
**REDES DE BANDA ANCHA**  
 Área de Ingeniería Telemática

---

## Equipos

---

Área de Ingeniería Telemática  
<http://www.tlm.unavarra.es>

Redes de Banda Ancha  
 5º Ingeniería de Telecomunicación

---

---

---


---

---

---

---

---


**REDES DE BANDA ANCHA**  
 Área de Ingeniería Telemática

---

## Equipos PDH y SDH

---

Área de Ingeniería Telemática  
<http://www.tlm.unavarra.es>

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

2/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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

3/18

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## CSU/DSU

**FM4000**  
 Application Diagram

4/18

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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

5/18

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

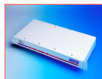
## CSU/DSU

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 individual basis. The equipment may process any combination of services. The DSU is 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.



6/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## CSU/DSU

**Specifications**

<b>Line E1 Interface</b> Port G703, 75 ohm Unbalanced, 120 ohm balanced Framing G704 (CRC4) or No CRC4 or Unframed Protocol any (x.25m, HDLC, FRAMA, etc) Line coding HDLC Bit rate 2,048 Mbps +/- 50ppm Cable length E1 BNC RG202 = 750m E1 RJ45 Belden 8132 = 175m E1 RJ45 Belden 9841 = 300m		<b>Status LED &amp; Diagnostics</b> Loopbacks Local loop, Remote loop BERT 2 <sup>n</sup> -1 PRBS Statistics Per GB21, 15min, 24 hour totals Major Alarms LOS, LOF, SQ Minor Alarms AIS, RAJ Data DTE Tx Data, DTE Rx Data, DTE fault Test Test via menu, Test LED on front panel	
<b>DTE Interface</b> Port X.21 or V.35 Interface X.21: ISO4903, 15-way D type V.35: ISO2593, 34-way M-rack Bit Rate 19.2Kbps, 9.6Kbps, 4.8Kbps, 2.4Kbps		<b>Compliance &amp; Approvals</b> Performance G703, G704, G706, GB23 BNC version OTR001 2DS, BAB1F NS4043M/P/603813 RJ45 version CTR12, CTR 13, BAB1F AA806631 Safety EN1000, EN 60950 EMC EN50022, EN50082 Statistics GB21, AT&T 54016:15 min, 24hr totals Management RFC1213 (MB II), RFC1495 (baht), RFC1157 (SNMP), RFC1406 (DS1/E1), MetroDw MB (DSU), RFC1215 (Taps)	
<b>Configuration &amp; Management</b> 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 (CCHT oct 113)		<b>Environment</b> Temp 0 - 50 deg C Humidity 0 - 95% RH, non-condensing Pressure 86 - 106 kPa	
<b>Power supply</b> AC Mains 100-250 VAC, 50-400 Hz, 50mA -48 VDC Supply -36 to -72 VDC, 200-100mA		<b>Packaging</b> Type 1U, 19 inch rackmount Dimensions 435 x 213 x 44 mm (W x D x H)	

7/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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

8/118

---

---

---

---

---

---

---

---

---


---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Interfaz E1 para Router

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

Flexible multiservice solutions **support 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 V-WICs") support voice, and data applications on Cisco 2600, 2800, 3600, 3700, and 3800 multiservice routers. The Multiflex V-WIC combines WAN Interface Card (WIC) and Voice Interface Card (VIC) functionality to **provide superior 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 V-WIC 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/data toll charges.
- **Multiplexed Voice/Data**—As a dual port T1 or E1 Drop and Insert Multiplexer with integrated DSU/CSU, reducing the complexity and number of network components and facilitating a graceful migration to bandwidth efficient packet voice.

9/118

---

---

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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.
- **Module shared between Cisco 2600/2800/3600/3700 and Cisco 3800 series.**
- **E1 versions support toll resources for telepresence services.**
- 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 V-WIC models). Improves branch-office network manageability and reliability.
- **Enhances only external third party CSU/DSU 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 V-WIC 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 V-WICs supply private branch exchange (PBX) and public switched telephone network (PSTN) connectivity for the NM-HDV, NM-HD-2VE, or NM-HDV2 via digital T1/E1 ports. The NM-HDV, NM-HD-2VE, and NM-HDV2 support industry standard H.323 based VoIP, industry standards FRF.11 and FRF.12 based VoFR, and AALS based VoATM.

