POINT
TO POINT

SM

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ALS
IP/PDH/SDH *Series*

ALS Series provides Native IP and Native PDH and SDH 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.

Its superior mix of Packet and TDM interfaces allows easy network evolution from pure TDM to pure IP.

A complete range of user interfaces (E1, Gigabit/Fast Ethernet and STM1) 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 drastic reduction of equipment complexity both in terms of units counts and physical connections.

ALS is available in all frequency bands from 4 to 42 GHz in single or duplicated configuration, with Gbps radio capacity. XPIC functionality is available for high capacity cross-polar implementations.

CARRIER ETHERNET
MEF
Certified Compliant

lte 4DVANCED

ALS

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IP/PDH/SDH *Series*

MAIN FEATURES
> Base-Band high circuit integration
> Reduced power consumption
> Excellent radio performance
> 4 QAM to 256 QAM modulations
> Layer 1/2/3/4 Header Compressor
> 1 Gbits throughput per radio channel
> XPIC configuration in single compact IDU
> Full software approach:
   • Modulation and radio capacity
   • ACM Adaptive Code & Modulation
   • Alarm/performance monitoring
   • Complete fault analysis
   • Availability of O&M Tools
     (Loop activation, switch manual forcing, etc.)
> Interchangeable modules
> PWE3 for full IP transport
> Mixed TDM / Ethernet interfaces for
   dual native transport
> Syncronous Ethernet support
> 1588 v2 support
> Easy configuration upgrade
> Integrated antennae up to 1.8 m

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

> 2G / 3G / LTE 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

L2 SWITCH FUNCTIONALITIES
> MEF-9 and MEF-14 certified
> 8 queues with flexible scheduler (Strict, WFQ, mixed)
> Flexible QoS definition based on
   VLAN, IPv4, IPv6, MPLS exp bits
> Per queue WRED congestion avoidance
> Flow Based Ingress Policer (CIR & EIR definition)
> Support for ERP (G.8032)
> Flow Control (IEEE 802.3x)
> RMON Statistic and Extensive VLAN management
> VLAN / VLAN STACKING (IEEE 802.1q with QinQ)
> LLF (Link Loss Forwarding)
> Link aggregation (IEEE 802.3ad)
> ETH OAM (IEEE 802.1ag/ITU-T Y 1731)
> Jumbo Frames up to 10Kbytes

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

NODAL CONFIGURATION
In a Nodal Station the cross-connection functionality can be distributed over a configuration of up to eight different IDUs, and each one can manage up to two different ODUs (depending on IDU type). Connections among IDUs are ring protected. Failing one IDU, no other IDU in the node is affected by loss of traffic.
Thanks to the IDU scalable approach and user friendly software management, it is possible to build up a nodal configuration through incremental expansions (from one up to twelve or sixteen different directions) with a reduced initial investment.
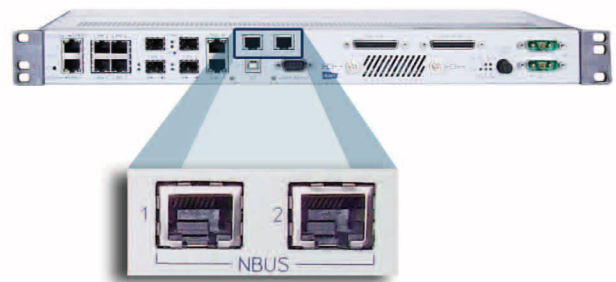
NODAL BUS SOLUTION
High speed protected nodal bus, the unique nodal solution to build complex nodes up to 16 indipendent directions with a full pay-as you grow approach.

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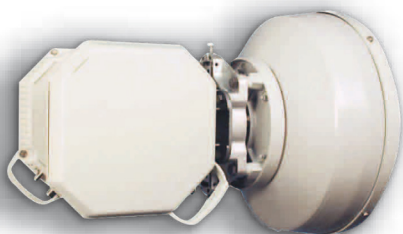
> Light weatherproof (IP65) box
> Easy and quick deployment
> Full software programmability of main RF parameters
> Extended (Software) frequency agility
> Configuration, capacity and modulation independent
> Excellent short and long term frequency stability
> Built-in ATPC functionality
> RF Loop

INDOOR UNIT

Several IDU models are available to fit any application:
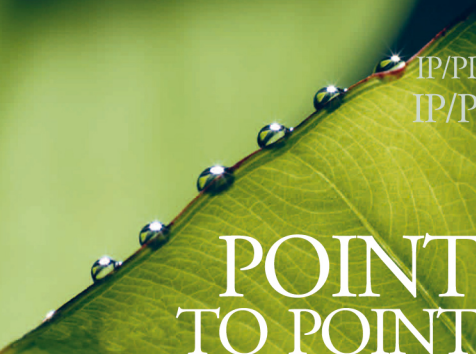
IP PDH SDH *Medium & High Capacity*

