



AL

Access Link Series



- ▶ AL4 4.40 - 5.00
- ▶ AL6L* 5.92 - 6.42
- ▶ AL6U* 6.42 - 7.11
- ▶ AL7 7.11 - 7.90
- ▶ AL8 7.70 - 8.50

- ▶ AL10* 10.50 - 10.70
- ▶ AL11 10.70 - 11.70
- ▶ AL13 12.75 - 13.25
- ▶ AL15 14.40 - 15.35
- ▶ AL18 17.70 - 19.70
- ▶ AL23 22.00 - 23.60
- ▶ AL25 24.50 - 26.50
- ▶ AL28 27.50 - 29.50
- ▶ AL32 31.80 - 33.40
- ▶ AL38 37.00 - 39.50

*Under development

AL Series is a PDH/Ethernet family of digital point-to-point microwave radio systems. Designed for transmitting low & medium capacity, AL series adopts standard network interfaces (E1, E3, Ethernet and STM-1) making it possible to implement any radio network topologies through advance system configuration options including protected radio rings up to 53x E1/105 Mbit/s and Radio Node deployment.

Thanks to the modularity of its architecture, AL series fits any market segment allowing to address from cost-sensitive applications to advanced network implementations in which high capacities, complex protection schemes and reliability are requested.

The AL Series is available in all frequency bands from 7 to 38 GHz in unduplicated or duplicated configuration with radio capacity from 4 up to 105 Mbit/s.

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 SIAE's equipment

CHARACTERISTICS

- ▶ Modules interchangeability
- ▶ Advanced microwave technology
- ▶ Dinamic modulation scheme (IDU plus)
- ▶ 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 16xE1 + 3xFE



up to 32xE1 + 3xFE



up to 16xE1 + 1xFE
+ 1xGE + 1xSTM1



up to 53xE1 + NxFE/GE
or Nodal configuration

Several IDU models are available to fit any application:

► Compact version - 1RU (1 Rack Unit)

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

	IDU	IDU plus
• Configuration	1+0 and 1+1	1+0 and 1+1
• Tributary options	- up to 16xE1 Balanced/Unbalanced - 3xFE+ 16xE1	- up to 32xE1 Balanced/Unbalanced - 3xFE+ 32xE1
• Capacity	from 4 to 64 Mbit/s	from 4 to 105 Mbit/s
• Service Channels	- 1x64Kb/s (V.11) or 1x9,6Kb/s (V.28) ⁽¹⁾	- 1x64Kb/s (V.11)

► Modular version - 1RU (1 Rack Unit)

- Fully software programmable
- Ethernet/Fast Ethernet/Gigabit Ethernet interface supports full-rate connections

	IDU	IDU plus
• Configuration	1+0 and 1+1	1+0 and 1+1 and 2x(1+0)
• Tributary options	- Up to 16xE1 Balanced/Unbalanced - 2xE3 - 3xFE+ 4xE1 - 2xSTM-1+16xE1	- Up to 32xE1 Balanced/Unbalanced - 4xFE + 24xE1 - 2xSTM-1+16xE1 - 1xSTM1 + 16XE1 + 2xFE + 1xGE
• Capacity	from 4 to 105 Mbit/s	from 4 to 105 Mbit/s ⁽²⁾
• 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 - 1x9,6Kb/s (V.28) or 2x4,8Kb/s (V.28) - 1xE1 wayside (capacity ≥34Mb/s) ⁽³⁾

► Modular version - 2RU (2 Rack Unit)

- Fully software programmable
- Ethernet/Fast Ethernet/Gigabit Ethernet interface supports full-rate connections

	IDU	IDU plus
• Configuration	1+0, 1+1 and 2x(1+0)	1+0, 1+1, 2x(1+1), 4x(1+0) expandable up to 12x(1+0), Drop/Insert
• Tributary options	- Up to 32xE1 Balanced/Unbalanced - 2xE3 - 3xFE+ 4xE1	- Up to 53xE1 Balanced/Unbalanced - 4xFE+ 53xE1 - 2xSTM-1+16xE1 + Nodal Connection - 1xSTM1 + 16XE1 + 2xFE + 1xGE + Nodal Connection
• Capacity	from 4 to 105 Mbit/s	from 4 to 550 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 - 1x9,6Kb/s (V.28) or 2x4,8Kb/s (V.28) - 1xE1 wayside (capacity ≥34Mb/s) ⁽³⁾

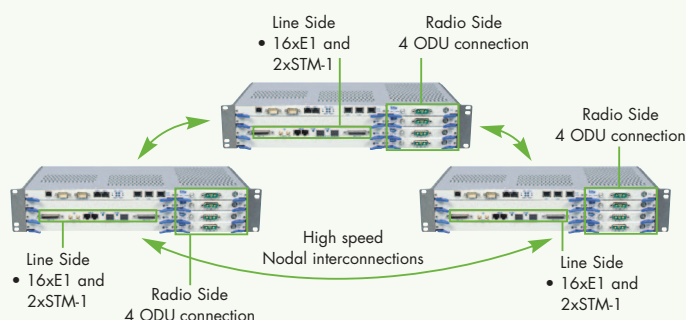
(1) Available for IDU with TDM interfaces (2) For higher capacity, ALS version available (3) only for 16 or 32xE1 version

NODAL CONNECTION (IDU plus)

In a Nodal Station the cross-connection functionality can be distributed over up to three different IDUs, each one can manage up to four different ODUs.

