



a Screen Service group company

SKY Links

Product Catalogue 2Q 2013





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SkyLinks is an RF engineering and manufacturing newco with a strong background in digital microwave radios. It provides High Capacity Digital Microwave Systems for licenced and licence-exempt Point to Point radio links.

Its product portfolio covers the broadcasting distribution needs as well as Telecom, Defence, Industry/Enterprise, ISP and many other wireless applications.





Historical Milestones

1980s

In the late 1980s Screen Service Italia (SSI) was founded in Brescia. It was active in management, assistance and trading of TV-radio systems, radio transmitters and other electronic equipment.

1990s

- SSI starts internal production of TV Transmitters and Microwave Links.
- Strategic partnership with M.B. International Srl, broadens its product portfolio with digital broadcasting technology.

2000s

- **2004:** SSI acquires a 39% stake in Innovaction S.r.l., a company which operates in projects and prototypes of electronics and transmission equipment.
- **2004:** Cape Natexis Private Equity Fund (CNPEF) and Fondamenta acquired a 60% stake in the company through SSBT S.p.A.
- **2005:** SSBT incorporates Screen Service America (SSA).
- **2005:** SSBT acquires the entire capital of M.B. International Telecom Labs S.r.l. (MBITL), a spin-off of M.B. International S.r.l.

2006s

- Screen Service System (SSS) is incorporated, entering into the system integration business with an opportunistic approach.
- **11-Jun-2007:** first day listed on the Milan Stock Exchange "Expandi Market".

2007s

- **Jun-2007:** MBITL signs agreement with Xilinx (NASDAQ – XLNX) as R&D partner for the development of several protocols in order to allow IPTV (Internet Protocol Television) to function on Xilinx's Platform.
- **Jun-2007:** Screenlogix is established and is expected to be involved in the development of a new generation of Hi-speed SuperComputers for number crunching, virtual servers and computer graphics.

- **Oct-2007:** SSBT acquires order from an important System Integrator for the supply of innovative transmitters for the broadcasting of digital terrestrial TV and mobile TV, manufactured according to the Software Defined Transmitter (SWDT) technology. The order has a value of approx. **16 million Euros.**
- **Oct-2007:** MBITL signs agreement with a major company, S&P 500 listed to develop software on embedded/digital signal processing family by utilizing the concept of "Software Defined Radio" of which MBITL is a pioneer.

2008s

- **At the end of January 2008,** Screen Service do Brasil (SSB) is incorporated and is already in a position to deliver the ISDB-T standard (also used in Japan) that has been adopted in Brazil for digital transmission.
- **Mar-2008:** record contract signed with RRD and Profit Group worth 14,5 million Euros (duration of 30 months w.e.f. 1-Apr-2008) for the supply of DVB-T equipment necessary to complete and define the digitalization process of the interregional broadcasters controlled by Profit Group.
- **Mar-2008:** financial loan of 8 million Euro granted to Profit Group (expired date 17-Mar-2011) which entitles SSBT to be the privileged supplier (first call-last refusal) of equipment necessary to the construction of the Wi-Max network of the following Italian Regions: Liguria, Toscana and the Province of Trento.
- **Mar-2008:** a call option has been granted by Profit Group for the purchase of 30% of share capital of RRD, leader in the supply of large scale solution in DVB-H technology. It can be exercised within March 2011 at a price of 7 million Euros.

2009s

- **SCREEN SERVICE acquires 100%** of RRD Reti Radiotelevisive Digitali S.r.l., a leader in the broadcast and telecommunications services industry.
- Screen Service and RRD play a primary role in the definition of the new standard for the US market, ATSC Mobile DTV (A/153), collaborating with OMVC (Open Mobile Video Coalition) and offering a complete high reliability end-to-end solution.



2010s

- **Screen Service founds Skylinks**, a newco with a long background of experiences in High Capacity Microwave Systems. Its product portfolio covers the broadcast needs but also telecom, defense, healthcare and many others.

2011s

- Tivuitalia becomes an officially authorized Italian Nationwide Network Operator.

Screen Service Broadcasting Technologies S.p.A.

Screen Service America LLC 100%

Screen Service do Brasil Ltda. 100%

Skylinks s.r.l. 100%

Tivuitalia S.p.A. 100%



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History

1980s

- Operations started as manufacturer of analog equipments for broadcasting RF distribution services.

1996s 2005s

- Italian branch of P>Com, Inc. (worldwide well-known as the absolute pioneer of Digital Microwave Systems in the Split-mount configuration) for designing and manufacturing of microwave ODUs (Out Door Units).

2005s 2010s

- Spin-off for adventuring in a brand new design of High Capacity Radios specifically designed to meet the future needs of very high speed rate wireless communications backhauling.

2010s

- Acquisition of 100% of the operations by Screen Service Broadcasting Technologies (SSBT) within a newco named SKYLINKS.

2011

- SkyLinks provides an Italian national operator with all equipments for its network infrastructure implementation.
- SkyLinks begins delivery of 17GHz License-Exempt systems to domestic WISP, Enterprises and Hospitals.



SkyLinks mission is to provide customers with leading microwave products and worldclass associated services.

SkyLinks best peculiarities are the very high skilled RF design group, a result oriented production department and a dramatically low time-to-market for both standard and customized solutions.

Staff is flexible and expert and self-committed to excellence; this is the real power of our organization.

SkyLinks offers wireless solutions for different applications in the following fields:

- Broadcasting
- Telecom
- ISP
- Industry/Enterprise
- Defence
- Security/Video Surveillance
- Healthcare and Disaster Recovery
- Fiber Network Backup
- Long Haul Trunk

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Applications

High Capacity MW for video, voice & data

A guide through examples of practical cases of possible
different network configurations

Mobile and Fixed wireless connectivity

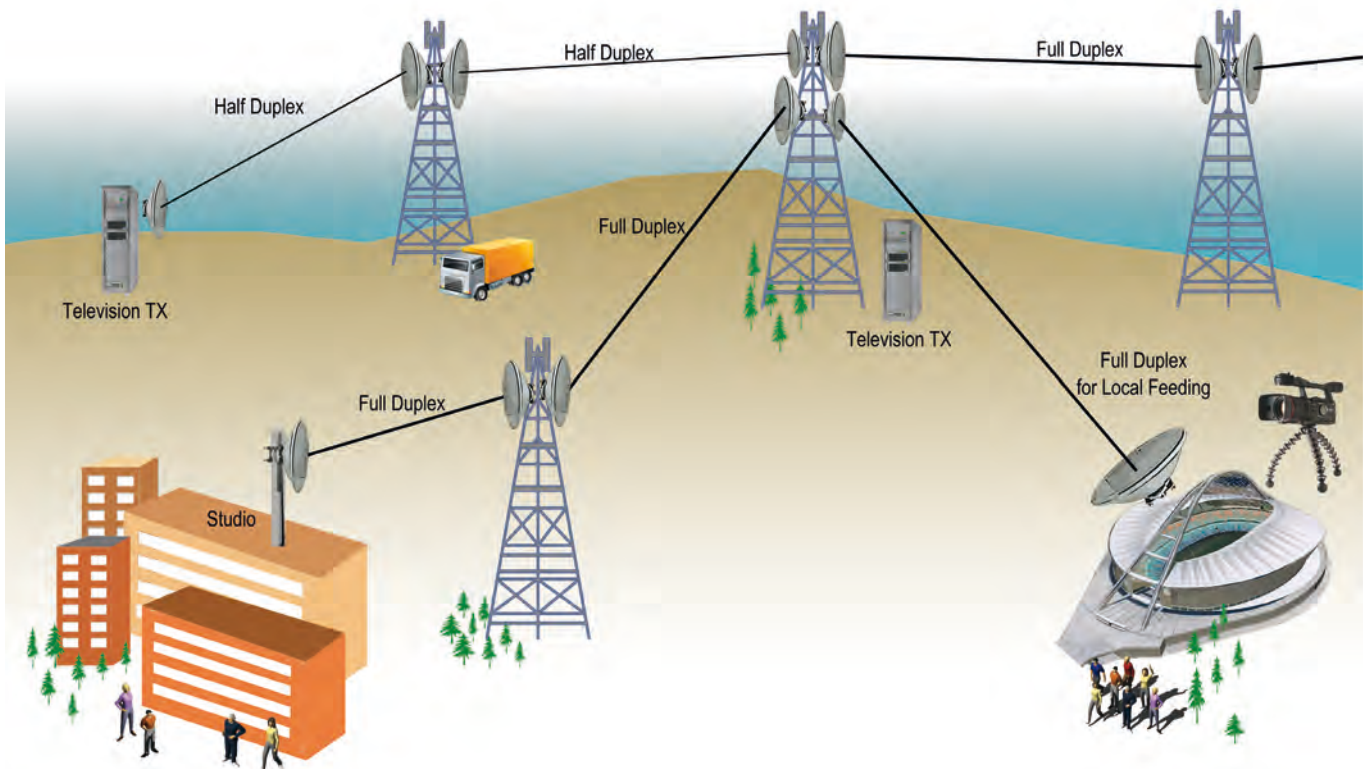
Skylinks digital Microwave Systems represent the most reliable and flexible solution for any demanding services in broadcasting distribution links.

Product availability includes:

- Mid/high capacity Mobile connections for video contributions from event sites for reaching the TV distribution network; COFDM modulation allows NON-LINE-OF-SITE connectivity.
- High/very high capacity Fixed backbone Microwave Links for transportation of the aggregated MUX contents to Television Transmitters Network.

The Microwave Links support 6/12/24 DVB-T MUXs or 3/6/12 DVB-T2 MUXs, depending on the configuration over the air. Systems can be redundant and guarantee prioritized services.

SkyLinks product lines offer wide range of Split-Mount and All-Indoor equipments, with AC or DC power supply options. Furthermore, the Split-Mount Radios are available in standard or High TX output power, whereas Indoor Solutions are available in very High and Ultra High TX output power level. The combination of the High Linearity of transmitter and QAM modulation schemes, assuring superb spectral efficiency, performs 99,999% link availability.



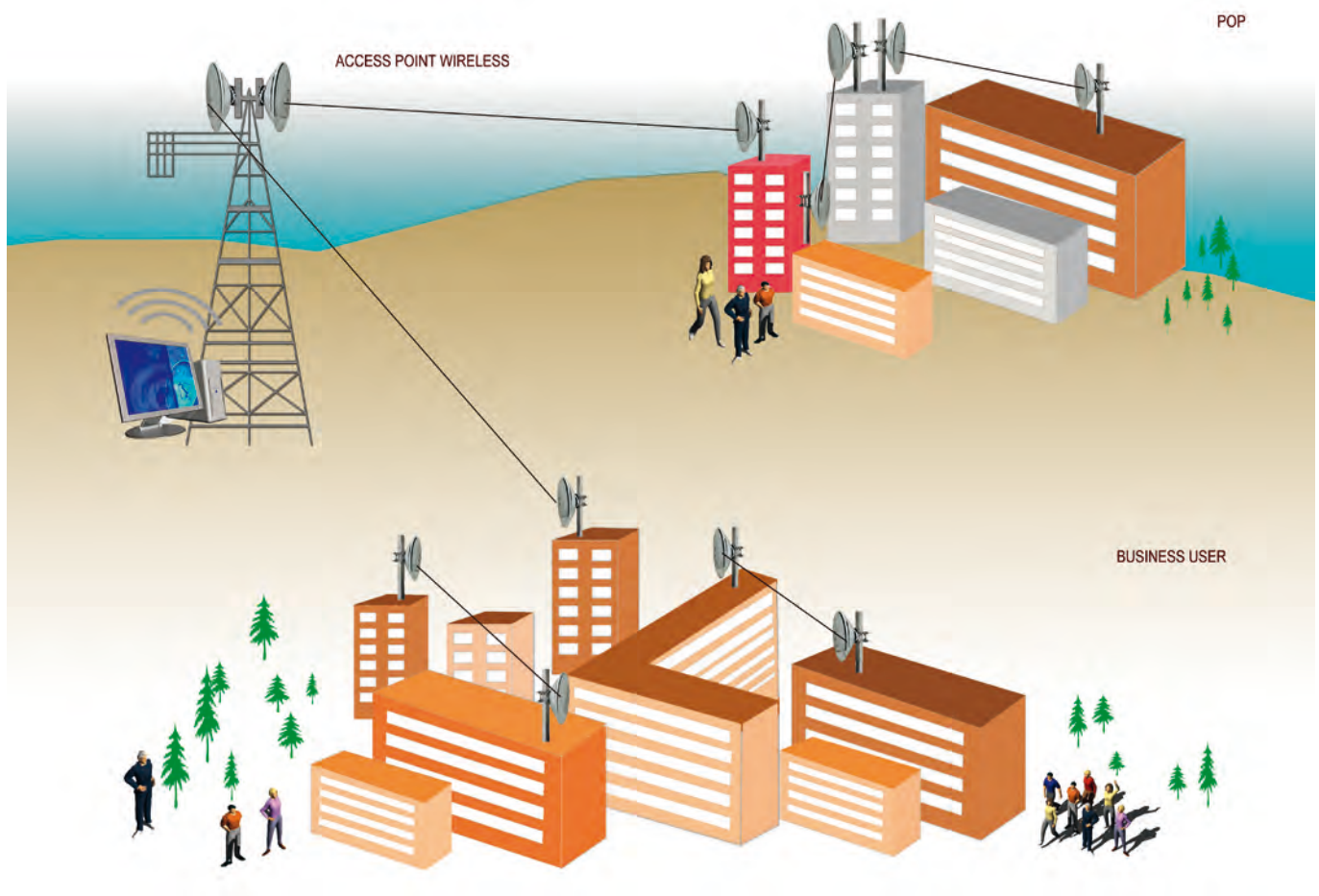
Internet Service Providers / Wireless Internet Service Provider

The SkyLinks' radio system HS-LINK/ISM, now available in the split-mount IDU+ODU solution (but very soon in the more compact & cost-effective full-outdoor layout) operates in the ETSI and FCC licensed frequency bands for high capacity Gigabit Ethernet backhauling up to 310 Mbps and in the ISM licence-exempt sub-bands at 17 GHz and 24 GHz (with a very efficient cross-polarized solution).