IDU Model	IP - PDH Solutions AL / ALplus	IP - SDH Solutions ALS	IP - PDH - SDH Solutions ALplus2 / ALCplus2e
IDU 1RU (1 rack unit) - Compact Version	ALC / ALCplus	ALS-C	ALCplus2 / ALCplus2e
Configuration	1+0 / 1+1	1+0 / 1+1 / 2x(1+0)	1+0 / 1+1 / 2x(1+0) / XPIC
TDM Transmission Capacity	Up to 32xE1	1xSTM1 / 2xSTM1 / 63-126xE1	Up to 160xE1 per radio direction
Ethernet Throughput Capacity	Up 100 Mbps	-	Up to 500 Mbps (per radio channel - 1 Gbps with XPIC)
Modulation	4 to 32QAM	32 and 128QAM	4 to 256QAM with 8 ACM
Tributary interfaces	16xE1 + 3xFE 32xE1 + 3xFE	2xSTM1	(16+2)xE1 + 2xSTM1 (32+2)xE1 + 2xSTM1 TDM Cross Connection capability 2xGE Electrical + 2xGE Optical/Electrical Syncronous Ethernet Support
Maintenance Interfaces	2x10BaseT + USB + RS232 + G704 (E1)	2x10BaseT + USB + RS232	2x10BaseT + USB + G704 (E1)
IDU 1RU (1 rack unit) - Modular Version	AL/ ALplus	ALS	ALplus2
Configuration	1+0 / 1+1	1+0 / 1+1 / 2x(1+0)/XPIC	1+0 / 1+1 / 2x(1+0)
TDM Transmission Capacity	Up to 32xE1	1xSTM1 / 2xSTM1 / 4xSTM1	Up to 80xE1 (per radio channel)
Ethernet Troughtput Capacity	Up 100 Mbps	155 / 310 / 620 Mbps	Up to 400 Mbps (per radio channel)
Modulation	4 to 32QAM	32 and 128QAM	4 to 256QAM with 8 ACM
Tributary interfaces	32xE1 24xE1 + 4xFE	2xSTM1 4xSTM1 8xE1 + 2xFE + 1xGE	16xE1 + 2xSTM1 TDM Cross Connection capability 1xGE Electrical/Optical + 1xGE Electrical + 1xGE Optical
Maintenance Interfaces	2x10BaseT + USB + RS232 + G704 (E1)	2x10BaseT + USB + RS232	2x10BaseT + USB + RS232 + G704 (E1)
IDU - Nodal	Modular 2RU	Modular 2RU	Nx1RU
Configuration	1+0 / 1+1 / 2x(1+1) Drop/Insert	1+0 / 1+1 / 2x(1+0) / 2x(1+1)	Nx(1+0), Nx(1+1) Drop/Insert Nx2x(1+0), Drop/Insert
TDM Transmission Capacity	Up to 53xE1	1xSTM1 / 2xSTM1 / 4xSTM1	Up to 160xE1 (per radio direction)
Ethernet Troughtput Capacity	Up 100 Mbps	145 / 290 / 580 Mbps	Up to 500 Mbps (per radio channel - 1 Gbps with XPIC)
Modulation	4 to 32QAM	32 and 128QAM	4 to 256QAM with 8 ACM
Tributary interfaces	53xE1 53xE1 + 4xFE 2xSTM1 + 16xE1 + Nodal Connection 2xSTM1 + 16xE1 + 1xFE + 1xGE + Nodal Connection	2xSTM1 4xSTM1 8xE1 + 2xFE + 1xGE	Nx2xSTM1 Nx16xE1 Nx2xGE TDM Cross Connection capability Syncronous Ethernet Support
Maintenance Interfaces	2x10BaseT+ USB + RS232+ G704 (E1)	2x10BaseT+ USB + RS232	2x10BaseT+ USB + G704 (E1)

