

The Alcatel 7390 LMDS Digital Base Station (DBS) is the digital part of the Alcatel 7390 LMDS access system. It comprises network interfaces, radio modems, IF interfaces as well as the centralized intelligence of the whole cell organization. Associated with the Alcatel 7390 LMDS Co-Pol or X-Pol Radio Base Station, the radio part of the base station, it acts as a hub transmitting voice and high speed data services for as many as 4,000 Alcatel 7390 LMDS Network Terminations (NTs) over a line-of-sight connection with a range of up to 5 kilometers (3 miles) (the cell diameter range depends on the system frequency).

Highly scalable and fully managed as part of a multiservice solution, Alcatel 7390 LMDS products can be rapidly deployed to provide a powerful, cost-effective access solution for the first mile delivery of a wide range of data, Internet, voice and video services.



High intelligence
High capacity
High integration



Tremendous capacity

The 7390 DBS offers a tremendous capacity, providing up to 40 Mb/s throughput per carrier up to eight carriers and serving up to 1,000 NTs per sector. It supports a complete variety of network interfaces, so customers enjoy seamless access to all existing public voice, data and broadband networks. Open interfaces ensure easy interconnections to PSTN, ISDN, leased lines, broadband networks and the Internet. An OC-3c/STM-1 (ATM 155 Mb/s) or T3/E3 (ATM 45/34 Mb/s) network interface provides the connection for data traffic while 64 x E1/T1 network interfaces are dedicated to circuit-oriented traffic.

Make the most out of any spectrum allocation

Four possible Modem Channeling solutions:

- ▼ 36 MHz per carrier, 36 MHz/40 Mb/s downlink, 4 x 9 MHz/10 Mb/s uplink
- ▼ 28 MHz per carrier, 28 MHz/32 Mb/s downlink, 4 x 7 MHz/8 Mb/s uplink
- ▼ 21 MHz per carrier, 21 MHz/24 Mb/s downlink, 2 x 9 MHz/10 Mb/s uplink
- ▼ 14 MHz per carrier allowing frequency reuse with scarce allocation, 14 MHz/17 Mb/s downlink, 2 x 7 MHz/8.5 Mb/s uplink, 14 MHz/17 Mb/s downlink, 4 x 3.5 MHz/4.25 Mb/s uplink

Each channeling can be combined with four Radio Solutions:

- ▼ Single carrier Co-Pol using the 7390 Co-Pol Radio Base Station
- ▼ Single carrier single antenna per sector with 1+1 protection
- ▼ Multicarrier using the 7390 X-Pol Radio Base Station. One transmit and one receive antenna per sector, for a large capacity with up to six carriers per radio sector with n + 1 protection
- ▼ Co-Pol: large T-R spacing
- ▼ X-Pol: to cope with small T-R spacing values thanks to polarization isolation

High level of integration

The Alcatel 7390 LMDS DBS has been designed for fast and easy installation. Its 22U (1 meter/1.09 yard high) 48 cm/19 in. cabinet (also available in a full outdoor version) is one of the smallest in the industry.

High flexibility

In order to adapt to any capacity, any redundancy mode, or any kind of traffic mix, the Alcatel 7390 DBS has been designed to offer the most flexible and modular architecture. The base station capacity can be increased by simply adding plug-in modules. The capacity of each sector can also be increased by increasing the number of carriers as well as by increasing the capacity of each carrier. This architecture is built around five main components:

- ▼ **ATM Network Termination (ANT):** The ANT board provides the ATM network interface. It can be secured through a 1+1 hot stand-by additional board. Adapted to any capacity (up to 155 Mb/s), it also offers every kind of interfaces required (optical mono/multimode, electrical). 1+1 protection is made possible through a specific coupling board (CPL).
- ▼ **TDM Network Termination (TNT):** The TNT board provides capacity of up to 16 E1 or T1 circuits with the capability of grooming 64 kb/s circuits originated by several TS. Four TNT boards can be plugged into the DBS chassis, thus providing a total capacity of 64 E1/T1 circuits per base station. These E1/T1 interfaces exist either on G.703 physical interface (several impedance values available) or through the ATM Network Termination interface, using AAL-1 circuit emulation.
- ▼ **ATM Modulator Demodulator (AMD):** The AMD modem board consolidates both modulation and demodulation functions for TDM and TDMA. One single AMD board comprises one TDM modulator (downstream carrier) and four TDMA burst demodulator (upstream carriers). Up to eight AMD boards, one per sector, can be plugged into the same DBS chassis; the redundancy is ensured with 1+1 or n+1 protection. Several channelings are available by software configuration from 14 to 36 MHz for the downlink, and from 4 x 3.5 or 2 x 7 MHz to 4 x 9 MHz for the uplink. The AMD also handles the MAC protocol with a capacity of 40 Mb/s.
- ▼ **IF Base Station (IBS):** The IBS board ensures the conversion into intermediate frequencies of the downstream and upstream channels. Up to eight intermediate frequency interface boards, one per sector, are available in the same DBS; the redundancy is ensured with 1+1 or n+1 protection. The IBS is adapted to any RF frequency band.
- ▼ **Power Supply (PS):** Two 1+1 protected power supply units and a 3-fan sub-rack.