This last solution represent the ideal alternative to WI-FI 5 GHz Hyperlan bridging equipments for smaller capacity (up to 200 Mbps in a 40 MHz RF channel) for national or local ISP/WISP operators in all their needs for backbone of wireless access IP, DSL or WiMax applications.

A specific version at 43 GHz for backbones of WiMAX access points in the UK market is available on request.

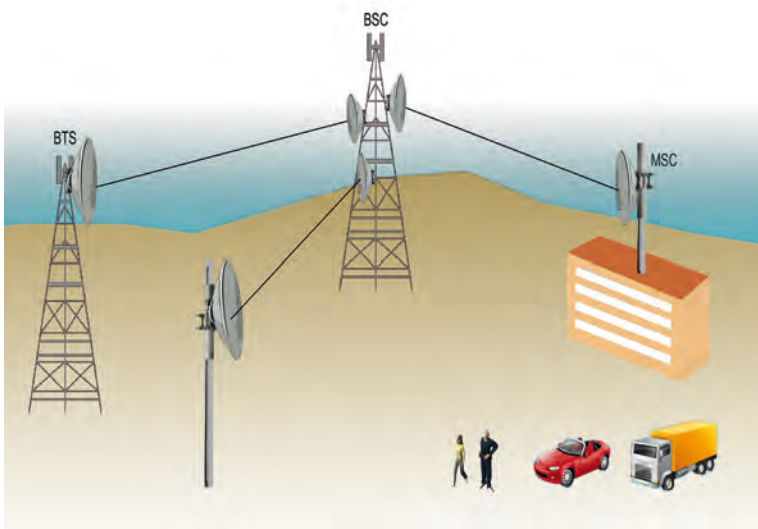
Last mile connections, point to point and IP networking are all best applications for the IP radio HS-LINK, available also at the 5.4-5.8 GHz sub-band.



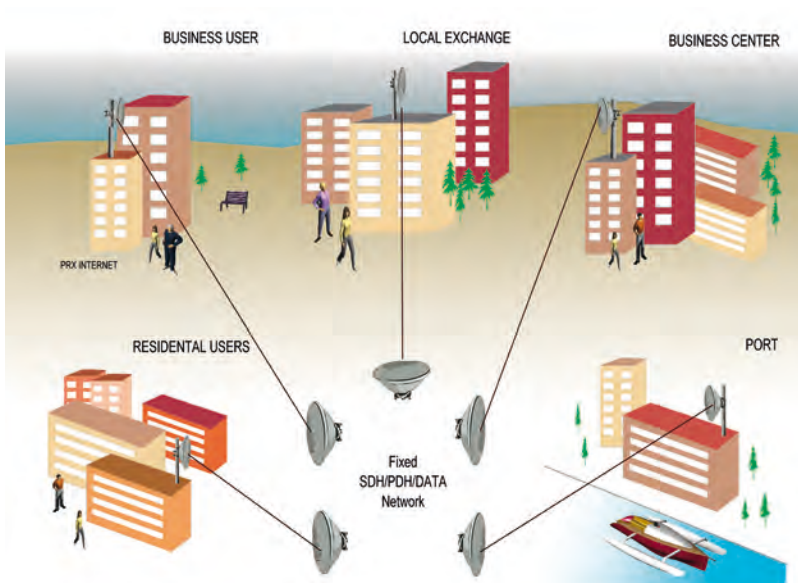
Mobile and Fixed Telecom network infrastructures.

SkyLinks Digital Radio System DRS has been designed to meet any possible configurations need of 3G and 4G mobile networks. The product features allow operators to tailor the transmission network according to the widest range of different topology requirements, with a solution offering a combination of E1/T1 lines from 2 to 63 and scalable Ethernet, either up to 155 Mbps in the standard version or to 310 Mbps using the Wide Band option. Aggregated 4+0 configurations available for Gigabit Ethernet capacity up to 900 Mbps.

SkyLinks DRS product line is the perfect solution for the convergence into Ethernet of modern network deployments for WiMax and LTE connectivity, and keeps an open eye on more traditional interfaces like E1 and STM1 both Electrical and Optical.



One of the most actual applications in fixed transmission network is the backup of main Fibre Optic lines or integration of combined solutions where the installation of the fibre is not possible or economically not recommended, assuring CAPEX and OPEX savings.

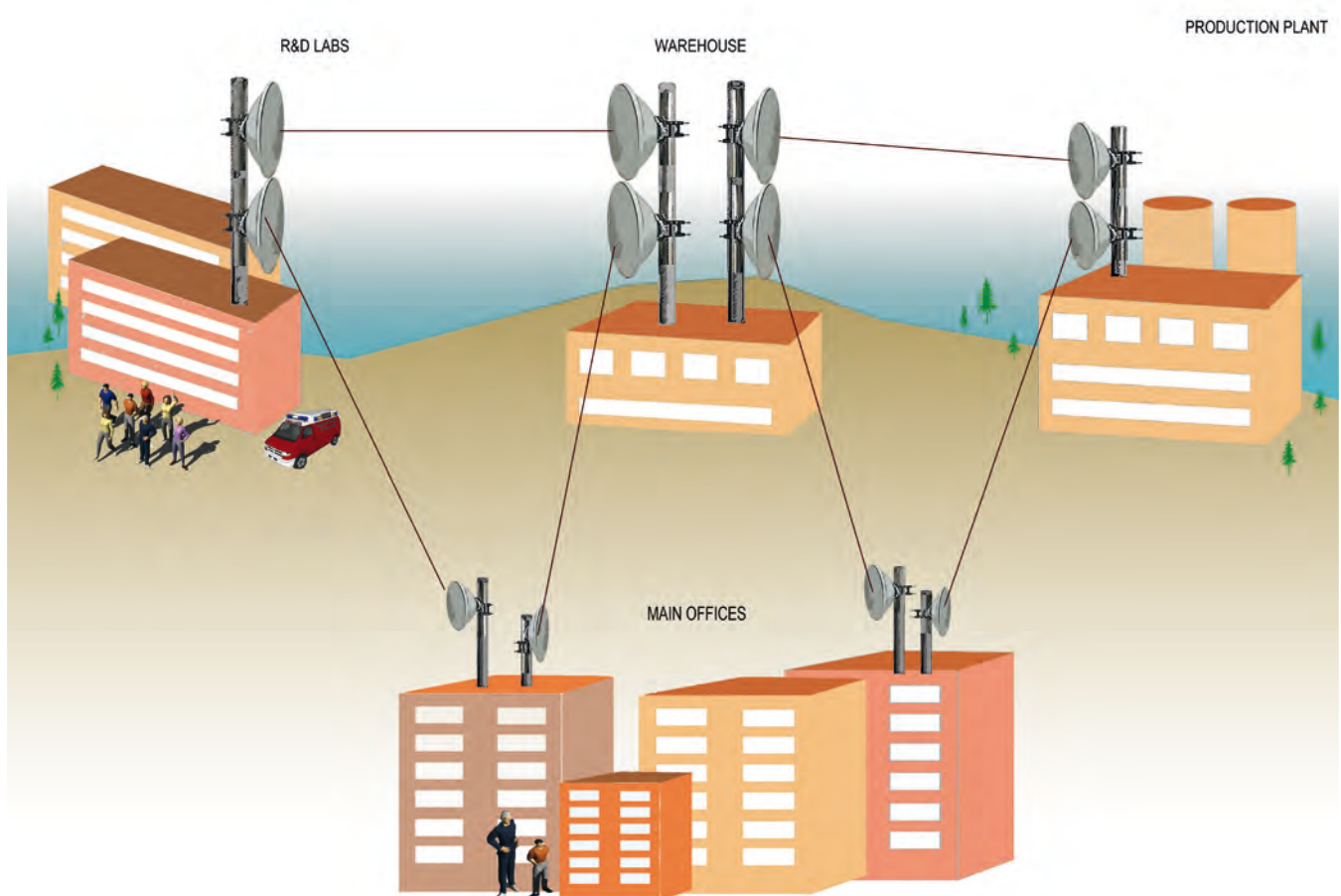


Enterprise network solution

SkyLinks offers a range of Digital Microwave Radio based telecommunication services to private Enterprises and Business Companies where the use of IT/IS applications is basic.

Increasing demand of corporate communications for data transport between the main offices and warehouses, remote R&D labs or subsidiary production plants is often more convenient to be realized through a fully owned wireless network rather than through leased lines, that are usually very expensive, un-secure and limited in speed rate.

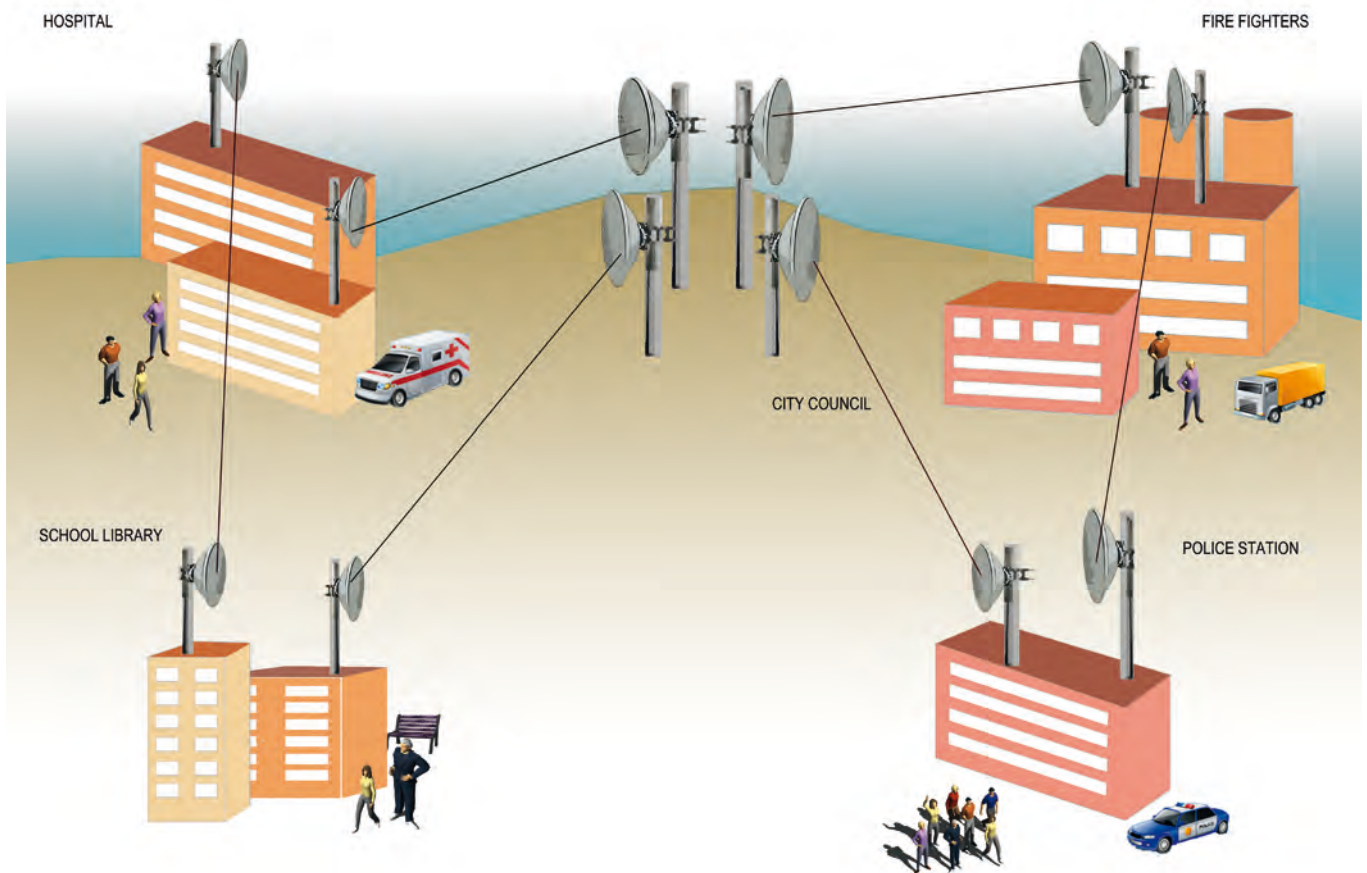
LAN extensions, VOIP and intranet requirements are easily guaranteed thanks to the IP wireless network solutions offered by SkyLinks product portfolio.



Municipal network solution

Skylinks IP based MW radio solutions provide local government with data and voice communication services for 100% owned network systems allowing different buildings to be safely connected.