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

10/118

---

---

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Interfaz E1 para Router

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


The Multiflex V-WICs 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 V-WICs support numerous functions, including Cisco IOS® command line interface initiated loopback control, similar to the popular WIC-1DSU-T1. Additionally the Multiflex V-WIC is also offered in a dual port version, including dual E1 configurations, enabling increased WAN port density in Cisco 2626/3626/373800 series multiservice access routers. The E1 V-WIC versions include integrated DSUs, while the T1 V-WIC versions integrate CSU and DSU functionality, simplifying remote network management.

The 2-port Multiflex V-WICs 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-2AS, or ISDN backup with the WIC-1B-S/T or WIC-1B-U.

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



11/118

---

---

---

---

---

---

---

---

---

---

---

---



**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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 **reducing the overall cost of ownership**. This data sheet contains **key 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 Pluggable (SFP) interface. SFP modules are available in multiple optical reaches from 2 to 80 km.

15/118

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

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

Features	Descriptions
Product Compatibility	<ul style="list-style-type: none"> <li>Cisco 7300 Router</li> <li>Cisco 7600 Series Routers</li> </ul>
Port Density per SPA	1 port
Physical Interface	<ul style="list-style-type: none"> <li>OC-12c/STM-4c SFP optics module (refer to optical parameters in Table 2)</li> <li>Visual status indicators (LEDs):               <ul style="list-style-type: none"> <li>SPA status LED</li> <li>Per port LEDs                   <ul style="list-style-type: none"> <li>Carrier and alarm</li> <li>Active and loopback</li> </ul> </li> </ul> </li> </ul>
Protocols	<ul style="list-style-type: none"> <li>High-Level Data Link Control (HDLC), RFC 2615</li> <li>Point-to-Point Protocol (PPP), RFC 1662</li> <li>Frame Relay, RFC 2427</li> <li>IPv4/IPv6</li> </ul>
Features and Functions	<ul style="list-style-type: none"> <li>Synchronization               <ul style="list-style-type: none"> <li>Local (internal) or loop timed (recovered from network)</li> <li>Porter activity monitoring</li> </ul> </li> <li>Local (diagnostic) and line (network) loopback</li> <li>Section data communications channel (SDCC) — Platform-dependent feature</li> <li>Payload mapping               <ul style="list-style-type: none"> <li>POS with 1 × X'43 self-synchronous scrambler</li> </ul> </li> <li>SONET/SDH compliance               <ul style="list-style-type: none"> <li>Teknorla (Bellcore) GR-253-CORE (as applicable)</li> <li>ANSI F1.105, F1.231</li> <li>ITU-T G.707, G.892, G.825 (as applicable)</li> </ul> </li> <li>Supported SONET/SDH alarm and signal events               <ul style="list-style-type: none"> <li>Signal failure bit error rate (SF-ber)</li> <li>Signal degrade bit error rate (SD-ber)</li> </ul> </li> </ul>

16/118

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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)

17/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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

18/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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-customer's 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, Voip, TDM – supported by next generation SDH technology. It 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.



19/118

---

---

---

---

---

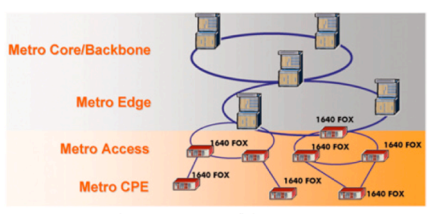
---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## STM-1/4 Multi-Service Node



**Metro Core/Backbone**

**Metro Edge**

**Metro Access**

**Metro CPE**

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

20/118

---

---

---

---

---

---

---

---







upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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

27/118

---

---

---

---

---

---

---


---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Cisco Multiservice Platform

The Cisco<sup>®</sup> ONS 15310-CL SONET Multiservice Platform is an economical, **Track unit (TRU)-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).

28/118

---

---

---

---

---

---

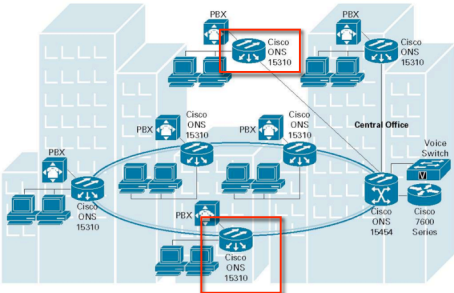
---

---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Cisco Multiservice Platform

Figure 2  
 The Cisco ONS 15310-CL Delivers Multiservices On Demand to the Customer Location and Metropolitan Edge



29/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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, automated 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.

