



**Alcatel 7510 Media Gateway**  
**A Next Generation Network Building Block**



ARCHITECTS OF AN INTERNET WORLD



As one of the key components of Alcatel's next generation network (NGN) solutions, the Alcatel 7510 Media Gateway provides seamless interworking of voice connections between the public switched telephone network (PSTN) and IP networks. Designed for the highest port density and scalability, the Alcatel 7510 Media Gateway is ideally suited for a centralized network model that requires huge gateway capacity, concentrated at a few points of presence (PoPs).



# THE FOUNDATION FOR YOUR NGN

As a single platform offering multiple media gateway applications, the Alcatel 7510 Media Gateway (MG) facilitates the evolution of the PSTN to a voice over packet network in a unique manner. Based on its TDM switching and voice over IP (VoIP) capabilities, the Alcatel 7510 MG supports Internet offload, as well as NGN Class 4 and Class 5 packet voice solutions. Because it uses open and standardized signaling and control protocols such as MEGACO/H.248 and SIGTRAN, it can be deployed with Alcatel softswitch and media gateway controller (MGC) platforms as well as integrated into any multivendor NGN.

Networks are evolving. To succeed, each step taken in the evolution from circuit-switched networks to packet-switched voice networks must immediately generate value for the network operator. This value can include:

- > Cost reduction
- > Additional revenue
- > Growth
- > Improved asset productivity

An NGN contains three main building blocks: softswitches, media gateways and a packet-based transport network.

Media gateways are the primary hardware elements in an NGN, setting the foundation for voice quality, reliability, scalability and performance. Media gateways provide voice over packet (VoP) capabilities and serve as key transitional elements between today's circuit-switched and tomorrow's packet-switched telephony networks.

No matter where you start or which evolutionary path you pick, the Alcatel 7510 MG has the right business solutions to ensure immediate value, and allows you to mix and match them as needed.

**As a single platform optimized for VoP and TDM switching applications, the Alcatel 7510 MG uniquely addresses the challenges of bringing together voice in circuit and in packet form.**



# FUTURE PROOF YOUR NGN

The Alcatel 7510 MG facilitates the evolution of the PSTN to a voice over packet network in a unique manner: multiple media gateway applications on a single platform.

## VoIP Termination

There is a tremendous volume of VoIP traffic out there — generated from IP phones in corporate environments or residential PC-Phone applications — and tremendous revenue opportunities as a result. Thanks to the Alcatel 7510 MG, IP telephony users can reach any PSTN phone worldwide.

## VoIP Trunking

Service providers can exploit a unique opportunity to reduce costs and improve asset productivity by using IP networks for long-distance and international voice connections.

## TDM-to-TDM Hairpinning

The TDM-to-TDM hairpinning capabilities of the Alcatel 7510 MG mean that local exchanges (LEXes) connected to our media gateways no longer need inter-LEX TDM connections. Switching of calls between such LEXes can now be done at the media gateway level, resulting in significant cost savings. In addition, the international gateway switch feature offers a very cost-effective way to convert a-law TDM traffic into  $\mu$ -law TDM traffic and vice versa.

## TDM-to-PRI Grooming

Internet dial-up traffic often causes congestion on a network's transit-switching layer. The Alcatel 7510 MG TDM-to-primary rate interface (PRI) grooming application allows you to reduce this traffic without a costly expansion of the transit switching capacity of your TDM network.