Connections among IDUs are ring protected. One IDU failure doesn't cause loss of traffic related to the other IDUs in the node.

Thanks to the IDU modular approach and easy 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) - (IDU plus)
- ▶ RMON Statistics (IDU plus)
- ▶ CIR (IDU plus)

NETWORK MANAGEMENT

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

OUTDOOR UNIT



- ▶ Light weatherproof (IP65) box
- ▶ Easy and quick deployment
- ▶ Fully Synthesized Microwave Unit
- ▶ MMIC technology
- ▶ 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

Two ODU versions are available: "Standard" for standard applications and "Universal" for high power requirements.

APPLICATIONS

The AL 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
- ▶ High Capacity Broadband Access Networks



TECHNICAL SPECIFICATIONS (*)

Frequency Band	4 GHz	6L/6U GHz	7/8 GHz	10/11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	25 GHz	28 GHz	32 GHz	38 GHz
Frequency Range	4.40 - 5.00	5.90 - 7.10	7.11 - 8.5	10.5 - 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	31.80 - 33.40	37.00 - 39.50
Modulation Schemes	4 QAM / 16 QAM / 32QAM											
Demodulation	Coherent (fully digital)											
Output Power at Point C' (dBm) "Standard" / "Universal"	4 QAM	+29	+31	+28/+31	+26/+30	+26/+30	+26/+29	+21/+24	+21/+24	+20/+23	+18/+21	+18/+21
	16 QAM	+24	+28	+23/+28	+21/+27	+21/+27	+21/+26	+16/+22	+16/+22	+16/+21	+15/+20	+14/+18
	32 QAM	+22	+28	+21/+28	+21/+27	+21/+27	+21/+26	+16/+22	+16/+22	+16/+21	+15/+20	+14/+18
Receiver Sensitivity (dBm) at BER 10 ⁻⁶ at point C (1+0 conf., RF filter losses included)												
Capacity 16xE1/34 Mbps	4 QAM	-86	-85	-85	-84,5	-84,5	-84,5	-84	-84	-83,5	-83	-82
	16 QAM	-82	-81	-81	-80,5	-80,5	-80,5	-80	-80	-79,5	-79	-78
Capacity 53xE1/100 Mbps	32 QAM	-76	-74,5	-74,5	-74	-74	-74	-73,5	-73,5	-73	-72,5	-71,5
Frequency Stability	± 5 ppm											
Frequency Agility	250 KHz (software programmable), 125 KHz (on request from 4 GHz to 25 GHz)											
ATPC	40 dB range implemented in 1 dB steps											
Management Interfaces	RS232C, USB, Ethernet 10 BASE-T (TMN) — RS232C, USB (LCT)											
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		Standard					Universal HP					
	1+0	254 x 254 x 114 (mm)					254 x 254 x 121 (mm)					
Power Supply	-48 Vdc (-15%, +20%), 24 Vdc with adapter											
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											

		IDU										
Channel Spacing	4 QAM	3.5 MHz (2E1 or 4 Mbps), 7 MHz (4E1 or 8 Mbps), 14 MHz (8E1 or 16 Mbps), 28 MHz (16E1/1E3 or 34 Mbps)										
	16 QAM	3.5 MHz (4E1 or 8 Mbps), 7 MHz (8E1 or 16 Mbps), 14 MHz (16E1/1E3 or 34 Mbps), 28 MHz (32E1/2E3 or 68 Mbps)										
	32 QAM	28 MHz (105 Mbps)										
Supported Configurations	1+0/1+1 MHSB/1+1 SD/1+1 FD/2x(1+0)											
Supported Capacities	2xE1/4xE1/8xE1/16xE1/1xE3/32xE1/2xE3											
Ethernet Throughput	4 to 100 Mbps											
Traffic Interfaces	75/120 Ω D-Type, 75 Ω Micro-Coaxial, RJ45											
Power Consumption (per Terminal)		Compact 1RU					Modular 1RU					
	1+0 configuration	≤ 36 W					≤ 43 W					
	1+1 configuration	≤ 61 W					≤ 73 W					

		IDU plus										
Channel Spacing	4 QAM	3.5 MHz (2E1 or 4 Mbps), 7 MHz (4E1 or 8 Mbps), 14 MHz (8E1 or 16 Mbps), 28 MHz (16E1 or 34 Mbps), 7 MHz (5E1 or 10 Mbps), 14 MHz (10E1 or 20 Mbps), 28 MHz (21E1 or 42 Mbps)										
	16 QAM	3.5 MHz (4E1 or 8 Mbps), 7 MHz (8E1 or 16 Mbps), 14 MHz (16E1 or 34 Mbps), 28 MHz (32E1 or 68 Mbps), 3.5 MHz (5E1 or 10 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)										
Supported Configurations	1+0/1+1 MHSB/1+1 SD/1+1 FD/2x(1+1)/4x(1+0)											
Supported Capacities	2xE1/4xE1/5xE1/8xE1/10xE1/16xE1/21xE1/32xE1/42xE1/ 53xE1											
Ethernet Throughput	4 to 100 Mbps											
Traffic Interfaces	75/120 Ω SCSI, 75 Ω Micro-Coaxial, RJ45											
Power Consumption (per Terminal)		Compact 1RU					Modular 1RU					
	1+0 configuration	≤ 34 W					≤ 39 W					
	1+1 configuration	≤ 59 W					≤ 69 W					

(*) Typical values