High performance Air interface

The Air interface has been designed to ensure an optimum spectrum utilization. Based on TDMA and ATM technologies, the patented radio frame is optimized for both circuit-oriented and data-oriented applications. The operator is free to mix voice and data according to customer needs. Thanks to a dynamic bandwidth allocation mechanism, based on a combination of polling, contention and piggybacking techniques, full network capacity is always available. In addition, a very efficient Reed-Solomon and convolutional channel FEC (Forward Error Correcting) is used for quasi error-free transmission ($BER < 10^{-14}$).

The overall performance is increased thanks to a reduced round trip delay (less than 8 ms for a single 64 kb/s circuit and less than 4 ms for an E1/T1 circuit). The Alcatel 7390 DBS also features a built-in data encryption capability which makes confidential communications possible. TDMA technology allows system flexibility, cost sharing and powerful dynamic bandwidth allocation capability. Thus, there is one modem board per radio channel regardless of the number of end users that share the bandwidth capacity on a real-time basis.

High reliability

Like the other components of the Alcatel 7390 LMDS system, the 7390 DBS benefits from an automated manufacturing process, field-proven components and severe test procedures, thus providing the highest level of quality and reliability. This reduces the sets of spare parts and limits the need for maintenance. This reliability is increased thanks to 1+1 or n+1 protections at every level, the redundancy of power supply units, the ATM network interfaces and the transmission chains (modem + IF board + 7390 Radio Base Station).

Integrated management

The Alcatel 5620 Network Manager (NM), formerly the 46020 Network Manager*, is based on the simple Network Management Protocol and is integrated with the general Alcatel management platform, to provide carrier-class end-to-end network and service management. It allows full control of network elements: configuration management, alarms monitoring, performance monitoring, and software download for fast and easy system upgrade.

Technical Summary

IF Interface

- ▼ Tx (DBS to RBS): 130 MHz
- ▼ Rx (RBS to DBS): 380 MHz
- ▼ Connector: N female 50Ω
- ▼ Maximum RBS-DBS cable length: 200 m (218 yards)
- ▼ Upstream channeling: 3.5 to 9 MHz
- ▼ Upstream roll-off factor: 25%
- ▼ Upstream modulation: QPSK
- ▼ Upstream FEC: Reed-Solomon RS (63,53,5)
- ▼ Downstream channeling: 14 to 36 MHz
- ▼ Downstream roll-off factor: 35%
- ▼ Downstream modulation: D-QPSK
- ▼ Downstream FEC
 - Inner code: convolutional, 7/8, k=7
 - Interleaver: depth=12
 - Outer code: Reed-Solomon RS (204,188,8)

Network Interfaces

- ▼ ATM STM-1 (155 Mb/s): optical monomode/multimode
- ▼ ATM OC-3 (155 Mb/s): optical monomode/multimode
- ▼ ATM n* E1, n ≤ 16: G.703
- ▼ ATM E3 (34 Mb/s): G.703
- ▼ ATM T3 (45 Mb/s): G.703
- ▼ E1: G.703 (75/120Ω), AAL-1 circuit emulation
- ▼ T1: G.703 (110Ω), AAL-1 circuit emulation
- ▼ Reference Clock: ATM interface, circuit E1/T1 interface, external clock: 2048 MHz (75Ω)

Power/Environment/Mechanical Data

- ▼ Power: 36 to 60 V DC, 960 W (fully loaded, eight 7390 RBSs included)
- ▼ Environment: -5° to 55° C (29° to 63° F) in operation, ETS 300 019-1-4 class 3.1 E
- ▼ EMC standards: ETS 300 385 class B
- ▼ Height: 120 cm (48 in.)
Width: 60 cm (24 in.)
Depth: 60 cm (24 in.)
- ▼ Weight: 135 kg (297 lb.) fully loaded

* This product belonged to the Newbridge family. Newbridge was acquired by Alcatel in May 2000.

For more information www.cid.alcatel.com

Alcatel, the Alcatel logo, MainStreet and Newbridge are registered trademarks of Alcatel. All other trademarks are the property of their respective owners. Alcatel assumes no responsibility for the accuracy of the information presented, which is subject to change without notice.

© 2000 Alcatel. All rights reserved. 10303
3CL 00428 0004 TQZZA Ed.03



ARCHITECTS OF AN INTERNET WORLD