Equipos ATM y ADSL

Area de Ingeniería Telemática
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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

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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.

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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

		Tx Power (dBm)		Rx Range (dBm)			
Type of back card	**Source 1310 nm**	**Min**	**Max**	**Min**	**Max**	**Physical**	**Range (km)**
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

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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.

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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**

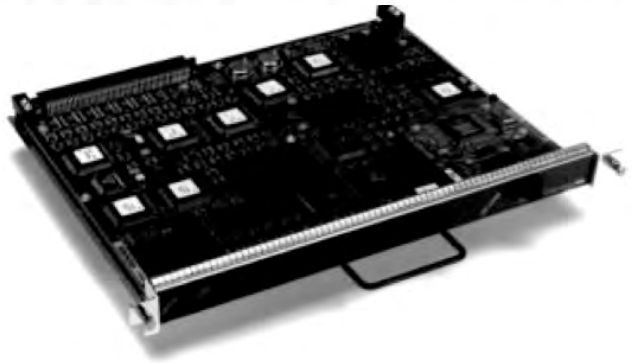
ATM interface para Cisco 7200

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

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

- Modem ADSL
- Router ADSL
- Router-IAD ADSL Wi-Fi
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVIvid S-A60 / L

Equipos ADSL

- **Modem ADSL**
- Router ADSL
- Router-IAD ADSL Wi-Fi
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVIvid S-A60 / L

Modem ADSL

- 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)

Equipos ADSL

- Modem ADSL
- **Router ADSL**
- Router-IAD ADSL Wi-Fi
- 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
- **Router-IAD ADSL Wi-Fi**
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVIvid S-A60 / L

Router-IAD ADSL Wi-Fi

SpeedTouch™ 706(i) - 780(i)

Broadband Voice IAD

SpeedTouch™ 706WL(i) - 780WL(i)

Wireless 802.11g Broadband Voice IAD

SpeedTouch 706WL - 780WL

Router-IAD ADSL Wi-Fi

The ultimate in digital and voice communication

The SpeedTouch IADs are DSL broadband access devices that allow ADSL connectivity while providing voice over IP functions for home and office users. The SpeedTouch 706WL and 780WL offer additional 802.11g wireless LAN interface. Both IADs support ADSL2/ADSL2+ and are backward compatible to ADSL offering auto-negotiation capability.

Easy to install / Easy to manage

Different mechanisms are available for remote or auto-configuration : TFTP/DHCP scenario's and full TR-69 Data Model are supported. Through the implementation of TR-104 for VoIP you will be able to configure and manage all your voice services.
The SpeedTouch Wireless Home Install Wizard makes setting up a wireless home network as easy as clicking a button, thereby drastically reducing helpdesk calls.
The wizard performs comprehensive system checks before and during the installation process, and validates all user inputs to guarantee the end-user a secured wireless connection (using WEP or WPA) to the Internet.

Voice over IP

The SpeedTouch 706(WL) offers one and the SpeedTouch 780(WL) offers two phone connectors to accommodate a telephone and a fax, for example. Once registered with a VoIP service, regular phone calls can be conducted over the Internet offering all the benefits of IP telephony. Both devices natively offer a wide range of supplementary services like Caller ID, CLIR, call waiting, call forwarding, 3-way conference, and message waiting notification.

Router-IAD ADSL Wi-Fi

Secure

The SpeedTouch firewall guarantees users the ultimate level in network security. Through integration with Hyper-NAT, the firewall leverages all the Application Level Gateways provided in the Hyper-NAT context to minimize undesired service impact. The SpeedTouch firewall provides stateful inspection of packets, and an integrated Denial of Service (DoS) engine monitors a wide range of attack patterns, and logs potential security breaches to a local cache or remote server.

The SpeedTouch 706WL/780WL also support powerful wireless security mechanisms, such as Wi-Fi Protected Access™ (WPA), Wired Equivalent Privacy (WEP) encryption, and a physical registration button, which allows users to communicate and access data with efficient link quality and the highest level of network security. Filtering of unwanted content on the Internet also got integrated. Different levels of content filtering are available ranging from white list/blacklist that can be maintained locally or remotely, to subscription-based URL blocking using a network located URL database for URL classification.

Services

The SpeedTouch IADs support a number of features, which guarantee efficient and robust delivery of multimedia services from the core of the network right to the end-user.

- TR-37 enables auto-configuration of network bandwidth according to service needs, allowing seamless integration with the network's provisioning system.
- Diffserv IP QoS
- Wi-Fi QoS, such as WME and WMM, guarantee local delivery of streamed media to the service delivery nodes.
- The optional dedication of the 5 GHz spectrum to streaming media adds robustness to the Wi-Fi delivery path.
- Smart DNS and DHCP support smooth introduction pf media delivery nodes, like Set Top boxes, VoIP phones, etc.

