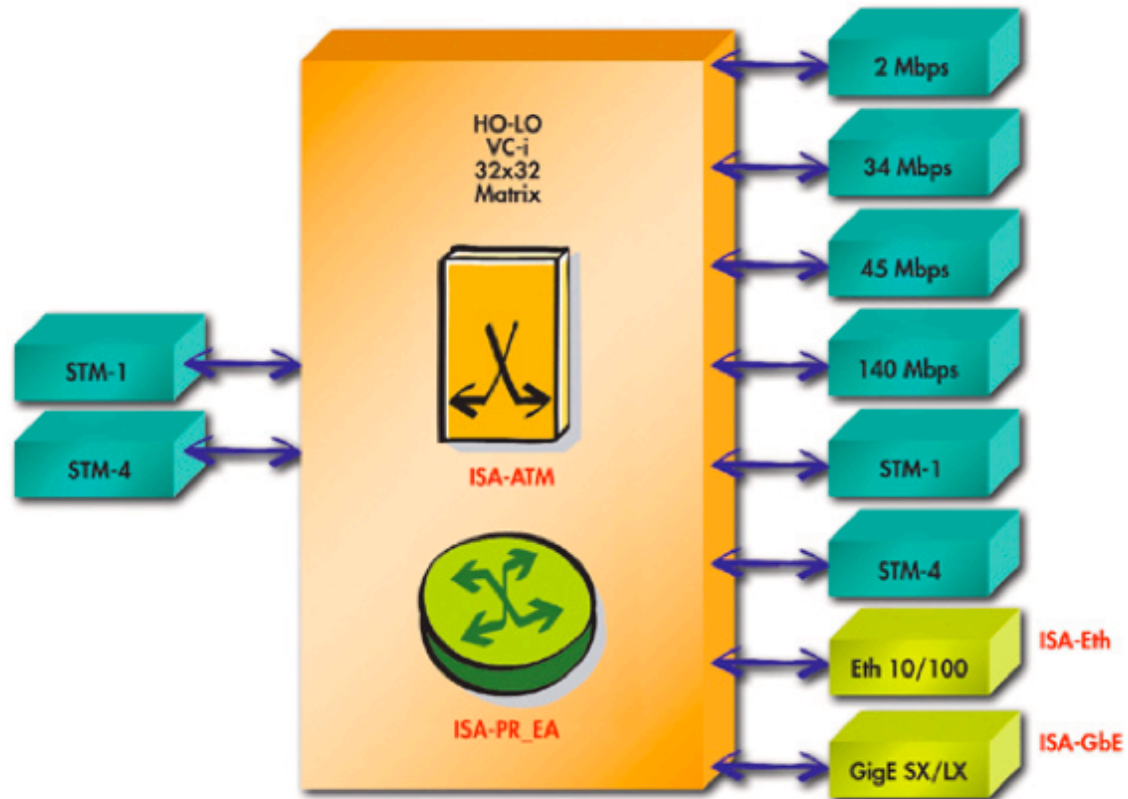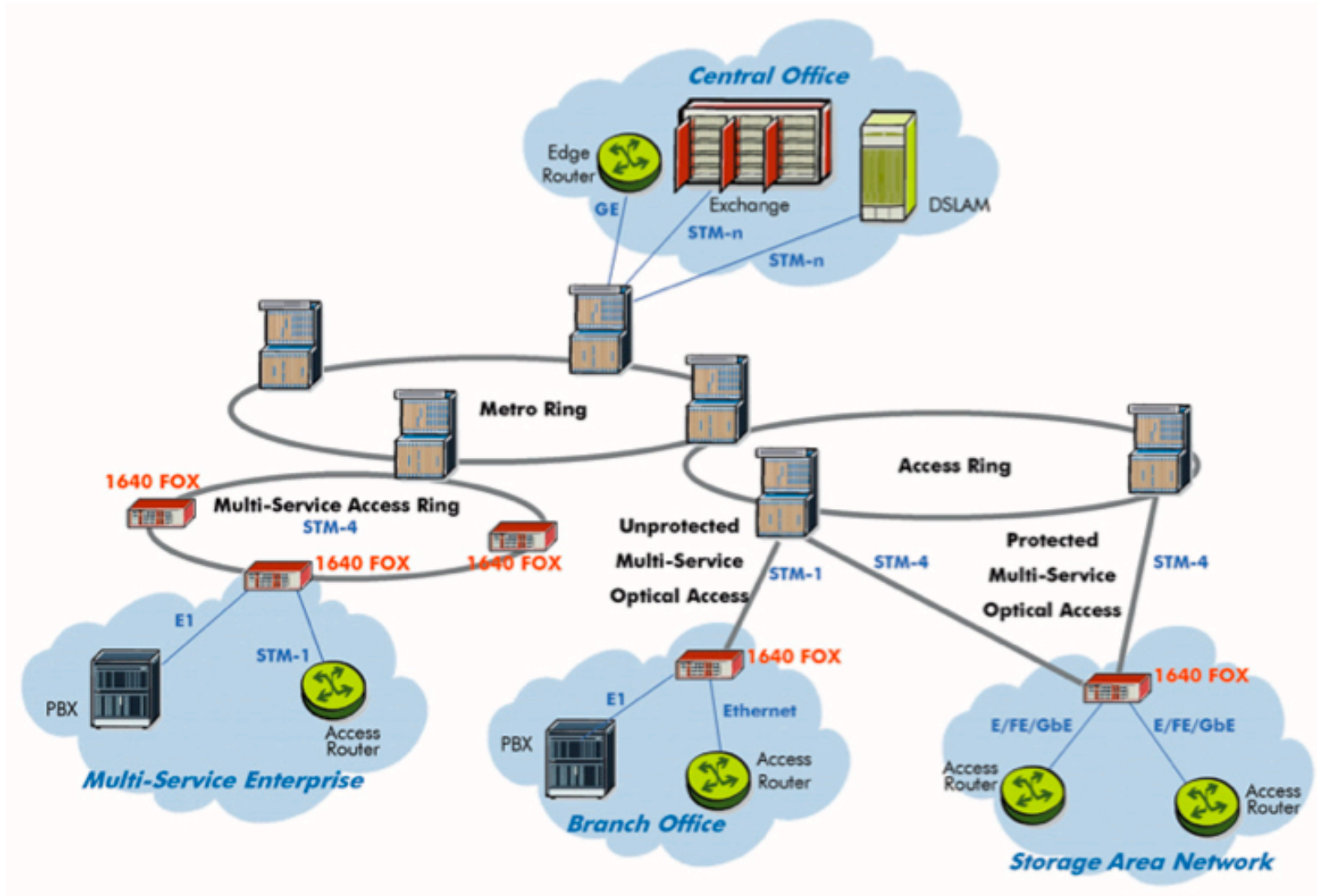Fig. 2: Alcatel 1640 FOX block diagram

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STM-1/4 Multi-Service Node

STM-1/4 Multi-Service Node

The Alcatel 1640 FOX can act as an ideal multi-protocol transport device between carrier's and end-customer's networks. Besides, allowing consolidation of different traffic patterns (TDM, ATM, Ethernet, GbE) into either segregated or shared SDH Virtual Containers (pipes), it performs edge functions such as traffic shaping, policing and QoS guarantees.

Alcatel 1640 FOX may be connected to any other SDH node located in a central office or in an access ring. In the latter case Alcatel 1640 FOX may connect to the ring either as a spur of a ring node or as a ring node itself.

Bi-directional working on a single fiber is available for metropolitan networks with fiber shortage.

Network Optimization

Corporate connections to network operators' or service providers' Points Of Presence (POPs) are more and more characterized by data traffic, such as LAN switch or access router interconnects.

Alcatel 1640 FOX may be used to deliver IP or ATM backhauling services at variable bit rates, overcoming the rigidity inherent to the discrete tributary bit rates offered by SDH.

When Alcatel 1640 FOX is directly inserted into an access ring node, traffic coming from different clients can be groomed into common SDH Virtual Containers, by means of cell or packet-based statistical multiplexing.

The network operator can then optimize the transport bandwidth utilization for more revenue-generating services, minimize the interconnection costs to external data equipment and ultimately reduce investments for network upgrades.

As most of replaceable units (common parts and traffic cards) are shareable within the Optical Multi-Service Nodes family, Alcatel 1640 FOX allows carriers to balance the impact of spare holding and personnel training, which results in reduced investments and network operation costs.

STM-1/4 Multi-Service Node

Technical Summary

Applications

> Terminal Multiplexer and Add Drop Multiplexer in protected or unprotected linear links, rings or meshed networks for multi-service optical access

> Single fiber working

> Metro Ethernet services (p2p, L2-VPN, Internet Access)

Interfaces

> Network interfaces: 2 x STM-1 or 2 x STM-4

> Customer interfaces (two slots available each):
  - 16 x 2Mbps (ISDN-PRA)
  - 1 x 34Mbps
  - 1 x 45Mbps
  - 2 x STM-1 (S-1.1, L-1.1, L-1.2)
  - 1 x STM-4 (S-4.1, L-4.1, L-4.2, L-4.2JE)
  - 11 x Ethernet 10/100 Base-TX (ISA-Eth plug-in)
  - 4 x Gigabit Ethernet Base-SX/LX (ISA-GbE plug-in)

Connectivity

> 32x32 STM-1 equivalent full non-blocking SDH matrix (HO/LO) in all configurations

> Unidirectional, bidirectional, broadcast connections

> Line and VC loopbacks

Synchronization

> Internal oscillator ±4.6 ppm

> Holdover drift ±0.37 ppm per day

> External sources: STM-n/2Mbps ports, 1 external 2MHz/2Mbps output

> Priority and Quality (SSM) synchronization algorithms

Data Engines (ISA)

> **ISA-ATM**: 600Mbps plug-in cell switch with STM-1 access on board; CBR, UBR, UBR+, VBR, GFR traffic contracts; point-to-multipoint from VC-12 up to VC4 payloads; policing and shaping; hard/soft PVCs connections (PNNI); equipment protection 1+1.

> ISA-PR_EA (Packet Ring Edge Aggregator): 1.6 Gbps plug-in switch with 4 x Ethernet 10/100 Base-TX interfaces or 1 x GE SX/LX on board; Eth/GFP and Eth/MPLS/POS ports VC-12 up to VC-4. MPLS label switch and VLAN-tag forwarding criteria. Packet classification (VLAN 802.1Q, priority 802.1p, IP-DA, IP-TOS, MPLS+exp) and dual rate leaky bucket traffic policing/metering. Integrated L2/L3 forwarding function. Ethernet Virtual Private Line and LAN Services support.

> **ISA-Eth**: Rate-adaptive Ethernet 10/100 transport. ITU-T G.7041 GFP mapping on N x VC-12, N x VC-3, VC-4 with in service BonD.

> **ISA-GbE**: rate-adaptive Gigabit Ethernet transport (ITU-T G.7041 GFP mapping on 1..4 x VC-4).

Environment

> Operating condition: ETS 300 019, class 3.2

> Storage condition: ETS 300 019, class 1.2

> Transportation condition: ETS 300 019, class 2.2

> ESD/EMC: ETS 300 386, "Telecommunications Center" CLASS B

Operation

> CMISE craft terminal through RS232 at 38.4kb/s

> Network management access through QB3 interface or Qecc G.784

> Local and remote SW download

> Remote inventory

> Housekeeping: 4 inputs + 2 outputs

> Auxiliary channels: 1 x RS-232, 1 x V.11

Standards

> *ITU-T/ETSI*

  In compliance to latest ITU-T/ETSI standards for SDH equipment

  I.113, I.150, I.311, I.321, I.326, I.356, I.357, I.361, I.363.5, I.371, I.432.1, I.432.2, I.610, I.630, I.731, I.732, Q.2110 B-ISDN SAAL, Q.2130 B-ISDN SAAL, Q.2140 B-ISDN SAAL, ETS 300 298-1, ETS 300 298-2, EN 301 163-1-1, EN 301 163-2-1

STM-1/4 Multi-Service Node

Protections

> Linear MSP single and dual-ended
> SNCP/I, SNCP/N
> SNCP Drop & Continue

Monitoring

> POM (Path Overhead Monitoring) on 100%VCs
> SUT (Supervisory Unequipped Trail)
> TCM (Tandem Connection Monitoring)
> Performance monitoring according to G.784, G.826, G.821
> Ethernet performance counters

Power

> Station battery: -48 to –60 V dc
> Ac mains: optional external AC/DC rectifier inclusive of 2h-battery backup (same cover as transmission chassis)
> Power consumption: 35 W (typical)

Physical Dimensions

> Chassis size: 90W x 285H x 313D mm
> Installation options: Desktop, wall-mount, ETSI rack

> **ATM Forum**

af-bici-0013.003, af-cs-0127.000, af-nm-0020.000, af-nm-0020.001, af-nm-0095.001, af-phy-0046.000, af-phy-0064.000, af-pnni-0055.000, af-pnni-0066.000, af-pnni-0081.000, af-tm-0121.000, af-uni-0010.002

> **IETF**

MPLS (Ethernet over MPLS)

> **IEEE**

IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, 802.1q/p

Equipos PDH y SONET/SDH

- CSU/DSU

- Interfaz E1 para Router

- Puerto POS STM-4c para Router

- STM-1/4 Multi-Service Node

- **MultiService Platform**

- MSPPs

Cisco Multiservice Platform

The Cisco® ONS 15310-CL SONET Multiservice Platform is an economical, 1-rack unit (1RU)-high delivery platform optimized for use as the last network element, at the customer location (CL), in a service provider's network or for use as an end node in enterprise or campus environments. The Cisco ONS 15310-CL takes advantage of the proven technology pioneered by the Cisco ONS 15454, the industry's leading multiservice optical transport platform (Figure 1).

Figure 1
Cisco ONS 15310-CL SONET Multiservice Platform

INTEGRATED OPTICAL NETWORKING

The Cisco ONS 15310-CL efficiently aggregates data, voice, and video services for transport. The platform effectively supports TDM and 10/100-Mbps Ethernet, and it provides integrated data-switching and cross-connect functions. Various data streams can be carried separately or together and transported in a one-for-one dedicated bandwidth mode or in a concentrated mode with no limit on the oversubscription ratio.

With the ability to transparently integrate into SONET networks, and an expansion slot providing the modularity to meet changing network needs, the Cisco ONS 15310-CL helps transform today's TDM-based transport networks into flexible, data-intensive superhighways.

Although many transport products claim to handle today's data and voice traffic, they lack the ability to provide effective bandwidth management for higher-speed IP-based data services. Many of these platforms require significant setup time and are difficult to provision. The Cisco ONS 15310-CL offers optimized bandwidth for high-speed IP-based data services, rapid service provisioning, and multiple optical interfaces through Small Form-Factor Pluggables (SFPs) for flexible SONET networking (Figure 2).

Cisco Multiservice Platform

Figure 2

The Cisco ONS 15310-CL Delivers Multiservices On Demand to the Customer Location and Metropolitan Edge
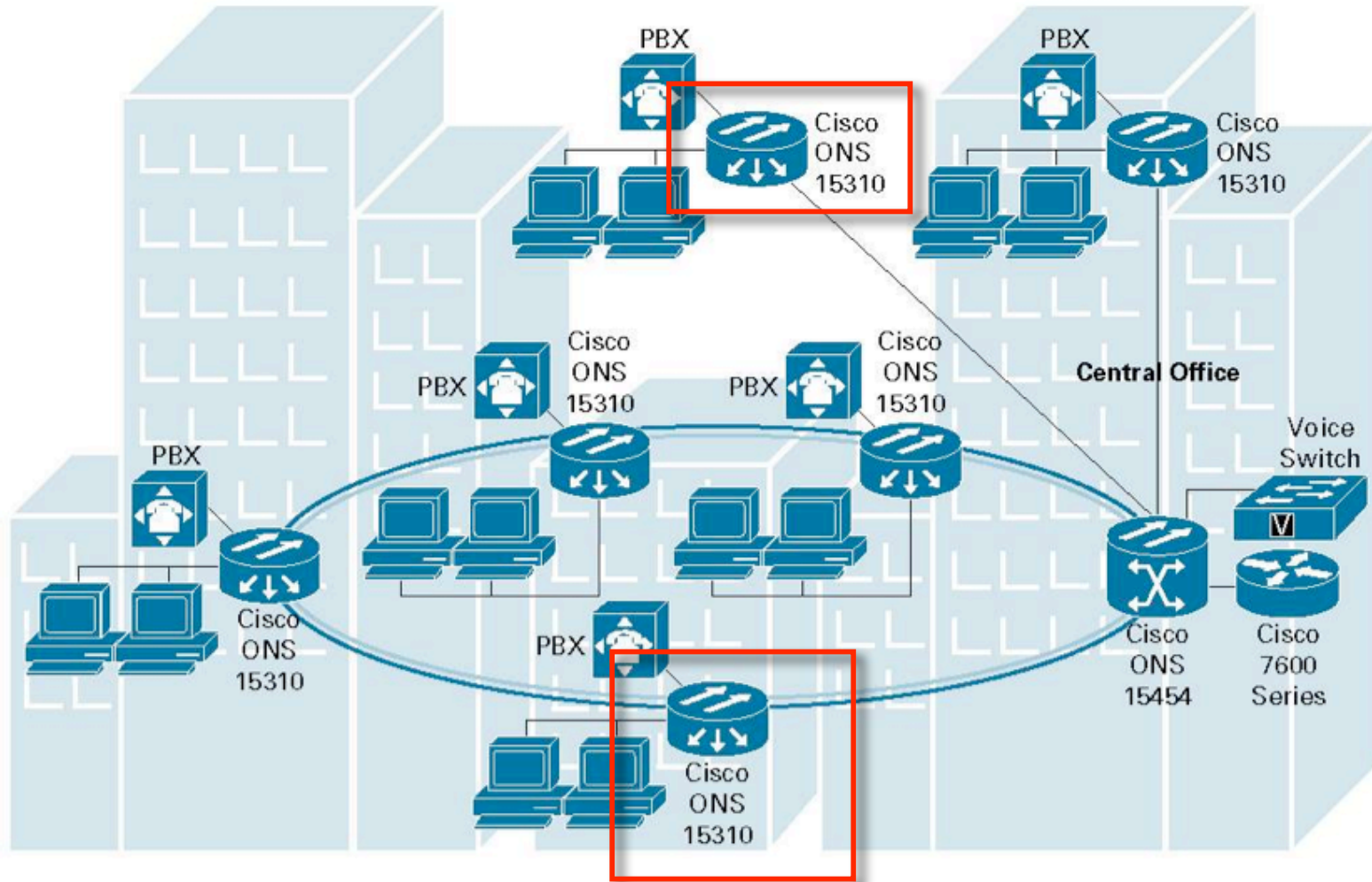
Cisco Multiservice Platform

EVOLUTIONARY SONET TRANSPORT

By extending the metropolitan (metro) edge to customer premises and providing direct high-speed LAN connectivity, the Cisco ONS 15310-CL allows service providers to cost-effectively offer scalable, high-speed data services over their transport networks. For the enterprise, the Cisco ONS 15310-CL offers the efficiency, scalability, and high availability to meet the bandwidth demands of the mission-critical e-business infrastructure. These features are available without implementing new technology or upgrading the existing transport network infrastructure.

This evolutionary platform supports high optical bandwidth and can drop a DS-1 from an OC-3 or OC-12 stream. The Cisco ONS 15310-CL also provides comprehensive STS- and VT-level bandwidth management and integrated data switching.

