



# ALS

PDH/SDH/Ethernet *Series*



- ▶ ALS6L 5.92 - 6.42
- ▶ ALS6U 6.42 - 7.11
- ▶ ALS7 7.11 - 7.90
- ▶ ALS8L 7.70 - 8.20
- ▶ ALS8U\* 8.20 - 8.50
- ▶ ALS11 10.70 - 11.70
- ▶ ALS13 12.75 - 13.25
- ▶ ALS15 14.40 - 15.35
- ▶ ALS18 17.70 - 19.70
- ▶ ALS23 22.00 - 23.60
- ▶ ALS25 24.50 - 26.50
- ▶ ALS28\* 27.50 - 29.50
- ▶ ALS32\* 31.80 - 33.40
- ▶ ALS38 37.00 - 39.50

\* Under development

The ALS Series provides PDH, SDH, and Ethernet connections; it is the ideal solution for a wide range of applications in access networks and backbone areas, covering any market segment ranging from cost-sensitive applications to advanced network implementations in which high capacities, complex protection schemes, and excellent reliability are mandatory.

A wide range of user interfaces (E1, E3, Gigabit/Fast Ethernet and STM-1) and a high degree of versatility allow very easy network planning and management.

ALS series includes nodal configuration for crowded stations where many different hops are converging, it allows a dramatic reduction of equipment complexity both in terms of number of units counts and physical connections

The ALS Series is available in all frequency bands from 6L to 38 GHz in single or duplicated configuration, with radio capacity from 4 up to 622 Mbit/s. XPIC functionality is also foreseen for high capacity transport.

## MAIN FEATURES

- ▶ Quick installation & commissioning
- ▶ Easy configuration upgrade
- ▶ Low O&M costs (high reliability and fast restoration of replaceable Units)
- ▶ Extended environmental compatibility
- ▶ Extreme compactness and lightness
- ▶ Optimized mechanical solutions
- ▶ Complete compatibility and inter-operability with all SIAE's equipment

## CHARACTERISTICS

- ▶ Modules interchangeability
- ▶ Advanced Microwave Technology
- ▶ Base-Band high circuit integration
- ▶ Reduced power consumption
- ▶ Excellent radio-electrical performance
- ▶ Full software approach:
  - Modulation and radio capacity
  - Alarm/performance monitoring
  - Fault analysis
  - Availability of O&M Tools (Loop activation, switch manual forcing, etc.)



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### SYSTEM OVERVIEW

#### INDOOR UNIT



up to 32xE1



Nodal configuration



up to 4xSTM-1

Several IDU models are available to fit any application:

#### ► IDU 1RU (1 Rack Unit) - Compact version

- All functions integrated in a single board
- Fully software programmable
- Reduced power consumption
- Ethernet/Fast Ethernet/Gigabit Ethernet interface supports full-rate connections

	PDH	SDH
• Configuration	1+0 and 1+1	1+0
• Tributary options	- up to 32xE1 Balanced/Unbalanced - 3xFE+ 32xE1	- 2xSTM-1 (Electrical/Optical) - Up to 63xE1 <sup>(2)</sup>
• Capacity	from 4 to 105 Mbit/s	from 155 to 311 Mbit/s
• Service Channels <sup>(1)</sup>	- 1x64Kb/s (V.11)	- 1x64Kb/s (V.11) and - 1xE1 wayside per STM-1 (maximum 2)

#### ► IDU 1RU (1 Rack Unit) - Modular version

- Fully software programmable
- Up to 2xSTM-1 in both unprotected and protected configurations
- Available XPIC functionality for SDH traffic
- Ethernet/Fast Ethernet/Gigabit Ethernet interface supports full-rate connections

	PDH	SDH
• Configuration	1+0 and 1+1 and 2x(1+0)	1+0, 1+1, 2x(1+0)
• Tributary options	- Up to 32xE1 Balanced/Unbalanced - Up to 75xE1 Balanced/Unbalanced <sup>(2)</sup> - 4xFE + 24xE1 - 2xSTM-1+16xE1 - 1xSTM1 + 16XE1 + 2xFE + 1xGE	- Up to 4xSTM-1 (Electrical/Optical) - 2xFE + 1xGE + 8xE1 - Up to 63xE1 <sup>(2)</sup>
• Capacity	from 4 to 155 Mbit/s	from 155 to 622 Mbit/s
• Service Channels	- 1x64Kb/s (V.11) and - 1x9,6Kb/s (V.28) or 2x4,8Kb/s (V.28) - 1xE1 wayside (capacity ≥34Mb/s)	- 1x64Kb/s (V.11) and - 1xE1 wayside per STM-1 (maximum 2)

#### ► IDU 2RU (2 Rack Unit) - Modular version

- Fully software programmable
- Up to 4xSTM-1 in both unprotected and protected configurations
- Available XPIC functionality for SDH traffic
- Ethernet/Fast Ethernet/Gigabit Ethernet interface supports full-rate connections