FLEXIBundLE

The FLEXIBundLE architecture enables service providers to define, manage, and evolve the characteristics of the service offered adopt the specific features of a differentiated service offering. The basis for this architecture is an extensive multi-role, multi-user management framework that allows each individual component of the Gateway to be (de)activated independently and remotely.

Hyper-NAT with IP pass-through

Hyper-NAT delivers absolute flexibility in managing any type of Network Address and/or Port translation, enabling seamless operation of servers on the local network. An extensive list of Application Level Gateways completes this powerful architecture to simultaneously enable services like:

- Any-to-many IPSec,
- L2TP and PPTP pass-through,
- IP pass-through,
- SIP, H.323...,
- FTP, RTSP, IPv6inIPv4, Jabber, Netmeeting, Microsoft Messenger...

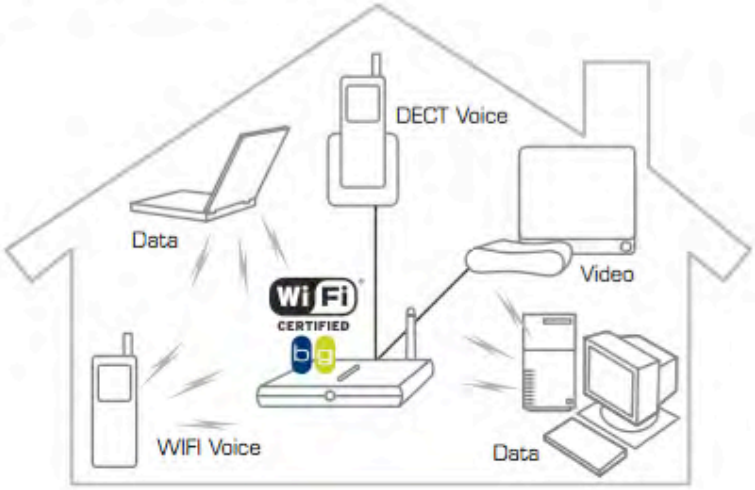
Router-IAD ADSL Wi-Fi

Why ours is better?

The SpeedTouch 706(WL) and 780(WL) have a unique positioning versus other products:

- The same software for our whole product range.
- We have strong management of IP QoS which comes from our Business Routers. We can support either QoS on multiple VP/VC (ATM level) or/and QoS at IP level.
- We have an implementation of TR-69 that enables an easy rollout on the field, in addition to our easy install wizard.
- We use VoIP stack from a market leader that guarantees instant operability with softswitch- and IP-PBX vendors and that gives confidence (SIP, MGCP or H.323).
- We support port mapping on any RJ45 port depending on the type of traffic (e.g. data, voice, or video).

If you are looking for a scaleable, manageable, and reliable Integrated Access Device, please visit us at www.speedtouchpartner.com



Technical Summary

Hardware specifications

- 12 Mb/s connection rate
  - Mini-PCI interface for IEEE 802.11g (2.4 GHz) wireless LAN connection (SpeedTouch 706WL and 780WL only))
- SpeedTouch 706(WL)
  - WAN
    + Level 2 FXO
  - LAN
    + 2 ports 10/100 BaseT Switch
    + 1 Voice port (FXS)
    + Wi-Fi* 802.11b/g
- SpeedTouch 780(WL)
  - WAN
    + Full FXO
  - LAN
    + 4 ports 10/100 BaseT Switch
    + 2 Voice ports (FXS)
    + Wi-Fi 802.11b/g
  - Possible HW expansion
    + USB 1.1 host/master
- AC Voltage: 100 - 120VAC/220 - 240VAC
- Ambient Temperature: 0 to 40°C (32 to 96°F)
- Relative Humidity: 20% to 90% (non-condensing)
- Dimensions: 240 x 160 x 40 mm (LxWxH) (9.5 x 6.4 x 1.6 in.)