ACCELERATED NETWORK ECONOMICS

The integrated multiservice optical networking functions of the Cisco ONS 15310-CL dramatically reduce service-delivery costs. Packaged in a 1RU, industrially temperature-hardened Network Equipment Building Standards (NEBS) 3-compliant assembly, the Cisco ONS 15310-CL delivers fast provisioning and low initial cost, while maintaining a small footprint and low operational cost throughout the life of the product.

PROVISIONING AND MANAGING THE CISCO ONS 15310-CL

Each Cisco ONS 15310-CL is equipped with Cisco Transport Controller, a subnetwork craft interface tool that simplifies node control. The Cisco Transport Controller GUI and point-and-click capabilities allow easy node turn-up, autorouted A-to-Z circuit provisioning, and rapid service creation. Cisco Transport Controller provides: element-level control; quick access to operation, administration, maintenance, and provisioning (OAM&P); a Transaction Language One (TL-1) command window; and graphical network topology representations, network conditions, and shelf configurations.

Cisco Transport Manager is the comprehensive element management system for the entire Cisco ONS products, including the Cisco ONS 15310-CL. Integrating fault, configuration, and performance management, Cisco Transport Manager streamlines and strengthens optical network OAM&P. The client-and-server platform easily scales to manage up to 1000 network elements and 100 simultaneous users. Cisco Transport Manager helps service providers quickly identify and correct network problem areas and more rapidly deploy revenue-generating services.

Cisco Multiservice Platform

Chassis

- 1RU-high chassis

- Two SFP optical ports; SFP options follow:
  - OC-3 intermediate reach and long reach
  - OC-12 intermediate reach and long reach
  - Multirate OC-3/OC-12 intermediate reach

- Twenty-one onboard DS-1 interfaces through a straight, 96-pin D-sub connector, with separately orderable cable with separate 64-pin transmit (Tx) and receive (Rx) connectors at customer side

- Three onboard DS-3 or EC-1 (electrical STS) per-port provisionable interfaces through a mini-BNC connector, with separately orderable mini-BNC-to-standard BNC conversion cable

- Flexible expansion port

- Integrated single-system cross-connect, timing, control, and DS-n service architecture

- 19- and 23-inch rack-mount and wall-mount options

- Alarm input/output contacts (3/2) port, Building Integrated Timing Supply (BITS) input/output (1/1) port, external LAN management port, local and craft management port, and user-data-channel (UDC) port-all with RJ-45 connectors

- Single-feed AC power or dual-feed DC power factory versions

Cisco Multiservice Platform

Configurations

- Point-to-point terminal

- Add/drop multiplexer

- Two-fiber unidirectional-path switched ring (UPSR)

- Path-protected mesh network (PPMN)

System Timing

- Internal Reference -SONET Minimum Clock (SMC) ±20 parts per million (PPM) compliant with Telcordia GR-253-CORE

- Holdover stability: 3.7 x 10; 7 per day, including temperature (<255 slips in first 24 hours)

- Line timed from any OC-n port

- External BITS

Software

- SONET, DS-3/EC-1, and DS-1

- UPSR, PPMN, 1 + 1, 1 + 0, bidirectional, and unidirectional

- Complete equipment and facility maintenance

- Complete performance monitoring per GR-499, GR-253, and GR-820

- Full Ethernet switching capability

- Protection-channel access (Telcordia GR-1230-CORE)

- Terminal and facility loopbacks

Equipos PDH y SONET/SDH

- CSU/DSU

- Interfaz E1 para Router

- Puerto POS STM-4c para Router

- STM-1/4 Multi-Service Node

- MultiService Platform

- **MSPPs**

Cisco MSPP

The Cisco® ONS 15310-MA is a **Multiservice Provisioning Platform (MSPP) that switches packet and TDM traffic,** and interfaces to both circuit-based and Ethernet/MPLS backbone networks. Together with the Cisco ONS 15310-CL, Cisco ONS 15454, and Cisco ONS 15600, the Cisco ONS 15310-MA provides an end-to-end solution for multiservice transport over SONET networks.

Product Overview

The Cisco ONS 15310-MA (Figure 1) is a carrier-class MSPP that efficiently switches Ethernet and TDM traffic for use in metropolitan and regional optical networks. Its flexibility and scalability allow it to support 1.5-Mbps to 2.5-Gbps TDM, as well as 10/100/1000-Mbps Ethernet interfaces. The Cisco ONS 15310-MA can aggregate traffic at a central office or collect services at the customer premises. At a central office, it can groom traffic from multiple customer-located network elements, such as the Cisco ONS 15310-CL, Cisco Catalyst® 3750 Series Switch, or another Cisco ONS 15310-MA for distribution to other networks or handoff to specialized networking devices, such as a Cisco 7600 Series Router, a high-capacity digital cross-connect (DXC), or a Class 5 telephone switch. At the customer premises, the Cisco ONS 15310-MA can collect high-density and high-capacity traffic from medium-sized and large businesses, or from several customers in a multitenant location.

Figure 1
Cisco ONS 15310-MA Multiservice Platform

Cisco MSPP

Carrier-Class Compact MSPP

In a very compact chassis (two systems fit side by side in six rack units [RUs]), the Cisco ONS 15310-MA provides six slots for hot-swappable traffic interfaces. High-density electrical (up to 168 DS-1), Ethernet (up to 32 10/100BASE-T), or optical interfaces can be terminated in this small footprint to optimize use of expensive real estate at the central office or remote terminal cabinet. A centralized two-stage 20-Gbps STS and 5-Gbps VT1.5-TDM cross-connect can switch SONET encapsulated traffic from any tributary port onto any optical interface.

All Cisco ONS 15310-MA common equipment, including processor, cross-connect, timing, and power supply, can be optionally duplicated for 99.999% reliability. Protection for TDM electrical as well as optical interfaces is also possible. Unidirectional-path switched ring (UPSR) and 1+1 automatic protection switching (APS) can be configured for greater fault tolerance in the optical network. The Cisco ONS 15310-MA is NEBS Level 3, FCC, and UL compliant, and supports industrial temperature ranges, making it fully qualified for deployment in central offices, customer locations, or remote terminals.

Applications

The flexibility of the Cisco ONS 15310-MA gives it superior versatility. Its true multilayer Ethernet-over-SONET transport capabilities allow service providers to more efficiently add support for next-generation, packet-based services to their existing infrastructure while limiting capital and operational expenditures and increasing speed of service delivery. Interoperability with the Cisco ONS 15310-CL, Cisco ONS 15454, and Cisco ONS 15600 provides a robust network solution that can deliver economical, scaleable, and cost-effective services on demand. The versatility and reliability of the Cisco ONS 15310-MA make it the optimal choice for a wide variety of applications, some of which are listed in the following sections.
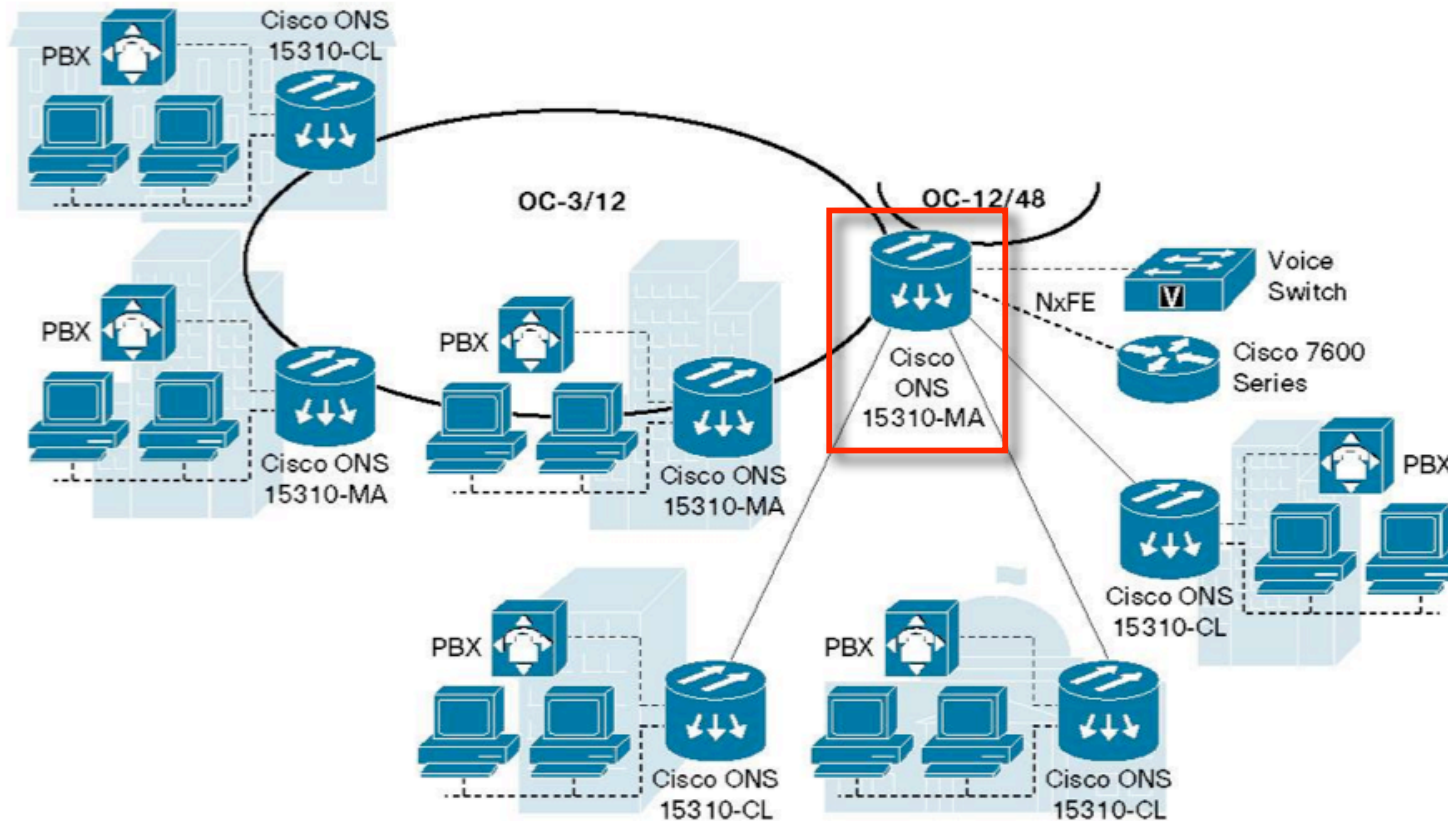
Cisco MSPP

Metro Access Aggregation

The Cisco ONS 15310-MA can serve as the first point of aggregation for customer access equipment that delivers services directly to the customer site. Flexible Small Form-Factor Pluggable (SFP)-based optical interface modules can terminate OC-3 or OC-12 collector rings. For example, multiple Cisco ONS 15310-CL platforms can be aggregated on a Cisco ONS 15310-MA at an end-office or small central office (Figure 2). Customer traffic can then be groomed for transport over an optical uplink, or terminated onto colocated networking devices – such as a Cisco 7600 Series Router or a Class-5 switch – using tributary interface ports.

Figure 2
The Cisco ONS 15310-MA as a Multiservice Aggregation Device

Cisco MSPP

Wireless Aggregation

With the advent of third-generation (3G) mobile services, wireless networks require high-capacity infrastructure to transport bandwidth-intensive services such as Web browsing or videoconferencing from a cellular phone. The multiservice capabilities of the Cisco ONS 15310-MA, together with its carrier-class reliability, compact size, and reduced power consumption, make it ideal for backhaul of TDM and packet traffic from the cell site to the nearest point of presence (POP) (Figure 3).
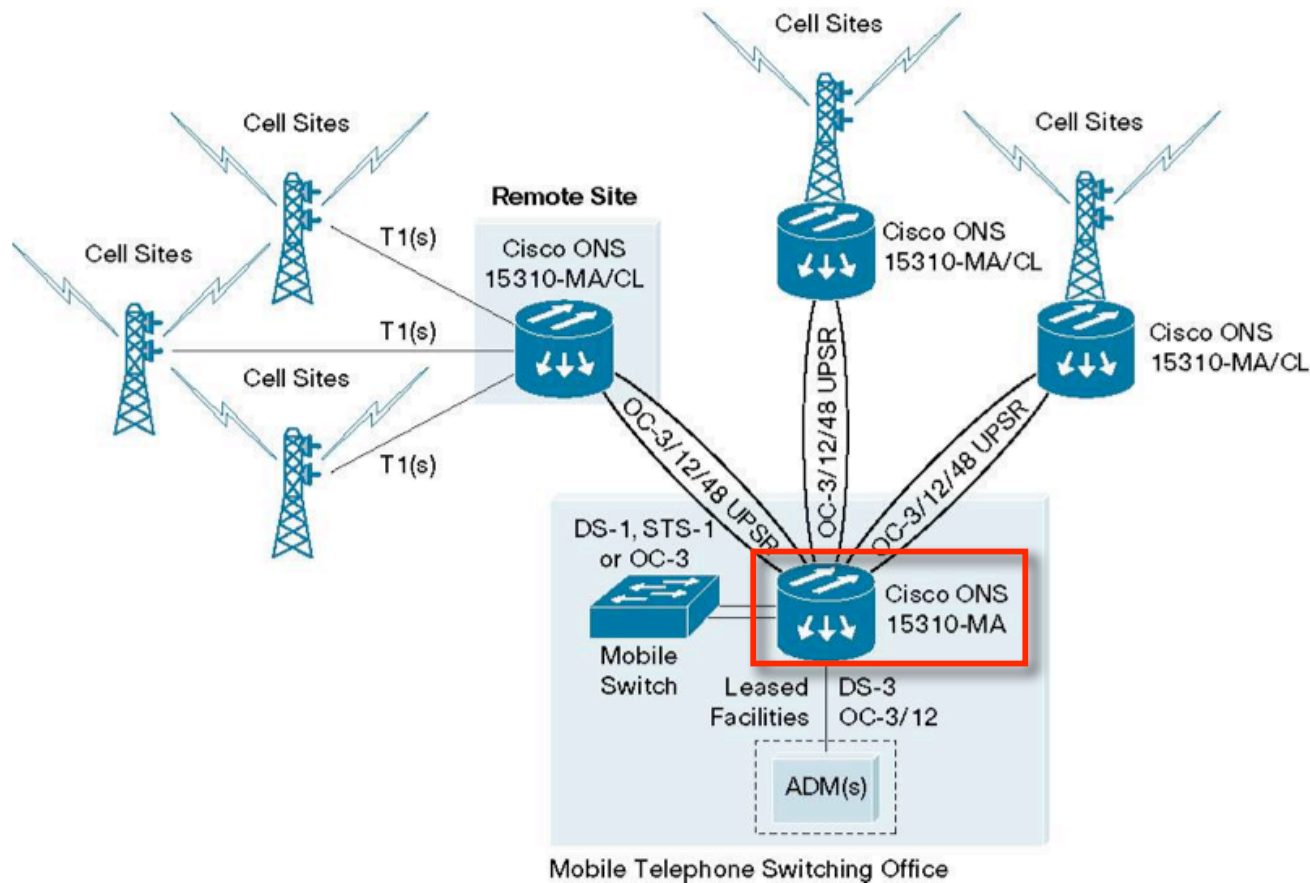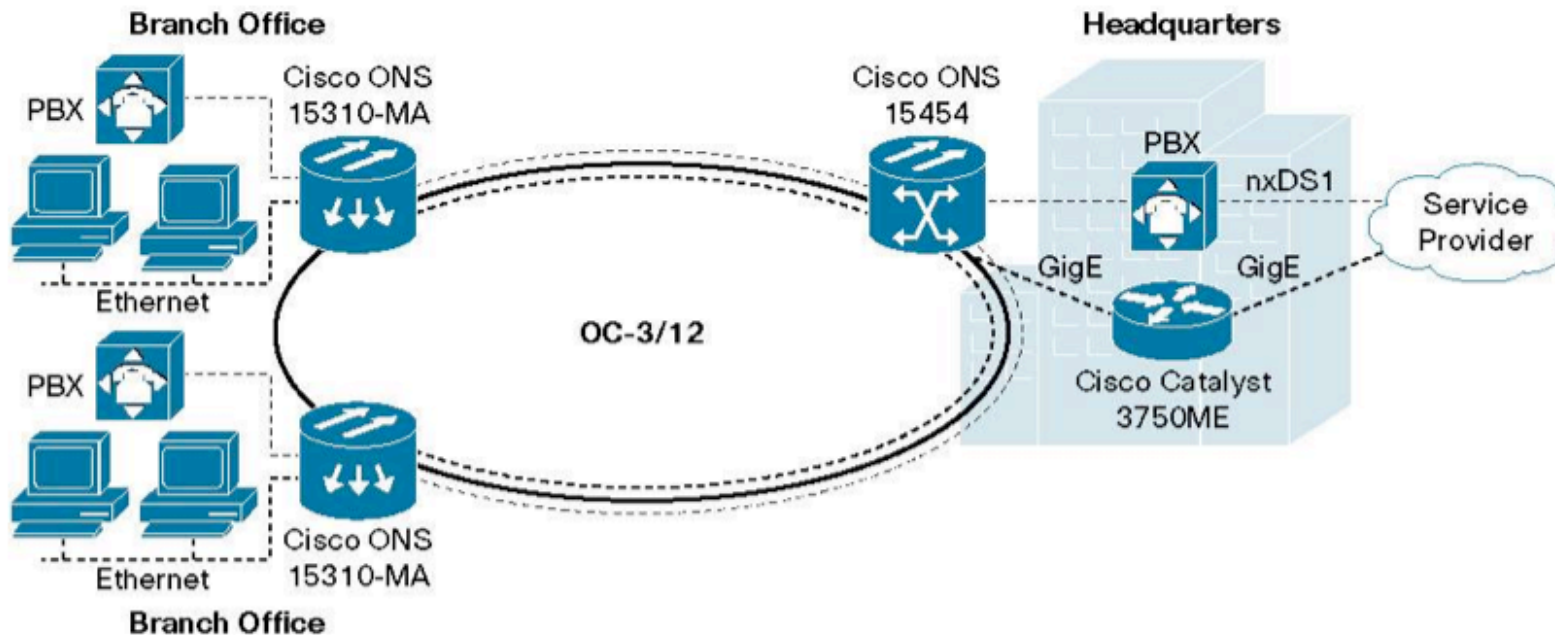
Cisco MSPP

Customer Access Platform

Service providers can collect voice and data services using the Cisco ONS 15310-MA at the customer location. Its carrier-class features, such as redundant common equipment and facility protection, allow it to support 99.999% availability requirements, making it specifically valuable for supporting the most demanding service-level agreements (SLA). Its compact form factor makes it easy to deploy in enterprise customer communication closets, which are typically space-constrained.

Enterprise Networks and Managed Services

The Cisco ONS Family of products can also serve as an optical transport platform for an enterprise-owned network or a managed service. A Cisco ONS 15310-MA located at the headquarters or main building of an office, university, or government campus, for example, can aggregate Ethernet and TDM traffic from multiple remote sites. Other Cisco ONS 15310-MA or Cisco ONS 15310-CL units can be used in these remote locations to connect to private branch exchange (PBX) systems and LANs. The hub unit would simultaneously interface with the service provider to receive bandwidth for switched voice or data services, Internet access, or a wide-area extension of the VPN (Figure 4).