30/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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 (I/U) 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

31/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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<sup>-7</sup> 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

32/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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**

33/118

---

---

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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/MPES 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 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



34/118

---

---

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Cisco MSPP

**Carrier-Class Compact MSPP**

In a very compact chassis (two systems fit side by side in six rack units [RU]), 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), optical interfaces can be terminated in this small footprint to optimize use of expensive real estate in the central office or remote terminal cabinet. A centralized two-stage 20-Chips STS and 5-Chips V11-5-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, scalable, 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.

35/118

---

---

---

---

---

---

---

---

---

---

---

---



**upna**  
UPN de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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).

39/118

---

---

---

---

---

---

---

---

---

---

**upna**  
UPN de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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

40/118

---

---

---

---

---

---

---

---

---

---

**upna**  
UPN de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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. **Port Compression (PCAP)**, **Link Capacity Adjustment Scheme (LCAS)**, standard encapsulation, and SONET **sub-50-millisecond resiliency schemes** **allow us 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.

41/118

---

---

---

---

---

---

---

---

---

---



**upna**  
Redes de Banda Ancha  
Area de Ingeniería Telemática

## 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)

45/118

---

---

---

---

---

---

---

---

---

---

**upna**  
Redes de Banda Ancha  
Area de Ingeniería Telemática

## Siemens MSPP

Highlights at a glance  
The SURPASS hit 7070 enables true multi-protocol convergence 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 160GbE VC4 and 1x10GbE VC-12 switching granularity
- Integrated packet fabrics (Ethernet, RPR)
- Multi-service platform: 2M, 34/45M, 155M, STM-1/4/16/64, 40G, 10/100/1G, 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

46/118

---

---

---

---

---

---

---

---

---

---

**upna**  
Redes de Banda Ancha  
Area de Ingeniería Telemática

## Siemens MSPP

**Major benefits for carriers**

- Increased revenue from new services
- Significant OPEX and CAPEX reduction
- 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.

**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

**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 Ring
MS-SPRing	Multi-Section Protection Ring
RPR	Resilient Packet Ring
SNCP	Sub-Network Connection Protection

**Multipoint-to-multipoint connections and aggregation via an integrated Layer 2 switch to build VLANs**

- 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

**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

47/118

---

---

---

---

---

---

---

---

---

---



**upna**  
REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## Siemens MSPP

**Metropolitan Core**  
SURPASS HIT 7070  
SURPASS HIT 7060 / HIT 7060 HC  
SURPASS HIT 7070

**Metropolitan Access**  
SURPASS HIT 7025 / HIT 7030  
SURPASS HIT 7035 / HIT 7050  
SURPASS HIT 7060

**Mobile Network**  
NGN Switching

**Customer Premises**  
SURPASS HIT 7020  
SURPASS HIT 7025  
SURPASS HIT 7030

Access Provider Network Termination

Company Site A  
Company Site B

POPs, ISPs, xDSL

TMMS

**Key Benefits:**  
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.

© Siemens AG 2006 • Communications  
Hofmannstr. 51 • D-81359 München  
Order No. A650001-ND-1113-9-7000

The information provided in this brochure contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract. Availability and technical specifications are subject to change without notice. The trademarks used are owned by Siemens AG or their respective owners. Printed in Germany. PAQ206.3

18/118

---

---

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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.

49/118

---

---

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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 PoPs 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

50/118

---

---

---

---

---

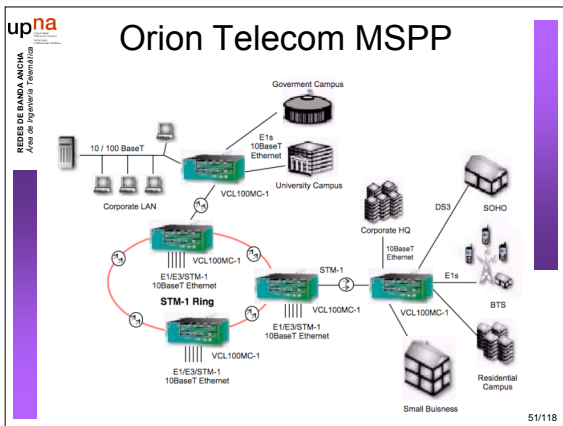
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