Router-IAD ADSL Wi-Fi

Software

ADSL Compliance

- ANSI T1.413 Issue 2, ITU G.992.1 Annex A (G.dmt), ITU G.992.2 Annex A (G.lite), ITU G.994.1 (G.hs)
- Support dying gasp
- Maximum Rate: 8 Mb/s for downstream and 1 Mb/s for upstream

ADSL2 Compliance

- ITU G.992.3 Annex A (G.dmt.bis), ITU G.992.4 Annex A (G.lite.bis)
- Maximum Rate: 12 Mb/s for downstream and 1.5 Mb/s for upstream

ADSL2+ Compliance

- ITU G.992.5 Annex A
- Maximum Rate: 24 Mb/s for downstream and 3 Mb/s for upstream

Wireless performance (SpeedTouch 706WL and 780 WL only)

- IEEE 802.11g and IEEE 802.11b
- Data Rate: 54, 48, 36, 24, 18, 12, 9, 6 Mb/s for 802.11g 11, 5.5, 2, 1 Mb/s for 802.11b
- Modulation Technique: OFDM for 802.11g; CCK (11 Mb/s, 5,5 Mb/s) for 802.11b; DQPSK (2Mb/s) for 802.11b; DBPSK (1 Mb/s) for 802.11b
- Operating Frequency: 2.4 ~ 2.497 GHz
- Operating Channels: depending on local regulations. For example, 11 Channels (North America), 13 Channels (Europe), and 14 Channels (Japan)

- Coverage Area:
  802.11g: Line of Sight (LoS - Outdoors): Max. 50 meters ;
  Indoors: Max. 20 meters
  802.11b: LoS (Outdoors): Max. 180 meters ;
  Indoors: Max. 60 meters
- Supports WEP (Wired Equivalent Privacy) mechanism with 64-bit or 128-bit key length
- Supports WMM, WPA-Personal, WPA2-Personal
- Supports the Access Control function: only registered WLAN clients can be allowed to associate to this IAD.
- SSID can be hidden for added security.
- Supports the Repeater function to extend the coverage area (WDS)

Router-IAD ADSL Wi-Fi

Voice over IP Features

- Call Feature: basic outgoing and incoming call, Call Waiting, 3 Way Conference Call, Call Transfer, Caller ID, Message Waiting Indication, Call Hold, Call Back on busy, Call Forward unconditional, Call Forward on Busy, Call Forward on No Reply
- Call Control: MGCP (RFC2705) or SIP (RFC3261)
- Voice Transport: compliance to RTP (RFC1889)
- Voice Codec: G.711 (a-law and μ-law), G.723.1A (780), G.726, and G.729A (optional on 706)
- Tone Signal: compliance to the area of North America, UK, Japan, China, and Europe
- Tone Generation: support DTMF, dial tone, ring back tone, busy tone, ring tone
- Tone Detection: DTMF
- Echo Cancellation: compliance to G.168
- Supports FAX/Analog Modem function
- Supports T.38 Fax relay (optional on 706)
- Supports RFC2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals
- Both VoIP ports supporting intelligent lifeline backup
- Manual selection of PSTN mode or VoIP mode while making a phone call
- Automatic selection of PSTN phone call on dialing emergency numbers
- Supports IP QoS

ATM Features

- Compliant to ATM Forum UNI 3.1 / 4.0 Permanent Virtual Circuits (PVCs)
- Support up to 8 PVCs for UBR, CBR, VBR-nrt, VBR-rt with traffic shaping
- RFC2684 LLC Encapsulation and VC Multiplexing over AAL5
- RFC2364 Point-to-Point Protocol (PPP) over AAL5
- RFC2225 Classical IP
- RFC2516 PPP over Ethernet: support Relay (Transparent Forwarding) and Client functions
- Supports PPPoA or PPPoE Bridged mode (the IP address got from ISP can be passed to the user's PC and behave as the IP address of the user's PC.)
- OAM F4/F5 End-to-End/Segment Loopback Cells

Bridging Features

- Supports self-learning bridge specified in IEEE 802.1d Transparent Bridging
- Supports up to 4096 learning MAC addresses
- Transparent Bridging among 10/100 Mb Ethernet, USB (780 only), and 802.11g wireless LAN

Router-IAD ADSL Wi-Fi

Routing Features

- NAT (Network Address Translation) / PAT (Port Address Translation) let multiple users on the LAN access the Internet for the cost of only one IP address.
- ALGs (Application Level Gateways): such as NetMeeting, MSN Messenger, FTP, Quick Time, mIRC, Real Player, CuSeeMe, VPN pass-through, etc.
- UPnP* IGD (Internet Gateway Device) with NAT traversal capability
- Static routes and Residential RIP
- DNS Relay, Dynamic DNS
- DHCP Client/Relay/Server
- The Simple Network Time Protocol (SNTP) can be used to get current time from network time server.