Cisco MSPP

A similar application takes place in high-rise buildings where the Cisco ONS 15310-MA can serve as a hub to distribute traffic through an optical backbone to Cisco ONS 15310-CL or other Cisco ONS 15310-MA devices in different floors (Figure 5).
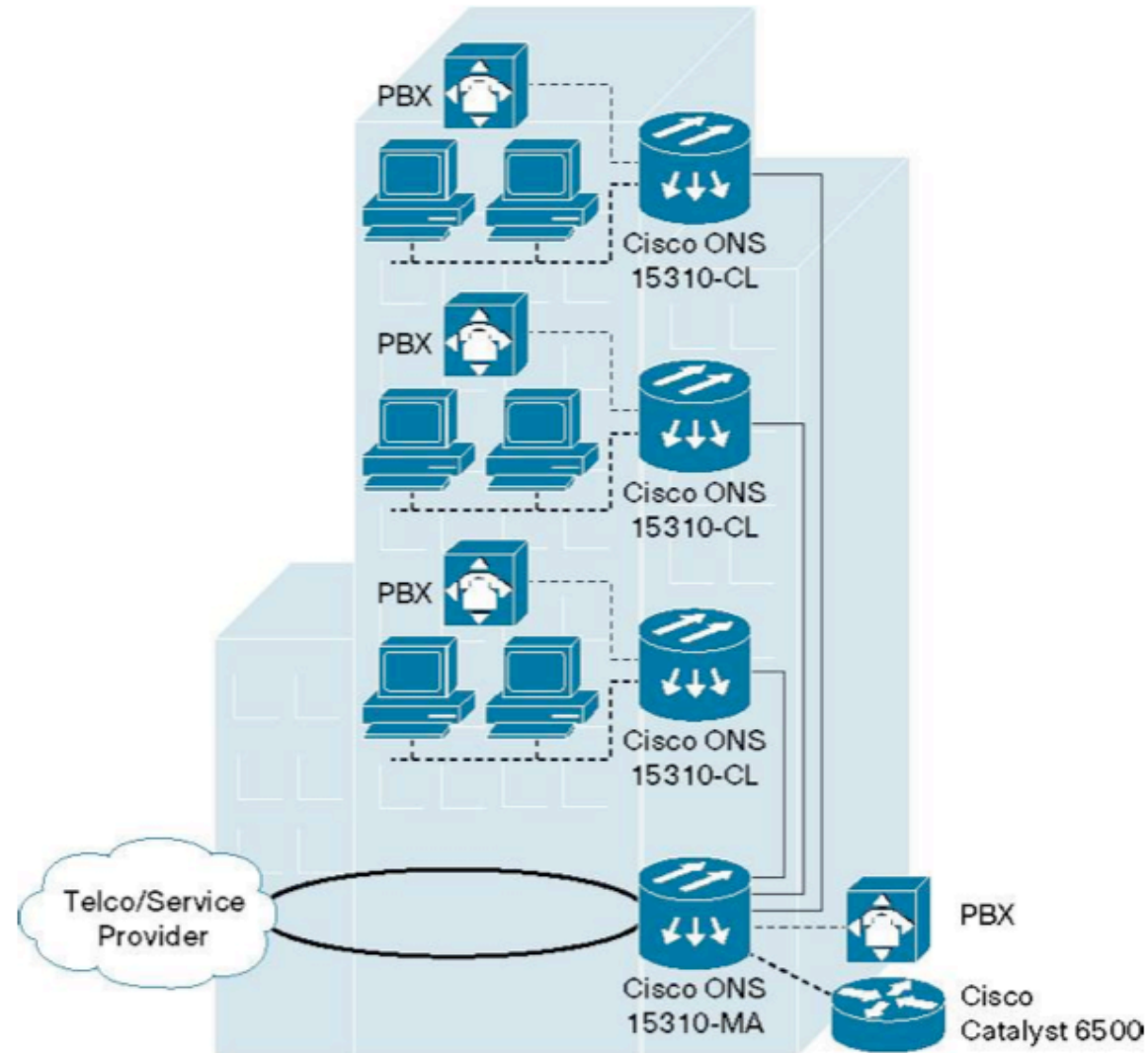
Cisco MSPP

Small Footprint

At only 6-RU high, the Cisco ONS 15310-MA provides unprecedented service density in its compact form factor (Figure 6). Two systems can fit side-by-side in a standard 23-inch rack. The small footprint increases network design flexibility, allowing service providers to deploy a powerful MSPP in small cabinets where space is limited, and deliver higher-bandwidth services in remote locations. It also helps service providers conserve space in central offices. Finally, as a customer access platform, the Cisco ONS 15310-MA can be more easily deployed in telecommunications closets of enterprise customers, resulting in more cost-effective and faster service activation.

Figure 6

The Small Form Factor Allows for Flexible Rack-Mounting Options
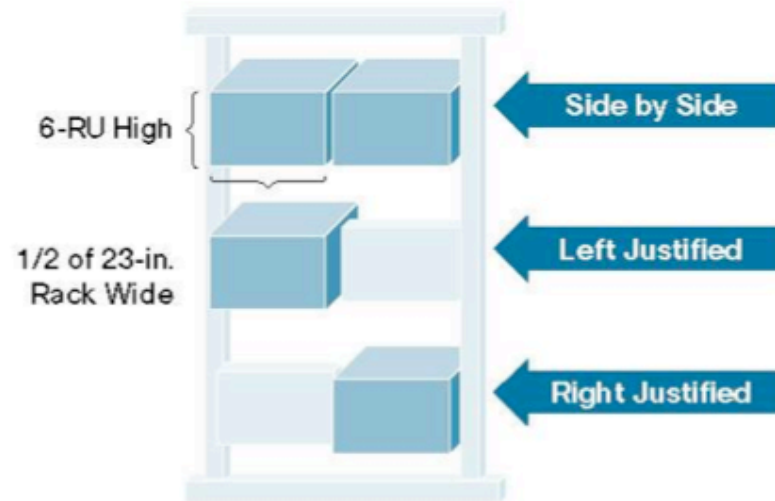
Cisco MSPP

Carrier Ethernet-over-SONET Transport

The Cisco ONS 15310-MA can be equipped with Ethernet cards to facilitate the delivery of carrier-class, private-line Ethernet and Fast Ethernet services. Virtual Concatenation (VCAT), Link Capacity Adjustment Scheme (LCAS), standard encapsulation, and SONET sub-50-millisecond (ms) resiliency schemes are used to deliver these point-to-point data services efficiently and in conjunction with the traditional TDM service-delivery requirements.

The Cisco ONS 15310 CE-Series 8-Port 10/100 Carrier Ethernet Card can be installed in a Cisco ONS 15310-CL or Cisco ONS 15310-MA for Layer 1 Ethernet-over-SONET applications. The Cisco ONS 15310 CE-Series provides port-mapped services and interoperability with the Carrier Ethernet cards supported on the Cisco ONS 15454, delivering Ethernet and Fast Ethernet solutions that span access and metropolitan-area networks.

Multilayer Ethernet-over-SONET Transport

Traditional Ethernet-over-SONET services consist of simple Layer 1 mapping of Ethernet frames into SONET for transport between two endpoints where SONET protection mechanisms are used to deliver sub-50-ms resiliencies. Consequently, bandwidth must be reserved for both working and protected traffic, resulting in underutilization of available bandwidth. Furthermore, services such as voice over IP (VoIP), digital videoconferencing, surveillance, and VPNs all require interconnectivity between multiple end locations. Using the traditional Ethernet-over-SONET point-to-point model, these solutions become very complicated and highly inefficient.

Switched Ethernet uses statistical multiplexing, which supports oversubscription and better usage of Ethernet networks. Resilient Packet Ring (RPR) enables efficient multipoint services, with spatial reuse of bandwidth and sub-50-ms, Layer 2 ring-based protection. Using switched Ethernet and RPR results in a more robust, efficient solution that economically addresses the needs of today's advanced services requirements.

The Cisco ONS 15310 ML-Series 8-Port 10/100 Ethernet Card is a Layer 2-switched services card that can be installed in the Cisco ONS 15310-CL or Cisco ONS 15310-MA. The card interoperates with the Cisco ONS 15454 ML-Series data cards on the Cisco ONS 15454, delivering Ethernet and Fast Ethernet solutions that span access and metropolitan-area networks.

Cisco MSPP

Card Type		Description
Control, Timing, Cross-Connect, and Optics (CTX)		
Data communications channel (DCC)	IP and OSI DCC	
Card protection	Unprotected, 1:1 protected	
Cross-connect	480 x 480 synchronous transport signal level 1 (STS-1), 2128 x 2128 VT1.5	
Optical ports	• 2 SFP optics ports per card	
	• Cisco qualified OC-3, OC-12, OC-48 and multirate SFPs supported	
	• Linear 1+1 APS or UPSR networking	

Interface or Card Type	No. of Ports per Card (Tx/Rx)	Protection	Shelf Port Density (Maximum)
Electrical Interfaces (SONET/ANSI)			
DS-1/DS-3/EC-1 High Density	84 DS-1; 3 DS-3/EC-1	0:1, 1:1	168 DS-1; 6 DS-3/EC-1 (protected)
DS-1/DS-3/EC-1 Low Density	28 DS-1; 3 DS-3/EC-1	0:1, 1:1	56 DS-1; 6 DS-3/EC-1 (protected)
CE-Series 10/100 Ethernet Card	8	0:1	32
ML-Series 10/100 Ethernet Card	8	0:1	32

Cisco MSPP

Protection Options

- SONET

  - Unidirectional Path Switched Ring (UPSR) – Telcordia GR-1400-CORE

  - 1 + 1 automatic protection switching (APS) – Telcordia GR-253-CORE

- Data

  - Resilient Packet Ring (RPR)

  - Spanning Tree Protocol and Rapid Spanning Tree Protocol (RSTP)

Node Configurations

- Terminal

- Linear add/drop multiplexer (ADM)

- Regenerator

- Ring

Cisco MSPP

Data Features

- Layer 1 Ethernet features
  - MEF9 certified EPL service
  - Sub-50-ms SONET protection and restoration of transport circuits
  - Low-latency transport
  - Transparent to Layer 2 bridging, switching, Ethernet MAC protocols (such as Cisco EtherChannel® technology, 802.1x, Cisco Discovery Protocol, VLAN Trunking Protocol [VTP], Spanning Tree Protocol), and VLAN (802.1Q and QinQ)
  - Ethernet link functions: autonegotiation, link-speed autosense, full and half duplex, flow control (802.3x)
  - Packet prioritization based on IP type of service (ToS) or 802.1P
  - Maximum packet size supported: 1548 bytes
  - Link integrity
- Layer 2 Ethernet features
  - MEF9 certified EVPL and ELAN service
  - RPR
  - Ethernet bridging (802.1D)
  - Ethernet Priority (802.1P)
  - Spanning Tree Protocol (802.1D), Rapid Spanning Tree Protocol (802.1w)
  - VLANs (802.1Q and 802.1Q in 802.1Q)
  - Point-to-point, point-to-multipoint, or RPR
  - Dedicated or shared bandwidth
  - Fast Ethernet EtherChannel technology (link aggregation)
  - Flexible packet classification – dual leaky bucket supporting committed information rate (CIR) and peak information rate (PIR) models

Cisco MSPP

- Per-class queuing with Weighted Deficit Round Robin (WDRR) scheduling

- Priority marking for end-to-end QoS support

- Layer 3 Ethernet features

  - Static routing

  - IP-aware QoS (IP ToS/IP DSCP)

  - IP SLA monitoring

- Other

  - General Framing Procedure (GFP)

  - Virtual Concatenation (high-order [HO] and low-order [LO] VCAT)

  - Link Capacity Adjustment Scheme (LCAS)

Siemens MSPP

Highlights at a glance

The SURPASS hiT 70xx series enables true multi-service provisioning and meets the needs of tomorrow's converged networks. It is a cost-effective platform that covers the whole range of network applications required for the regional and metro core. SURPASS hiT 7070 has been optimized for both packet and traditional TDM traffic.

Key features

- Non-blocking 160G@VC-4 and nx10G@VC-12 switching granularity
- Integrated packet fabrics (Ethernet, RPR)
- Multi-service platform: 2M, 34/45M, 155M, STM-1/4/16/64, 40G, 10/100BT, GbE, 10 GbE
- GFP (Generic Framing Procedure) mapping, LCAS and support of virtual concatenation for optimal scalability of Ethernet services
- Support of concatenated services (VC-4-4c, VC-4-16c, VC-4-64c)
- A variety of STM-64 interfaces, including WDM variants
- Extensive protection mechanisms (SNCP, MSP, BSHR, hardware) including RPR traffic steering

Siemens MSPP

Major benefits for carriers
- Increased revenue from new services
- Significant OPEX and CAPEX reductions
- Seamless integration into the existing network infrastructure
- Full integration into Siemens' best-in-class network management system (TNMS)

Increased revenues from new services
SURPASS hiT 7070 gives carriers a unique competitive advantage by transporting flexible Ethernet services using reliable SDH technology. Ethernet services can be offered with carrier-grade quality as well as best effort service. SURPASS hiT 7070, maximizes the revenue to be gained from existing capacity and opens new revenue streams, while keeping investments low.

Significant operational and investment cost reductions
SURPASS hiT 7070 is highly scalable: It allows the operator to start with a basic configuration at lowest price and cost-efficiently upgrade the system in-service step by step. Not only is the bandwidth scalable, but also the number and type of services, bringing all the flexibility the

carriers need in today's telecommunication market. It prepares the operator's networks for future requirements, allows business-driven growth and assures early time-to-market.

Seamless integration into the existing network infrastructure
SURPASS hiT 7070 protects the installed SDH investment and maintains the operator's TDM services and revenue.

Full integration into Siemens TNMS
SURPASS hiT 7070 is fully integrated into Siemens' best-in-class TNMS network management system, which provides end-to-end administration, performance monitoring for the converged next generation SDH network, improving operating efficiency and simplifying network operations.

Technological advantages
SURPASS hiT 7070 can be deployed as an UHC feeder, a terminal or add-drop multiplexer, a local cross-connect or a multi-ring. It also offers:
- Flexible and scalable links through use of GFP and LCAS

- Multipoint-to-multipoint connections and aggregation via an integrated Layer 2 switch to build VLAN's
- RPR for metro access where ring topologies dominate
- Cost-efficient Metro WDM and DWDM backbone feeding
- Carrier services such as TDM leased lines, VLAN, VPN application, SAN and clear channels

Designed with the future in mind
SURPASS hiT 7070 allows carriers to scale into the future by upgrading their switching matrix capacity and line rates. Moreover, it features trend technologies like Ethernet Layer 2, RPR and ASON.

Abbreviations

ASON	Automatic Switched Optical Network
LCAS	Link Capacity Adjustment Scheme
MSP	Multiplex Section Protection
MS-SPRing	Multi-Section Protection Ring
RPR	Resilient Packet Ring
SNCP	Sub-Network Connection Protection

Siemens MSPP
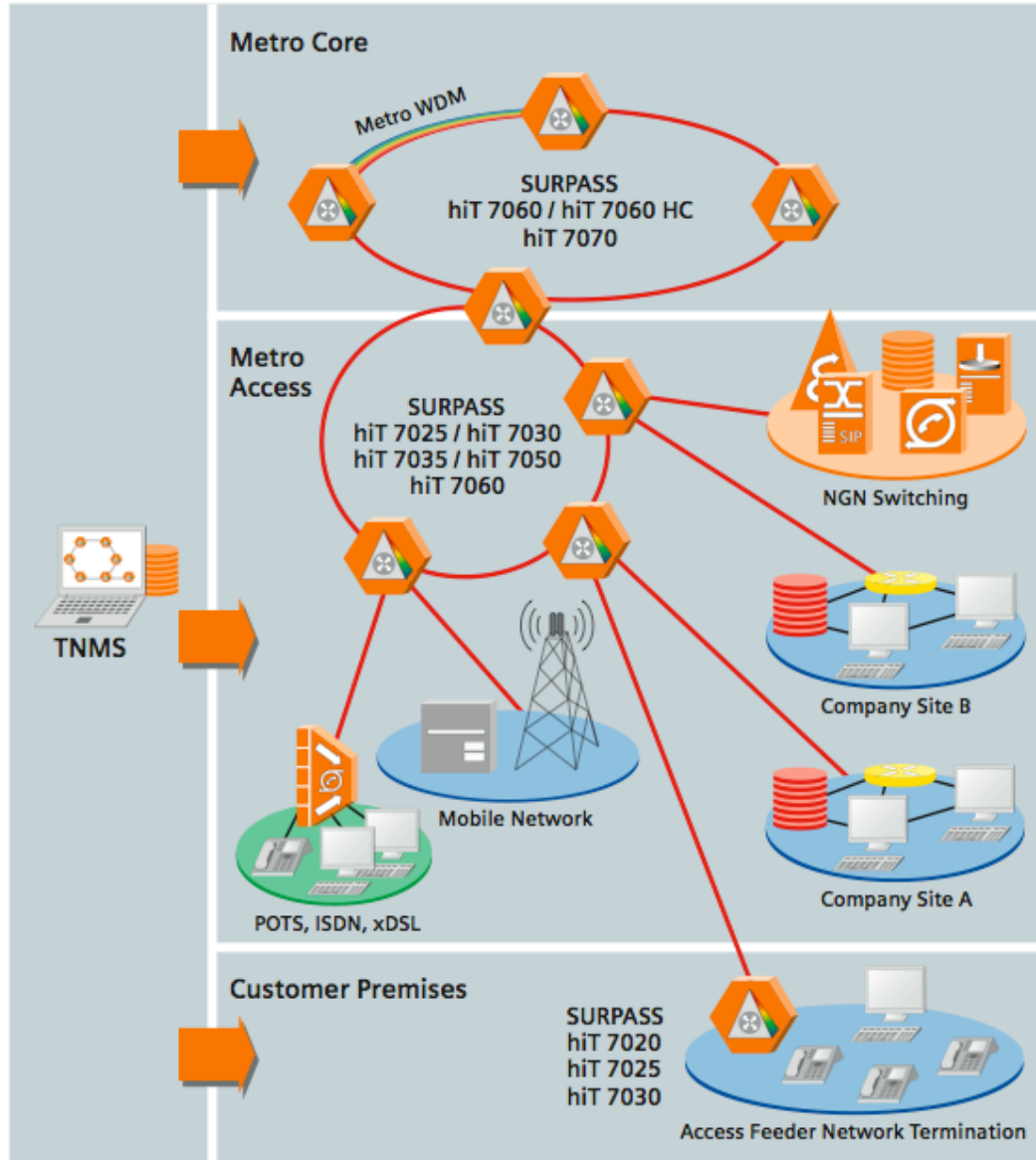
SURPASS hiT 7070 helps carriers significantly cut costs, increase revenue through more efficient and new service delivery, and quickly adapt to customers' demands. This makes SURPASS hiT 7070 a key investment for profitable and future-proof metropolitan networks.