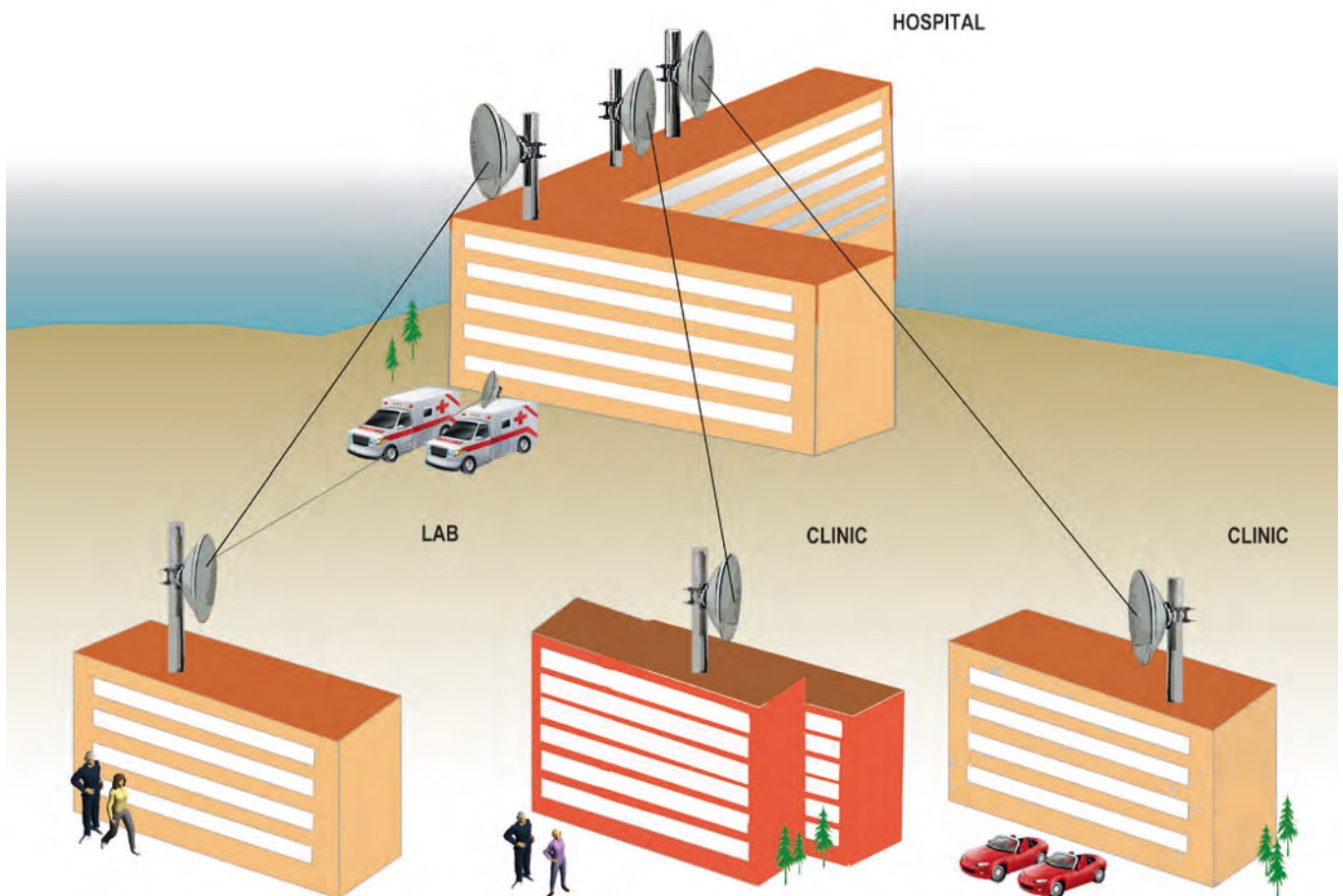
The main Municipal database centre can be accessed by remote institutional offices through a variety of E1/E3 lines or Ethernet connections up to over 600 Mbps Gigabit Ethernet.



Healthcare private network

One of the most important applications of IP based digital microwave systems is represented by the connection between buildings in hospital complexes and from the main electronic archive to remote laboratories and specialist health checking points.

Skylinks also offers mobile solutions for connection of ambulances or temporary first aid installations to the institutional healthcare network, for connection of digital instruments or data/voice over IP communications.



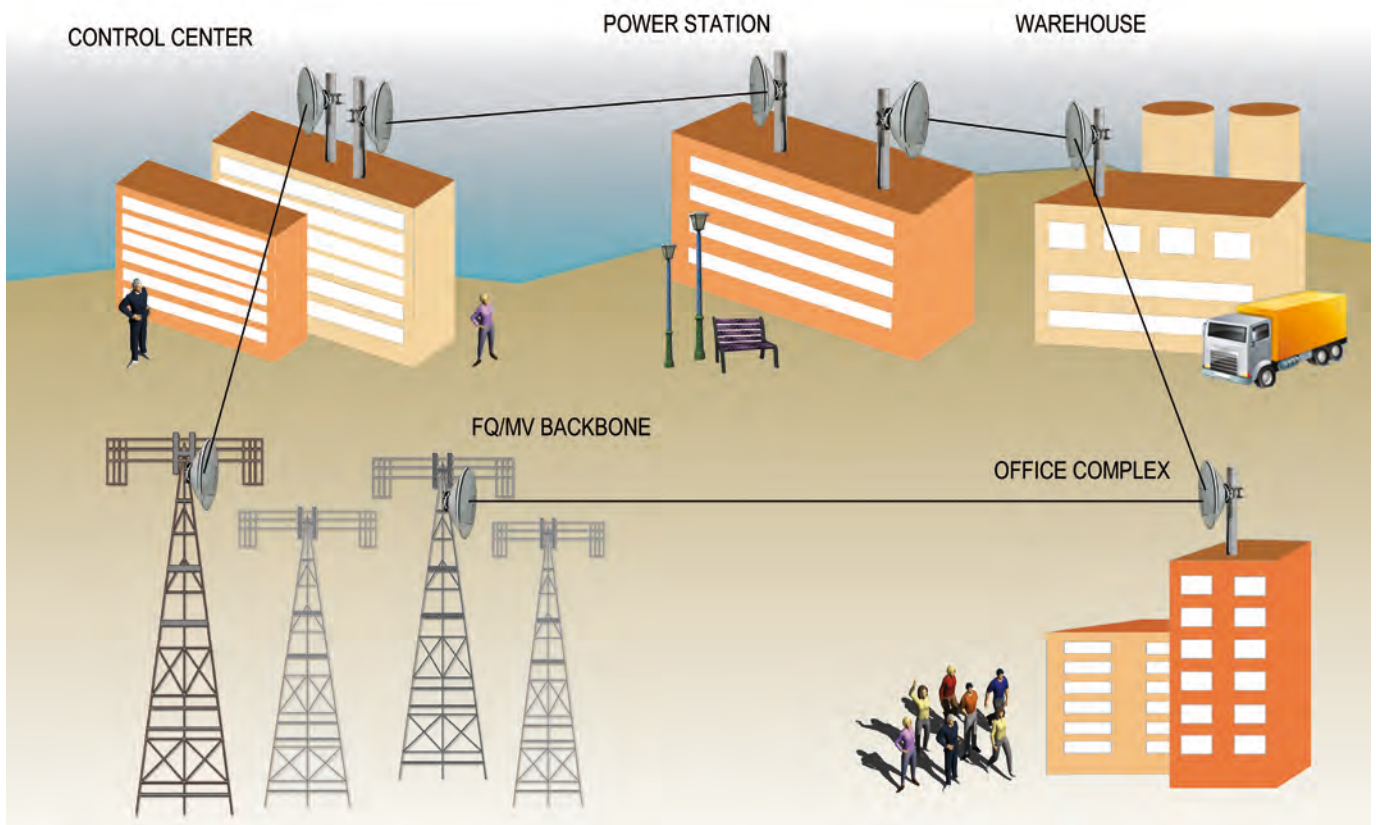
Utility networks

SkyLinks microwave radio systems are successfully used in the networks of utility companies in the electric (also smart grid infrastructure) and other sectors.

Available capacity options (4-622 Mbps) in conjunction with multiple types of interfaces (Fast Ethernet, Gigabit, V.35 and E1, STM-1) provide these companies with data and voice services.

Skylinks products fulfil the requirement of Utility/Energy providers for wireless networking systems running parallel to the distribution lines for carrying telemetry and other critical information in addition to data and voice communication internal services.

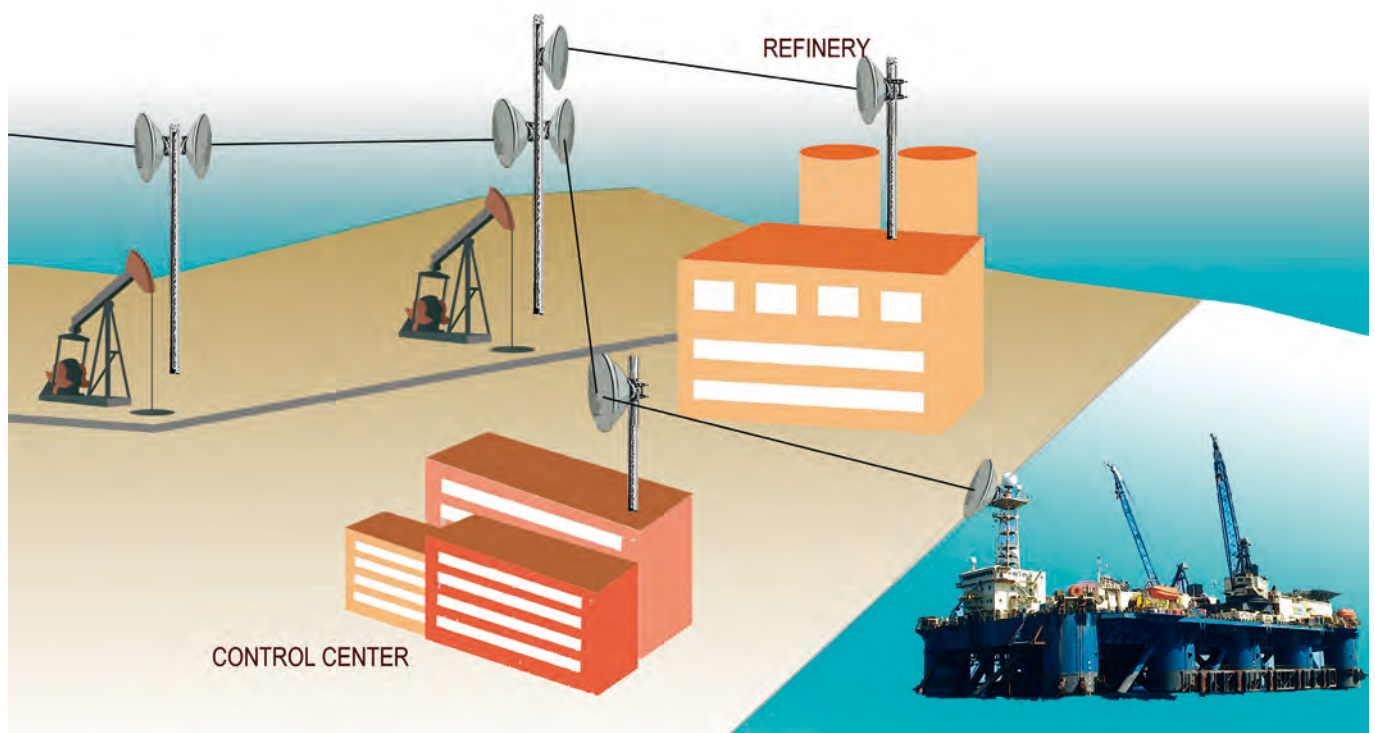
Thanks to the Full-Indoor very and ultra high power HS/All-in-One systems, Skylinks provides unmatched solutions in terms of distance coverable by a single run (over 100 Km. with 99,99% availability).



Pipelines control

One of the historic application of microwave links is the connection between sea oil platforms to the mainland refineries. Skylinks equipment had been widely used for this purpose.

Pipeline networks typically use fiber optic connections between the control center and the distribution sites were digital microwave links actually find application for back systems or repeaters.



Video surveillance

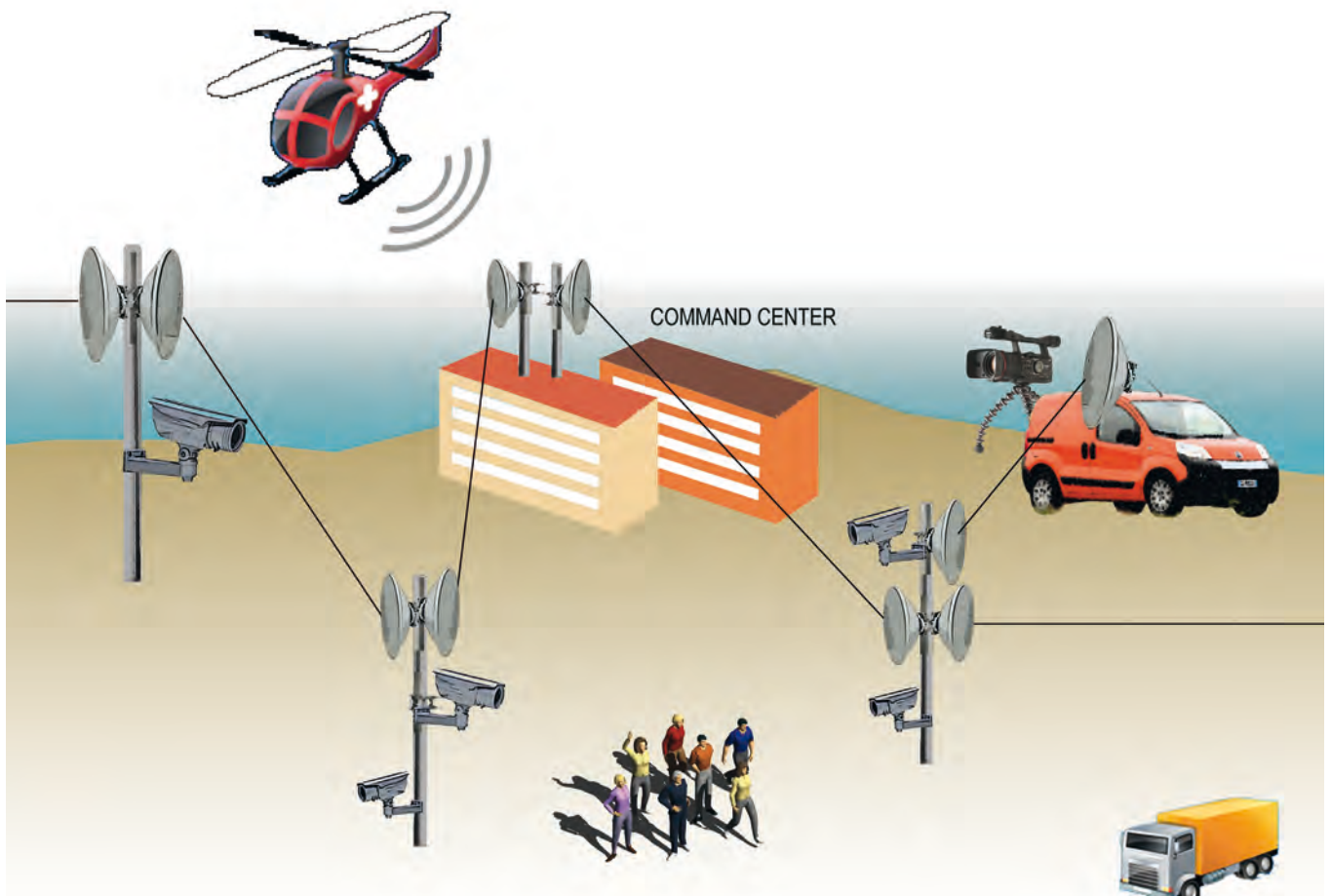
Thanks to the expertise in broadcasting of the parent Company SSBT, SkyLink can offer the best video surveillance solutions both for fixed and mobile application, including downlink for aircraft/helicopters.