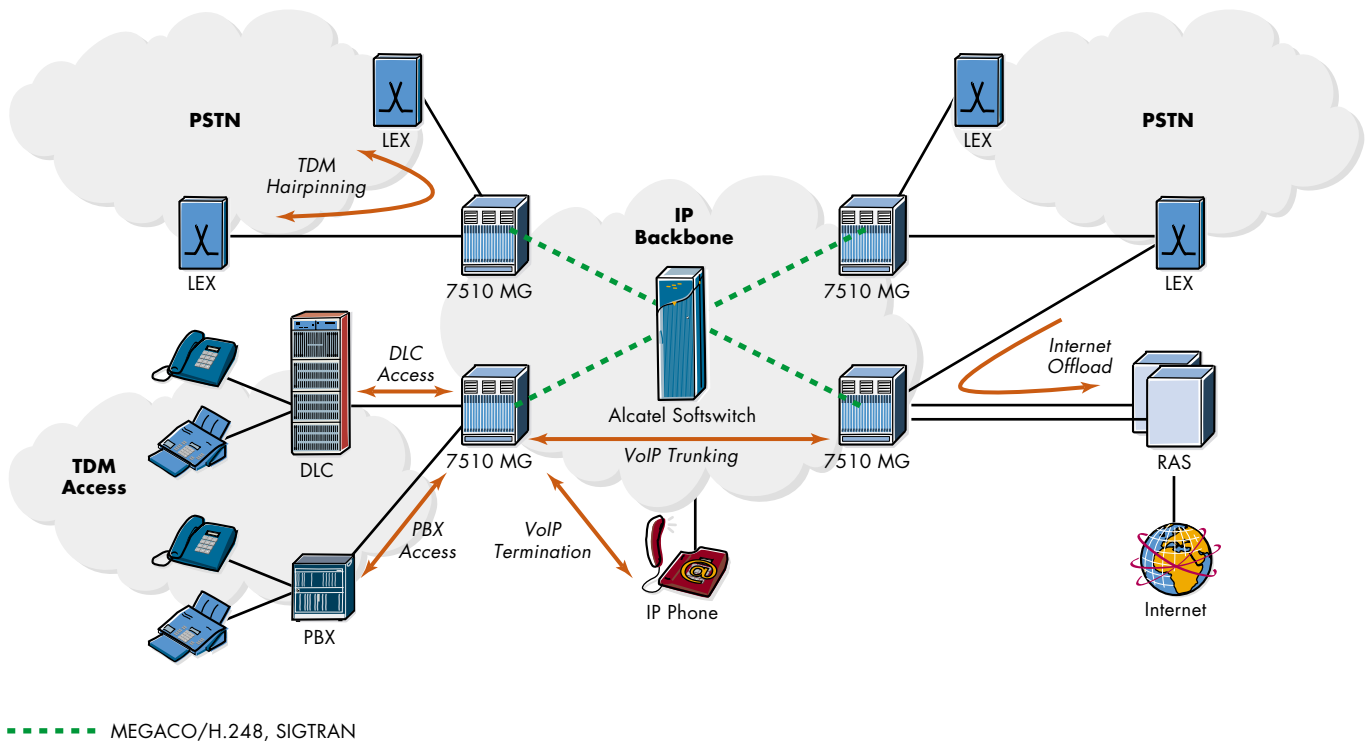
## PBX Access

To expand your customer base and grow your revenues, you need to attract businesses and large corporate customers. Business voice and enhanced services such as Internet protocol - virtual private network (IP-VPN) are key to the success of an NGN in this market space. The Alcatel 7510 MG allows for provisioning of ISDN PRI interfaces and provides direct access to public branch exchange (PBX) systems, bypassing LEXes entirely.

## Digital Loop Carrier Access (Centralized Access Gateway)

To further improve the asset productivity of an NGN while protecting your investment in TDM access nodes — also known as digital loop carriers (DLCs) — you need to be able to access those DLCs. The ability of the Alcatel 7510 MG to directly access DLCs makes true NGN Class 5 solutions possible and smooth LEX replacement scenarios a reality.

Figure 1 - One Platform with Multiple Media Gateway Applications



# GO BEYOND IP TELEPHONY

## **Extend Telephony Services from PSTN to IP without any Compromises**

IP-based services are gaining momentum, and more and more IP telephony solutions are being deployed, both in private and public networks. As a result, there is an increasing need for PSTN/IP interworking. In the NGN model, the media gateway allows for a seamless interworking of voice connections across these disparate networks. Using the latest VoIP features, the Alcatel 7510 MG ensures the best possible speech quality.

In addition to telephony services, the Alcatel 7510 MG establishes fax and modem connections across IP networks without any restrictions. The seamless support of analog fax machines or Group 3 fax services is critical, especially for business customers. Depending on the quality parameters offered by the IP network, the Alcatel 7510 MG applies a transparent tunneling of a fax connection or a T.38-compliant fax relay service.

Users demand trouble-free access to voice mail systems and effective interactive voice response (IVR)-based services. The Alcatel 7510 MG meets those demands by ensuring proper transport or relay of dual tone multifrequency (DTMF) tones across network borders.

A media gateway has a definite challenge: maintaining superior quality when establishing telephony connections across disparate networks. The Alcatel 7510 MG goes beyond that by ensuring the same quality for fax and modem services, as well as in-band signaling such as DTMF.