Orion Telecom MSPP

Introduction

The VCL100MC-1 Multi-Service Provisioning Platform (MSPP) is a compact, leading edge, and yet practical bandwidth provisioning equipment designed to meet low or medium capacity bandwidth service demands. This unique product is part of a family of Multi-Service Provisioning Platform and Access Nodes from Orion. As with all products in Orion's family, the VCL100MC-1 MSPP also supports end-to-end provisioning and management of voice and data services across all the segments of the optical network - from the customer premises to the core. It combines innovative optical networking software with the intelligence of SDH to deliver a flexible solution to today's service providers. The VCL100MC-1 can be configured as Terminal Multiplexers (TMUX) or Add-Drop Multiplexers (ADM), with mix-and-match tributary interfaces at E1, E3, DS3 or 10/100 Mbps Ethernet service interfaces. The product has a built in non-blocking cross-connect at VC-3 and VC-12 granularity for efficient traffic grooming. In view of the growing demand for packet services, VCL100MC-1 provides rate controlled 10/100 Base-T interfaces to carry inter-office traffic from corporate LANs, campus networks, or from Internet Service Providers.

Orion Telecom MSPP

Features

- E1/DS1, E3/DS3
- Multiple tributary slots
- Low priced Terminal Multiplexer and Add- Drop Multiplexer
- 3U chassis - available in rack mounting option
- Integrated multi-service delivery
- Direct Ethernet-to- SDH / SONET mapping using built-in 10/100 Base-T Interfaces
- Linear and ring topologies
- Multi-level protection schemes - Unprotected, MSP, SNCP
- Advanced networking software with support for open standards such as OSPF

Advantages

- Flexibility and modularity in tributary configurations
- Can be placed in customer premises or PoP's with space constraints.
- Compact size
- Provision both voice and data services from the same platform. Efficient use of transport bandwidth by supporting per-port rate adaptive Ethernet services.
- Enables creation of point-to-point Transparent LAN services or Virtual Private Network Services
- Topology support to cater to customer network scenarios
- Carrier-grade protection schemes enable you to cater to differing customer protection requirements.
- Enables automatic topology discovery, shared mesh restoration and Point-and-Click Provisioning (PNCP).
- User friendly GUI based Network Element Software for local and remote provisioning

Orion Telecom MSPP
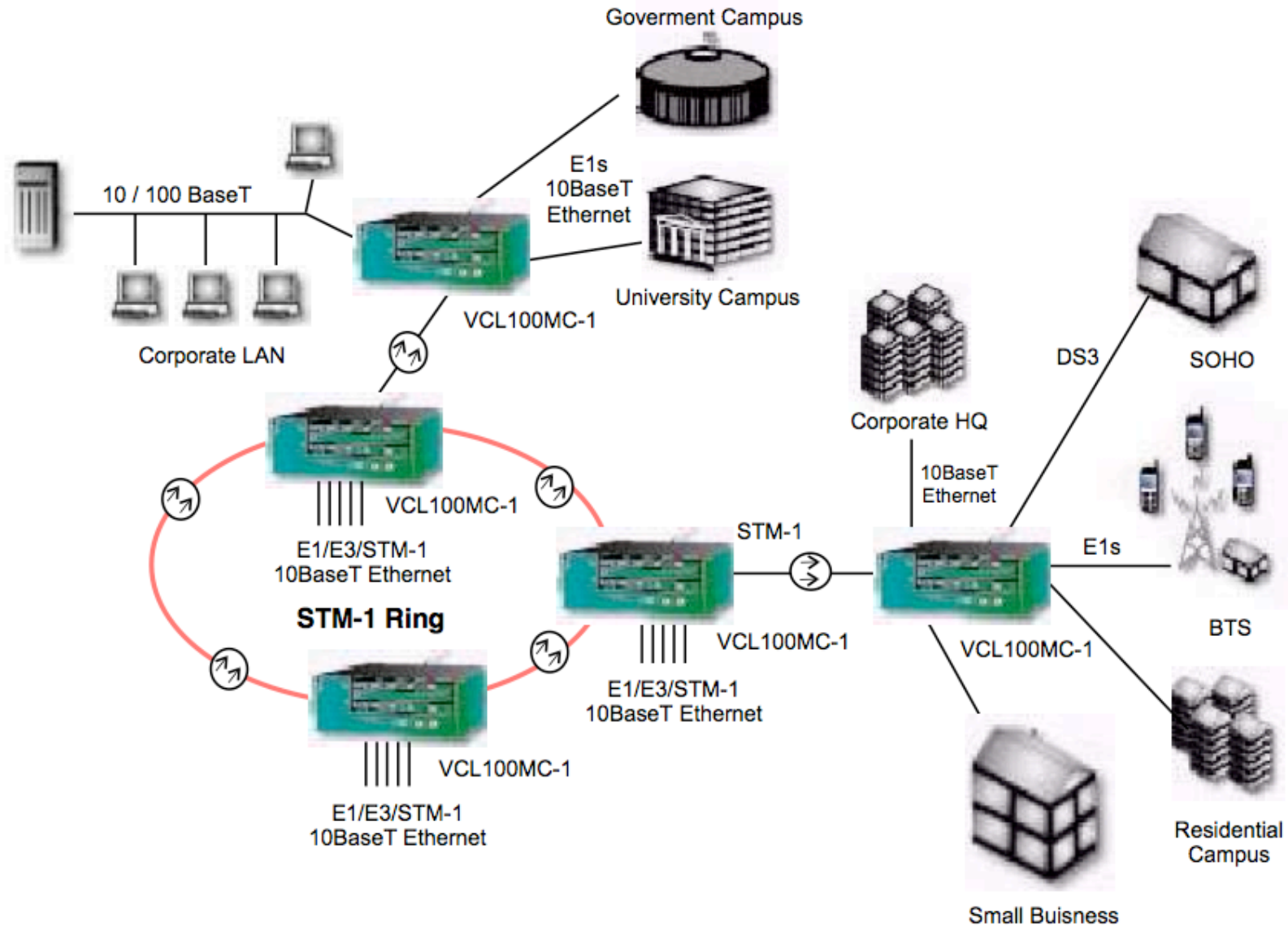
Orion Telecom MSPP

Technical Specifications

Network Topology
- Linear, Ring, Mesh

Network Element Configurations
- Terminal Multiplexer (TMUX)
- Add-Drop Multiplexer (ADM)

Aggregate Interfaces
- 2 X STM-1e/o
- S1.1, L1.1, L1.2 (ITU-T G.957 compliant)
- Optical (1+1) Redundancy in Terminal Multiplexer Mode.

Tributary Interfaces
- E1/DS1, E3/DS3
- STM-1o
- STM-1e/E4
- 10 Base-T/100 Base-TX Ethernet

Cross Connect
- 252 X 252 VC-12
- Fully non blocking
- Line to Line, Line to Tributary, Tributary to Line, Tributary to Tributary

Maintenance
- Higher-order and Lower-order POH, all SDH level performance monitoring (as per ITU-T G.826 and ITU-T G.784)
- Software downloads

Network Management
- Element Management System: VCLNES , supports full FCAPS functionality.
- RS-232 port for craft interface
- In-band control supported using SONET/SDH Overhead bytes.
- E1 management channel support with drop facility

Power Supply
- -48V DC nominal, -36V to –60V DC
- Power consumption: 35W (without Ethernet Interfaces)

Timing & Synchronization
- Timing & Synchronization of System (as per ITU-T G. 813)

- Internal and External Timing interfaces – Two E1 BITS interfaces (as per ITU-T G.703)
- Internal oscillator capable of supplying a ITU-T G.813 compliant Stratum-3 SEC
- Support of SSM byte

Order wire support, Alarms and User data Channel
- E1/E2 bytes used for Express order wire (Omnibus/ Selective calling facilities)
- Five potential-free outputs and two potential-free inputs
- F1 byte for user data channel

Physical Dimensions
- Dimensions (H X W X D): 132 mm x 435 mm x 220 mm

Environmental
- Operating Temperature: 0° to 50° C
- Relative Humidity: 10% to 90%, non-condensing

Equipos ATM

Area de Ingeniería Telemática
http://www.tlm.unavarra.es

Redes de Banda Ancha
5º Ingeniería de Telecomunicación

Equipos ATM

- Cisco MGX
  - 8830 Multiservice Switch
  - PXM-1E Processor Switch Module
  - SRM-3T3
- Marconi BXR 48000
- Interfaz ATM para Router

Equipos ATM

- **Cisco MGX**
  - **8830 Multiservice Switch**
  - PXM-1E Processor Switch Module
  - SRM-3T3
- Marconi BXR 48000
- Interfaz ATM para Router

Cisco MGX 8830 Multiservice Switch

The Cisco MGX® 8830 Advanced ATM Multiservice Switch extends a full suite of narrowband interfaces and broadband trunking to remote sites with low density and high service mix requirements, using PNNI and MPLS for flexibility network and service evolutions.

Figure 1

Cisco MGX 8830 Multiservice Switch

KEY APPLICATIONS

- Frame Relay
- Frame Relay-to-ATM network interworking
- Frame Relay-to-ATM service interworking
- IP-enabled Frame Relay
- ATM
- IP virtual private networks (IP VPNs)
- VoIP, VoATM
- DSL aggregation
- Circuit emulation
- MPLS PE

KEY FEATURES

- Processor, switch fabric and broadband interfaces combined in as a single module
- ATM Modular Optics
- Full-featured, narrowband ATM for managed data, voice, and video services
- Compact form factor
- Private Network-to-Network Interface (PNNI) routing
- Industry's highest network availability
- Innovative architecture for supporting multiple control planes and dynamic allocation of services mix

Cisco MGX 8830 Multiservice Switch

TECHNICAL SPECIFICATIONS

Seven double-height function module slots can also be converted to single-height slots with the addition of mid-rail dividers while the unit is in service:

- Two slots reserved for processor switch modules (PXM)
- One slot reserved for two service-resource modules (SRMs)
- Four slots may be used double height or as eight single-height slots for service modules

Switching Fabric

- 1.2-Gbps shared-memory fabric (PXM-1E processor switching module)

Network Interfaces

- OC-3c/STM-1
- T3
- E3
- Channelized T3 (down to DS0 for Frame and DS1 for ATM)
- Channelized STM-1 (down to DS0 for Frame and DS1 for ATM)
- N x T1/E1
- T1/E1
- Channelized T1 (down to DS0)
- Channelized E1
- High-speed serial interface (HSSI), X.21, V.35

Optional Redundancy

The control processor, switching fabric, critical backplane signals, power supplies, and power modules can be configured for 100 percent system redundancy.

Equipos ATM

- **Cisco MGX**
  - 8830 Multiservice Switch
  - **PXM-1E Processor Switch Module**
  - SRM-3T3
- Marconi BXR 48000
- Interfaz ATM para Router

Cisco MGX PXM-1E Processor Switch Module

The Cisco® MGX® PXM-1E Processor Switch Module for the Cisco MGX 8850 and Cisco MGX 8830 Advanced ATM Multiservice Switch is a combination ATM switching fabric and ATM interface and processor card (Figure 1). The PXM-1E provides flexible support of ATM interfaces and allows fast and efficient expansion of ATM modular optics from one OC-3c/STM1 to eight OC-3c/STM1 ports.

The Cisco MGX PXM-1E combines a 1.2-Gbps shared-memory switching fabric with integrated trunking at speeds up to 622 Mbps. The switching fabric provides 1.2 Gbps of nonblocking switching capacity, while the processor provides the control plane that delivers advanced multiservice networking software, diagnostics, and performance monitoring.

Figure 1. Cisco MGX PXM-1E Processor Switch Module

KEY APPLICATIONS

- Frame Relay
- Frame Relay-to-ATM network interworking
- Frame Relay-to-ATM service interworking
- IP-enabled Frame Relay
- ATM
- IP virtual private networks (IP VPNs)
- VoIP, VoATM
- DSL aggregation
- Circuit emulation

KEY FEATURES

- 1.2 Gbps nonblocking switching
- Support for T1/E1, T3/E3 to OC-3c/STM1 interfaces
- High-density combination interface speed cards with modular optics allow bandwidth on demand, and is expandable from one OC-3c/STM1 to eight OC-3c/STM1 ports
- Hierarchical Private Network-to-Network Interface (PNNI) routing with Multiple Peer Group (MPG)
- PNNI/switched virtual circuit (PNNI/SVC) routing and signaling
- Support for both new and existing service-resource modules (SRMs)

Cisco MGX PXM-1E Processor Switch Module

TECHNICAL SPECIFICATIONS

ATM Switch Fabric Card

- Offers 1.2 Gbps nonblocking switching
- Supports hot insertion and removal
- Supports 1:1 hot-standby redundancy
- Provides full environmental monitoring of cabinet temperature, cooling fan speeds, and supply voltages
- Provides four LED indicators:
    - Card status
    - Major/minor network alarms
    - LAN control port activity detect
    - DC power status
- Flexible trunking capability on the processor through various back-card combinations provides the following interfaces:
    - 4 x OC-3c/STM-1
    - 8 x OC-3c/STM-1
    - 8 x T3/E3
    - 16 x T1/E1-includes support for IMA version 1.0 and 1.1
    - Combo card—8 x T3/E3 + 4 x OC-3c/STM1
- Modular optics allow "pluggable" capacity as needed; hot swappable with enhanced serviceability
- Upper back card supports the following functions:
    - User and management interfaces

Cisco MGX PXM-1E Processor Switch Module

PHYSICAL LAYER T1/E1 INTERFACE

Table 1 describes the physical characteristics of the Cisco MGX PXM-1E T1/E1 interface.

Table 1. Physical Layer T1/E1 Interface Type of Back Card

	T1	E1
Port Speed	1.544 Mbps	2.048 Mbps
Cell Transfer Rate	3622 cells/sec	4528 cells/sec (G.704)
Number of Ports	16	16
Line Coding	B8ZS	HDB3
Line Framing	ANSI T1.408 extended Super Frame format line framing	ITU-T G.704 16 frame multiframe line framing
Port Media	100 ohm twisted pair	120 ohm twisted pair for RBBN and 75 ohm coaxial for MCC
Port Connector	RBBN	RBBN and MCC
Cell Mapping	Direct	Direct
Redundancy	1:1, Y-cable	1:1, Y-cable

Cisco MGX PXM-1E Processor Switch Module

PHYSICAL LAYER T3/E3 INTERFACE

Table 2 describes the physical characteristics of the Cisco MGX PXM-1E T3/E3 interface (8 T3/E3 port or 8 T3/E3 ports plus 4 port OC-3c/STM1 Combo modules).

Table 2. T3/E3 Interface Physical Characteristics

Characteristic	T3 (DS3)***	E3***
Line Rate	44.736 Mbps ±20 ppm	34.368 Mbps ±20 ppm
Line Code	B3ZS	HDB3
Cell Transfer Rate	96,000 cells per second in PLCP mode 104,268 cells per second in ADM mode	80,000 cells per second
Framing	C-bit Parity	ITU** T G.832
Signal Level	ANSI T1.102, Telecordia GR-499 Core	ITU-T G.703
Connector	Male SMB* and MCC**	Male SMB* and MCC**
Cell Mapping	Physical Layer Convergence Protocol (PLCP) and Direct	Direct***

*   Male SMB for 8 port T3/E3 modules

** MCC is used in the 8 port T3/E3 ports on the MGX-T3E3-155 Combo Modules

***T3 or E3 is software configurable in the 8 port T3/E3 ports on the MGX-T3E3-155 Combo Modules

Cisco MGX PXM-1E Processor Switch Module

PHYSICAL LAYER OC-3C/STM-1 INTERFACE

- Four OC-3c/STM-1 (155.520-Mbps) ports

- Trunk or port interface mode

- Cell transfer rate of 353,208 cells per second
- Compliant with Synchronous Optical Network (SONET) standards
    - Telecordia GR-253-CORE

    - ANSI T1.105

- Compliant with SDH standards
- ITU-T G.707, G. 708, and G.709
- ITU-T G. 957, G.958
- ITU-G.783 Annex-A

Table 3 describes the OC-3c/STM-1 interface.

Table 3. OC-3c/STM-1 Interface Physical Characteristics

Type of back card	Source 1310 nm	Tx Power (dBm)		Rx Range (dBm)		Physical	Range (km)
		Min	**Max**	**Min**	**Max**		
Multimode Fiber (MMF)	LED	−22	−15	−31	−10	SC* and LC**	2 km
Single-Mode Fiber (SMF) Intermediate Reach (IR)	Laser (Class 1)	−15	-8	−28	−8	SC* and LC**	15 km
SMF Long Reach (LR)	Laser (Class 1)	−5	0	-34	−10	SC* and LC**	40 km
STM* Electrical	N/A	N/A		N/A		MCC***	100m for IG59 cables

* SC is used in the 4 port OC-3c/STM1 modules

** LC is used in the 8 port T3/E3 plus 4 port OC3-c/STM1 Combo modules and 8 port OC-3c/STM1 modules

*** MCC for 8 port STM1 Electric modules

Cisco MGX PXM-1E Processor Switch Module

ATM LAYER

- Configurable for trunk and public or private User-Network Interface (UNI) application
- UNI compliant to ATM Forum UNI Specifications V.3.0 and V.3.1 and V4.0, and ITU-T I.361 and I.432 specifications
- Complies with standard usage parameter control (UPC) and connection admission control (CAC) per ATM Forum UNI Specification V.3.1 and Traffic Management V.4.0 and ITU-T I.371
- Supports virtual circuit connections (VCCs) and virtual path connections (VPCs) per ATM Forum UNI Specification V.4.0 and ITU-T I.371
- 27,000 connections per chassis
- Virtual path identifier/virtual channel identifier (VPI/VCI) range for VCCs and VPCs: per UNI Specification 4.0
- Early Packet Discard (EPD) and Partial Packet Discard (PPD)

VIRTUAL TRUNKS

- Up to 31 virtual interfaces and each supports 16 CoS queues
- Interfaces can be ports, trunks, VNNI, VUNI, EVNNI, and EVUNI

TRAFFIC MANAGEMENT

- Constant Bit Rate (CBR), variable bit rate real time (VBR-rt), variable bit rate non-real time (VBR-nrt), unspecified bit rate (UBR), available bit rate ABR-STD
- Up to 16 classes of service (CoS)

CELL BUFFERING

- Large ingress and egress cell buffer architecture
- 128,000 cells stored per card:
    - Accommodates large traffic bursts
    - Avoids network congestion and cell discard
    - Suited to Transmission Control Protocol/Internet Protocol (TCP/IP) traffic

Cisco MGX PXM-1E Processor Switch Module

SUPPORT FOR DYNAMIC ROUTING USING PNNI 1.0

- Offers automatic end-to-end connection management mechanism
- Deterministically allocates bandwidth and reroutes connections autonomously over optimum network paths
- Preserves service integrity during network failure
- Offers E.164/NSAP addressing
- Offers support for SVC/SVP and SPVC/SPVP
- Offers QoS-based routing

ENHANCED CALL ADMISSION CONTROL

- A user programmable enhanced connection admission control (E-CAC) feature decides whether to admit or deny connections based upon the requested quality of service.

NETWORK MANAGEMENT

- Management using Cisco WAN Manager
- Simple Network Management Protocol (SNMP)-based for configuration and statistics collection
- Graphical user interface (GUI)

PHYSICAL SPECIFICATIONS

- Dimensions: (H x D): 15.83 x 15.65 in. (40.2 x 39.8 cm)

ELECTRICAL SPECIFICATIONS

- Input power required: –48 VDC
- Power consumption: 100W

Equipos ATM

- **Cisco MGX**
  - 8830 Multiservice Switch
  - PXM-1E Processor Switch Module
  - **SRM-3T3**

- Marconi BXR 48000

- Interfaz ATM para Router

Cisco MGX-SRM-3T3

THE CISCO MGX-SRM-3T3 SERVICE RESOURCE MODULES (SRMs) PROVIDE 1:N REDUNDANCY, M13 MULTIPLEXING CAPABILITIES, AND BIT ERROR RATE TESTING (BERT). DESIGNED FOR USE WITH THE CISCO MGX™ 8800 AND 8200 PRODUCTS, THE SRM-3T3 OFFERS THREE T3 PORTS ON THE BACK CARD.