Digital camera sources or analog MPEG2/4 SD or HD signals specifically converted with encoders/decoders, can be easily interfaced via ASI or Fast Ethernet port and distributed through the Digital Microwave network to reach remote controlling sites and or storage servers rooms.

SkyLinks mobile systems find application in all kind of situation where fast deployment is a must.

Emergency communications are one of the top priority needs in case of disasters like earthquake, tsunami and many other natural events where standard telecommunications channel are destroyed or temporary out of order.

It is proven that the good result of first aid activities in such areas is essential for limiting the number of victims, and communications are a topic issue that can be easily solved by using SkyLinks microwave solutions.

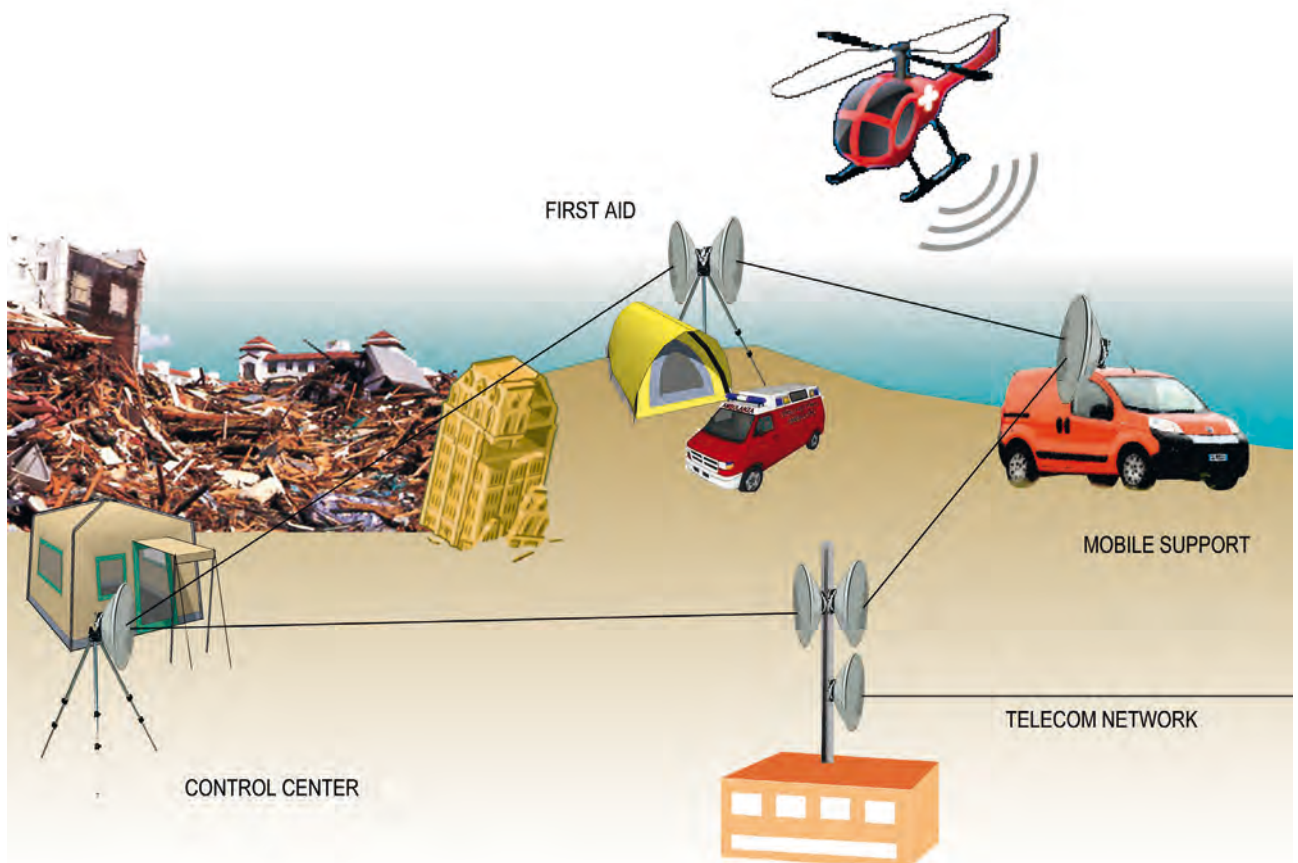


Disaster recovery

SkyLinks mobile systems find application in all kind of situation where fast deployment is a must.

Emergency communications are one of the top priority needs in case of disasters like earthquake, tsunami and many other natural events where standard telecommunications channel are destroyed or temporary out of order.

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Systems

High Capacity Microwave Systems

1+0, 1+1, 2+0, 4+0, XPIC

Split Mount and Full Indoor Hardware Configurations

SKYLINKS Digital Microwave Systems product portfolio offers both Split Mount and Full-Indoor solutions. The product line covers the frequency range from 1,4 to 43GHz, and modulation schemes from QPSK to 256QAM.

Two different HW configurations are available, based on specific SDIDU providing several combinations of Line Interfaces with scalable Ethernet from 1 up to 620Mbps. SKYLINKS Digital Microwave Radios flexibility allows customer to deploy any kind of wireless point-to-point connections within public and private networks and can be tailored to be suitable for cellular mobile network up to 4G (LTE), for fixed and mobile video broadcasting distribution systems, for ISP and WIMAX backhauling, utilities and military networks.

Skylinks products portfolio includes the following systems:

Licensed

- DSR/SM - Split Mount SDIDU DRS + ODU
- DRS/FI - Full Indoor SDIDU DRS + RFU
- HS/SM - Split Mount SDIDU HS + ODU
- HS/FI - Full Indoor "ALL IN ONE" 2U Radio

License exempt

- HS-LINK/ISM

Digital Radio System/Split Mount (Hybrid)



> SDIDU



> ODU + Antenna

System Features

- Selectable Rates and Interfaces
 - PDH Options
 - > Up to 16 x E1/T1
 - > 100BaseTX/Ethernet: Scalable 1-100 Mbps
 - > DS-3/E-3/STS-1
 - Super PDH Options
 - > Up to 32 x E1/T1
 - > 100 BaseTX/Ethernet: Scalable 1-100 Mbps
 - SDH Options
 - > 1-2 x SDH STM-1/OC-3 SONET
 - GigaBit Ethernet
 - > 2E1+ 4x1000BaseTx/Ethernet: Scalable 1-310 Mbps
 - RF Channels bandwidth
 - >ETSI=3,5-7-14-28-56MHz; FCC=10-20-30-40-50MHz
- Support for multiple configurations for both PDH and SDH 1+0, 1+1 protection/diversity
- East/West Repeater (2+0) or East/East capacity doubler.
- Selectable Spectral Efficiency of 0.8 to 6.25 bits/Hz (including FEC and spectral shaping effects)
- QPSK, 16 -256 QAM Modulation
- Powerful Trellis Coded Modulation concatenated with Reed-Solomon Error Correction
- Built-in Adaptive Equalizer
- Support of Voice Orderwire Channels
- Adaptive Power Control
- Built-in Network Management System (NMS)
- Consecutive Point ring architecture
- Built-in Bit Error Rate (BER) performance monitoring
- Integrated Crosspoint switch: allows a total of 160 E1s (200 T1s) to be mapped any-to-any between front-panel ports and RF link(s).
- Optional STM-1 Mux/Demux: allows the SDIDU™ to extract up to 63 E1 (or 84 T1) from an STM-1. In conjunction with an integrated Crosspoint Switch, up to 223 E1 (284 T1s) can be mapped any-to-any between front-panel ports, STM-1, and RF link(s).
- XPIC

Hardware Available configurations

Full Duplex	Half Duplex TX or RX	TX Power Standard or High
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System Available configurations

1 + 0	1+1 HSB/SD/FD	2+0 E/E or E/W or XPIC
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Default

Option

155 Mbps @ 128 QAM 28 MHz Ch BW	310Mbps @ 256QAM 56Mhz Ch BW	XPIC
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The SkyLinks DRS shall meet the requirements for XPIC operation specified in ETSI EN 302-217-2-1 and ETSI EN 302-217-2-2., except for:

- 256QAM XPIC operation is not currently supported.
- The DRS do not support class 6B (512QAM mode) operation in 40MHz channels.
- Class 6B operation in 7 MHz and 14 MHz channels is not supported.

The Digital Radio System provides a cost-effective solution to high capacity data transmission requirements. Operating from 4 to 38 GHz, it features compact/easy –to –install IDU and ODU.

The DRS provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency. Additionally, it features enhanced software allowing capacity/configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by mobile service providers, internet service providers (ISP), utilities, public telephone operators, local governments, TV networks and corporate users.

The DRS represent a new microwave architecture designed to address universal applications..

The same ODU can be used for PDH, SDH and IP applications offering modulation schemes from QPSK up to 128QAM, and selectable channel BW of 3.5, 7, 14 and 28 MHz (from 10 to 56 Mhz in the WB option). The Software Defined Indoor Unit (SDIDU) offers a basic configuration, suitable for PDH application and can be upgraded with simple fw and plug-in hw modules for Super PDH, SDH, FE, GE and ASI options.

This advanced technology platform is designed to provide the flexibility to customers for their current and future network needs.

The ODU is fully calibrated over the temperature range and operates down to -50°C (optional).

The ODU supports all applications within the same HW platform covering from QPSK up to 128 QAM with very low Phase Noise and superior reliability (high MTBF).

The IDU supports both 1+0 and 1+1 protection and Ring architectures, it is provided in a chassis arrangement 1U 19 inch standard rack. The modem and power supply functions are supported using easily replaceable plug-in modules. An additional feature of the IDU is provision for a second plug-in modem / IF module to provide repeater or transit network configurations (East/West) or Capacity Doubling (East/East).

SkyLinks Digital Radio System includes integrated Operations, Administration, Maintenance, and Provisioning (OAM&P) functionality and also Design features enabling simple commissioning for the radio network installation in the customer's premises.

Another highlight of Skylinks Radio Products is the scalability and the capability to support a Ring architecture. This Ring or consecutive point radio architecture is self-healing in the event of an outage in the link and automatically re-routes data traffic, thereby ensuring the continuity of service to the end user.

The overall architecture consists of a single 1U rack mount Indoor Unit (IDU) with a cable connecting to an Outdoor Unit (ODU) with an external antenna.

SYSTEM PARAMETERS

Frequency	4/L6/U6 GHz	7/8 GHz	10 GHz	11/13 GHz
Standards	ETSI/FCC	ETSI	ETSI/FCC	ETSI/FCC
Operating Frequency (GHz)	3.8 to 4.2 , 4.40 to 5.00 5.90 to 7.10	7.10 to 8.50	10.00 to 10.70	10.70 TO 11.70 12.75 TO 13.25
Channel BW 28 MHz Channel BW 56 MHz	128 QAM STM-1 32 QAM 1STM-1 / 128 QAM 2*STM-1			
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	SDT / HI +27/+32 +24/+29 +22/+27		SDT / HI +26/+31 +23/+28 +21/+26	STD / HI +26/+31 +23/+28 +21/+26
Rx Sensitivity @ 10-6 BER 28 MHz, 56 MHz, 155 / 310 Mbps	-70 dBm -72 / -66 dBm		-69 dBm -71/-65 dBm	
Frequency	15 GHz	18 GHz	23/26 GHz	38 GHz
Standards	ETSI	ETSI/FCC	ETSI/FCC	ETSI/FCC
Operating Frequency (GHz)	14.40 to 15.35	17.70 to 19.70	21.20 to 23.60 24.55 to 26.45	31.80 to 33.40 37.00 to 39.50
Channel BW 28MHz Channel BW 56MHz	128 QAM STM-1 32 QAM STM-1 / 128 QAM 2*STM-1			
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	STD / HI +25 +22 +20	STD / HI +24 +21 +19	STD / HI +23 +20 +18	STD / HI +18 +15 +13
Rx Sensitivity @ 10-6 BER 28 MHz, 56 MHz, 155 / 310 Mbps	-69 dBm -71/-65 dBm	-67 dBm -69/ -64 dBm		-66 dBm -68/ -63 dBm
Frequency Stability	0.0010%			
Background BER	<10-12			
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198			
	Power Supply ETSI EN 300 132-2			
	EMC / Safety ETSI EN 301 489 / IEC EN 60950			

PAYLOAD INTERFACE PARAMETERS

PDH	Line Rate	1 to 32 x E1/T1
	Interfaces	120 Ω balanced or 75 Ω unbalanced
	Standards Compliance	ITU-T G.703, G783
Fast Ethernet	Line Rate	Full-Duplex, scalable up to 150 Mbps
	Interfaces	2 x 100 Base-Tx
	Standards Compliance	IEEE 802.3
SDH	Line Rate	1 or 2 STM -1/ OC3 155.52 Mbps
	Interfaces	Optical Type Sc Single mode 1310nm, Electrical BNC
	Standards Compliance	Telcordia
Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 300 Mbps
	Interfaces	4 x 1000 Base-Tx
	Standards Compliance	IEEE 802.3