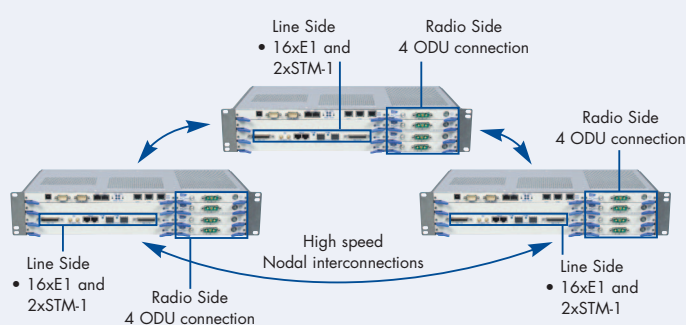
	PDH	SDH
• Configuration	1+0, 1+1, 2x(1+1), 4x(1+0) expandable up to 12x(1+0), Drop/Insert	1+0, 1+1, 2x(1+1) and Drop/Insert
• Tributary options	- Up to 53xE1 Balanced/Unbalanced - 4xFE+ 53xE1 - 2xSTM-1+16xE1 + Nodal Connection - 1xSTM1 + 16XE1 + 2xFE + 1xGE + Nodal Connection	- Up to 4xSTM-1 (Electrical/Optical) - 2xFE + 1xGE + 8xE1 - Up to 63xE1 <sup>(2)</sup>
• Capacity	from 4 to 550 Mbit/s	from 155 to 622 Mbit/s
• Service Channels	- 1x64Kb/s (V.11) and - 1x9,6Kb/s (V.28) or 2x4,8Kb/s (V.28) - 1xE1 wayside (capacity ≥34Mb/s)	- 1x64Kb/s (V.11) and - 1xE1 wayside per STM-1 (maximum 2)

(1) available for IDU with TDM interfaces - (2) with dedicated unit

## ► NODAL CONNECTION

In a Nodal Station the cross-connection functionality can be distributed over a configuration of up to three different IDUs, and each one can manage up to four different ODUs. Connections among IDUs are ring protected. One IDU failure doesn't cause any loss of traffic in relation to the other IDUs in the node.

Thanks to the IDU's modular approach and user friendly software management, it is possible to build up a nodal configuration through smooth expansions (from one up to twelve different directions) with a reduced initial investment.



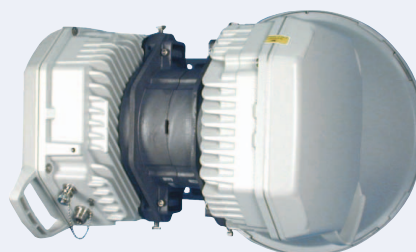
## L2 SWITCH FUNCTIONALITIES

- MAC Address switching, ageing and learning
- VLAN / VLAN STACKING ( IEEE 802.1q with Q&Q )
- Ethernet QoS ( IEEE 802.1p )
- Flow Control ( IEEE 802.3x )
- IP-V4 ToS / IP-V6 TC
- Jumbo Frames (with 1x1000 BASE-SX/LX + 8xE1)
- RMON Statistic
- CIR

## NETWORK MANAGEMENT

- SNMP Agent protocol with "Full IP" or "OSI+IP" stack
- Messages Routine: static, OSPF, IS-IS
- Local Craft Terminal (LCT) interface: USB (BType)
- Network management System (NMS) interface:
  - Ethernet 10BASE-T
  - RS232 (only for modular versions)
  - EOC (only for PDH traffic)
  - Out band and In-Band communication (only for E1 traffic with modular versions)
  - DCC byte for STM-1 traffic

## OUTDOOR UNIT



- Light weatherproof (IP65) box
- Easy and quick deployment
- Full software programmability of main RF parameters
- Extended (Software) frequency agility
- Configuration, capacity and modulation independent
- Excellent short and long term frequency stability
- Built-in ATPC functionality
- RF Loop

## APPLICATIONS

The ALS series has been conceived and designed to cover a wide range of applications, such as:

- 2G / 3G / 3,5G Cellular Network Infrastructure
- 10/100/1000 Mbit/s Ethernet connections
- WiMAX backhauling
- Private data Networks (WANs, LANs, etc.)
- Utility Networks (Railways, Pipelines, etc.)
- Back-up transmission medium to Fibre Optic links
- Spur Links for Backbones/Rings
- Last Mile Fibre Extension
- Leased Lines Replacement
- SDH Radio Ring Deployment up to 4xSTM-1
- High Capacity Broadband Access Networks