True PSTN interworking includes the support of vital maintenance and supervision functions. The SS7 network requires continuity tests (COTs) to conduct loopback and tone check testing on the path before a circuit is established. The Alcatel 7510 MG fully supports COT functions, and allows detection of any failure of DS0 channels.

### **Open Up the Future with Industry-Standard Control and Signaling Interfaces**

The Alcatel 7510 MG fully supports the NGN model by providing an open interface to the control layer, using the industry-standard media gateway control protocol, RFC 3015 (MEGACO/H.248). As a result of its open

architecture, the Alcatel 7510 MG can be deployed in NGN solutions based on an Alcatel softswitch and MGC platforms or any third-party media gateway controller (MGC) that supports MEGACO/H.248.

By fully incorporating the SIGTRAN standards, the Alcatel 7510 MG ensures reliable and secure transport of SS7 or ISDN signaling between the PSTN and the NGN.

The NGN architecture strictly separates the control, media and transport layers of a network. The use of standards-based protocols such as MEGACO/H.248 for gateway control as well as SIGTRAN for signaling transport over IP is key to make this network model work.



# CARRIER GRADE RELIABILITY AND AVAILABILITY

Carriers cannot afford to compromise the availability of their revenue-generating services when migrating voice networks to NGN. The Alcatel 7510 MG ensures carrier grade reliability and availability, and guarantees maximum network uptime.

## Generate Revenue While Your Network is Up and Running

The Alcatel 7510 MG has been engineered to support continuous operation and offer the highest system availability in the industry. Through fault tolerance based on extensive redundancy concepts and carrier grade design, the Alcatel 7510 MG offers 99.999 percent system availability, with a system downtime of less than 5.3 minutes per year.

To achieve high fault tolerance, all system functions of the Alcatel 7510 MG are fully redundant and hot swappable. In the event of failure of an active module, extensive equipment protection switching (EPS) mechanisms ensure seamless switchover to the spare module and reconfiguration of the system. Also, line protection via automatic protection switching (APS) is supported for optical interfaces (SDH or SONET).

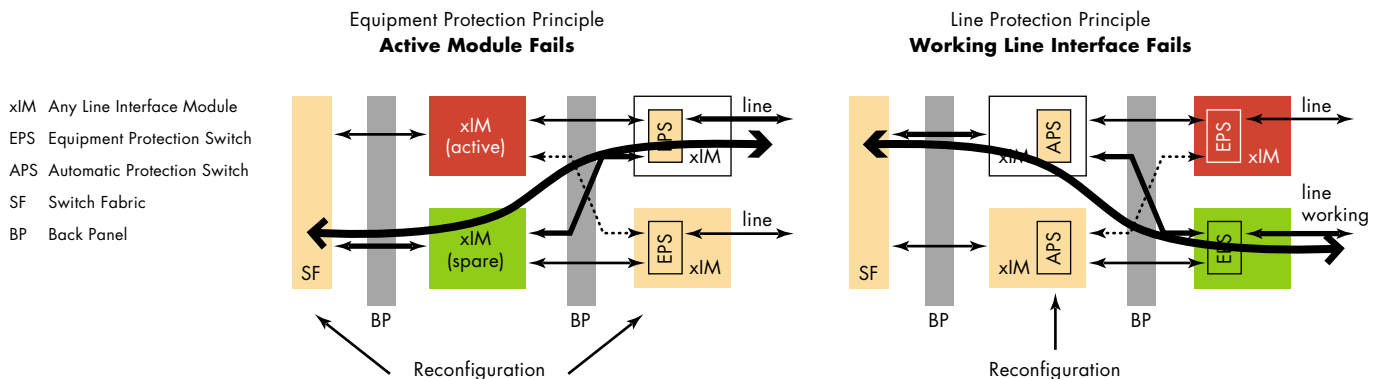
The carrier grade design of the Alcatel 7510 MG is fully Telcordia GR-63 and NEBS Level-3 compliant. The chassis supports hot swappable, redundant DC power supplies with 1+1 redundant dual power feed and n+1 redundant, field replaceable cooling fan trays, as well as a fully redundant clock module and clock distribution.