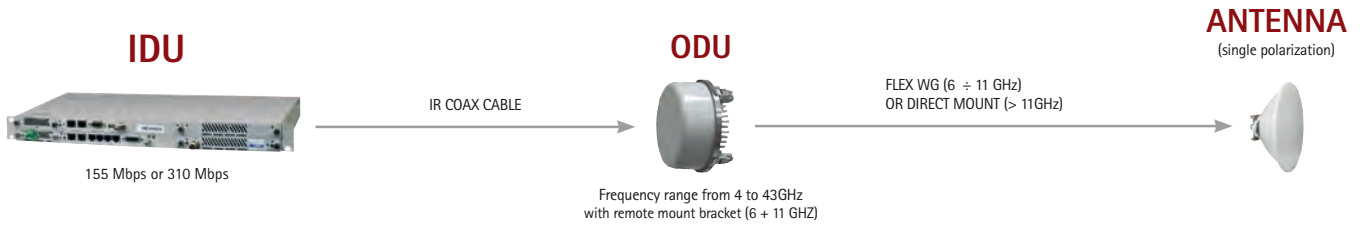
MECHANICAL/ENVIRONMENTAL

Dimensions	IDU: 19" standard rack (1U), 445 x 238.5 x 44.5mm ODU: D 240mm x 240mm x 70mm
Weight	IDU: 4 Kg; ODU: 6.0 Kg
Operating Temperature	IDU: -5° to +45°C; ODU: -33° to +55°C
Altitude	Up to 4500 meters
Humidity	IDU: 95% condensing; ODU: 100% all-weather
Power Input	-48V DC (-36V to -60V DC)
Power Consumption	IDU: <25 watts; ODU: <25 watts, HP version <35W
Cooling	Natural convection
Coaxial Interfaces	IDU N-type female, ODU N-type female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna Interface	Standard Rectangular WG or Coaxial N-type connector (6-11 GHz); proprietary direct mount (13GHz and above)
Standards Compliance	ETSI ETS 300 019

NETWORK MANAGEMENT & CONFIGURATIONS

Support	SNMP, Fully featured Mib, Web based GUI, Embedded HTML server, CLI
Local Access	Ethernet 10/100 Base - T / RJ - 45
Control Channel	In band
Support Configurations	1+0 (1U), 1+1 (1U)
Radio Protection	Hot standby, hitless switching with frequency or space diversity

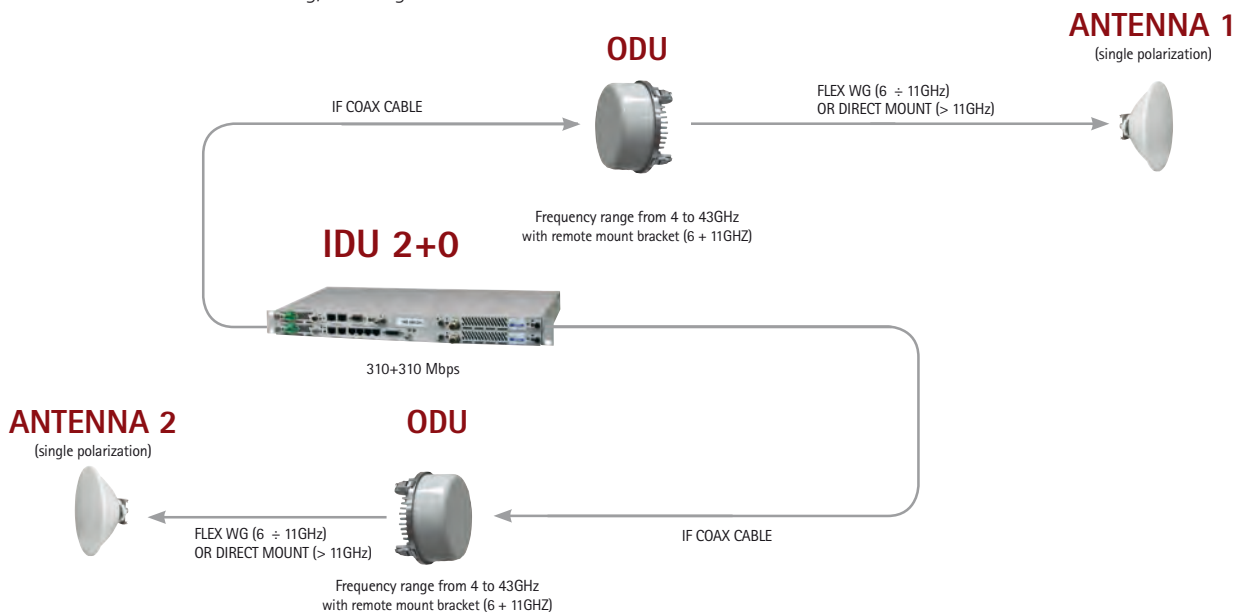
1+0 Basic Configuration



DRS/SM 2+0 EAST/WEST

2+0 East/West Configuration

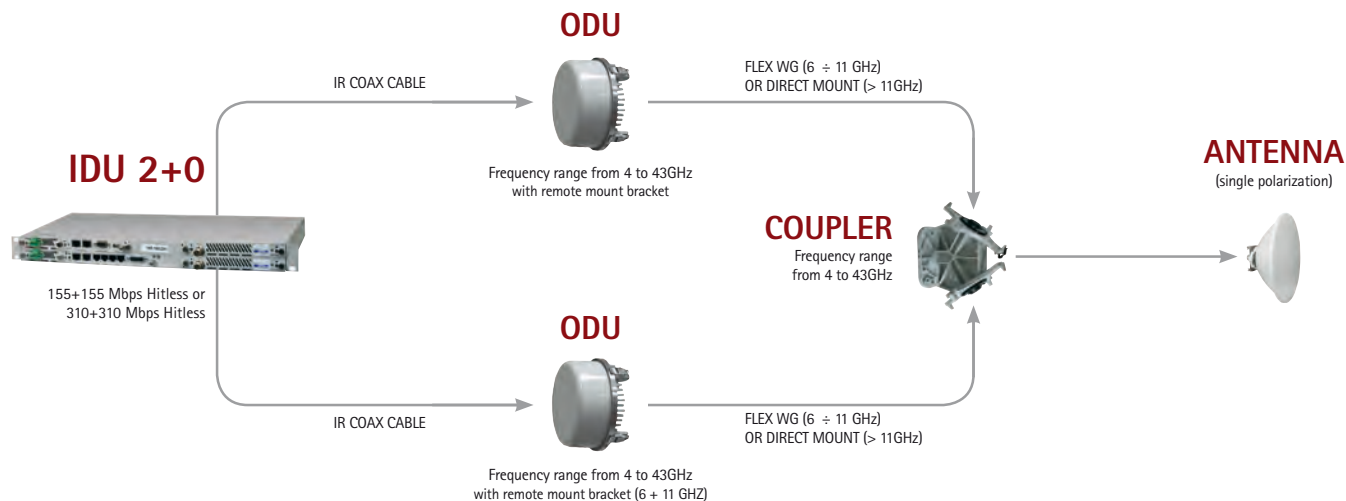
The Software Defined IDU supports a 2+0, or east-west, configuration that allows a consecutive point architecture to be achieved with only a single 1 RU chassis at each location. In this configuration the SDIDU contains two modems and may contain two power supplies. One modem is referred to as the west modem and the other as the east modem. The SDIDU is connected to two ODUs, one broadcasting/receiving in one directing of the ring architecture and the other broadcasting/receiving in the other.



DRS/SM 2+0 EAST/EAST

2+0 East/East Configuration

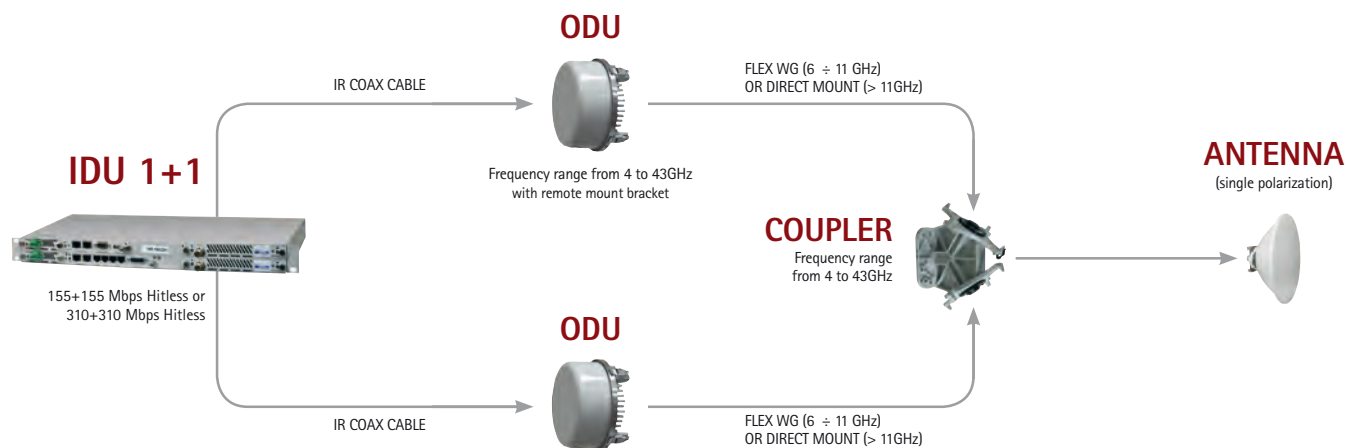
The SDIDU is capable of aggregating link bandwidth in 2+0 mode to achieve up to 600 Mbps Ethernet throughput when used with the Wideband Modem/IF modules in 56MHz with 128-QAM capable ODUs. The 2+0 East/East configuration allows for the doubling of the throughputs. When configured for 2+0 East/East, the SDIDU balances the traffic between the two links based upon the source and destination MAC addresses of the Ethernet packets. Sufficient diversity of MAC addresses is required to achieve fullutilization of the 2+0 East/East configuration. In the event of a link failure, throughput will only be reduced by one-half, and traffic on the failed link will be automatically re-routed to the remaining link.



DRS/SM 1+1 HSB

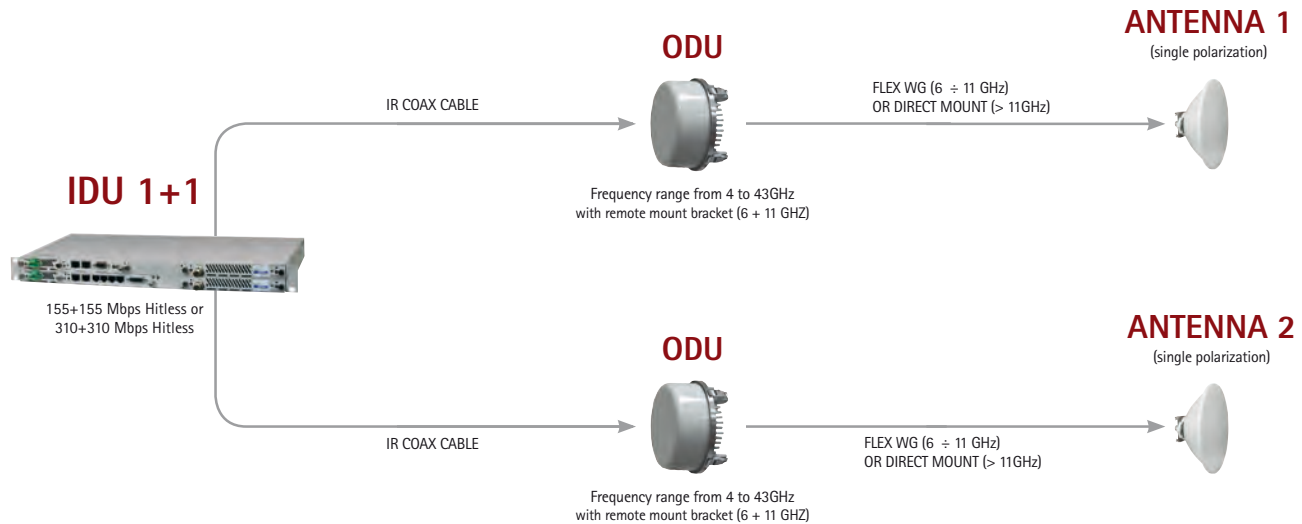
Protected Non-Diversity (Hot Standby)

Operating in Protected Non-Diversity mode, also called Hot Standby, one ODU at each location transmits to two ODUs at the other location. This mode does not require the extra bandwidth or interference protection. It provides hitless receive switching and hot standby. The SDIDU automatically switches transmit ODU upon appropriate ODU alarm or ODU interface error, minimizing transmit outage time. The SDIDU supports couplers with asymmetric attenuation. The SDIDU can be configured to automatically compensate for coupler loss during switching.