Cisco MGX-SRM-3T3

Highlights

A service resource module (SRM) provides three major functions for service modules; it provides for bit error rate tester (BERT) of T1 and E1 lines and ports, loops back individual N x 64 channels toward the customer premises equipment (CPE) and provides for 1:N redundancy. The SRM-3T3 provides the additional capability of supporting multiple T1 channels over T3 lines on the SRM and distributing those channels to T1 service modules in the shelf.

Bit Error Rate Tester

After a service module line or port is put into loopback mode, the SRM can generate a test pattern over the looped line or port, read the received looped data, and report on the error rate. This operation can be performed on a complete T1 or E1 line, on a fractional T1 or E1 line, on a SD0 bundle (N x DS0), or on a single DS0 channel. The SRM can support BERT only one line or channel at a time. BERT is capable of generating a variety of test patterns, including all ones, all zeros, alternate one zero, double alternate one zero, 223-1, 220-1, 215-1, 211-1, 29-1, 1 in 8, 1 in 24, DDS1, DDS2, DDS3, DDS4, and DDS5.

1:N Service Module Redundancy

Service module redundancy provides 1:N redundancy for multiple groups of service modules, where a group consists of N active and one standby service module. The redundant service module in a group must be a superset (with respect to functionality) of the cards. Upon the detection of a failure in any of the service modules, the packets destined for the failed

service module are carried over the CellBus to the SRM in its chassis. The SRM receives the packets and switches them to the backup service module via the CellBus. Thus each active SRM provides redundancy for a maximum of 11 service modules per shelf.

Cisco MGX-SRM-3T3

Bulk Mode

Each of the T3 ports can be used to support up to 28 multiplexed T1 lines, which are distributed to T1 service module ports in the switch. Called bulk distribution, this feature is performed when the SRM is in "bulk mode." The purpose of this feature is to allow large numbers of T1 lines to be supported over three T3 lines rather than over individual T1 lines.

Out of the maximum possible 84 T1 channels (3 times 28), up to 80 channels per shelf can be active at any time. Any T1 channel in a T3 line can be distributed to any eight port on a service module in any slots of the shelf without restriction. Each MGX 8800 shelf can support up to 80 T1/E1s, and the whole chassis supports up to 160 T1s. As an option, the SRMs can use back cards and native T1/E1 interfaces to bring the total to 192 DS1s; 160 DS1s using twenty 8-port cards and the SRMs, and 32 DS1s using four 8-port cards with T1/E1 back cards (for the MGX 8220).

The SRM-3T3 can also be operated in "nonbulk mode" on a port-by-port basis. For a port configured in nonbulk mode, bulk distribution is disabled and the SRM provides BERT and 1:N redundancy functions only.

When operating in bulk mode, individual T1 lines can be used on service module ports. However, a service module port cannot be used simultaneously with an individual T1 line and with a distributed T1 channel.

Ordering Information

MGX-SRM-3T3(=)	Service resource module, supporting three T3s
MGX-BNC-3T3-M(=)	Three T3 back card, BNC connector
MGX-SR-8(=)	License for redundancy

- Three DSX-3 (44.736 Mbps +/-40 ppm) interfaces with dual female 75-ohm BNC coaxial connectors per port (separate RX and TX)
- B3ZS line coding
- Pulse shape conforming to ANSI T1.102
- BERT and extended loopback pattern generation/ verification
- 1:1 redundancy with Y-cabling

SRM-T3 LED Indicators

Type of LED	Color	Meaning
ACTIVE (ACT) LED	Green	Indicates card set is in active mode.
STANDBY (STBY) LED	Yellow	Indicates card set is in standby mode.
FAIL (FAIL) LED	Red	Indicates BNM-155 card set has failed or the line module is missing.

Equipos ATM

- Cisco MGX
  - 8830 Multiservice Switch
  - PXM-1E Processor Switch Module
  - SRM-3T3

- **Marconi BXR 48000**

- Interfaz ATM para Router

Marconi BXR 48000 Broadband Switch Router

The BXR48000 is a carrier-class, multiservice switch router that scales to 480 Gbps of full-duplex capacity. This deterministically non-blocking platform offers concurrent support of connectionless IP routing, Multiprotocol Label Switching (MPLS), and Asynchronous Transfer Mode (ATM) switching.

Marconi BXR 48000 Broadband Switch Router

Data summary

System architecture	• 40 to 480 Gbps, full duplex, deterministically non-blocking capacity
	• Payload and Protocol Agnostic architecture
	• High-performance system control processors and distributed module control processors
	• Up to 12M connections of any type
	• Up to 10K connection setups/teardowns per second, per system for on-demand service and fast connection reroute
Interfaces	• Up to 768 OC-3c/STM-1 POS, IP-Aware (IPA) ATM, ATM
	• Up to 768 OC-12c/STM-4 POS, IPA ATM, ATM
	• Up to 192 OC-48c/STM-16 POS, IPA ATM, ATM
	• Up to 48 OC-192c/STM-64 POS, IPA ATM, ATM
	• Up to 480 Gigabit Ethernet interfaces
	• Up to forty-eight 10 Gigabit Ethernet interfaces
IP/MPLS	• IP – Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP), OSPFv2-TE, BGP-4, IS-IS-TE, PIM-SM, PIM-DM, MBGP, IPv4, IPv6, and static and default routing
	• MPLS – RSVP-TE, LDP, and permanent LSP (P-LSP)
	• IP routing/forwarding
	• LER (edge) and LSR (core) switch router
	• Experimental-bit-inferred LSP (E-LSP) and label-inferred LSP (L-LSP)
	• LC-ATM and shim header support
	• DiffServ-aware traffic engineering
	• IP and MPLS DiffServ – class selector (CS), assured forwarding (AF), expedited forwarding (EF), and default forwarding (DF)
	• MPLS IntServ – guaranteed service (GS) and controlled load (CL)
	• Deep packet classification and filtering
	• Traffic conditioning, WRED, and per-class and per-connection queuing and scheduling
	• MPLS and IP VPNs – PWE3, RFC 2547bis (P and PE)
	• Line-rate performance up to 1.5B pps
	• More than 1M IP routes

Marconi BXR 48000 Broadband Switch Router

Ethernet	• 802.1p/Q priority/VLAN tag
	• Link aggregation (intra-card)
	• Jumbo frames (9192)
	• DHCP relay
	• BootP forwarding
	• VRRP
	• 802.1 Spanning Tree/VLAN
	• Rapid Spanning Tree
	• Transparent LAN Service
	• Port Mirroring
ATM	• Permanent virtual connections (PVx), switched virtual connections (SVx), and soft PVx (SPVx) – point-to-point, point-to-multipoint, multipoint-to-point
	• ATM Forum UNI 3.0, 3.1, and 4.0; Interim Local Management Interface (ILMI) 4.0
	• ATM Forum PNNI, H-PNNI, AINI, and Interim Interswitch Signaling Protocol (IISP)
	• Dynamic PNNI Hierarchy
	• Virtual path termination (VPT) and virtual UNI
	• Transit Network Selection (TNS)
	• ATM VPNs – network service access point (NSAP) filtering and closed user groups (CUGs)
	• Path Trace and Connection Trace
	• Connection Modify
	• SPVx traffic pacing and prioritized connection reroute
	• ATM Forum Traffic Management 4.x – constant bit rate (CBR), real-time variable bit rate (rt-VBR), non-real-time VBR (nrt-VBR), unspecified bit rate (UBR), available bit rate (ABR), guaranteed frame rate (GFR), and UBR with minimum desired cell rate (MDCR)
	• Dual generic cell rate algorithm (GCRA) policing
	• Per-VC queuing, per-QoS queuing and VC merge
	• Early packed discard (EPD), partial packet discard (PPD), and partial packet policing
	• RFC 1483/2684 permanent virtual circuit (PVC) support
	• ATM Forum LAN Emulation Client (LEC)

Marconi BXR 48000 Broadband Switch Router

Data summary (continued)

Resilience
- Level 4 hot-swappable (zero traffic loss in system upon insertion/removal with power)
- Redundant system control processors, timing control modules (TCMs), port cards, power conditioning modules (PCMs), and cooling system
- Zero-packet-loss fabric protection and capacity upgrades
- Redundant line, Building Integrated Timing Supply (BITS), and Stratum 3E derived timing
- SONET 1+1 APS, SDH MSP
- Hitless software upgrades
- Call/connection preservation for ATM and MPLS connections
- Backup LSP, fast reroute, and non-stop forwarding and routing
- Dynamic protection switching
- Denial of service prevention/protection
- PNNI/MPLS traffic engineering/rerouting
- Management Plane Security: SNMPv3 w/ DES/3DES, SSH, SSL, AES, RADIUS, TACACS+, SecurID, Kerberos
- Control Plane Security: MD5 (OSPF, RSVP-TE, IS-IS, BGP-4, LDP), Route Filtering via RPCL
- Data Plane Security: Unicast RPF, Filtering & Rate Limiting, e.g., port ID, IP address, Tx/Rx port, etc.

Network management

General
- Out-of-band management via Ethernet and serial interfaces
- In-band management via LAN Emulation (LANE)/Classical IP (CLIP) and MPLS
- Command line interface (CLI) and Web-based graphical user interface (GUI)
- Simple Network Management Protocol (SNMP v3)
- Statistics based on ITU-T G.826; Telcordia GR-1248; ATM Forum Usage Measurement; and ITU-T I.610 Operation, Administration, and Maintenance (OAM) support
- Telcordia OSMINE/NGNESS: TIRKS, NMA, NCON, ServiceOn® suite of applications
- Automatic discovery, additions, deletions, and modifications to devices
- Configuration management and status monitoring
- Fault management
- Management of PVx, SPVx, and LSPs
- Northbound Common Object Request Broker Architecture (CORBA) interfaces
- Graphical display of statistics and performance data

Marconi ATM Port Cards

Superior, high-speed performance for multiservice infrastructures

OC-3c/STM-1 through OC-192c/STM-64 ATM for the BXR48000
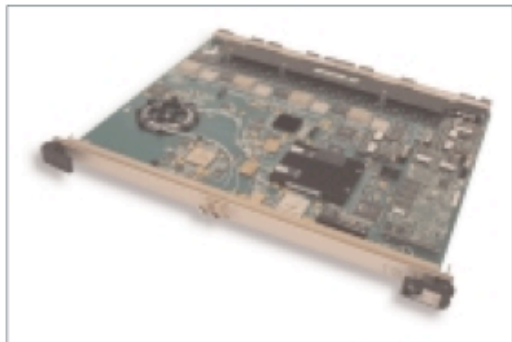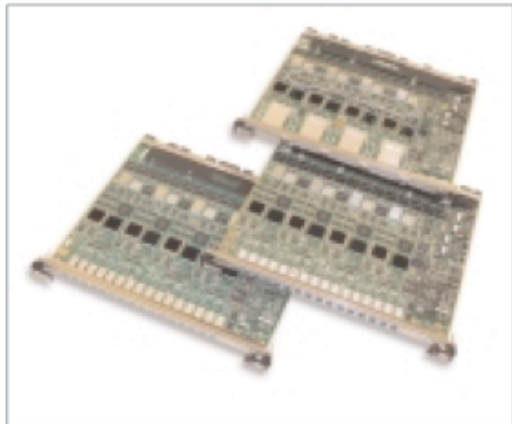
Marconi's Asynchronous Transfer Mode (ATM) port cards for the BXR™48000 provide the most efficient, high-speed cell-based traffic management for services and transport. When equipped with ATM port cards, the BXR48000 enables operators to reduce costs and expand their ATM and Multiprotocol Label Switching (MPLS) infrastructures with the widest range of high-speed, optical-cell-based interfaces available.

The BXR48000 ATM port card family extends Marconi's leadership in supporting predictable services and transport on the industry's most versatile multiservice switch router. Marconi was first-to-market with OC-12c, OC-48c, and OC-192c ATM port cards, enabling the widest range of differentiated, cell-based services from best-effort Internet to services requiring the highest security and most stringent Quality of Service (QoS) assurances.

### Key benefits

- Protects investment in ATM technology through continued use and expansion of multiservice network infrastructures
- Enables growth of high-speed ATM service offerings from OC-3c/STM-1 to OC-192c/STM-64
- Enables aggregation of existing cell-based multiservice networks — Frame Relay, digital subscriber line (DSL), ATM, Transparent LAN Services (TLS) — into a high-speed, protocol-

Marconi ATM Port Cards

Operators can use the ATM port cards to offer high-speed cell-based services such as real-time encrypted video transmission, in addition to multiservice aggregation and trunking at rates from OC-3c/STM-1 to OC-192c/STM-64. Marconi ATM port cards also support Label-Controlled ATM (LC-ATM) functionality for MPLS transport, including the ability to tunnel traffic across the MPLS core.

The BXR48000 supports up to 48 ATM port cards (any port speed and protocol) at full line rate (full duplex) with deterministically non-blocking performance. With the superior performance and industry-leading scalability of the BXR48000, operators can grow their multiservice cell-based networks using a switch router that uniquely supports a smooth evolution to a next-generation, multiservice packet infrastructure.

and payload-agnostic multiservice core

- Provides the necessary bandwidth and QoS guarantees for mission-critical applications such as encrypted, high-speed, real-time video transmission
- Protects services by providing carrier-class reliability of greater than 99.999 percent availability via comprehensive disaster recovery features
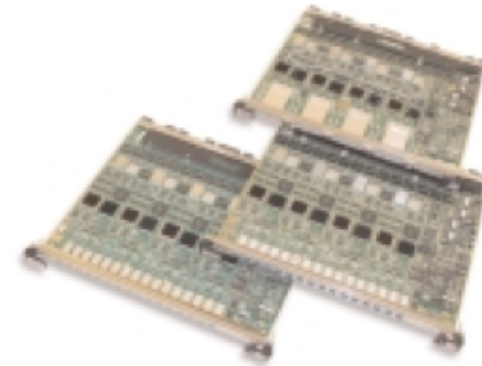
Marconi ATM Port Cards

Data summary

ATM

- Permanent virtual connections (PVx), switched virtual connections (SVx), and smart PVx (SPVx)
- Point-to-point and point-to-multipoint connections
- Virtual path termination (VPT) and virtual user-to-network interface (UNI)
- UNI 3.0, 3.1, and 4.0; Interim Local Management Interface (ILMI) 4.0
- Private Network–Network Interface (PNNI), Hierarchical PNNI (H-PNNI), ATM Inter-Network Interface (AINI), Interim Interswitch Signaling Protocol (IISP)
- Transit network selection

MPLS label switched router (LSR)

- Open Shortest Path First, version 2, with Traffic Engineering (OSPFv2-TE), Intermediate System–to–Intermediate System with Traffic Engineering (IS-IS-TE), Border Gateway Protocol, version 4 (BGP-4)
- Label Distribution Protocol (LDP), Resource Reservation Protocol with Traffic Engineering (RSVP-TE)
- Layer 2 virtual private network (VPN): ATM over MPLS
- Layer 3 VPN: RFC 2547 P router

Traffic management

- 16 independent service classes with per–virtual circuit (VC) queuing/scheduling
- ATM Forum Traffic Management 4.x: constant bit rate (CBR), unspecified bit rate (UBR), real-time variable bit rate (rt-VBR), non-real-time VBR (nrt-VBR), available bit rate (ABR)
- MPLS DiffServ (class selector [CS], assured forwarding [AF], expedited forwarding [EF]) and MPLS IntServ (controlled load [CL], guaranteed service [GS])
- Per-connection queuing and scheduling (strict priority and/or weighted round robin)
- Connection admission control (CAC), dual leaky bucket policing
- Dynamic buffer management with frame discard (early packet discard [EPD] and partial packet discard [PPD]), cell loss priority (CLP) 0/1

Disaster recovery

- Port redundancy – Synchronous Optical Network (SONET) automatic protection switching (APS) and Synchronous Digital Hierarchy (SDH) multiplex section protection (MSP)
- Port card redundancy
- Redundant SPVx/label switched paths (LSPs)
- PNNI/MPLS traffic engineering rerouting

General

- Hitless software upgrades
- ITU I.610 operation, administration, and maintenance (OAM) support
- Level 4 hot-swappable (zero traffic loss in system upon insertion/removal with power)
- Connection preservation for ATM and MPLS connections
- Up to 256,000 bidirectional connections per port card

Compliance

- NEBS Level 3
- Emissions/immunity approvals: FCC/47CFR, ICES-003, EN300386, VCCI
- Safety approvals: UL/CSA 60950, EN60950, EN60825
- Environmental approvals: GR-63-CORE, GR-1089-CORE
- Specifications/standards: Telcordia GR-253-CORE; ITU-T G.691, G.707, G.709; ANSI T1.105

Marconi ATM Port Cards

Optical interfaces

155 Mbps OC-3c/STM-1 multimode port card (BXRATM16/155MM1)

Clock source	Primary or secondary 8 kHz reference – line, Building Integrated Timing Supply (BITS), Stratum 3E
Connectors	LC
Data rate	155.52 Mbps
Framing	STS-3c/STM-1
Free-run clock accuracy	±20 ppm
Line encoding	Non-return to zero (NRZ)
Loopbacks	Line, terminal, diagnostic
Media	Multimode fiber, 62.5 µm/125 µm
Port capacity	16
Power	-14 to -20 dBm transmit power; -12 to -26 dBm receive sensitivity; 0 to 6 dB path attenuation
Statistics	Loss of signal (LOS), loss of frame (LOF), loss of pointer (LOP), far-end block error (FEBE), alarm indication signal (AIS), remote defect indication (RDI), bit interleaved parity (BIP) errors, header check sequence (HCS) errors, loss of cell delineation (LCD), path unequipped, path label mismatch (PLM)
Typical line length	500 m (1,640.42 ft)
Wavelength	Transmit: 1270–1380 nm; receive: 1100–1600 nm

155 Mbps OC-3c/STM-1 single mode port card (BXRATM16/155IR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	LC
Data rate	155.52 Mbps
Framing	STS-3c/STM-1
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652
Port capacity	16
Power	-8 to -15 dBm transmit power; -8 to -28 dBm receive sensitivity; 0 to 12 dB path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	15 km (9.32 mi)
Wavelength	Transmit: 1274–1356 nm; receive: 1270–1570 nm

Marconi ATM Port Cards

Data summary (continued)

622 Mbps OC-12c/STM-4 and OC-3c/STM-1 multimode port card (BXRATM16/622MM1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	LC
Data rate	622.08 Mbps
Framing	STS-12c/STM-4c
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Multimode fiber, 62.5 μm/125 μm
Port capacity	16
Power	-14 to -20 dBm transmit power; -12 to -26 dBm receive sensitivity; 0 to 6 dB path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	OC-12c/STM-4: 2 km (1.24 mi); OC-3c/STM-1: 500 m (1,640.42 ft)
Wavelength	Transmit: 1270–1380 nm; receive: 1100–1600 nm