SpeedTouch 706WL

SpeedTouch 780WL

Security

- PAP (RFC1334), CHAP (RFC1994), and MS-CHAP for PPP session
- Firewall supports IP packet filtering based on IP address/ Port number/Protocol type
- Protect Denial of Service (DoS) attacks, such as SYN Flood, IP Smurfing, Ping of Death, Fraggle, LAND, Tear-drop, etc.
- Supports URL filtering on demand

Management

- User-friendly embedded web configuration interface with password protection
- Remote management access control
- Telnet session for local or remote management
- Firmware upgrades through HTTP or TFTP
- The boot loader contains very simple web page to allow the users to update the run-time firmware image.
- Configuration file backup and restore
- SNMPv1 agent with MIB-II, Interface MIB

Regulatory Approvals and Compliance

- EMC: FCC part 15 Class B, CE
- Telecom: FCC part 68 Class B
- Safety: UL, CB, LVD

Equipos ADSL

- Modem ADSL
- Router ADSL
- Router-IAD ADSL Wi-Fi
- 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

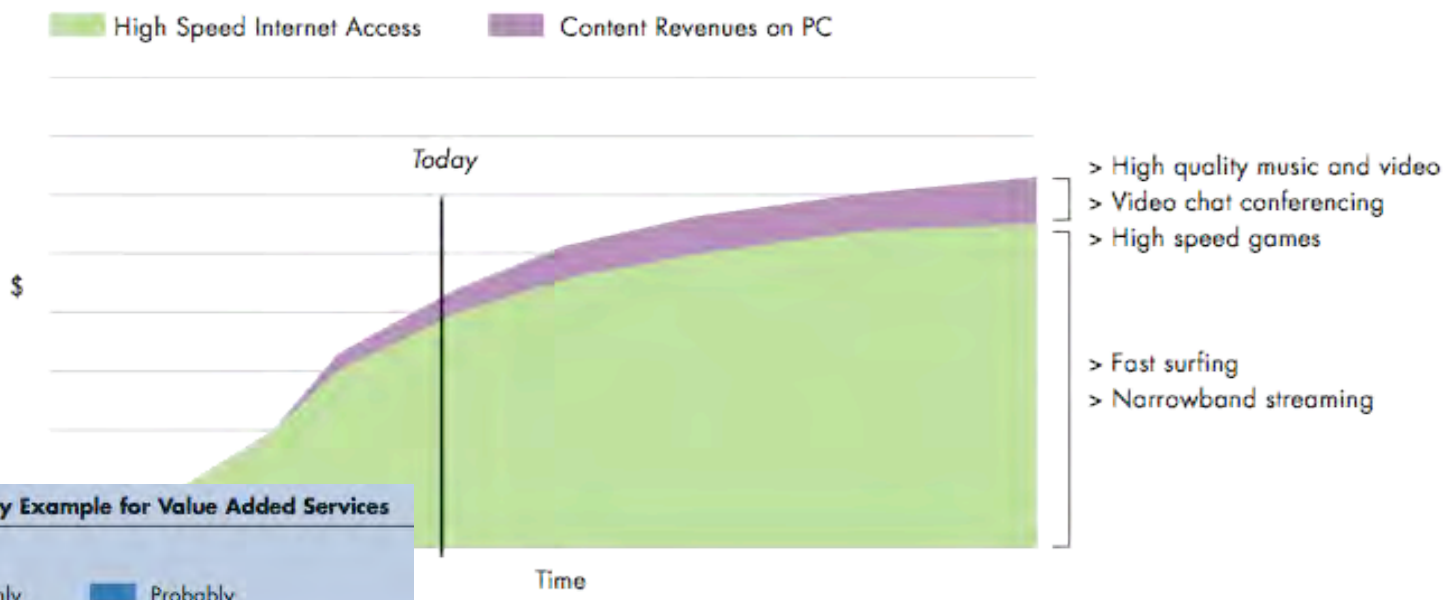


Figure 2: SME Survey Example for Value Added Services

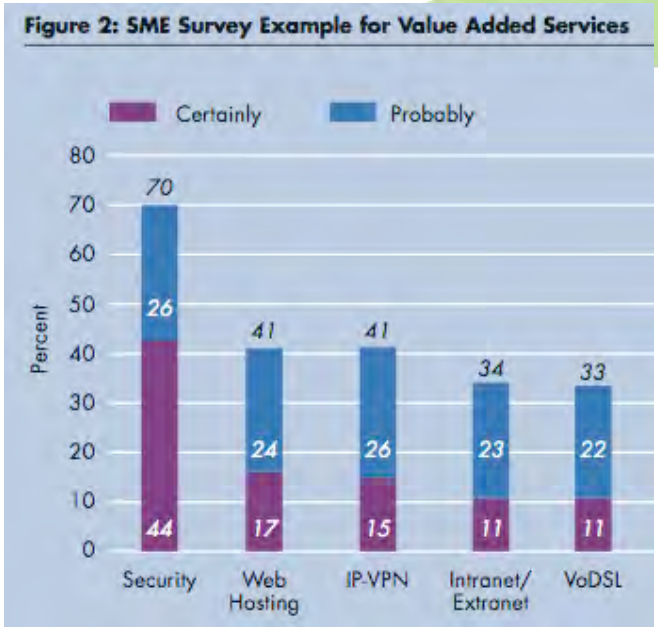


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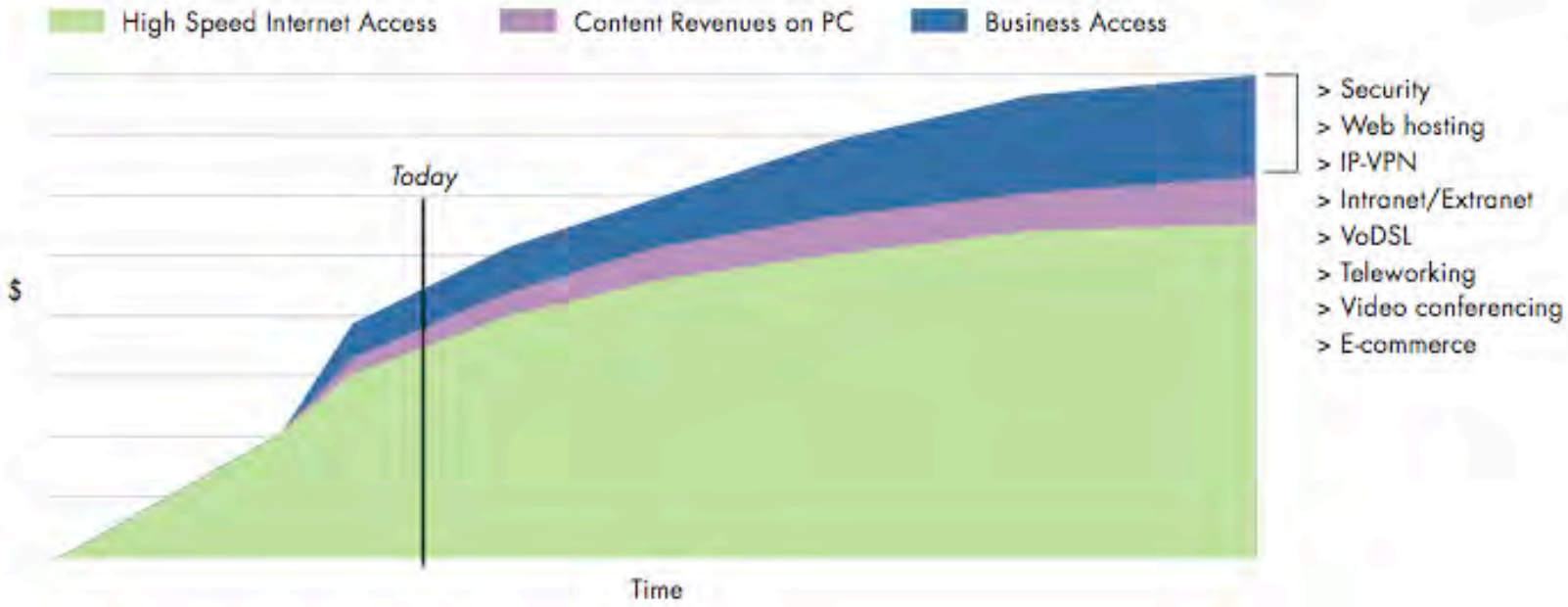
Figure 3: Maximizing Revenues with Business Access Services



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.