Space Diversity Configuration

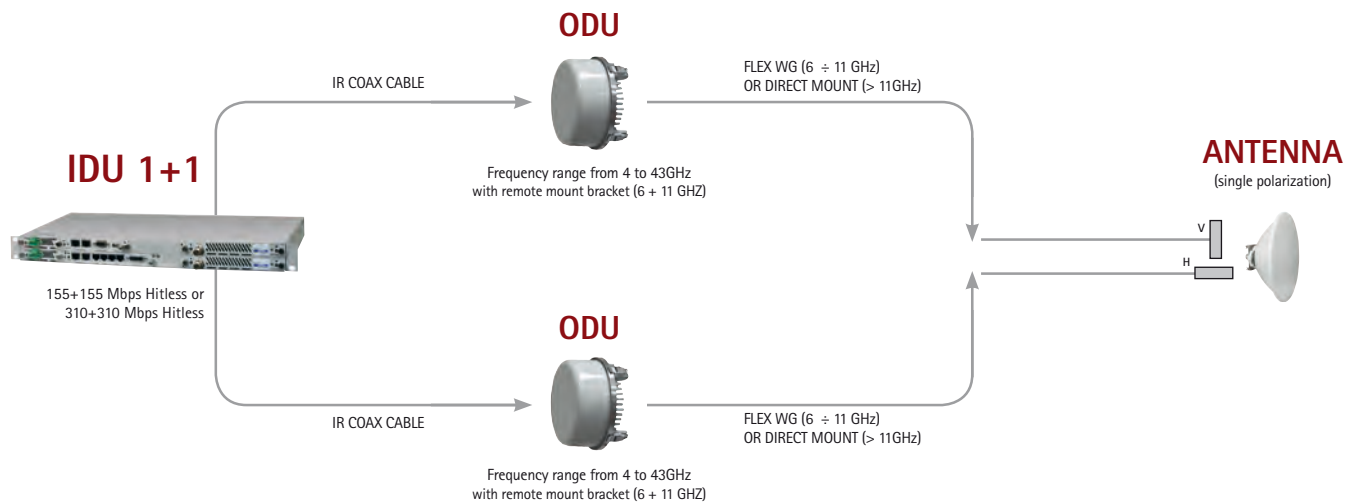
In Protected Diversity mode, the link between each pair of modems is the same, as shown in Figure, providing complete redundancy. This arrangement requires bandwidth for both links and non-interference between the links, but it provides hitless receive and transmit switching. The SDIDU supports both frequency and spatial diversity. In spatial diversity, two non-interfering paths are used. The proprietary framer chooses the best, or error-free, data stream and forwards it to the Line Interface Units (LIUs).



DRS/SM 1+1 FD

Frequency Diversity Configuration

In Protected Diversity mode, the link between each pair of modems is the same, as shown in Figure, providing complete redundancy. This arrangement requires bandwidth for both links and non-interference between the links, but it provides hitless receive and transmit switching. The SDIDU supports both frequency and spatial diversity. In frequency diversity, two frequencies are used to achieve non-interference. The proprietary framer chooses the best, or error-free, data stream and forwards it to the Line Interface Units (LIUs).



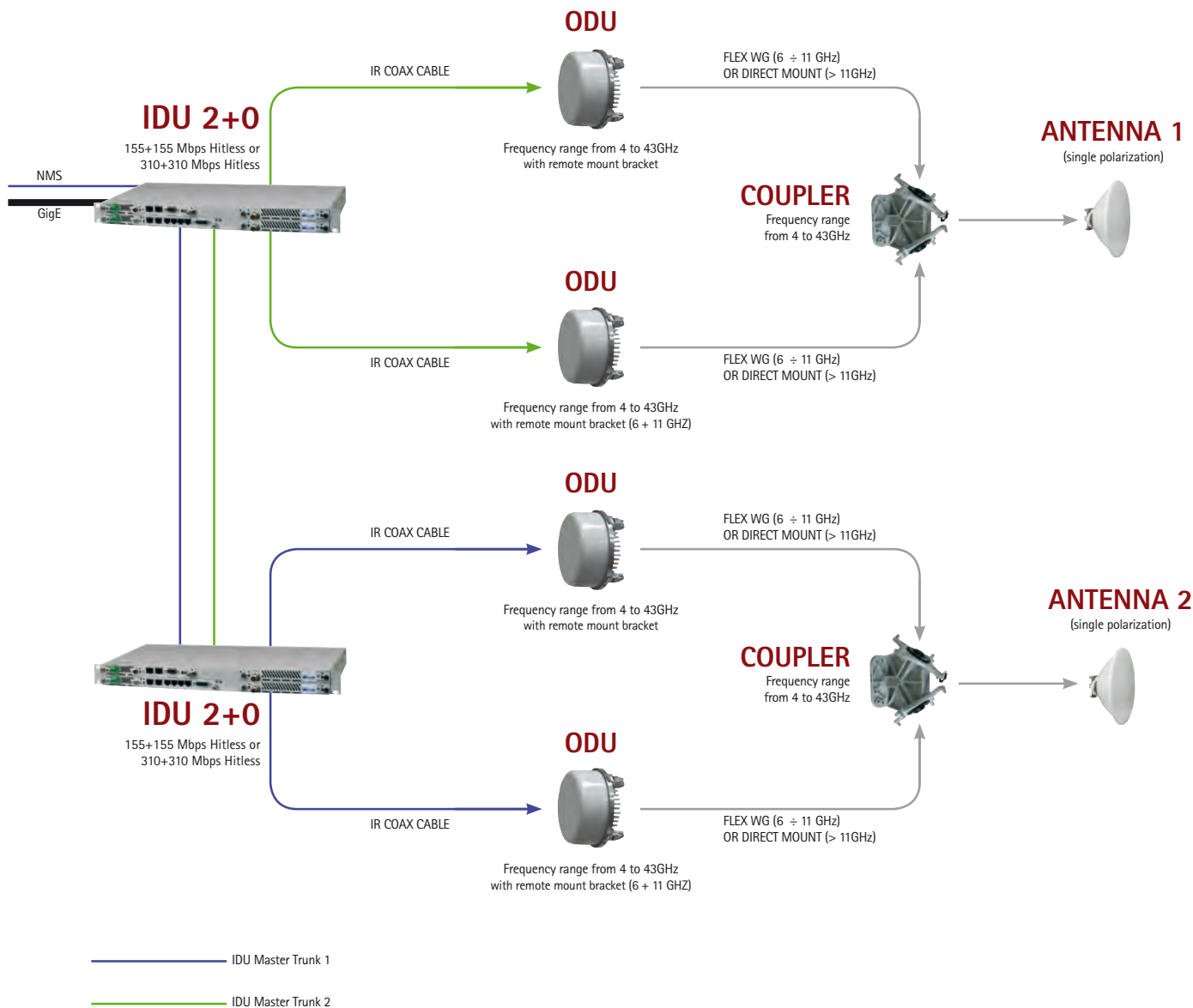
DRS/SM 4+0 EAST/EAST

4+0 East/East Configuration

In addition to aggregating two links, the SDIDU is capable of pairing with another SDIDU to aggregate a total of four links to achieve a maximum throughput of over 1000 Mbps when used with Wideband Modem/IF modules in a 50 or 56 MHz RF channel BW.

As with 2+0 East/East, the SDIDU balances the traffic among the four based upon the source and destination MAC addresses of the Ethernet packets. Sufficient diversity of MAC addresses is required to achieve full-utilization of the 4+0 East/East configuration.

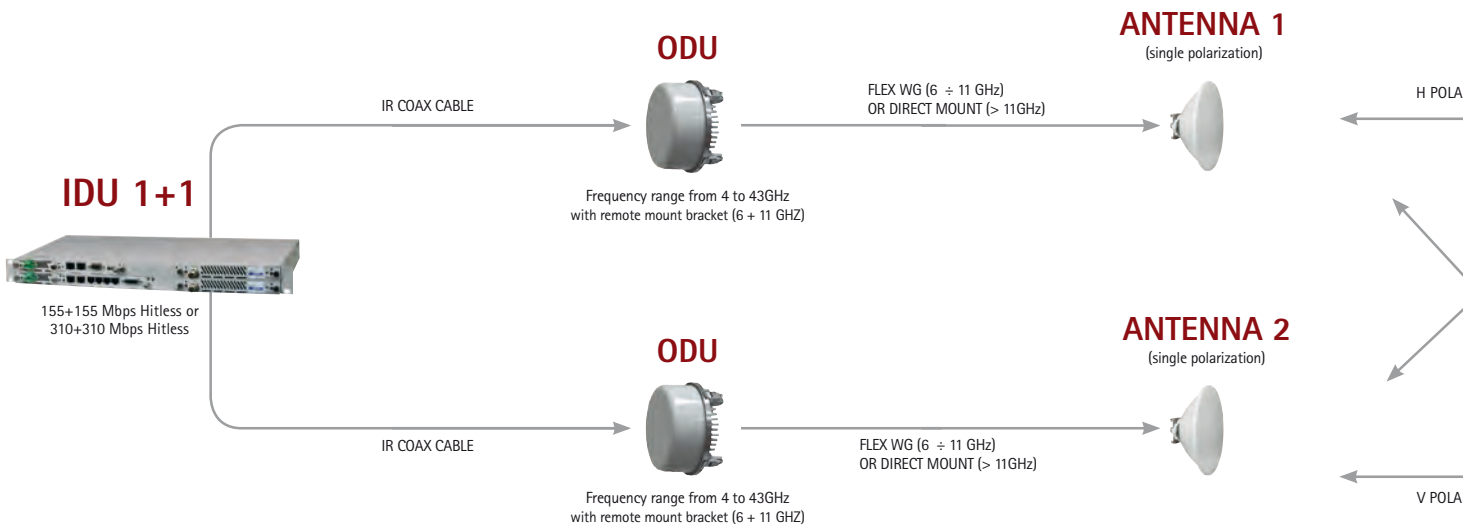
In the event of a link failure, throughput will only be reduced by one-quarter, and traffic on the failed link will be automatically re-routed to the remaining links.

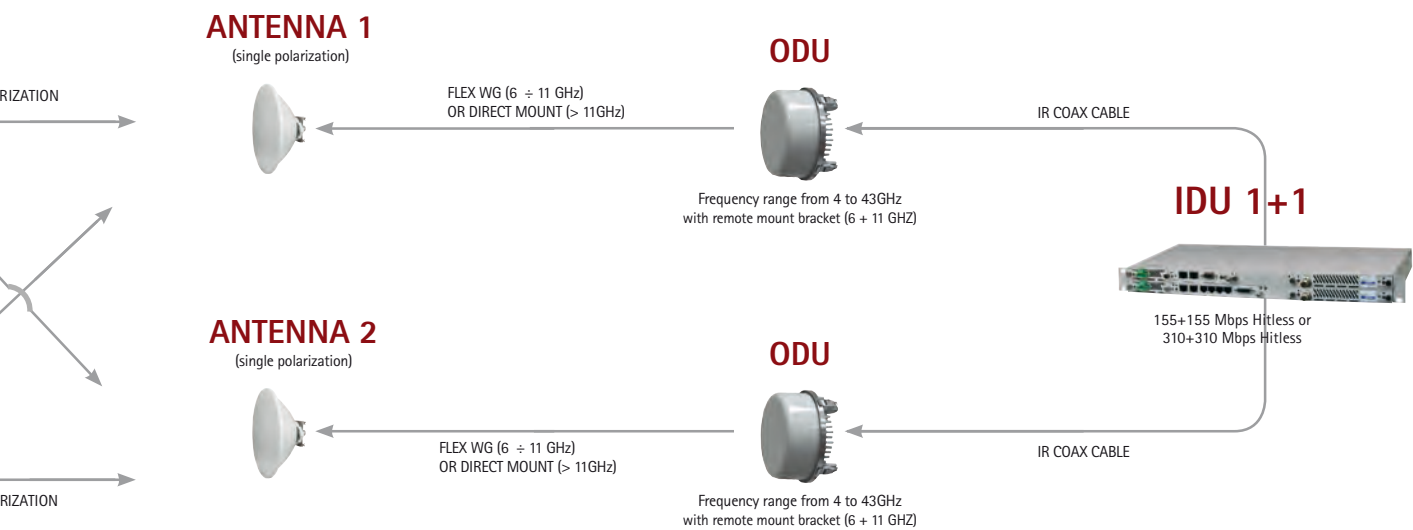


2+0 XPIC

2+0 XPIC operates similarly to East-East operation. Both links are required to have the same configuration. Each one carries independent payloads based on channel mapping and Ethernet link Aggregation.

- The DRS SDIDU shall insure that the both links are configured to compatible modes.
- The DRS SDIDU shall insure that both links are configured to the same frequency.