# ALS

## PDH/SDH/Ethernet Series

### TECHNICAL SPECIFICATIONS (\*)

Frequency Band	6L/6U GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	25 GHz	28 GHz	38 GHz	
Frequency Range	5.90—7.10	7.11—8.5	10.7—11.7	12.75—13.25	14.40—15.35	17.70—19.70	21.20—23.60	24.50—26.50	27.50—29.50	37.00—39.50	
Channel Spacing	4 QAM	7 MHz (4E1 or 8 Mbps), 14 MHz (8E1 or 16 Mbps), 28 MHz (16E1/1E3 or 34 Mbps) 7 MHz (5E1 or 10 Mbps), 14 MHz (10E1 or 20 Mbps), 28 MHz (21E1 or 42 Mbps)									
	16 QAM	7 MHz (8E1 or 16 Mbps), 14 MHz (16E1/1E3 or 34 Mbps), 28 MHz (32E1/2E3 or 68 Mbps) 7 MHz (10E1 or 20 Mbps), 14 MHz (21E1 or 42 Mbps), 28 MHz (42E1 or 84 Mbps)									
	32 QAM	28 MHz (53E1 or 105 Mbps) 56 MHz (1STM-1/2STM-1 or 145/290 Mbps)									
	128 QAM	28 MHz (1STM-1/2STM-1 or 145/290 Mbps) 56 MHz (2STM-1/4STM-1 or 290/580 Mbps)									
Supported Configurations	1+0 / 1+1 MHSB / 1+1 SD / 1+1 FD / 2+0 / 2x(1+1) / 4x(1+0)										
Modulation Schemes	4 QAM / 16 QAM / 32QAM / 128QAM										
Supported Capacities	4xE1 / 5xE1 / 8xE1 / 10xE1 / 16xE1 / 1xE3 / 21xE1 / 2xE3 / 32xE1 / 42xE1 / 53xE1 / 1xSTM-1 / 2xSTM-1 / 4xSTM-1 (with XPIC)										
Ethernet Throughput	4 to 580 Mbps										
Traffic Interfaces	75/120 Ω SCSI , 75/120 Ω D-Type, 75 Ω Micro-Coaxial, RJ45										
Demodulation	Coherent (fully digital)										
Output Power at Point C' (dBm)	4 QAM	+31	+31	+30	+30	+29	+24	+24	+24	+23	+21
	16 QAM	+28	+28	+27	+27	+26	+22	+22	+22	+21	+18
	32 QAM	+28	+28	+27	+27	+26	+22	+22	+22	+21	+18
	128 QAM	+26**	+26	+25**	+25**	+24	+20	+20	+20	+19	+16
Receiver Sensitivity (dBm) at BER 10 <sup>-6</sup> at point C (1+0 conf., RF filter losses included)											
Capacity 16xE1/34 Mbps	4 QAM	-85	-85	-84,5	-84,5	-84,5	-84	-84	-83,5	-83	-82
	16 QAM	-81	-81	-80,5	-80,5	-80,5	-80	-80	-79,5	-79	-78
Capacity 53xE1/100 Mbps	32 QAM	-74,5	-74,5	-74	-74	-74	-73,5	-73,5	-73	-72,5	-71,5
	32 QAM	-	-	-	-	-	-72,5	-71,5	-71,5	-70,5	-69,5
Capacity 1xSTM-1/145 Mbps	128 QAM	-71	-70,5	-70	-70	-69,5	-68	-67	-67	-66	-65
	128 QAM	-68	-67,5	-67	-67	-66,5	-65	-64	-64	-63	-62
Frequency Stability	± 5 ppm										
Frequency Agility	250 KHz (software programmable), 125 KHz (on request from 6 GHz to 25 GHz)										
ATPC	40 dB range implemented in 1 dB steps										
Transmitter Power Attenuation	Software programmable, up to 40 dB in 1 dB steps										
Management Interfaces	RS232C, USB, Ethernet 10 BASE-T										
IDU/ODU Max Cable Length	300 m										
IDU/ODU Interconnection (per terminal)	50 Ω Coaxial Cable per RT										
Dimensions (W x H x D)											
IDU	IDU 1RU Compact	480 x 45 x 190 (mm)									
	IDU 1RU Modular	480 x 45 x 270 (mm)									
	IDU 2RU Modular	480 x 90 x 270 (mm)									
ODU		Universal				ALS					
	1+0	254 x 254 x 121 (mm)				157 x 400 x 190 (mm)					
Power Supply	-48 Vdc (-15%, +20%), 24 Vdc with adapter										
Power Consumption (per Terminal)		Compact IDU 1RU				Modular IDU 1RU					
	1+0 configuration	PDH		SDH		PDH		SDH			
	1+1 configuration	≤ 34 W		≤ 42 W		≤ 39 W		≤ 44 W			
	≤ 59 W		N.A.		≤ 69 W		≤ 79 W				
Environmental Performance											
ODU Weather Proofing Class	IP65										
IDU Temperature Range	-5 °C to +50 °C										
ODU Temperature Range	-35 °C to +55 °C										
Compliant with	ETSI EN 302 217										

(\*) Typical values

(\*\*) Higher Output Power version available

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