622 Mbps OC-12c/STM-4 and OC3c/STM-1 single mode port card (BXRATM16/622SR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	LC
Data rate	622.08 Mbps
Framing	STS-12c/STM-4c
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 μm/125 μm G.652
Port capacity	16
Power	-8 to -15 dBm transmit power; -8 to -28 dBm receive sensitivity; 0 to 7 dB path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	2 km (1.24 mi)
Wavelength	Transmit: 1274–1356 nm; receive: 1270–1570 nm

Marconi ATM Port Cards

622 Mbps OC-12c/STM-4 and OC3c/STM-1 single mode port card (BXRATM16/622IR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	LC
Data rate	622.08 Mbps
Framing	STS-12c/STM-4c
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652
Port capacity	16
Power	-8 to -15 dBm transmit power; -8 to -28 dBm receive sensitivity; 0 to 12 dB path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	15 km (9.32 mi)
Wavelength	Transmit: 1274–1356 nm; receive: 1270–1570 nm

Marconi ATM Port Cards

2,488 Mbps OC-48c/STM-16 single mode port card (BXRATM4/2488SR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	SC
Data rate	2,488.32 Mbps
Framing	STS-12c/STM-16
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652
Port capacity	4
Power	-3 to -10 dBm transmit power; -3 to -18 dBm receive sensitivity; 0 to 7 dBm path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	2 km (1.24 mi)
Wavelength	Transmit: 1266–1360 nm; receive: 1260–1570 nm

2,488 Mbps OC-48/STM-16c single mode port card (BXRATM4/2488LR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	SC
Data rate	2,488.32 Mbps
Framing	STS-48c/STM-16
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652, G.654
Port capacity	4
Power	+3 to -2 dBm transmit power; -9 to -28 dBm receive sensitivity; 10 to 24 dBm path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	80 km (49.7 mi)
Wavelength	Transmit: 1500–1580 nm; receive: 1260–1570 nm

Marconi ATM Port Cards

Data summary (continued)

9,952 Mbps OC-192c/STM-64 single mode port card (BXRATM1/9952SR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	SC
Data rate	9,953.28 Mbps
Framing	STS-192c/STM-64
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652
Port capacity	1
Power	0 to -4 dBm transmit power; -1 to -11 dBm receive sensitivity; 0 to 6 dBm path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	12 km (7.45 mi)
Wavelength	Transmit: 1290–1330 nm; receive: 1250–1600 nm

9,952 Mbps OC-192c/STM-64 single mode port card (BXRATM1/9952LR1)

Clock source	Primary or secondary 8 kHz reference – line, BITS, Stratum 3E
Connectors	SC
Data rate	9,953.28 Mbps
Framing	STS-192c/STM-64
Free-run clock accuracy	±20 ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 µm/125 µm G.652
Port capacity	1
Power	+1 to -2 dBm transmit power; -9 to -26 dBm receive sensitivity; 10 to 22 dBm path attenuation
Statistics	LOS, LOF, LOP, FEBE, AIS, RDI, BIP, HCS, LCD, path unequipped, PLM
Typical line length	80 km (49.7 mi)
Wavelength	Transmit: 1530–1565 nm; receive: 1250–1600 nm

Equipos ATM

- Cisco MGX
  - 8830 Multiservice Switch
  - PXM-1E Processor Switch Module
  - SRM-3T3

- Marconi BXR 48000

- **Interfaz ATM para Router**

ATM interface para Cisco 7200

The Cisco Systems ATM Interface Processor (AIP) for the Cisco 7000 family of router platforms, was the industry's first commercially available, standards-based Asynchronous Transfer Mode (ATM) router interface. (The Cisco 7000 family includes the Cisco 7000 and Cisco 7500 series routers.) The dual-RISC and dual-segmentation and reassembly (SAR)-based AIP is installed in more than one thousand Cisco 7000 family routers connecting LAN and WAN internetworks to ATM cell-switching networks. An important part of the CiscoFusion™ architecture, the AIP provides key ATM internetworking services to campus ATM networks that use high-performance platforms such as Cisco's LightStream® 100 switch for workgroup and small campus ATM networks, LightStream 2020 switch for multiservice enterprise ATM switch applications, and Catalyst™ 5000 ATM-capable multilayer LAN switch.

The ATM internetworking services that the AIP supports are included in the Cisco Internetwork Operating System (Cisco IOS™) software for ATM and switching, an advanced infrastructure that binds together all Cisco ATM and LAN switching products to enable the deployment of scalable switched internetworks. These include LAN Emulation and virtual LAN (VLAN) internetworking services, ATM Address Resolution Protocol (ARP) services for Classical IP over ATM as defined in RFC 1577, connectionless services for Switched Multimegabit Data Service (SMDS) and ATM internetworking, and native protocol support via multiprotocol encapsulation as defined in RFC 1483.

The AIP also supports real-time multimedia applications such as desktop videoconferencing and collaborative computing with point-to-multipoint (multicast) signaling, which permits the creation of one-to-many switched virtual connections.

The AIP includes an intelligent traffic management feature that allows bursty traffic to be shaped as it is transmitted into an ATM network—important when using one of the many emerging public ATM networks that require conformance to a traffic contract.
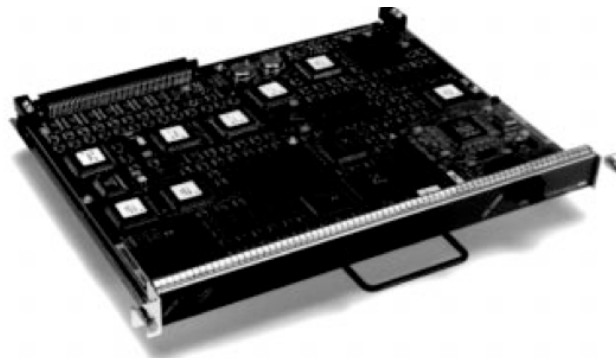
ATM interface para Cisco 7200

ATM Interface Processor Features

- Single native ATM port with transmission rates up to 155 Mbps over a variety of ATM media interfaces

- Traffic shaping to control bursty data traffic; eight user-definable peak rate queues in addition to user-definable average rate and burst size limits for each virtual connection

- Supports ATM Adaptation Layers (AALs) 3/4 and 5

- Dual RISC and dual-SAR design for high-performance cell and packet processing

- Up to 512 simultaneous packet segmentations or reassemblies

ATM Internetworking Services

- Cisco Internetwork Operating System (Cisco IOS) software for ATM

- ATM Forum LAN Emulation and virtual LAN internetworking services; LAN Emulation Configuration Server (LECS), LAN Emulation Server (LES), Broadcast and Unknown Server (BUS), and LAN Emulation Client (LEC) components; up to 256 VLANs

- ATM ARP server for Classical IP and ARP over ATM support as defined in RFC 1577 and RFC 1755

- Multiprotocol routing over ATM for IP, Novell IPX, DECnet, AppleTalk Phases 1 and 2, CLNS, XNS, and Banyan VINES via multiprotocol encapsulation as defined in RFC 1483

- ATM connectionless services as specified in ITU-T I.364 for SMDS over AAL 3/4; routing per RFC 1209 is included

ATM Connection Types

- Permanent virtual connections (PVCs) and switched virtual connections (SVCs) with idle disconnect

- Virtual channel and virtual path (VCI and VPI) termination

- Standard ATM Forum UNI signaling; point-to-point and point-to-multipoint signaling

- Up to 2048 ATM virtual connections maximum

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Pública de Navarra
Nafarroako
Unibertsitate Publikoa

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Área de Ingeniería Telemática

ATM interface para Cisco 7200

ATM Media Interface Types

- Complies with ATM Forum, ITU-T, and ETSI specifications
- Can be self-timed from internal clock or network-timed to support isochronous applications
- SONET/SDH STS-3c/STM-1 155-Mbps multimode fiber, SC duplex connector, up to 3 km
- SONET/SDH STS-3c/STM-1, 155-Mbps single-mode fiber, ST connectors, up to 15 km
- DS3 44.736-Mbps coaxial cable, BNC connectors
- E3 34-Mbps coaxial cable, BNC connectors
- TAXI 4B/5B 100-Mbps multimode fiber, MIC connectors, up to 3 km

Additional Features

- Interim Local Management Interface (ILMI) support for address prefix acquisition and ATM service address registration
- Responds to/generates F5 (loopback) Operations and Maintenance (OAM) cells
- Flash EPROM for downloading new software images
- CiscoWorks™ network management integration; traffic shaping setup and PVC establishment through local management console or using Simple Network Management Protocol (SNMP) and CiscoView™
- Three LEDs for quick status checks and problem identification
- Full SNMP agent and support for RFC 1213 interface MIB, the DS3 MIB per RFC 1407, and future support for emerging AToM MIB specifications
- Supports online insertion and removal (OIR) feature, which allows an AIP to be removed or installed without turning off system power

Equipos ADSL

Equipos ADSL

- Modem ADSL

- Router ADSL

- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVIvid S-A60 / L

Equipos ADSL

- **Modem ADSL**

- Router ADSL

- DSLAM

  - Alcatel ASAM 7300 (-c)

  - AVIvid S-A60 / L

Modem ADSL

DSL-302G

150X Faster Than Analog Modems!

- Plug & Play USB Installation
- Flexible Fast Ethernet or USB Connectivity
- Supports 2 Computers Simultaneously
- Wide Range of DSLAM Interoperability

ADSL Combo Modem

Modem ADSL

D-Link, a worldwide leader in networking products, introduces the new DSL-302G, a newly designed ADSL Modem that provides both USB and Ethernet connectivity at an affordable price.

The DSL-302G uses ADSL (Asymmetric Digital Subscriber Line) technology to bring you Internet connection speeds up to 150 times faster than a 56K analog modem over a standard phone line.

Two computers can simultaneously connect to the DSL-302G through its USB and Ethernet port to share its high-speed Internet connection. You can connect to its Ethernet port regardless of the operating system you are using, or connect to its USB port to allow easy installation to a USB equipped computer running Windows 98SE, Me, 2K, XP, or Mac OS 9 and OS X.

The modem comes with a simple configuration tool and a web-based Graphical User Interface (GUI) that allows you to easily modify settings to connect to an Internet Service Provider(ISP). Connection speed, traffic statistics and other detailed information are displayed.

The DSL-302G supports Static IP, Dynamic IP, as well as PPPoE connections terminating on the local PCs. The DSL-302G supports all applications such as video games and VPN connections with no configuration needed on the modem.

The DSL-302G is easily upgradeable in the field, making it future-proof for both end-users and service providers.

The DSL-302G is a great all-around solution that will satisfy your needs, whether you're a home user who requires high-speed Internet access for faster web surfing or quicker downloads, or a small business that depends on the Internet to conduct daily business.

Modem ADSL

Hardware Features
- RJ-11 port for ADSL Connection
- USB 1.1 (B-Connector)
- RJ-45 port for 10/100 BaseT Ethernet Connection

Diagnostic LEDs Indicator
- Power
- ADSL/Ethernet/USB Activity
- Network Status

Software Features
Dynamic Learning
(Up to 4096 adresses)

Management
- Windows Software Management
- HTTP Web Management

Standards
- ANSI T1.413 issue 2
- ITU G.992.1 (G.dmt)
- ITU G.992.2 (G.lite)
- ITU G.994.1 (G.hs)

Data Rates
- DMT full rate downstream (up to 8Mbps)
- DMT full rate downstream (up to 640Kbps)
- G.lite ADSL downstream (up to 1.5Mbps)
- G.lite ADSL upstream (up to 512Kbps)

USB Support
Minimum Requirements
- Mac OS 9, OS X
- Windows XP, Windows 2000, Windows Me, Windows 98, Windows 98SE
- Pentium 166Mhz or faster

Ethernet Support
Minimum Requirements
- Operating System Independent (works with Windows, Linux, UNIX, and Macintosh)
- Ethernet (NIC) Network Interface Card/Port

Certifications
- FCC Part 15 Class B
- FCC Part 68
- IEC 60950
- CSA 950/US
- CE Mark
- UL 1950 3rd Ed

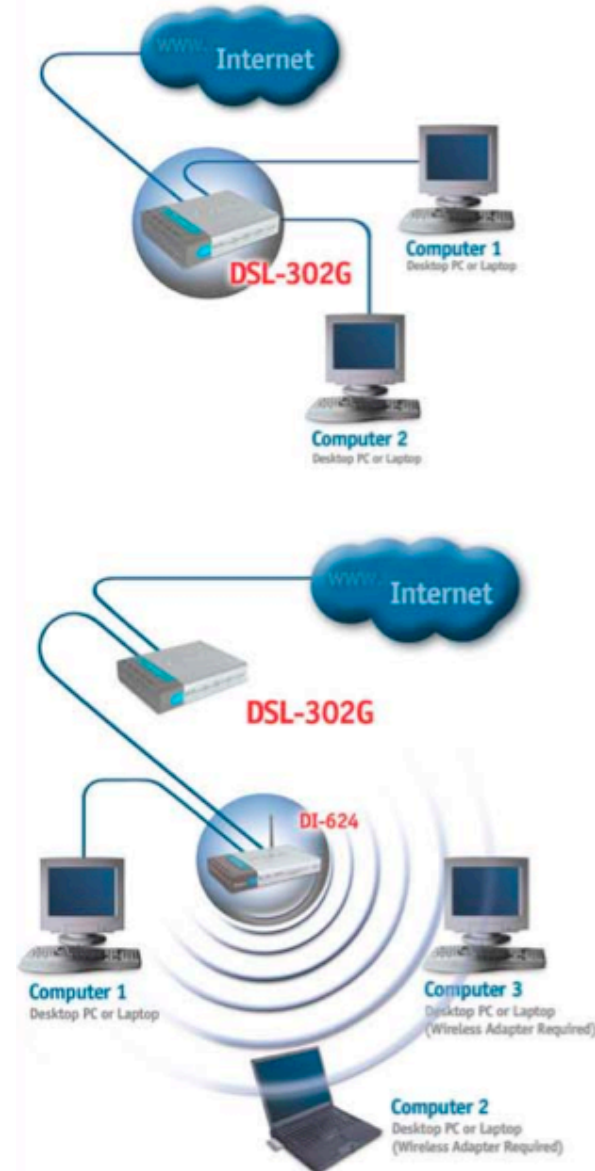**Power Adapter**
Output: 9V AC 1A

Operating Temperature
0° to 50°C
(32 to 122 degrees Farenheit)

Dimensions
142mm x 109mm x 31mm
(5.6in x 4.3in x 1.22in)

Weight
0.21 kg (7.4 oz)

Internet

DSL-302G

Computer 1
Desktop PC or Laptop

Computer 2
Desktop PC or Laptop

Internet

DSL-302G

DI-624

Computer 1
Desktop PC or Laptop

Computer 3
Desktop PC or Laptop
(Wireless Adapter Required)

Computer 2
Desktop PC or Laptop
(Wireless Adapter Required)

Equipos ADSL

- Modem ADSL

- **Router ADSL**

- DSLAM

    - Alcatel ASAM 7300 (-c)
    - AVIvid S-A60 / L

Router ADSL

SpeedTouch™ 510 v6

Multi-user ADSL gateway

Features at-a-glance:
- ADSL2+ connection to the Internet
- 1x Ethernet port
- Firewall
- NAT connection sharing including helpers for most popular protocols (SIP, RealAudio, etc.)
- VPN support

SpeedTouch 510 v6

UPnP

Router ADSL

Rapid access for all

Using the Internet can be frustrating if you have a slow response time, especially when you have several PCs connecting simultaneously. But not anymore. Surfing takes on a whole new dimension with the SpeedTouch 510. Powerful tools for residential users, the new SpeedTouch 510 is also **perfect for small and home offices (SOHO)**: they're the ideal solution for multi-PC users, regardless of configuration or location. If you're looking for a bandwidth builder, take a closer look at the SpeedTouch 510.

Easy installation

With the SpeedTouch 510, a new standard has been set in convenience and ease of installation.

You're only five clicks away from the Internet. Just connect your PC, laptop, or local area network to the modem over an Ethernet interface and you are ready to go. An advanced setup wizard guides you through the installation process.

As the gateway comes with an integrated PPP-client, no additional software needs to be installed on the computer.

Home networking

This gateway is the ideal solution for residential users and for small and home offices where there is a pressing need to share ADSL access, along with family members or colleagues. Residential users will especially appreciate that PCs, game consoles, PDAs, set-top boxes and other devices can instantly connect to the Internet through a single high-speed ADSL point of access.

Security

This ADSL residential gateway has a built-in firewall that denies unauthorized access to all PCs and Internet devices hooked up to the user's broadband ADSL connection.

This powerful firewall can be configured by end-users, equipment retailers or service providers for a broad range of security policies and requirements. Attacks are stopped in the gateway and will not reach the devices. With the SpeedTouch 510, you'll be secure 24/7.

Router ADSL

Technical summary

▸ Hardware specifications

- Interfaces:
  - LAN:
    - 10/100Base-T (RJ45)
    - MDI/MDI-x autosensing
    - 1 Ethernet port
  - WAN:
    - ADSL line (RJ11) for ADSL/POTS
- Dimensions: 30 x 147 x 114mm (h x w x d)
  (1.18 x 5.78 x 4.48 in.)
- Temperature: 0° to 40° C (32 to 105 F)
- Humidity: 20% to 80%
- AC voltage: 100 to 120, 220 to 240 V
- Frequency: 50/60 Hz

▸ ADSL modem specifications

- ADSL Annex A
- ADSL2 Annex A, L
- ADSL2+ Annex A

▸ Multi-user Router

- ATM
  - Extensive multi-PVC ATM Quality of Service
    (UBR, CBR, VBR-rt, VBR-nrt)
  - DSLForum TR-37 autoconfiguration
- Bridging
  - self learning bridge at wire speed
- IP Routing
  - UPnP* certified Internet Gateway Device, enabling
    major conferencing and gaming technlolgies
  - IPSec passthrough from multiple LAN clients,
    enabling secure homeworking
  - Supports PPPoE, PPPoA, IPoA, CIP, ETHoA
  - DNS server and relay, DHCP server and relay
  - Network Address Translation for connection
    sharing, including support for SIP, H.323, Realaudio,
    FTP, IRC, IKE, IPSec-ESP, Jabber, ILS, ...
  - Simultaneous bridging and routing of PPPoE
    connections, enabling network based VPNs

SpeedTouch 510 v6

Equipos ADSL

- Modem ADSL
- Router ADSL

- DSLAM
  - **Alcatel ASAM 7300 (-c)**
  - AVIvid S-A60 / L

7300 Alcatel ASAM

7300 Alcatel ASAM

The Alcatel 7300 Advanced Services Access Manager (ASAM) uses DSL technology to deliver high-bandwidth access and new revenue-generating broadband services over existing telephone wiring. It combines high density with the lowest power consumption per ADSL line on the market. It provides capacity to meet residential needs for gaming, video streaming, VoD, and home offices. It meets business demands for business-quality access, VPNs, Internet and email hosting, video conferencing, security features, and direct connection to ATM or Ethernet networks.