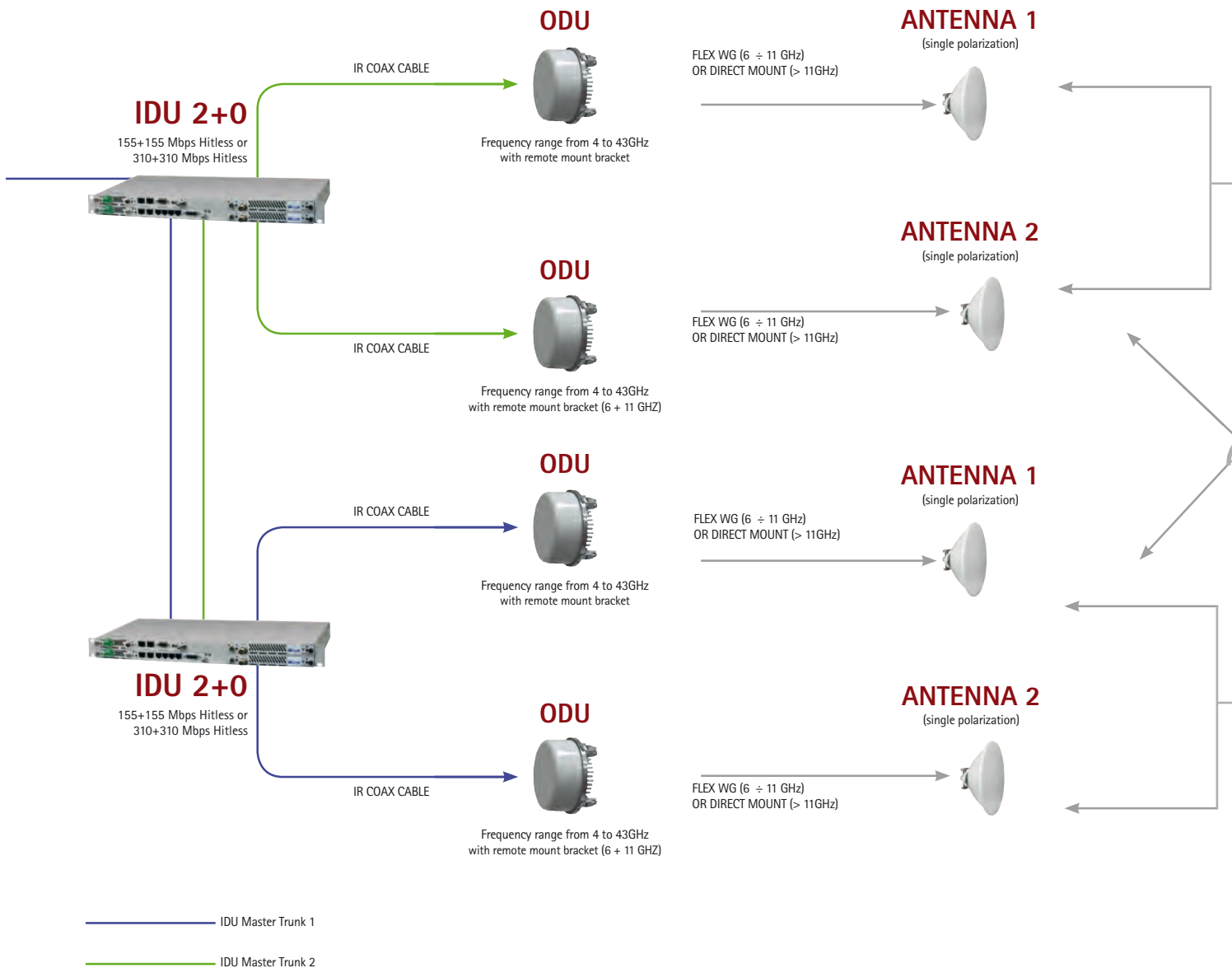
2+2 XPIC (Transmitter Switching)

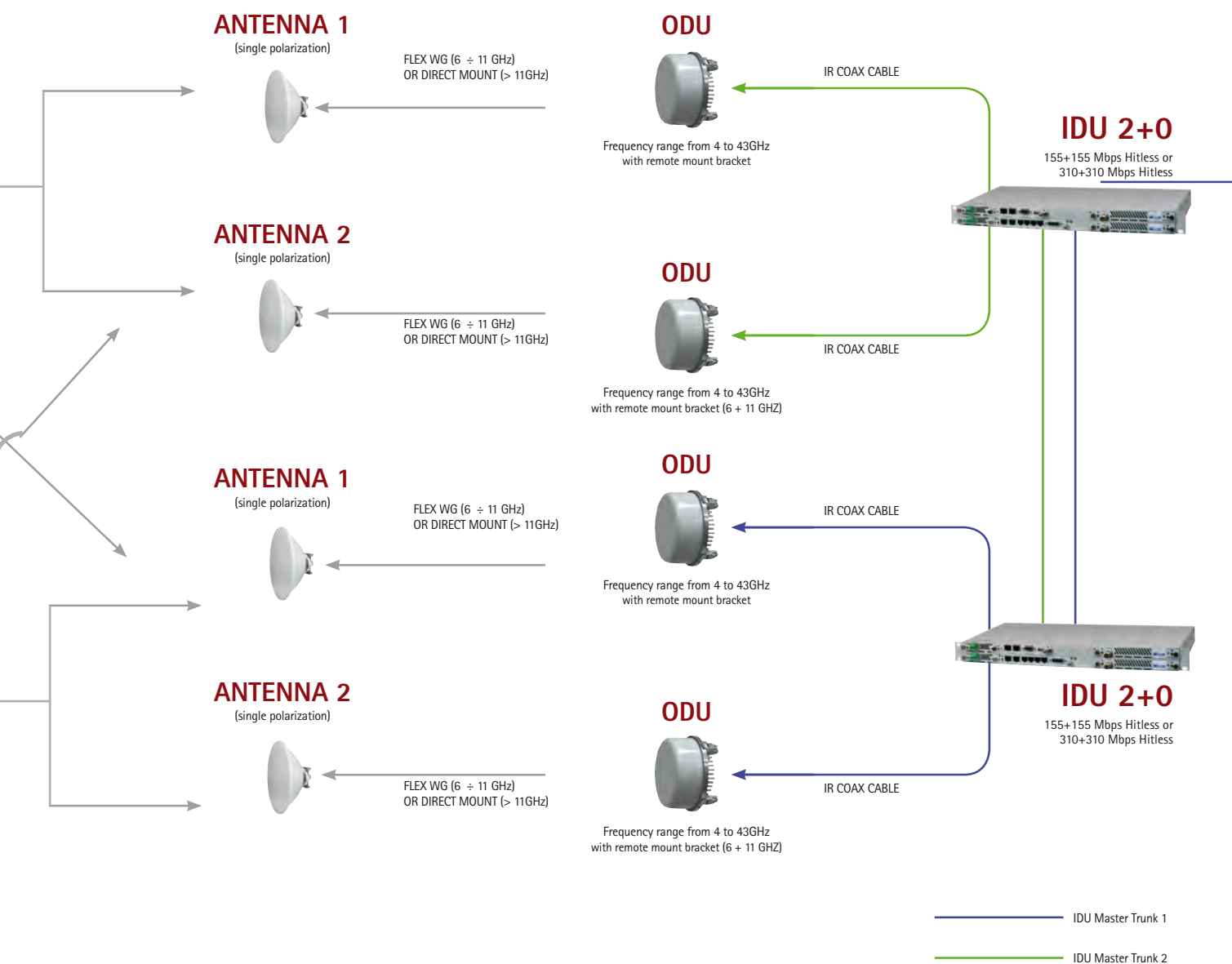
When configured into 2+2 XPIC mode, the DRS SDIDU shall perform transmitter switching as actually implemented for 1+1 transmitter switching. This includes, but is not limited to:

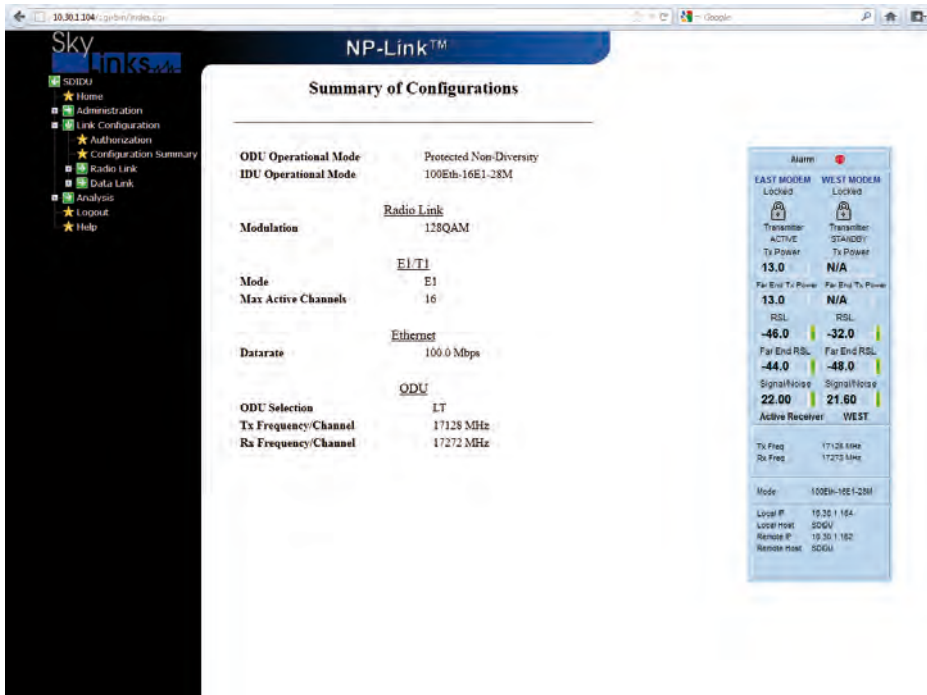
- ODU alarm switching
- ODU disconnect switching
- Manual switching via GUI, CLI, and SNMP
- Remote protection switching

A protection switch shall also be required if the XPIC Serdes is unlocked.

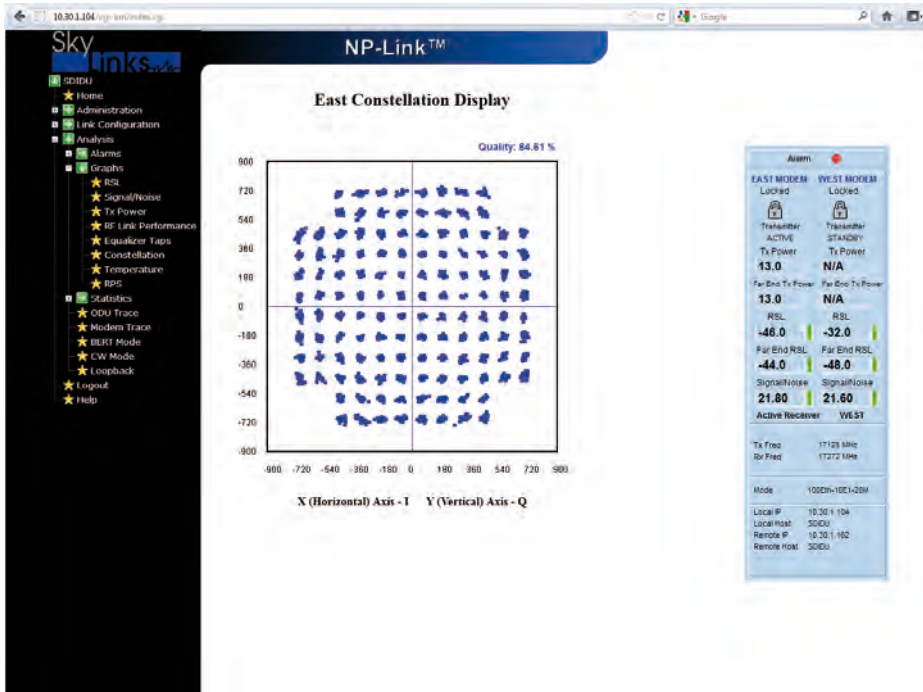
Each modem shall maintain a "Local protection state", which shall be bad if any of the Protection switching criteria is currently met, and good otherwise. Each modem shall report its "Local protection state" to the XPIC partner modem via the XPIC Serdes interface. The other modem shall track this as the "Serdes remote protection state". The "Serdes remote protection state" shall be set to bad if the XPIC Serdes interface is unlocked. Each modem shall cause a protection switch to occur if either the "Local protection state" OR the "Serdes remote protection state" is bad.







GUI EXAMPLE



GUI EXAMPLE





Digital Radio System/Full Indoor (Hybrid) Frequency Range from 4 to 11GHz



> SDIDU In 1+0 Configuration



> SDIDU In 1+1 Configuration



> RFU VHP 1+0 Configurations



> RFU VHP 1+1 Configurations



> RFU UHP - In 1+1 configuration

System Features

- Selectable Rates and Interfaces
 - PDH Options
 - > Up to 16 x E1/T1
 - > 100BaseTX/Ethernet: Scalable 1-100 Mbps
 - > DS-3/E-3/STS-1
 - Super PDH Options
 - > Up to 32 x E1/T1
 - > 100 BaseTX/Ethernet: Scalable 1-100 Mbps
 - SDH Options
 - > 1-2 x SDH STM-1/OC-3 SONET
 - GigaBit Ethernet
 - > 2E1+ 4x1000BaseTx/Ethernet: Scalable 1-310 Mbps
- Support for multiple configurations for both PDH and SDH
 - 1+0, 1+1 protection/diversity
 - Hot Standby
 - East/West Repeater (2 + 0)
- Selectable Spectral Efficiency of 0.8 to 6.25 bits/Hz (including FEC and spectral shaping effects)
- QPSK, 16 -256 QAM Modulation
- Powerful Trellis Coded Modulation concatenated with Reed-Solomon Error Correction
- Built-in Adaptive Equalizer
- Support of Voice Orderwire Channels
- Adaptive Power Control
- Built-in Network Management System (NMS)
- Consecutive Point ring architecture
 - Built-in Bit Error Rate (BER) performance monitoring
 - Integrated Crosspoint switch: allows a total of 160 E1s (200 T1s) to be mapped any-to-any between front-panel ports and RF link(s).
 - Optional STM-1 Mux/Demux: allows the SDIDU™ to extract up to 63 E1 (or 84 T1) from an STM-1. In conjunction with an integrated Crosspoint Switch, up to 223 E1 (284 T1s) can be mapped any-to-any between front-panel ports, STM-1, and RF link(s).

Default Option

155 Mbps @ 128 QAM 28 MHz Ch BW	310Mbps @ 256QAM 56Mhz Ch BW	XPIC
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Hardware Available configurations

Full Duplex	Half Duplex TX or RX	TX Power Very HI PW Ultra HI PW
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System Available configurations

1 + 0	1+1 HSB/SD/PD	2+0 E/E or E/W or XPIC
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The SkyLinks DRS/FI provides a cost-effective solution to high capacity data transmission requirements. Operating from 4 to 38GHz, it features compact/easy-to-install IDU and RFU.

The DRS/FI provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency.

Additionally, it features enhanced software allowing capacity/configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by mobile service providers, internet service providers (ISP), utilities, public telephone operators, local governments, TV networks and corporate users.

The DRS/FI represents a new microwave architecture designed to address universal applications where the customers/installations require all the equipments to be fitted indoor into standard 19"RU.

The RFU (6RU) is actually mounted in the rear side in vertical position in order to easy connect the antenna port flanges to the WG feeders.

The same RFU can be used for PDH, SDH and IP applications offering modulation schemes from QPSK up to 256QAM, and selectable channel BW of 3.5, 7, 14 and 28 MHz (from 10 to 56 Mhz in the WB option). The Software Defined Indoor Unit (SDIDU) offers a basic configuration, suitable for PDH application and can be upgraded with simple fw and plug-in hw modules for Super PDH, SDH, FE, GE and ASI options. This advanced technology platform is designed to provide the flexibility to customers for their current and future network needs.