**Orion Telecom MSPP**

REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

upna

**Technical Specifications**

- Network Topology**
  - Linear, Ring, Mesh
- Network Element Configurations**
  - Terminal Multiplexer (TMUX)
  - Add-Drop Multiplexer (ADM)
- Aggregate Interfaces**
  - 2 X STM-160
  - S1.1, L1.1, L1.2 (ITU-T G.967 compliant)
  - Optical (1+1) Redundancy in Terminal Multiplexer Mode
- Tributary Interfaces**
  - E1/DS1, E3/DS3
  - STM-10
  - STM-16/64
  - 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 PGH, all SDH level performance monitoring (as per ITU-T G.826 and ITU-T G.784)
- 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**
  - E1E2 bytes used for Express order wire (Drimbus/ 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

52/118

---

---

---

---

---

---

---

---

---

---

**Equipos ATM**

REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

upna

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

Redes de Banda Ancha  
5º Ingeniería de Telecomunicación

---

---

---

---

---

---

---

---

---

---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Equipos ATM

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

54/118

---

---

---

---

---

---

---

---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Equipos ATM

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

55/118

---

---

---

---

---

---

---


---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Cisco MGX 8830 Multiservice Switch

The Cisco MGX<sup>®</sup> 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, narrow-band 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

56/118

---

---

---

---

---

---

---

---

**upna**  
Universidad Politécnica de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## Cisco MGX 8830 Multiservice Switch

**TECHNICAL SPECIFICATIONS**

Several 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.

57/118

---

---

---

---

---

---

---

---

---

---

**upna**  
Universidad Politécnica de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## Equipos ATM

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

58/118

---

---

---

---

---

---

---

---

---

---


**upna**  
Universidad Politécnica de Navarra  
 REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## Cisco MGX PXM-1E Processor Switch Module

The Cisco<sup>®</sup> MGX<sup>®</sup> 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)

59/118

---

---

---

---

---

---

---

---

---

---


**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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



60/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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	B3ZS	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

61/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

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

62/118

---

---

---

---

---

---

---

---

---

---



upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Equipos ATM

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

66/118

---

---

---

---

---

---

---

---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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.



67/118

---

---

---

---

---

---

---

---

upna  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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.



68/118

---

---

---

---

---

---

---

---









**upna**  
 upna.com  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Técnica

## 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	$\pm 50$ ppm
Line encoding	Non-return to zero (NRZ)
Loopbacks	Line, terminal, diagnostic
Media	Multimode fiber, 62.5 $\mu\text{m}$ /125 $\mu\text{m}$
Port capacity	16
Power	-14 to -20 dBm transmit power; -12 to -28 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 interleave parity (BIP) errors, heaper check sequence (HCS) errors, loss of cell destination (LCD), path unequipped, path label mismatch (PLM)
Typical line length	600 m (1,640.42 ft)
Wavelength	Transmit: 1270-1380 nm; receive: 1100-1600 nm

**155 Mbps OC-3c/STM-1 single mode port card (BXRATM16/155SR1)**

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	$\pm 50$ ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 $\mu\text{m}$ /125 $\mu\text{m}$ G.652
Port capacity	16
Power	-8 to -18 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 (8.32 mi)
Wavelength	Transmit: 1274-1356 nm; receive: 1270-1570 nm

78/118

**upna**  
 upna.com  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Técnica

## 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	$\pm 50$ ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Multimode fiber, 62.5 $\mu\text{m}$ /125 $\mu\text{m}$
Port capacity	16
Power	-14 to -20 dBm transmit power; -12 to -28 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	$\pm 50$ ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 $\mu\text{m}$ /125 $\mu\text{m}$ 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

79/118

**upna**  
 upna.com  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Técnica

## Marconi ATM Port Cards

**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	$\pm 50$ ppm
Line encoding	NRZ
Loopbacks	Line, terminal, diagnostic
Media	Single mode fiber, 10 $\mu\text{m}$ /125 $\mu\text{m}$ 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 (8.32 mi)
Wavelength	Transmit: 1274-1356 nm; receive: 1270-1570 nm

80/118



**upna**  
Universidad Politécnica de Navarra

REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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 teleconferencing and collaborative computing with point-to-multipoint (multipoint) 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.