The Alcatel 7510 MG also offers fully redundant software for system control, call processing, signaling and routing. The Alcatel 7510 MG Fault Tolerance Application Manger (FTAM) software:

- > Detects internal and external outages
- > Notifies the management system of the existence and nature of the fault
- > Isolates the fault
- > Automatically restores service by initiating the appropriate corrective action

These measures result in industry-leading system availability, and ensure stable call preservation in case of failure.

Figure 2 - Equipment and Line Protection Principles





## Minimize Central Office Floor Space, Power and Cooling Requirements, Maximize Profit

There is one clear way to minimize a media gateway's footprint: maximize its port density. The Alcatel 7510 MG provides the industry's leading port density for both TDM switching and VoP media gateway applications. Its high-density media conversion modules are offered in two sizes, supporting either 4,032 or 2,016 concurrent VoP connections with G.711 coding per slot. By applying the most efficient n+1 redundancy scheme, a total of five media conversion modules — four active plus one hot spare — provide 16,128 concurrent VoP connections per chassis.

The port density is increased even further by optimizing the chassis configuration for TDM switching applications because no packet interface and no media conversion modules are needed. With an optical TDM interface connectivity of up to 8,064 DS0 per circuit interface card, the Alcatel 7510 MG provides a TDM port density of up to 64,512 DS0 per chassis, in fully redundant 1+1 configuration.

Allowing up to three chassis to be mounted in a standard telco rack, the Alcatel 7510 MG is clearly best in class.

**Over time, operating expenditures often exceed capital expenditures. The recurring cost of office floor space, power and cooling make up a significant portion of operating expenditures. With VoP port density of up to 48,384 DS0 in a single rack, the Alcatel 7510 MG dramatically reduces central office footprint.**

**Table 1 - Alcatel 7510 Media Gateway Port Density**

Maximum port density per configuration	PSTN Interface: 4-port STM-1/OC-3, optical, (e.g., OC-3 configuration)		PSTN Interface: 32-port E1/T1, electrical, (e.g., E1 configuration)	
	Per chassis	Per rack	Per chassis	Per rack
VoP media gateway	16,128	48,384	7,936	23,808
TDM switching	64,512	193,536	14,880	44,640

# BUILD YOUR COMPETITIVE **EDGE**

The Alcatel 7510 MG has been engineered to provide superior voice mediation from circuit to packet, and it delivers. Its revolutionary architecture offers native circuit as well as packet switching combined with the most economic utilization of digital signal processor (DSP) resources. The result: guaranteed superior packet voice performance and flexibility.

## A System Architecture Optimized for Packet Voice Applications

As with most migrations from one technology to another, the evolution from circuit-switched to packet-switched voice networks is happening in incremental steps, over time. As a consequence, both domains need to be adequately supported. The Alcatel 7510 MG uniquely addresses this requirement by offering dedicated, high capacity switching fabrics for circuit as well as packet connections, allowing each connection to be treated in the most efficient manner.

Based on a star topology, the high capacity packet switch interconnects all modules and provides dedicated bandwidth to each slot. This design guarantees unlimited scalability within the system with no performance degradation.

### System control module (SCM)

- > Control and signaling protocol stacks
- > Control path Packet Switch Fabric (c-PSF)
- > Signaling and management interfaces
- > 2-port 10/100Base-T Ethernet

### Media conversion module (MCM)

- > DSP-based voice processing
- > 4,032/2,016 DS0 per card

### Switching fabric module (SFM)

- > Native TDM and packet switching
- > Circuit Switch Fabric (CSF)
- > Data path Packet Switch Fabric (d-PSF)