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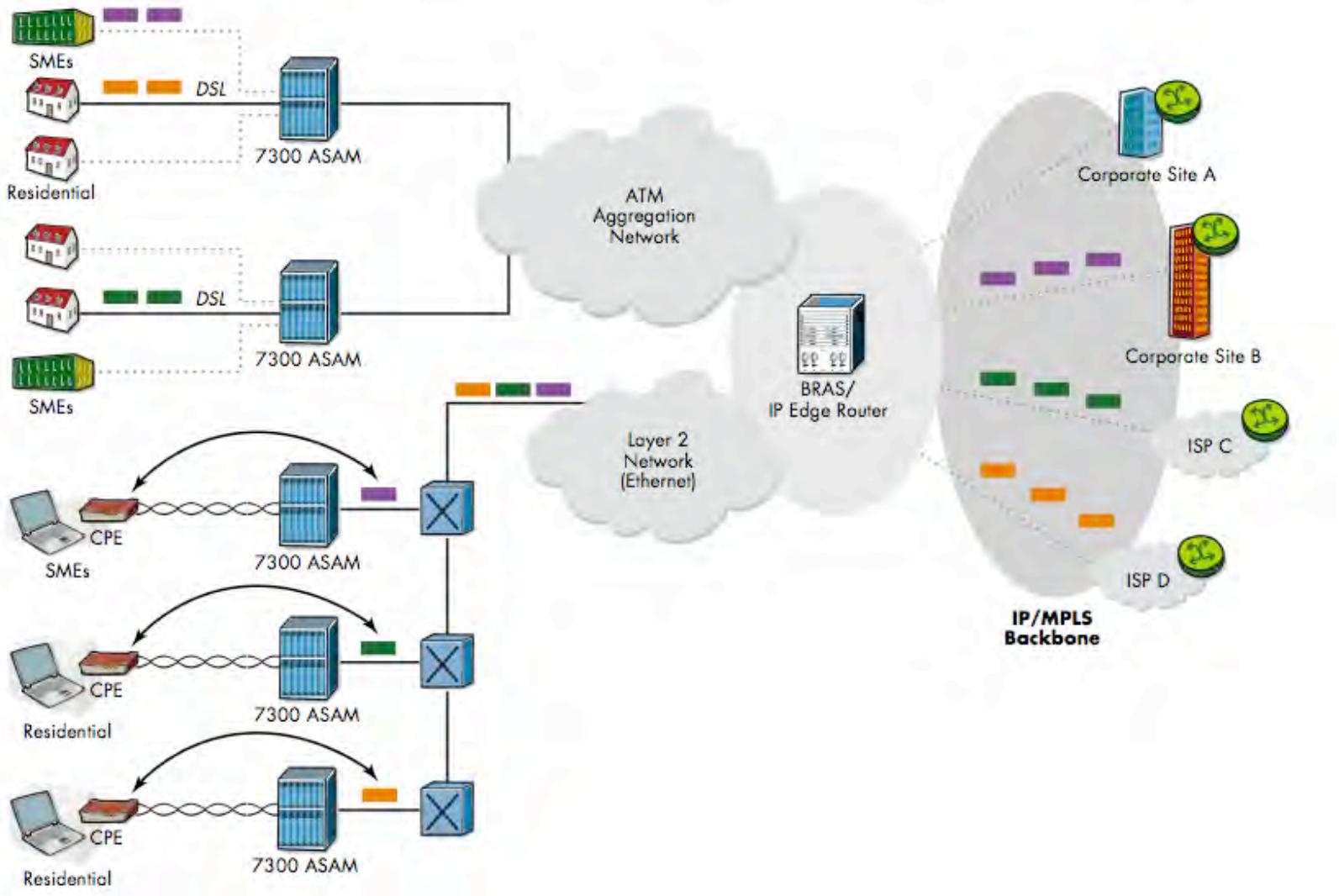
Figure 4: Aggregation for HSI Service



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.

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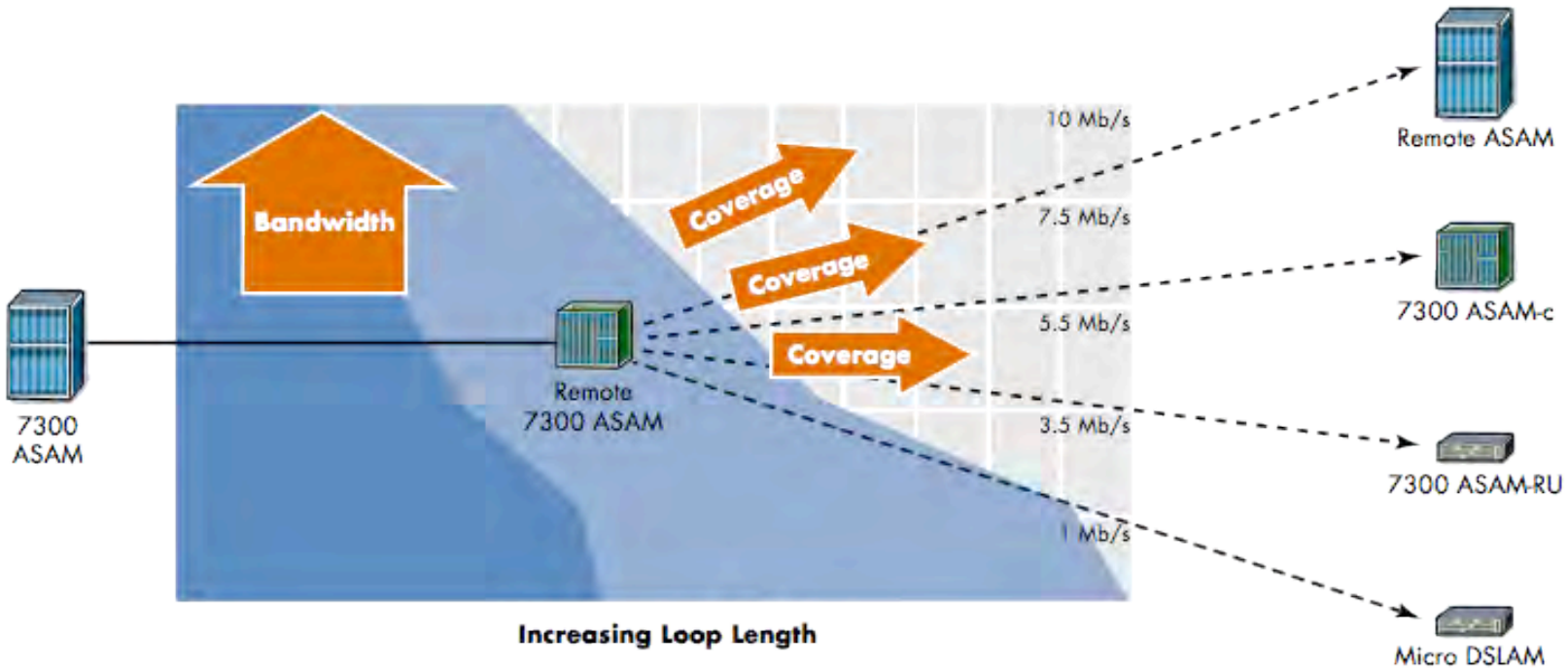
Figure 5: Alcatel 7300 ASAM Subtending Options