IDU 1RU
up to 1 Gbps

IDU 1RU / NODAL
up to Nx1 Gbps

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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	42 GHz
Frequency Range	4.4-5.0	5.9-7.1	7.11-8.5	10.2-11.7	12.75-13.25	14.4-15.35	17.7-19.7	21.2-23.6	24.5-26.5	27.5-29.5	31.8-33.4	37-39.5	40.5-43.5
Modulations Schemes	4 QAM / 8 QAM / 16 QAM / 32 QAM / 64 QAM / 128 QAM / 256 QAM												
Channel Spacing	3.5 MHz / 7 MHz / 14 MHz / 28 MHz / 40 MHz / 56 MHz												
Ethernet Throughput	Up to 1 Gbps per radio channel												
Supported Configurations — Terminal applications	1+0 / 1+1 MHSB / 1+1 SD / 1+1 FD / 2+0 / 2x(1+1)												
Nodal applications	Up to 8x(1+1) or up to 16x(1+0)												
Supported Capacities	2xE1 / 4xE1 / 5xE1 / 8xE1 / 10xE1 / 16xE1 / 21xE1 / 32xE1 / 42xE1 / 53xE1 / 1xSTM1 / 80xE1 / 160xE1 / 2xSTM1 / 4xSTM1												

Output Power (dBm) at Point C' **
AS ODU / ASN ODU

	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	42 GHz
4 QAM	+28	+29	+29	+28	+28	+28	+23	+23	+22	+21	+20	+19	+17
QAM	+28	+29	+29	+28	+28	+28	+23	+23	+22	+21	+20	+19	+17
16 QAM	+25	+26	+26	+25	+25	+25	+21	+21	+20	+19	+18	+17	+15
32 QAM	+25	+26	+26	+25	+25	+25	+21	+21	+20	+19	+18	+17	+15
64 QAM	+24	+25	+25	+24	+24	+24	+19	+19	+18	+17	+16	+15	+13
128 QAM	+24	+25	+25	+24	+24	+24	+19	+19	+18	+17	+16	+15	+13
256 QAM	+23	+24	+24	+23	+23	+23	+18	+18	+17	+16	+15	+14	+12

Receiver Sensitivity (dBm) at BER 10^{-6} at Point C
(1+0 conf., 28 MHz BW, RF filter losses included)
AL/ALplus, ALS, ALplus2, ALplus2e
(see Indoor Unit Table)

	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	42 GHz
4 QAM	-83/-89,5	-83/-89,5	-83/-89,5	-82,5/-89	-82,5/-89	-82,5/89	-82/-88,5	-82/-88,5	-81,5/-88	-81/-87,5	-80/-86	-80,5/-86,5	-85,5
8 QAM	-/-82,5	-/-82,5	-/-82,5	-/-82	-/-82	-/-82	-/-81,5	-/-81,5	-/-81	-/-80,5	-/-79	-/-79,5	-78,5
16 QAM	-76/-81	-76/-81	-76/-81	-75,5/-80,5	-75,5/-80,5	-75,5/-80,5	-75/-80	-75/-80	-74,5/-79,5	-74/-79	-73/-77,5	-73,5/-78	-77
32 QAM	-74/-77,5	-74/-77,5	-74/-77,5	-73,5/-77	-73,5/-77	-73,5/-77	-73/-76,5	-73/-76,5	-72,5/-76	-72/-75,5	-71/-74	-71,5/-74,5	-73,5
64 QAM	-/-75,5	-/-75,5	-/-75,5	-/-75	-/-75	-/-75	-/-74,5	-/-74,5	-/-74	-/-73,5	-/-72	-/-72,5	-71,5
128 QAM	-70,5/-73,5	-70,5/-73,5	-70,5/-73,5	-70/-73	-70/-73	-70/-73	-69,5/-72,5	-69,5/-72,5	-69/-72	-68,5/-71,5	-67,5/-70	-67,5/-70,5	-69,5
256 QAM	-/-70,5	-/-70,5	-/-70,5	-/-70	-/-70	-/-70	-/-69,5	-/-69,5	-/-69	-/-68,5	-/-67	-/-67,5	-66,5

Frequency Stability	± 5 ppm
Frequency Agility	250 KHz (software programmable), 125 KHz on request
RTPC	Up to 20/30 in 1 dB steps
ATPC	Up to 20/40 dB in 1 dB steps
Management Interfaces	RS232C, USB, Ethernet 10 BASE-T (TMN)
IDU/ODU Interconnection (per terminal)	50 Ω Coaxial Cable per RT

Dimensions (W x H x D)

1RU Compact IDU	480 x 45 x 212 (mm)
1RU Modular IDU	480 x 45 x 270 (mm)
2RU Modular IDU	480 x 90 x 270 (mm)
ASN ODU 1+0	254 x 254 x 114 (mm)
AS ODU 1+0	254 x 254 x 154 (mm)
Power Supply	-48 Vdc (– 15%, + 20%)

Overall Power Consumption (per Terminal)	ALC-ALCplus	ALS-C	ALCplus2
1+0 configuration	≤ 34 W	≤ 42 W	≤ 60 W
1+1 configuration	≤ 59 W	≤ 72 W	≤ 90 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
(**) Nominal values according to ETSI