84/118

---

---

---

---

---

---

---

---

---

---

---

**upna**  
Universidad Politécnica de Navarra

REDES DE BANDA ANCHA  
Area de Ingeniería Telemática

## 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 1.364 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

86/118

---

---

---

---

---

---

---

---

---

---

---

**upna**  
Universidad Politécnica de Navarra

REDES DE BANDA ANCHA  
Area 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 FS (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 ATM MIB specifications
- Supports online insertion and removal (OIR) feature, which allows an AIP to be removed or installed without turning off system power

86/118

---

---

---

---

---

---

---

---

---

---

---

upna REDES DE BANDA ANCHA  
Universidad Politécnica de Navarra  
Área de Ingeniería Telemática

## Equipos ADSL

---

---

---

---

---

---

---

---

upna REDES DE BANDA ANCHA  
Universidad Politécnica de Navarra  
Área de Ingeniería Telemática

## Equipos ADSL

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

88/118

---

---

---

---

---

---

---

---

upna REDES DE BANDA ANCHA  
Universidad Politécnica de Navarra  
Área de Ingeniería Telemática

## Equipos ADSL

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

89/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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**

90/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## Modem ADSL

D-Link, a worldwide leader in networking products, has designed the DSL-302G, a DSL 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.

91/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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 addresses)

**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 640Kops)
- G.lite ADSL downstream (up to 1.5Mbps)
- G.lite ADSL upstream (up to 512Kops)

**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**

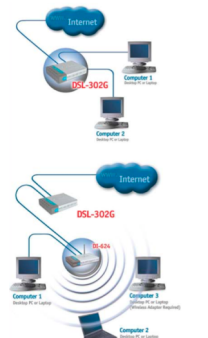
- FCC Part 15 Class B
- FCC Part 68
- IEC 60950
- CSA 950US
- CE Mark
- UL 1950 3rd Ed

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

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

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

**Weight**  
 0.21 Kg (7.4 oz)



2/118

---

---

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## Equipos ADSL

- Modem ADSL
- **Router ADSL**
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVivid S-A60 / L

93/118

---

---

---

---

---

---

---


---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## Router ADSL

### SpeedTouch™ 510 v6

Multi-user ADSL gateway



SpeedTouch 510 v6  
UPnP

Features at-a-glance:

- ADSL2+ connection to the Internet
- Tx Ethernet port
- Firewall
- NAT connection sharing including helpers for most popular protocols (SIP, RealAudio, etc.)
- VPN support

94/118

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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 all you need for a fast, reliable connection. Perfect for small and home offices (SOHO), they're the perfect solution for your home network 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 configuration wizard guides you through the setup 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 powerful 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 and through 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.

95/118

---

---

---

---

---

---

---

---



upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## Router ADSL

Technical summary

**Hardware specifications**

- Interfaces:
  - LAN:
    - 10/100Base-T (RJ45)
    - MDI/MDI-x auto-sensing
    - 1 Ethernet port
  - WAN:
    - ADSL line (RJ11) for ADSL/POTS

**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<sup>®</sup> certified Internet Gateway Device, enabling major conferencing and gaming technologies
  - 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

(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



SpeedTouch 510 v6

99/118

---

---

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## Equipos ADSL

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

97/118

---

---

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 7300 Alcatel ASAM



99/118

---

---

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 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.

99/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 7300 Alcatel ASAM

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

**Figure 2: SME Survey Example for Value Added Services**

Service	Certainly (%)	Probably (%)
Security	44	26
Web Hosting	17	41
IP-VPN	19	41
Intranet/Extranet	11	34
VoDSL	11	23

100/118

---

---

---

---

---

---

---

---

**upna**  
 REDES DE BANDA ANCHA  
 Área de Ingeniería Telemática

## 7300 Alcatel ASAM

**Figure 3: Maximizing Revenues with Business Access Services**

101/118

---

---

---

---

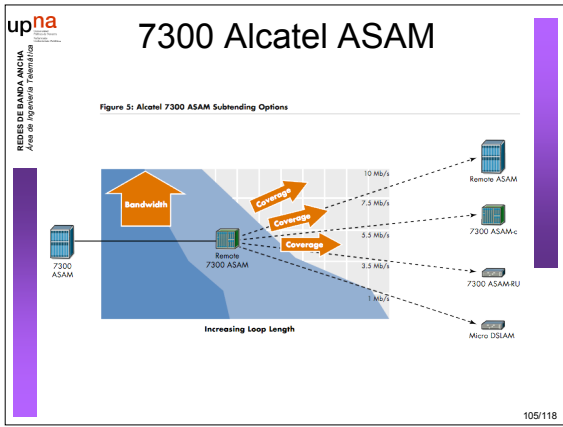
---

---

---

---






---

---

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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).