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).

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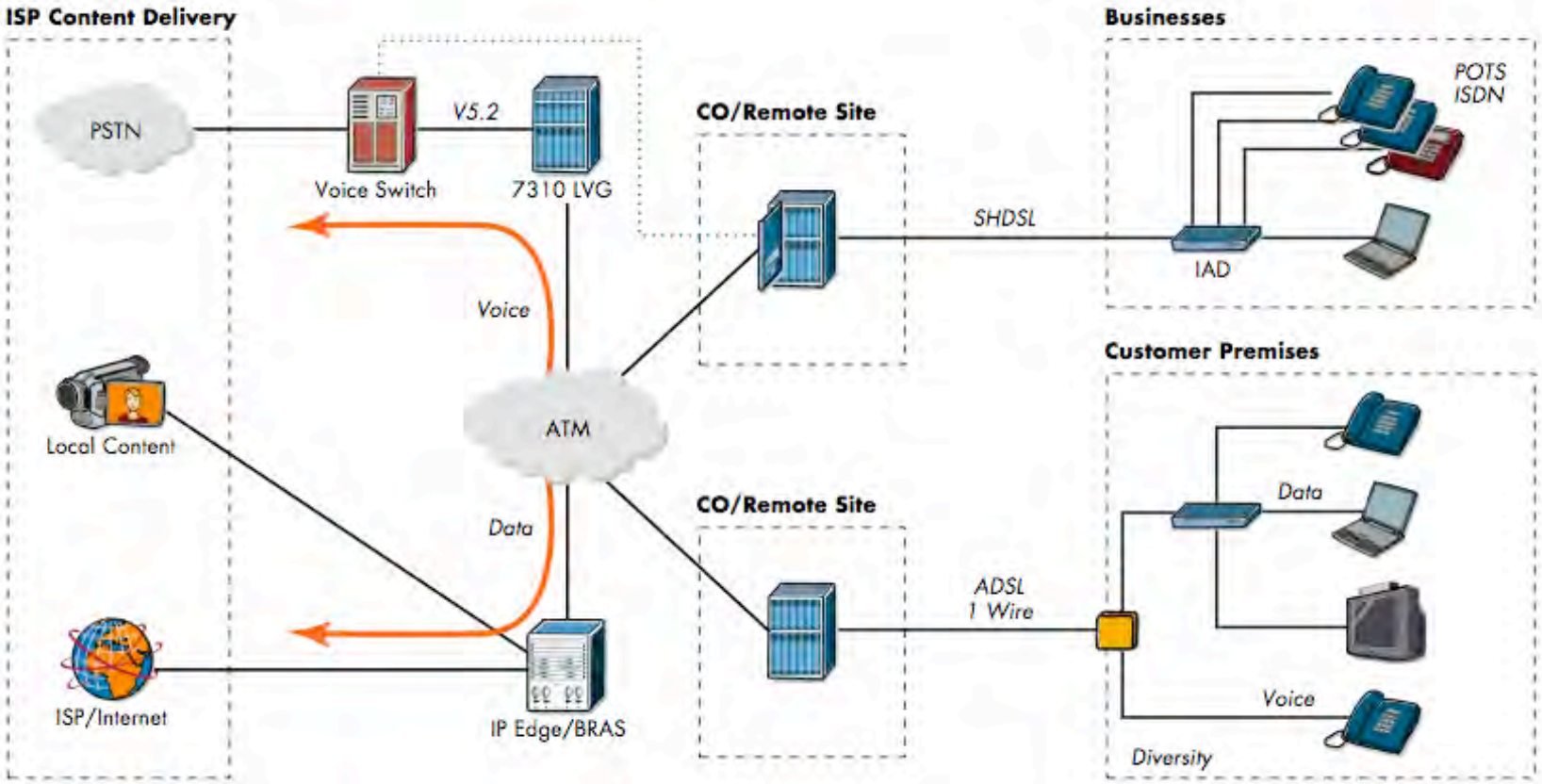
Figure 6: Bundling Voice and Data Services in Centralized or Distributed Network Architecture