7300 Alcatel ASAM

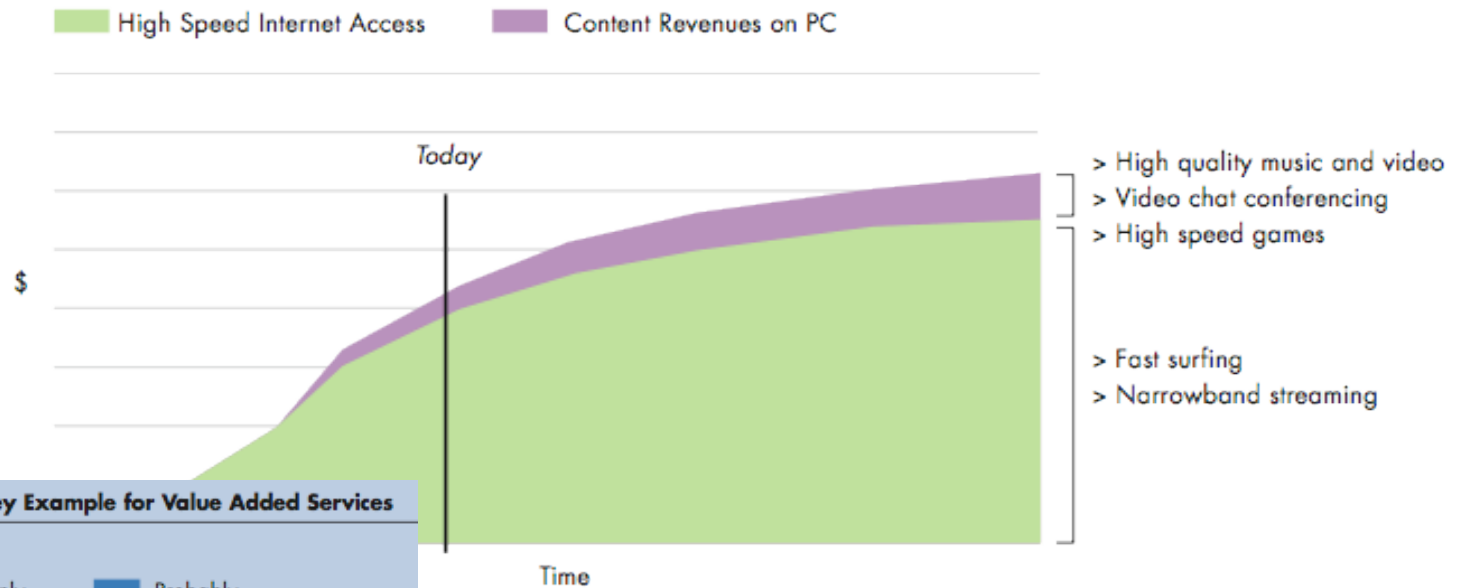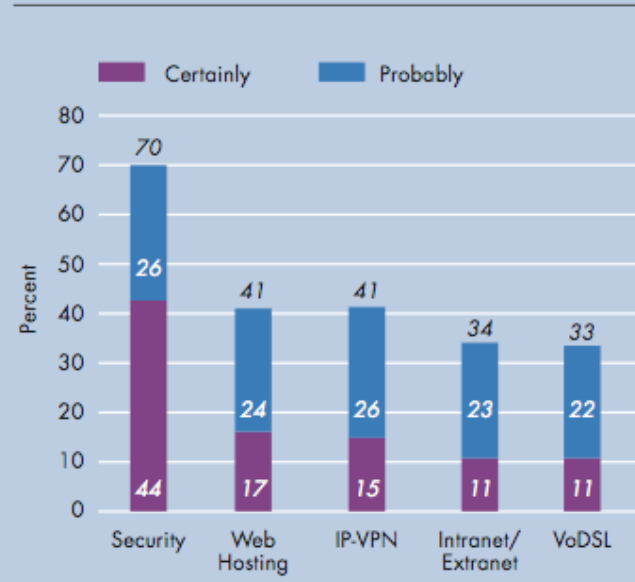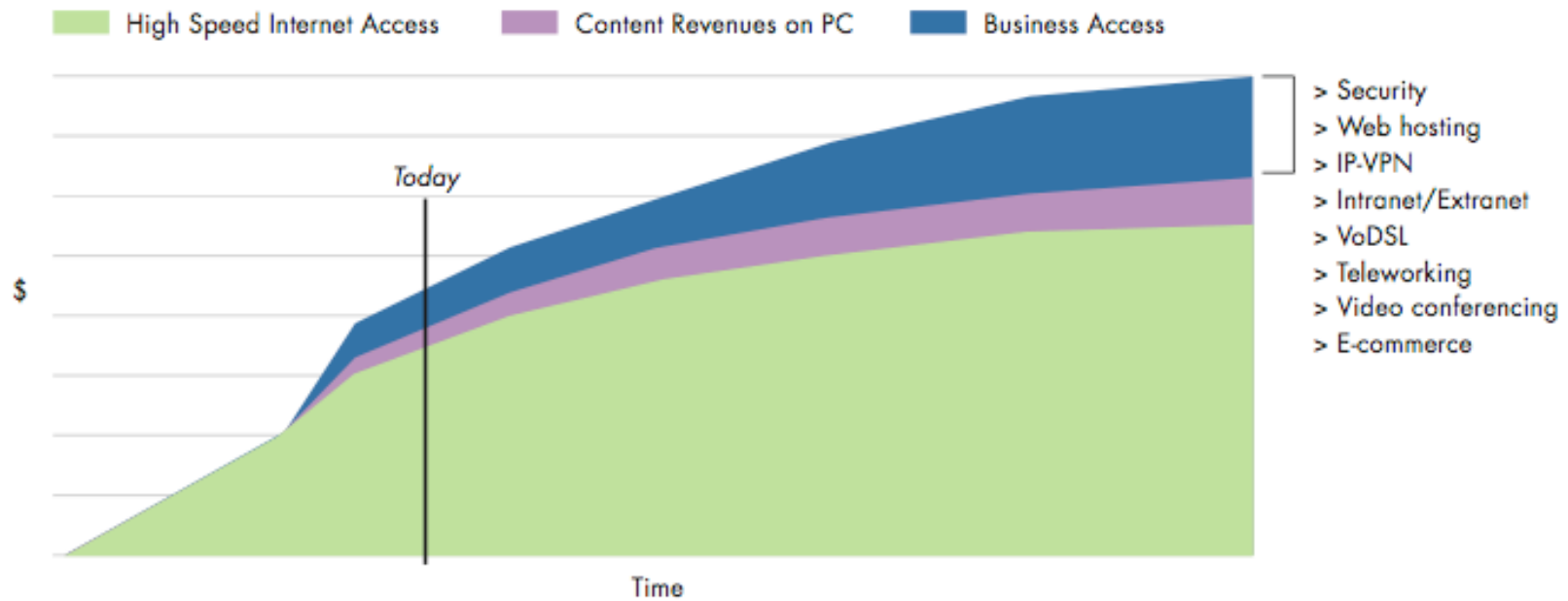**Figure 1: Incremental Evolution of Services for PC Users**

High Speed Internet Access   Content Revenues on PC

Today

$

> High quality music and video
> Video chat conferencing
> High speed games

> Fast surfing
> Narrowband streaming

Time

Figure 2: SME Survey Example for Value Added Services

Certainly   Probably

Service	Certainly	Probably	Total
Security	44	26	70
Web Hosting	17	24	41
IP-VPN	15	26	41
Intranet/Extranet	11	23	34
VoDSL	11	22	33

Percent

7300 Alcatel ASAM

Figure 3: Maximizing Revenues with Business Access Services

Legend: High Speed Internet Access · Content Revenues on PC · Business Access

Today

$

Time

> Security
> Web hosting
> IP-VPN
> Intranet/Extranet
> VoDSL
> Teleworking
> Video conferencing
> E-commerce

7300 Alcatel ASAM

An open broadband platform designed to seamlessly integrate with existing field deployments

From a service perspective, the unprecedented growth in DSL has largely been driven by the demand for HSI access. However HSI service alone will not adequately differentiate service providers to retain and attract new customers. To effectively compete while creating new revenue generating services, providers need a broadband platform that will enable them to offer a range of compelling services to their diverse base of business and residential customers.

This will require an open platform that:
> protects existing investments
> enables advanced revenue-generating services for business and residential customers
> ensures maximum geographic coverage
> simplifies DSL provisioning and connectivity for faster customer activation

The Alcatel 7300 ASAM is an open platform. It is the answer for broadband copper-based deployment, offering:
> support for multiple classes of DSL service, including ADSL, VoDSL, g.SHDSL, VDSL, and evolving to ADSL+, the further evolution of VDSL, and passive optical networks (PONs)
> multiple IP and asynchronous transfer mode (ATM) quality of service (QoS) capabilities
> performance monitoring for managing service level agreements (SLAs) in the business area

From a network deployment perspective, service providers need the flexibility to choose between several network connectivity options such as ATM, Ethernet, or IP. They also need to reach customers in remote areas.

The Alcatel 7300 ASAM supports a wide variety of network interfaces, such as ATM, STM-1, E3, E1 and Ethernet. This gives service providers the flexibility to choose between many options for edge and backbone networks.

Figure 4 illustrates DSL aggregation solutions.

7300 Alcatel ASAM

Figure 4: Aggregation for HSI Service
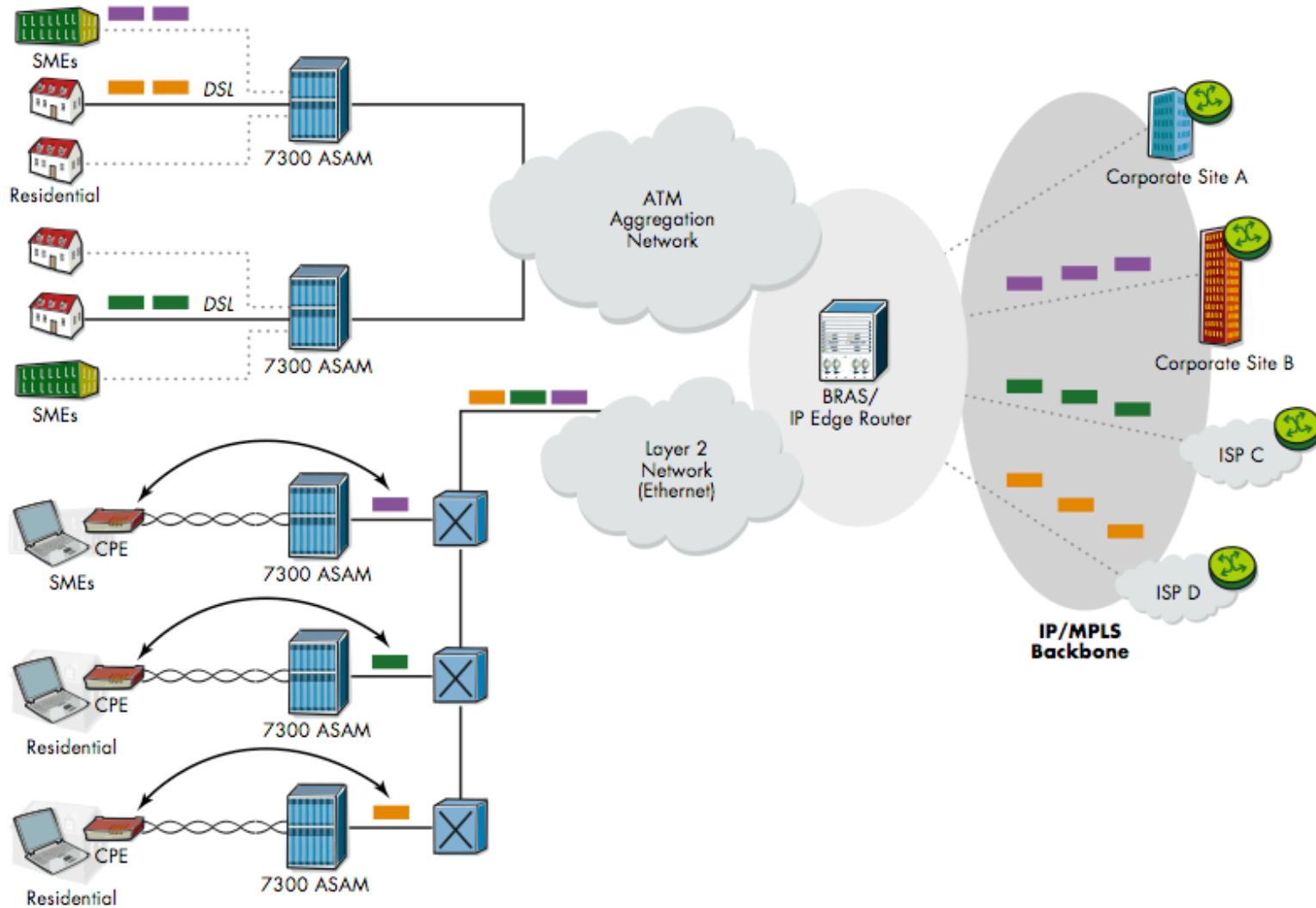
7300 Alcatel ASAM

EXTENDING
NETWORK COVERAGE

Maximum geographic coverage delivering bandwidth and services economically to remote areas through a comprehensive range of remote solutions

The next step in DSL deployment that service providers are putting in place is the extension of DSL network coverage to reach all potential DSL subscribers in low penetration areas.

The Alcatel 7300 ASAM is highly scalable. To achieve maximum reachability in remote areas and to economically get full ADSL coverage, the Alcatel 7300 ASAM can be configured as a host supporting multiple remote 7300 ASAMs through optical and electrical subtending interfaces (see Figure 5).

Subtending options can include:

> a local Alcatel 7300 ASAM serving customers directly connected to the central office

> remote Alcatel 7300 ASAM-o outdoor street cabinets

> Alcatel 7300 ASAM-c compact indoor or outdoor units

> small remote units

> micro DSLAMs

The Alcatel 7300 ASAM-o and 7300 ASAM-c can also be configured as aggregation nodes for remote Alcatel 7300 ASAMs. The capacity of small systems can be extended easily to meet growing demand. The systems can be deployed in office buildings, and they are temperature hardened to be reliably deployed in extreme environments.

7300 Alcatel ASAM

Figure 5: Alcatel 7300 ASAM Subtending Options
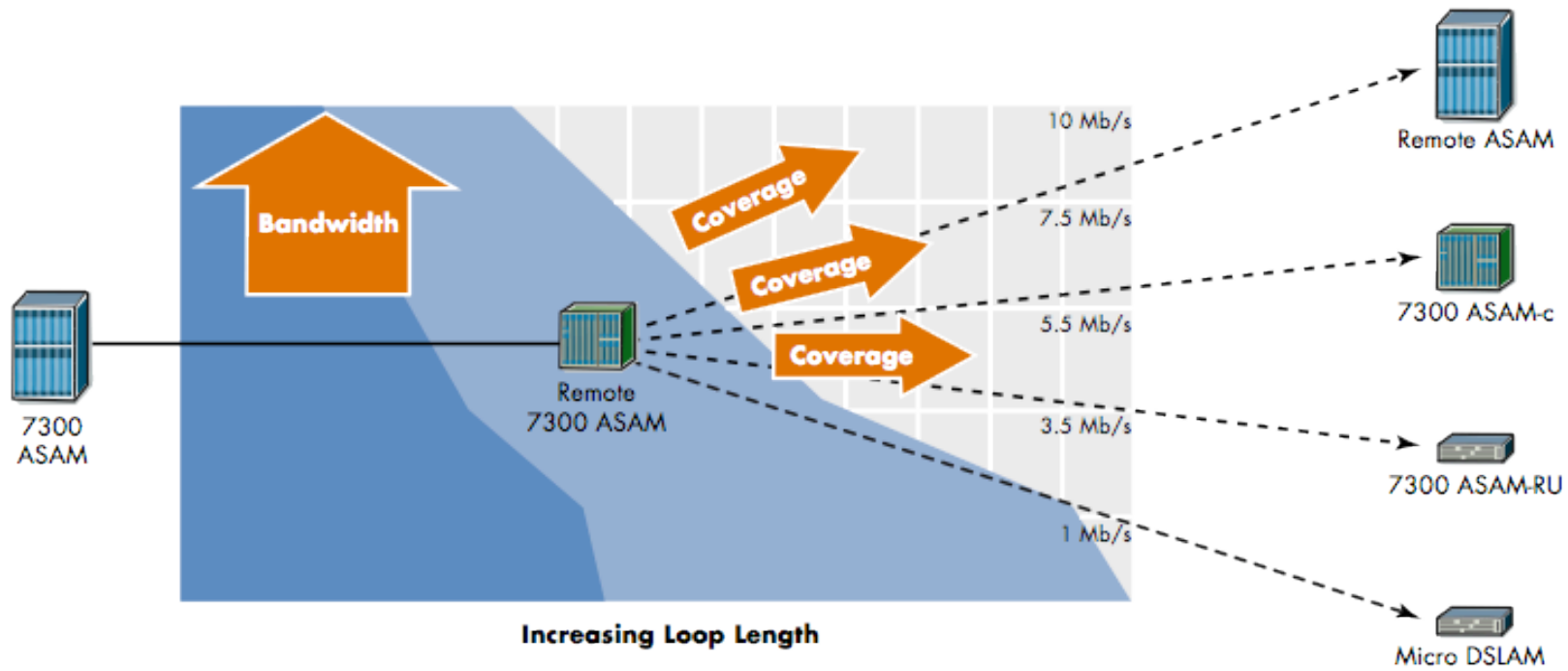
7300 Alcatel ASAM

**VOICE, DATA AND VIDEO CONVERGENCE:**

UNIVERSAL DSLAM

The Alcatel 7300 ASAM provides an evolutionary path to a next generation voice and data network. It supports legacy applications while enabling a gradual transition from circuit to packet-based networks.

Today we provide access to traditional voice switches. The Alcatel 7300 ASAM also enables voice and data on a single DSL connection

through integrated Voice over DSL (VoDSL) cards, or the centralized Alcatel 7310 Loop Voice Gateway (LVG) . This enables a direct V5.2 interface accessing voice switches. In the future, we will open the voice traffic to a next generation switching platform (H.248 / Megaco).