106/118

---

---

---

---

---

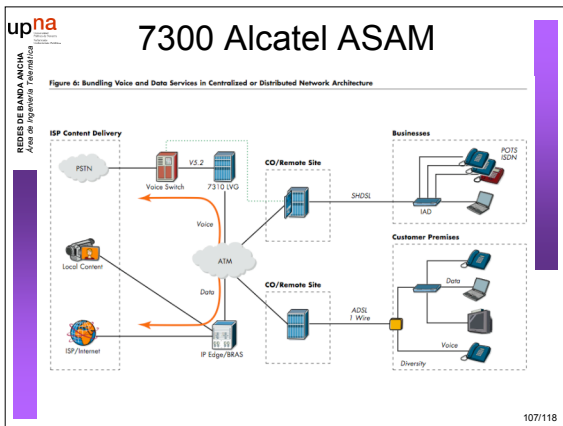
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

# 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.

108/118

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

# 7300 Alcatel ASAM

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

109/118

---

---

---

---

---

---

---

---

upna  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

# 7300 Alcatel ASAM

## MEETING THE CHALLENGES OF TODAY AND TOMORROW

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 6020 XM, for faster customer activation
- integrated test capabilities that provide visibility of the entire network and accurate line qualification before lines are put in service

110/118

---

---

---

---

---

---

---

---



**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## Equipos ADSL

- Modem ADSL
- Router ADSL
- DSLAM
  - Alcatel ASAM 7300 (-c)
  - AVivid S-A60 / L

114/118

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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 km
  - = Downstream: 32 kbps to 10 Mbps
  - = Upstream: 32 kbps to 1 Mbps
- ADSL data rates (ITU-T G.992.1)
  - = Downstream: 32 kbps to 4 Mbps
  - = Upstream: 32 kbps to 1 Mbps
- ADSL+ data rates (ITU-T G.992.2)
  - = Downstream: 32 kbps to 28 Mbps
  - = Upstream: 32 kbps to 3 Mbps
- ADSL++ data rates (optional)
  - = Downstream: 32 kbps to 50 Mbps
  - = Upstream: 32 kbps to 8 Mbps

**ATM Capabilities**

- ATM PVC support per ATM UNI 3.1 and 4.0 signalling
- ATM Shaping, support for CBR, VBR-n, VBR-rt, GFR & UBR traffic types
- AAL5 data & management transparency
- Configurable VP/VCI range, up to 480 connections per system
- 8 VPVC per ADSL port
- Early and partial packet discard
- Intelligent dynamic buffering architecture with per VPVC 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, 2023, 3635, 3636)
- CLI through Serial port or Telnet
- Embedded HTTP server for configuration and management from standard Web browser
- SNMP V1 and V2 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

115/118

---

---

---

---

---

---

---

---

**upna**  
REDES DE BANDA ANCHA  
Área de Ingeniería Telemática

## 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:
  - = 496 ADSL2+ ports
  - = 384 VDSL2 ports@
  - = 384 G.SHDSL 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
- 496 VLANs
- 496 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: 9,000 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-n, VBR-rt, GFR & UBR traffic types
- AAL5 data & management transparency
- Configurable VP/VCI range, up to 592 connections per system
- 8 VPVC per ADSL port
- Early and partial packet discard
- Intelligent dynamic buffering architecture with per VPVC queuing

**Uplinks**

- 16x100/1000 BT Giga Ethernet ports
- 8 MiniBIC port for MiniBIC 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 km
  - = Downstream: 32 kbps to 10 Mbps
  - = Upstream: 32 kbps to 1 Mbps
- ADSL data rates (ITU-T G.992.1)
  - = Downstream: 32 kbps to 4 Mbps
  - = Upstream: 32 kbps to 1 Mbps
- ADSL+ data rates (ITU-T G.992.2)
  - = Downstream: 32 kbps to 28 Mbps
  - = Upstream: 32 kbps to 3 Mbps
- ADSL++ data rates (optional)
  - = Downstream: 32 kbps to 50 Mbps
  - = Upstream: 32 kbps to 8 Mbps
- 48 VDSL2 ports DMT cell-relay / card

116/118

---

---

---

---

---

---

---

---

**upna**  
Unión de Ingenieros de Telecomunicaciones

**REDES DE BANDA ANCHA**  
Área de Ingeniería Telemática

## 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

117/118

---

---

---

---

---


---

---

---

**upna**  
Unión de Ingenieros de Telecomunicaciones

**REDES DE BANDA ANCHA**  
Área de Ingeniería Telemática



118/118

---

---

---

---

---

---

---

---