7300 Alcatel ASAM

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.

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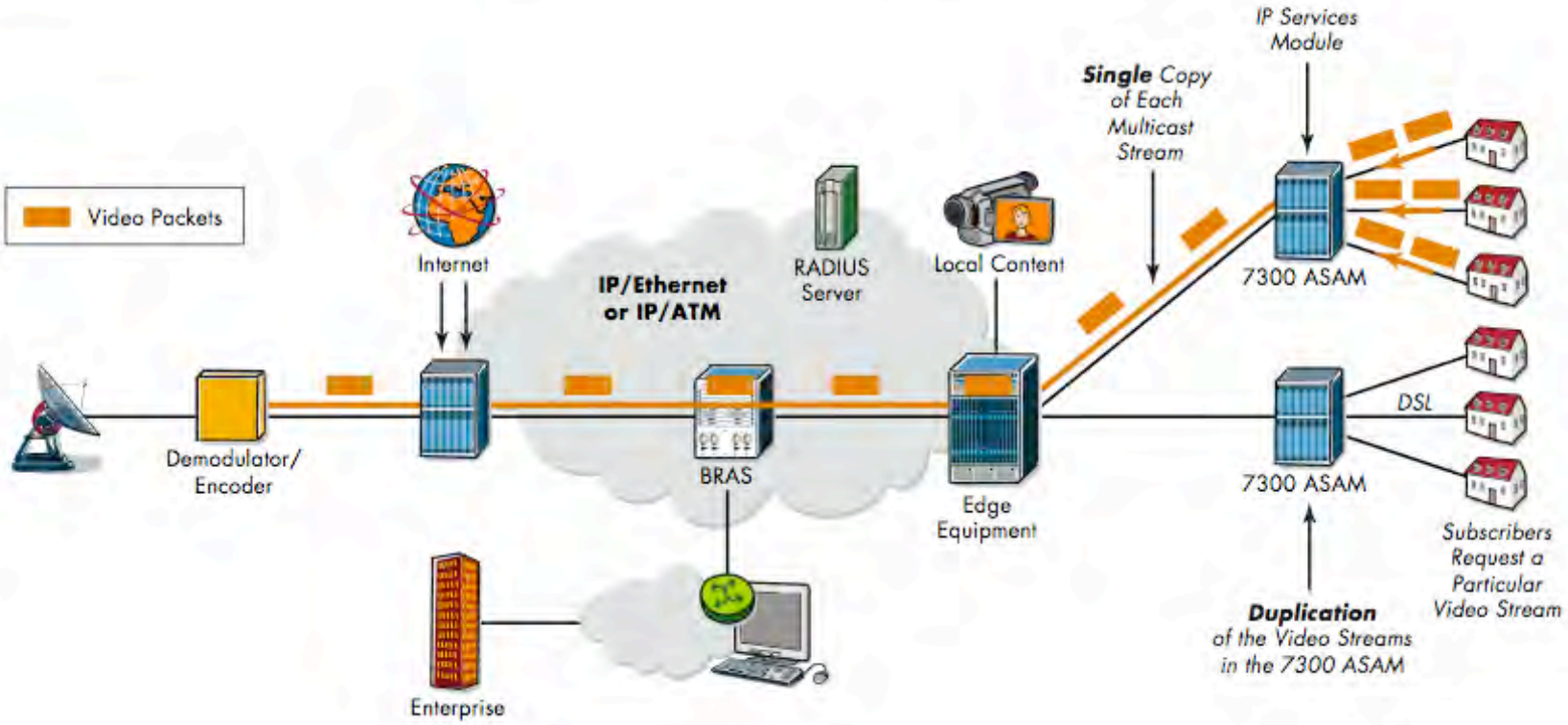
Figure 7: Multicast Video Streams with the Alcatel 7300 ASAM for High Bandwidth IP Video Applications



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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
- Router-IAD ADSL Wi-Fi
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - **AVIvid S-A60 / L**

DSLAM AVIvid S-A60

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™ 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