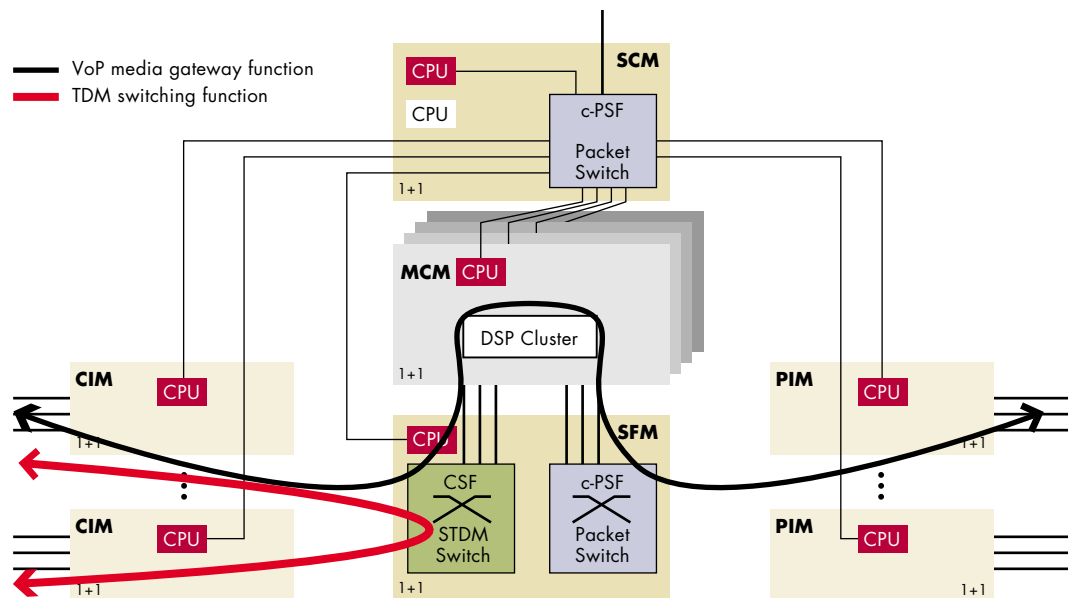
### Circuit interface module (CIM)

- > TDM interfaces to the PSTN
- > 4-port STM-1/OC-3, optical
- > 32-port E1/T1, electrical

### Packet interface module (PIM)

- > Ethernet interface to IP network
- > 1-port Gigabit Ethernet, optical

Figure 3 - System Architecture Overview



To deliver superior packet voice performance while maximizing port density and flexibility, the Alcatel 7510 MG hosts pooled DSP resources on dedicated media conversion modules. Equipped with high density DSPs and leading-edge voice processing features, these modules are the heart of the media gateway.

### Scale and Trim Your Network Equipment for Maximum Efficiency

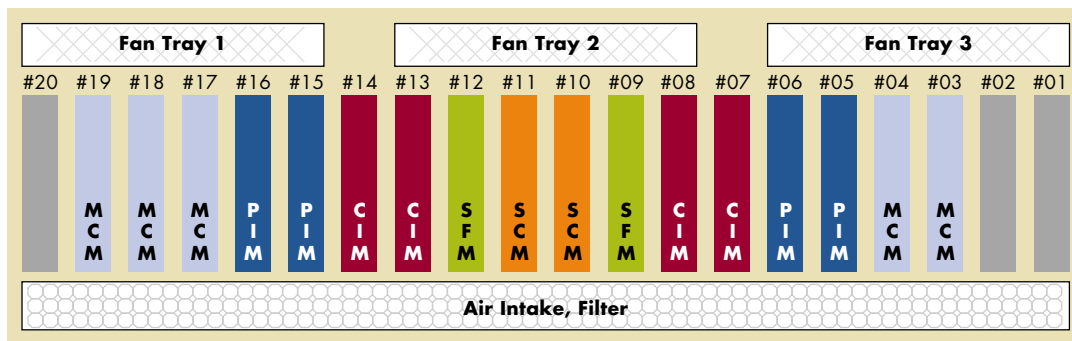
In the evolution of circuit-switched networks to packet-switched voice networks, there are several possible scenarios, ranging from a cap and grow scenario (a smooth and stepwise introduction of VoP for accommodating network growth while maintaining the installed PSTN base) to a replacement scenario (complete replacement of a legacy TDM switch by an

appropriate NGN softswitch and VoP media gateway components). To accommodate these different scenarios, network equipment — especially media gateways — needs to cover a broad range of capacity and scalability requirements.

With its generic slot concept — 16 out of the total 20 slots within a chassis can be flexibly used for any combination of line cards and voice processing modules — the Alcatel 7510 MG offers maximum flexibility and scalability. In a minimum configuration, only 6 slots are occupied for a fully redundant VoP media gateway application. For the remaining 10 slots, many different expansion scenarios are feasible based on a combination of additional PSTN connectivity in STM-1/OC-3 or E1/T1 configurations, or additional voice processing capacity.