7300 Alcatel ASAM

Figure 6: Bundling Voice and Data Services in Centralized or Distributed Network Architecture
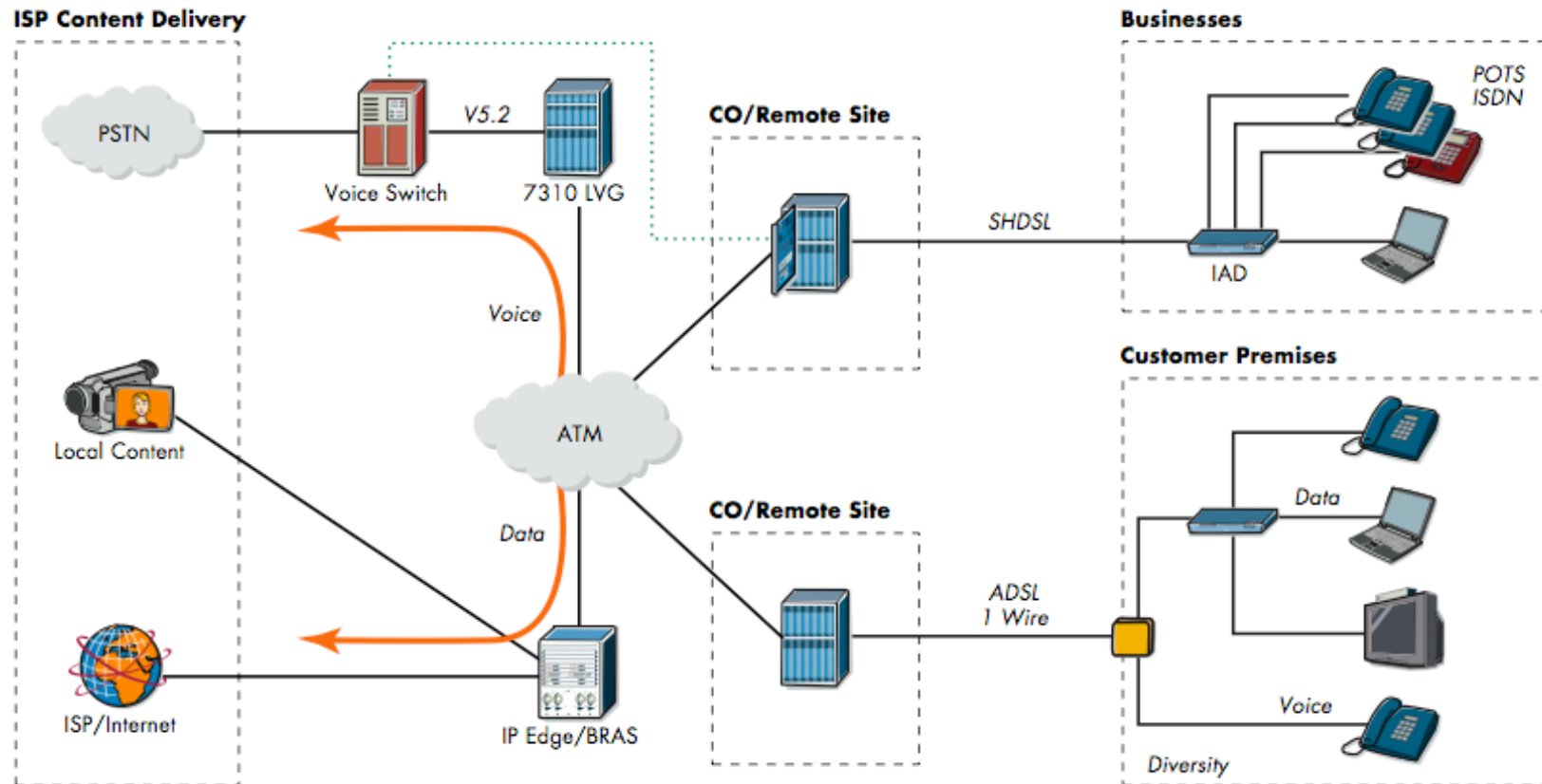
MULTIMEDIA SERVICE **DELIVERY**

Standards-based end-to-end solution for multimedia services

In order to maintain and expand their customer base, and increase revenues, service providers can take advantage of the installed ADSL base to offer broadband services such as streaming video, VoD, PC TV, and other value-added services.

Alcatel has created an end-to-end standards-based solution for video services, such as personal video, broadcast TV, VoD, and e-commerce. The Alcatel 7300 ASAM is ready for video applications on various end-user platforms, such as personal computers and televisions. It has been deployed in various places to provide advanced VoD services, but also can be used for cost-optimized video broadcast because of the built-in multicasting functionality. This eliminates replicated traffic in the network. Services can be delivered closer to the end users with optimal network performance ensured, and users can selectively join or leave real-time audio or video multicasts.

7300 Alcatel ASAM

Figure 7: Multicast Video Streams with the Alcatel 7300 ASAM for High Bandwidth IP Video Applications
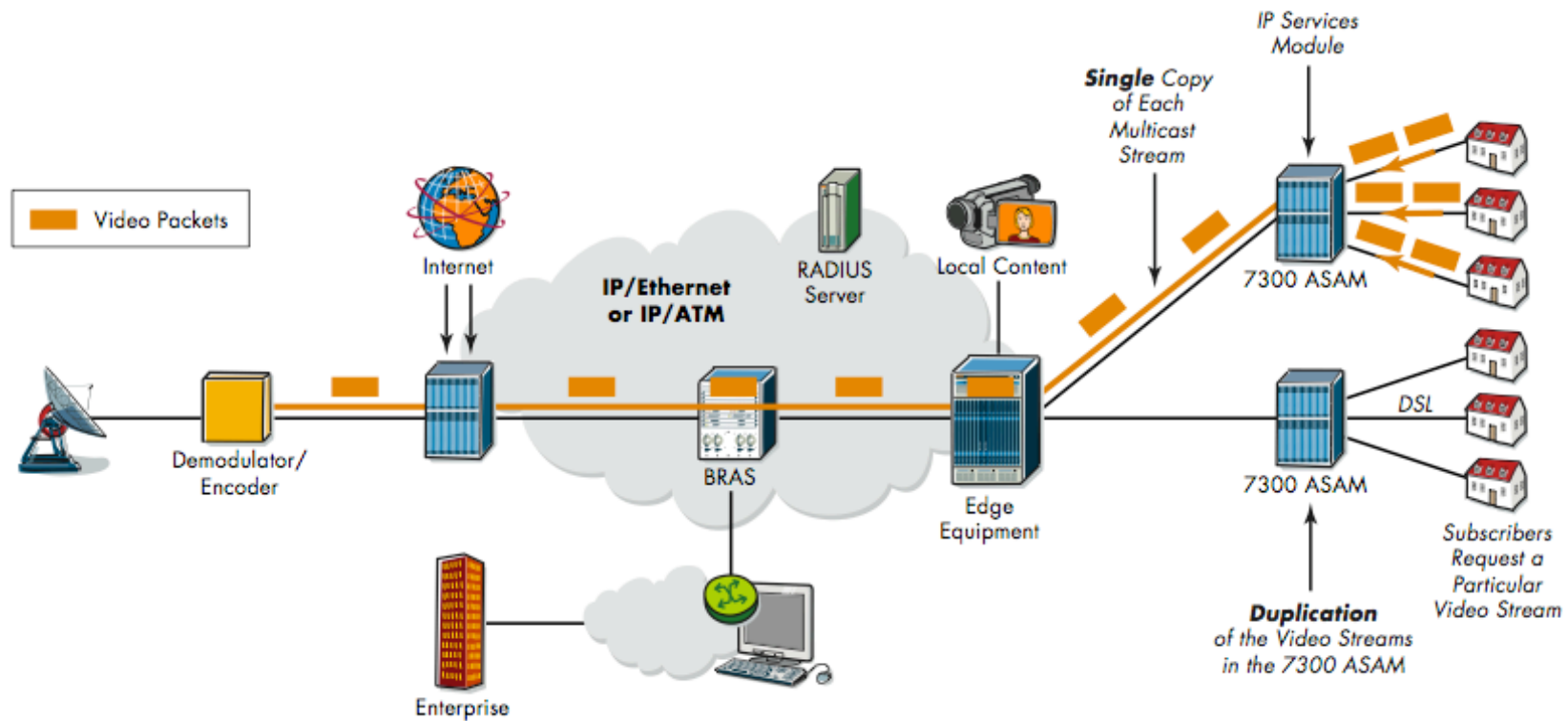
7300 Alcatel ASAM

MEETING THE CHALLENGES OF

TODAY AND TOMORROW

The Alcatel 7300 ASAM is the next step in the evolution of DSL deployment

The Alcatel 7300 ASAM is the next step in the evolution of DSL deployment. With its flexible interfaces, ease of deployment, carrier class service capabilities, and advanced networking features, it meets the many challenges of DSL networking today and for the future. The Alcatel 7300 ASAM family provides:

> an open platform that supports a variety of DSL services

> a very high density and the lowest power consumption per ADSL line on the market

> connectivity to a variety of network services, such as ATM, EMAN, IP, local video content and voice

> protection of existing investments with easy migration from previous releases simplifying the integration of the Alcatel 7300 ASAM into the existing network

> maximum geographic coverage delivering bandwidth and services economically to remote areas with a comprehensive range of remote solutions (Alcatel 7300 ASAM-c, Alcatel 7300 ASAM-o, micro DSLAMs and remote units)

> DSL CPE autoprovisioning and simplified end-to-end provisioning and connectivity through the Alcatel 5620 NM, for faster customer activation

> integrated test capabilities that provide visibility of the entire network and accurate line qualification before lines are put in service

Alcatel 7300 ASAM-c

The Alcatel 7300 Advanced Services Access Manager-compact unit (ASAM-c) is used to deploy DSL lines in small central offices or outdoor cabinets. It offers the same functionality as the Alcatel 7300 ASAM, with support for up to 120 DSL lines. It provides a direct connection to an ATM or Ethernet network with IP functionality. The connectivity to the IP network is provided through an Ethernet uplink. It can be subtended from a hub Alcatel 7300 ASAM through electrical or optical links.

The Alcatel 7300 ASAM-c enables service providers to offer their customers higher bandwidth and more services by reducing loop length and increasing geographic coverage. As a result, service providers can reach many more potential customers, achieve ubiquitous geographic coverage with small systems, and extend the capacity of their systems at the pace of growing customer demand.

Alcatel 7300 ASAM-c

Technical Summary

System Capacity

> Up to 120 lines per shelf (5 cards, 24 lines each) with splitters
> 5 slots
> Extendable to 1,440 lines (12 x 120)
> Ultra density line card: 24 lines per board

Interface Cards

ATM network

> STM-1 (155 Mb/s)
> E3 (34 Mb/s)
> DS3 (44 Mb/s)
> 4 x E1 IMA (4 x 2.0 Mb/s)
> 1,310/1,550 nanometer dark fiber
> Up to 96 MB on-board memory
> Optional 1+1 redundancy (APS/EPS)
> STM-4 upgradeable

Ethernet network

> 100Base-T interface
> VLAN support according to 802.1q standard
  - ISP or other service identification based on VLAN
  - User traffic mapped to VLAN
  - 4,095 VLAN IDs
  - Security (fire-walling) based on VLAN

Line Interface Cards

> ADSL – multi-standard auto-detect ADSL
  - POTS: ITU-T G.dmt
  - POTS: ITU-T G.lite
  - POTS: ANSI T1.413
  - ISDN: ITU-T G.dmt B
  - ISDN: ETSI TS 101 388
  - 24 lines per board
> ITU.T g.SHDSL
  - 24 lines per board
> ILMI 4.0 automatic CPE configuration (PVC and SVC)
> VDSL: DMT multi-standards-based
  - 8 lines per board, evolving to 12 and 24 in next version
> Passive splitter types:
  - TBR21
  - 600 Ω impedance
  - ETSI harmonized impedance splitter (TR 101 728)
  - ISDN
> Subtending line cards
  - 4 x E1 IMA
  - E3
  - DS3
  - STM-1
  - 1,310/1,550 nanometer dark fiber

IP Service Module

> 10/100 Ethernet interface
> RFC 1483/RFC 2684 (bridged, routed), PPPoA , PPPoE
> L2TP, MPLS (RFC2547 bis in static mode), virtual routing
> RIP, RIPv2, OSPFv2, BGP4
> RADIUS

Management

> Element management layer (EML) through Alcatel 5523 AWS Element Manager (AWS)
> Network management layer (NML) through Alcatel 5620 Network Manager (NM)
  - Interfacing with other (legacy) OSSs, including CORBA
> Connectivity:
  - Over ATM network, in-band PVC (ATM VP/VC)
  - Out-of-band through 10/100 Ethernet port
> Local management through a web-based craft terminal. Software runs on a standard PC with Windows 2000 or higher, and any browser software

Alcatel 7300 ASAM-c

ATM Service Characteristics

> Supported ATM QoS classes: UBR, UBR+, CBR, Rt-VBR/nrt-VBR, GFR
> Multi-QoS per line
> Up to 10,368 connections (PVC/SVC) per system
> Up to 16 connections (VC) per line

Physical Specifications

> Height: 53 cm (20.9 in.)
> Width: 48.2 cm (19.0 in.)
> Depth: 30 cm (11.8 in.)
> Maximum 3 shelves per rack

Other Characteristics

> Test bus for metallic line test
  • Integrated metallic cross-connect
  • Soft connection of individual DSL lines
  • Connector for external test equipment
> 5 Gb/s backplane

Power

> Average power consumption: 1.2 W per ADSL line

Product Safety and Environment

> EN 60950 A1, A2, A3, A4, A11, Class 1 (IEC 950)
> ETS 300 019-1-3 class 3.1E
> Temperature hardened
> Operational temperature range: 0 C to 45 C (32 F to 113 F)

Equipos ADSL

- Modem ADSL

- Router ADSL

- DSLAM

  – Alcatel ASAM 7300 (-c)

  – **AVlvid S-A60 / L**

DSLAM AVIvid S-A60

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Área de Ingeniería Telemática

Architecture
- Scalable, non-blocking IP fabric
- Multi Gbps switching
- IGMP v1 & v2 & v3
- 1000 Multicast
- Internal power supply
- Four fans and status LED
- Stackable
- Internal POTS Splitter feature
- Max port density: 60 ADSL2++ ports

IP Capabilities
- Multi Gbps switching, non-blocking
- Bridging and routing
- Support for IPV4, IPV6@
- Bridging Ethernet to Ethernet and Ethernet to ATM
- Routing and forwarding over ATM, RFC 1483/2684
- 496 VLANs
- 496 Virtual Circuits
- 15,000 MAC addresses
- VLAN 802.1P/Q
- IGMP v1 & v2 & v3 snooping or proxy
- Broadcast and Multicast with internal agent AVIcast[tm] for IP Multicast management in Video broadcast application
- PPPoE: 120 clients
- DHCP server / relay@ (option 82)
- Per flow WFQ

Subscriber Links
- 60 ADSL2++ ports DMT cell relay
- Annex A (optional Annexes B & M)
- Two 64-pin CHAMP connectors
- Long Reach ADSL2: rates of 128 kbps up to 21 kft
- ADSL data rates (ITU-T G.992.1)
  - Downstream: 32 kbps to 10 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL G.lite data rates (ITU-T G.992.2)
  - Downstream: 32 kbps to 4 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL2+ data rates (ITU-T G.992.5)
  - Downstream: 32 kbps to 26 Mbps
  - Upstream: 32 kbps to 3 Mbps
- ADSL2++ data rates (optional)
  - Downstream: 32 kbps to 50 Mbps
  - Upstream: 32 kbps to 6 Mbps

ATM Capabilities
- ATM PVC support per ATM UNI 3.1 and 4.0 signalling
- ATM Shaping, support for CBR, VBR-rt, VBR-nrt, GFR & UBR traffic types
- AAL5 data & management transparency
- Configurable VPI/VCI range, up to 480 connections per system
- 8 VP/VC per ADSL port
- Early and partial packet discard
- Intelligent dynamic buffering architecture with per VP/VC queuing
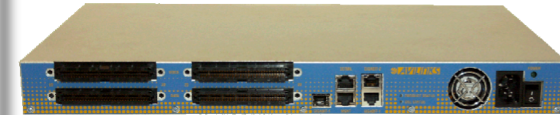
Management and Services
- 1 Ethernet 100BASE-T port
- 1 Serial port for local craft interface (RJ-45)
- Support for Private and Public MIBs (RFC 1213, 1493, 2933, 3635, 3636)
- CLI through Serial port or Telnet
- Embedded HTTP server for configuration and management from standard Web browser
- SNMP V.1 and V.2 agent
- SSL/SSH encryption for secure management access
- Dual bank Flash memory for software upgrade
- Local and remote self-diagnostic testing

POTS Splitters (option)
- Fully integrated ADSL POTS splitters
- Annex A (optional Annexes B & M)
- Two 64-pin CHAMP connectors for PBX connections
- Meets DC requirements in Annex 1.2 of T.413 Issue 2
- Meets Voice band requirements in Annex 1.3 of T.413 Issue 2
- Meets ADSL band requirements in Annex 1.4 of T.413 Issue 2

DSLAM AVIvid L

Architecture

- Scalable, distributed, non-blocking IP fabric
- Multi Gbps switching
- Native Multicast management
- IGMP v1, v2 & v3
- 254 Multicast per shelf
- 511 Multicast per shelf (optional)
- 8 slots for Line Cards
- Internal redundant power module
- 1 fan tray with air filter, three fans (redundancy)
- Internal POTS splitter feature for ADSL2+ and VDSL2
- All slots are hot swappable
- Max port density:
  - 480 ADSL2+ ports
  - 384 VDSL2 ports@
  - 384 G.SHDSLbis ports@
  - 16x10/100/1000 BT Giga Ethernet ports
  - 8 optical Giga Ethernet ports
  - 2x10 Giga Ethernet ports (with optional IP switch)

IP Capabilities

- Multi Gbps switching, non-blocking
- Bridging and routing
- Support for IPV4, IPV6@ and MPLS@
- Bridging Ethernet to Ethernet and Ethernet to ATM
- Routing and forwarding over ATM, RFC 1483/2684
- 4094 VLANs
- 4094 Virtual Circuits
- 15,000 MAC addresses
- VLAN 802.1P/Q
- IGMP v1 & v2 & v3 snooping
- Broadcast and Multicast with internal agent AVIcast™ for IP Multicast management in Video broadcast application
- PPPoE: 960 clients
- DHCP: 9,600 addresses, per port configuration
- Per flow WFQ

ATM Capabilities

- Multi Gbps switching, non-blocking
- ATM PVC support per ATM UNI 3.1 and 4.0 signalling
- ATM Shaping, support for CBR, VBR-rt, VBR-nrt, GFR & UBR traffic types
- AAL5 data & management transparency
- Configurable VPI/VCI range, up to 592 connections per system
- 8 VP/VC per ADSL port
- Early and partial packet discard
- Intelligent dynamic buffering architecture with per VP/VC queuing

Uplinks

- 16x10/100/1000 BT Giga Ethernet ports
- 8 MiniBIC port for MiniGBIC modules
- 2x10 Giga Ethernet ports (with optional IP switch)

Subscriber Links

- 60 ADSL2++ ports DMT cell relay / card
- Annexes A & B (optional Annex M) / card
- Two 64-pin CHAMP connectors / card
- Long Reach ADSL2: rates of 128 kbps up to 21 kft
- ADSL data rates (ITU-T G.992.1)
  - Downstream: 32 kbps to 10 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL G.lite data rates (ITU-T G.992.2)
  - Downstream: 32 kbps to 4 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL2+ data rates (ITU-T G.992.5)
  - Downstream: 32 kbps to 26 Mbps
  - Upstream: 32 kbps to 3 Mbps
- ADSL2++ data rates
  - Downstream: 32 kbps to 50 Mbps
  - Upstream: 32 kbps to 6 Mbps
- 48 VDSL2 ports DMT cell relay / card

DSLAM AVIvid L

Subscriber Links
- 60 ADSL2++ ports DMT cell relay
- Annex A (optional Annexes B & M)
- Two 64-pin CHAMP connectors
- Long Reach ADSL2: rates of 128 kbps up to 21 kft
- ADSL data rates (ITU-T G.992.1)
  - Downstream: 32 kbps to 10 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL G.lite data rates (ITU-T G.992.2)
  - Downstream: 32 kbps to 4 Mbps
  - Upstream: 32 kbps to 1 Mbps
- ADSL2+ data rates (ITU-T G.992.5)
  - Downstream: 32 kbps to 26 Mbps
  - Upstream: 32 kbps to 3 Mbps
- ADSL2++ data rates (optional)
  - Downstream: 32 kbps to 50 Mbps
  - Upstream: 32 kbps to 6 Mbps

POTS Splitters (option)
- Fully integrated ADSL POTS splitters
- Annex A (optional Annexes B & M)
- Two 64-pin CHAMP connectors for PBX connections
- Meets DC requirements in Annex 1.2 of T.413 Issue 2
- Meets Voice band requirements in Annex 1.3 of T.413 Issue 2
- Meets ADSL band requirements in Annex 1.4 of T.413 Issue 2