**In some areas, voice over packet may be introduced on a small scale. Penetration will likely proceed at different paces in different locations. A smart investment is a media gateway that allows you to take control. It is flexible and scalable enough to accommodate your network growth, whatever the market, in the most efficient manner.**

Figure 4 - Sample Chassis Configuration



# MANAGE YOUR SUCCESS

## **Comprehensive Management Completes the Solution**

For element management the Alcatel 7510 MG can be managed using the text-based command line interface (CLI) or the graphic user interface (GUI)-based Alcatel 7510 Media Gateway Element Manager (MG EM).

## **Alcatel 7510 Media Gateway Command Line Interface**

The Alcatel 7510 MG command line interface (CLI) can be accessed using IP Telnet sessions, or by a local console. A maximum of eight simultaneous logins to the CLI are possible. The Alcatel 7510 MG includes an embedded simple network management protocol (SNMP) agent and supports a complete list of standards-compliant management information bases (MIBs), including an Alcatel MIB for remote SNMP-based element management.

## **Alcatel 7510 Media Gateway Element Manager**

The Alcatel 7510 MG Element Manager (EM) communicates with the SNMP agent to provide comprehensive remote element management of the Alcatel 7510 MG. The Alcatel 7510 MG EM supplies the flexible service capabilities that large and growing network service providers require while reducing network management complexity. It offers an easy-to-use GUI and a comprehensive suite of element management applications.

## **Alcatel 1300 Convergent Network Management Center**

The Alcatel 7510 MG EM can be seamlessly integrated into the Alcatel 1300 Convergent Network Management Center (CMC), providing integrated network management of the complete NGN solution. The Alcatel 1300 CMC addresses

The Alcatel 7510 MG provides a comprehensive set of open, standards-based element management functions and interfaces that allow full integration with network management and operations support systems. Working seamlessly together, these capabilities simplify new service installation and provisioning tasks while reducing operation and maintenance costs.



the entire operations and maintenance needs of the Alcatel softswitches, gateways and Alcatel 1000 PSTN switches. In addition to local management functions, the Alcatel 1300 CMC provides:

- > A network map with animated alarm status of all network elements
- > An integrated alarm list
- > Provisioning functions (e.g., trunk management acting on the Alcatel softswitches and gateways)

Open interface support guarantees that the Alcatel 1300 CMC can interface with your existing operations support systems.

Figure 5 - Alcatel 1300 CMC



THE ALCATEL 7510 MG

# SEAMLESS **EVOLUTION** FROM CIRCUIT TO PACKET

By enabling voice services to be transported over data networks, service providers can maximize the value of their current investments while enabling future service rollouts that incorporate the latest technologies. Featuring an advanced architecture and interfaces optimized for packet voice applications together with carrier class reliability, availability and quality, the Alcatel 7510 MG combines the reliability and simplicity of voice with the speed and efficiency of data networks.

- > **Future-proof investment** – Single platform offers multiple gateway applications with the most deployment flexibility, yet without cost penalty
- > **Maximum network uptime** – Due to carrier class reliability and 99.999% system availability
- > **OPEX savings** – Highest port density minimizes channel cost, floor space, and power and cooling requirements
- > **CAPEX savings** – Maximum scalability ensures efficient capacity expansions in gradual steps
- > **Optimized system architecture** – Native TDM and packet switching for high-performance packet voice applications

Explore the Alcatel 7510 MG's unique capabilities in the converged networks of the future. Deliver more today and tomorrow.



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## Glossary

CIM	circuit interface module	NEBS	Network Equipment Building System
CLI	command line interface	NGN	next generation network
CMC	Convergent Network Management Center	PBX	public branch exchange
COT	continuity test	PIM	packet interface module
CSF	circuit switch fabric	PRI	primary rate interface
DLC	digital loop carrier	PSTN	public switched telephone network
DSP	digital signal processor	RAS	remote access server
DTMF	dual tone multi-frequency	SCM	system control module
E1	2.048 Mb/s interface	SDH	synchronous digital hierarchy
FTAM	fault tolerant application manager	SFM	switch fabric module
GUI	graphical user interface	SIGTRAN	signaling transport
IP	Internet protocol	SONET	synchronous optical network
ISDN	integrated services digital network	SNMP	simple network management protocol
LEX	local exchange	SS7	Signaling System No. 7
MCM	media conversion module	TDM	time division multiplexing
MEGACO	media gateway control protocol, RFC 3015	TFTP	trivial file transfer protocol
MGC	media gateway controller	VoIP	voice over IP
MIB	management information base	VoP	voice over packet

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