The RFU is fully calibrated over the temperature range (-5 + 45°C).

The RFU supports all applications within the same HW platform covering from QPSK up to 128, 256QAM with very low Phase Noise and superior reliability (high MTBF).

The IDU supports both 1+0 and 1+1 protection and Ring architectures, it is provided in a chassis arrangement 1U 19 inch standard rack.

The modem and power supply functions are supported using easily replaceable plug-in modules. An additional feature of the IDU is provision for a second plug-in modem / IF module to provide repeater or transit network configurations (East/West) or Capacity Doubling (East/East).

SkyLinks Digital Radio System includes integrated Operations, Administration, Maintenance, and Provisioning (OAM&P) functionality and also Design features enabling simple commissioning for the radio network installation in the customer's premises.

Another highlight of Skylinks Radio Products is the scalability and the capability to support a Ring architecture. This Ring or consecutive point radio architecture is self-healing in the event of an outage in the link and automatically re-routes data traffic, thereby ensuring the continuity of service to the end user.

The overall architecture consists of a single 1U rack mount Indoor Unit (IDU) with a cable connecting to a Full Indoor RFU and then to an external antenna by means a WG feeders.

SYSTEM PARAMETERS

Frequency	4/L6/U6 GHz	7/8 GHz	10 GHz	11 GHz
Standards	ETSI/FCC	ETSI	ETSI/FCC	ETSI/FCC
Operating Frequency (GHz)	3.8 to 4.2, 4.40 to 5.00 5.90 to 7.10	7.10 to 8.50	10.00 to 10.70	10.70 TO 11.70 12.75 TO 13.25
Channel BW 28MHz Channel BW 56MHz	128 QAM STM-1 32 QAM 1STM-1 / 128 QAM 2*STM-1			
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	VHP / UHP +35/+40 +32/+37 +30/+35		VHP / UHP +34/+38 +31/+35 +29/+33	
Rx Sensitivity (dBm) @10-6 BER 28MHz, 56MHz, 155 / 310Mbps	-70 -72 / -66		-69 -71/-65	
Frequency Stability	0.0010%			
Background BER	<10-12			
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198			
	Power Supply ETSI EN 300 132-2			
	EMC / Safety ETSI EN 301 489 / IEC EN 60950			

PAYLOAD INTERFACE PARAMETERS

PDH	Line Rate	1 to 32 x E1/T1
	Interfaces	120 Ω balanced or 75 Ω unbalanced
	Standards Compliance	ITU-T G.703, G783
Fast Ethernet	Line Rate	Full-Duplex, scalable up to 150 Mbps
	Interfaces	2 x 100 Base-Tx
	Standards Compliance	IEEE 802.3
SDH	Line Rate	1 or 2 STM -1/ OC3 155.52 Mbps
	Interfaces	Optical Type Sc Single mode 1310nm, Electrical BNC
	Standards Compliance	Telcordia
Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 300 Mbps
	Interfaces	4 x 1000 Base-Tx
	Standards Compliance	IEEE 802.3



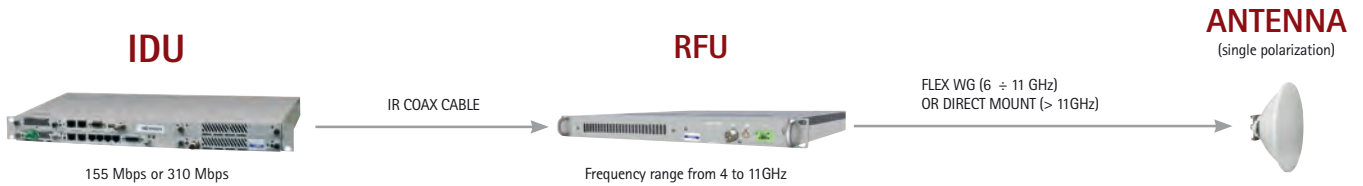
MECHANICAL/ENVIRONMENTAL

Dimensions	IDU: 19" standard rack (1U), 445 x 238.5 x 44.5mm - RFU: 19" Rack 6U 482 mm x266mm x 126mm			
Weight	IDU: 4 Kg; RFU: 9,8 Kg			
Operating Temperature	IDU & RFU: -5° to +45°C			
Altitude	Up to 4500 meters			
Humidity	IDU: 95% condensing; ODU: 100% all-weather			
Power Input	-48V DC (-36V to -60V DC)			
Power Consumption	IDU: <25 watts; RFU: Standard < 55 W, High <145 W			
Cooling	Natural convection			
Coaxial Interfaces	IDU N-type female			
Antenna Interface	4 GHz UDR48/N-Type	6GHz UDR70 (CPR137)	7/8 GHz UDR84	10/11 GHZ UDR100/120
IDU-RFU Cable	N-Type			
Standards Compliance	ETSI ETS 300 019			

NETWORK MANAGEMENT & CONFIGURATIONS

Support	SNMP, Fully featured Mib, Web based GUI, Embedded HTML server, CLI
Local Access	Ethernet 10/100 Base - T / RJ - 45
Control Channel	In band
Support Configurations	1+0 (1U), 1+1 (1U)
Radio Protection	Hot standby, hitless switching with frequency or space diversity

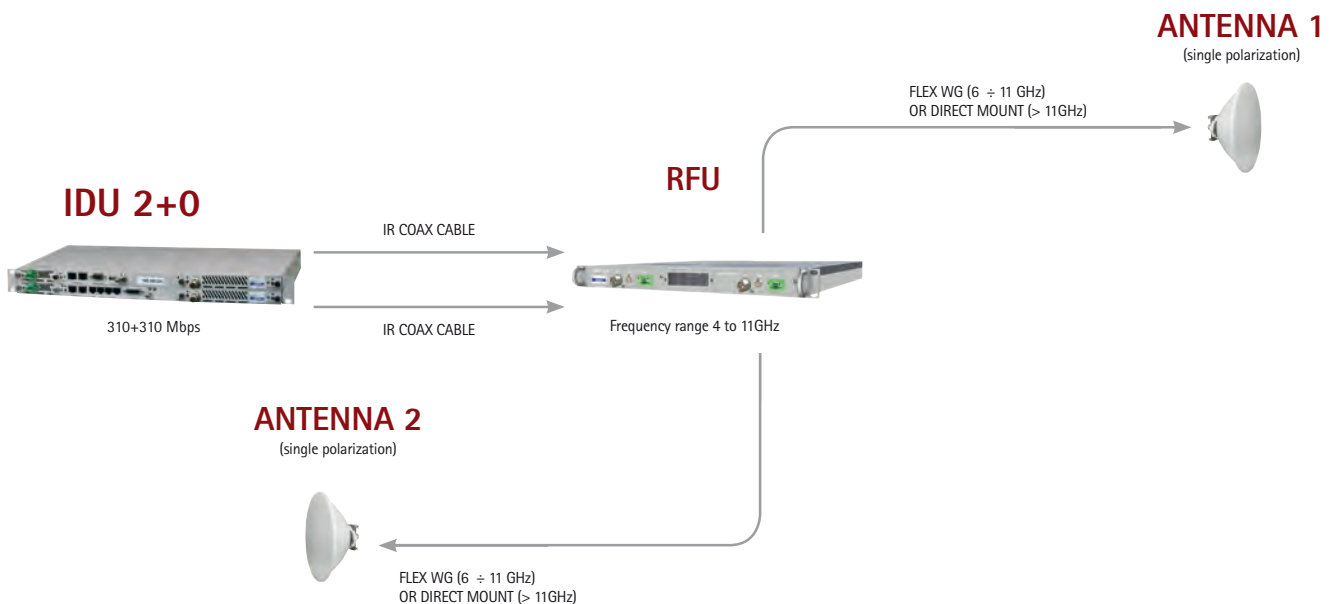
1+0 Basic Configuration



DRS/F1 2+0 EAST/WEST

2+0 East/West Configuration

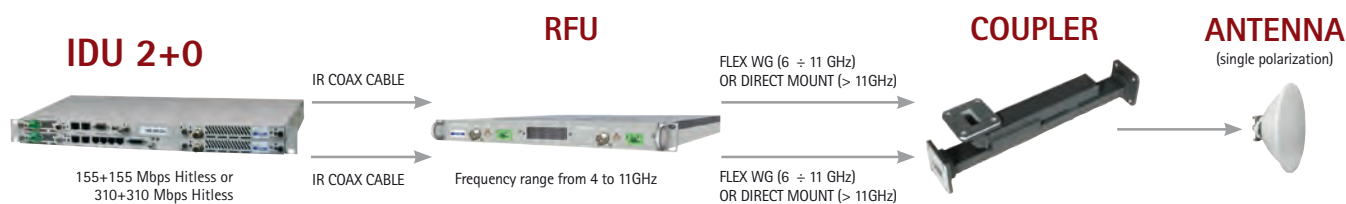
The Software Defined IDU supports a 2+0, or east-west, configuration that allows a consecutive point architecture to be achieved with only a single 1 RU chassis at each location. In this configuration the SDIDU contains two modems and may contain two power supplies. One modem is referred to as the west modem and the other as the east modem. The SDIDU is connected to two ODUs, one broadcasting/receiving in one directing of the ring architecture and the other broadcasting/receiving in the other.



DRS/F1 2+0 EAST/EAST

2+0 East/East Configuration

The SDIDU is capable of aggregating link bandwidth in 2+0 mode to achieve up to 600 Mbps Ethernet throughput when used with the Wideband Modem/IF modules in 56MHz with 128-QAM capable ODUs. The 2+0 East/East configuration allows for the doubling of the throughputs. When configured for 2+0 East/East, the SDIDU balances the traffic between the two links based upon the source and destination MAC addresses of the Ethernet packets. Sufficient diversity of MAC addresses is required to achieve full utilization of the 2+0 East/East configuration. In the event of a link failure, throughput will only be reduced by one-half, and traffic on the failed link will be automatically re-routed to the remaining link.



DRS/F1 1+1 HSB

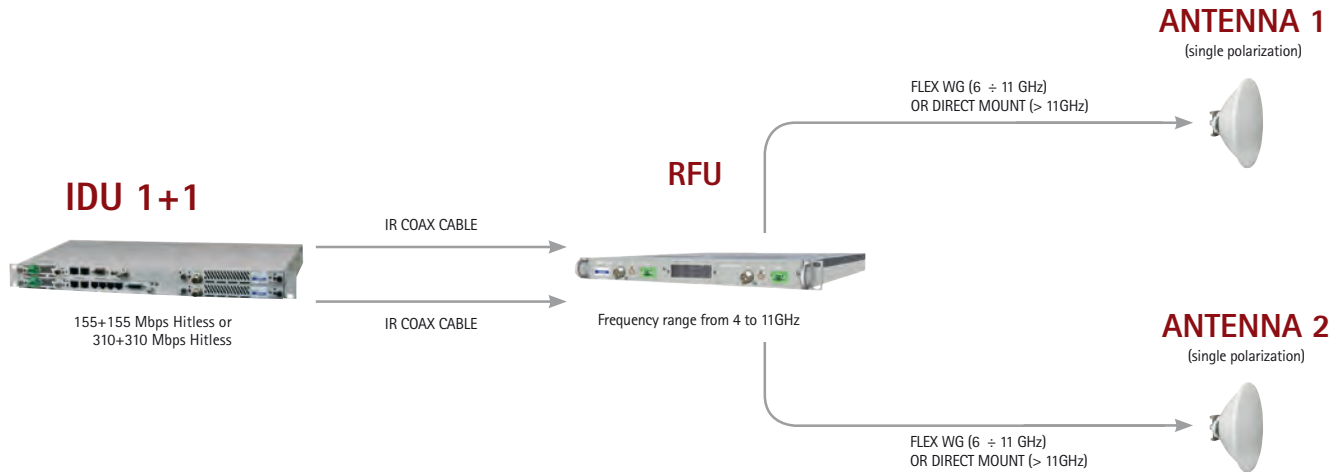
Protected Non-Diversity Configuration (Hot Standby)

Operating in Protected Non-Diversity mode, also called Hot Standby, one ODU at each location transmits to two ODUs at the other location. This mode does not require the extra bandwidth or interference protection. It provides hitless receive switching and hot standby. The SDIDU automatically switches transmit ODU upon appropriate ODU alarm or ODU interface error, minimizing transmit outage time. The SDIDU supports couplers with asymmetric attenuation. The SDIDU can be configured to auto-matically compensate for coupler loss during switching.



Space Diversity Configuration

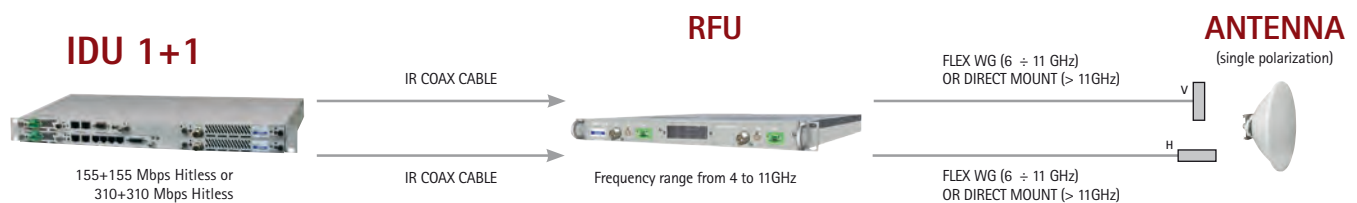
In Protected Diversity mode, the link between each pair of modems is the same, as shown in Figure, providing complete redundancy. This arrangement requires bandwidth for both links and non-interference between the links, but it provides hitless receive and transmit switching. The SDIDU supports both frequency and spatial diversity. In spatial diversity, two non-interfering paths are used. The proprietary framer chooses the best, or error-free, data stream and forwards it to the Line Interface Units (LIUs).



DRS/F1 1+1 FD

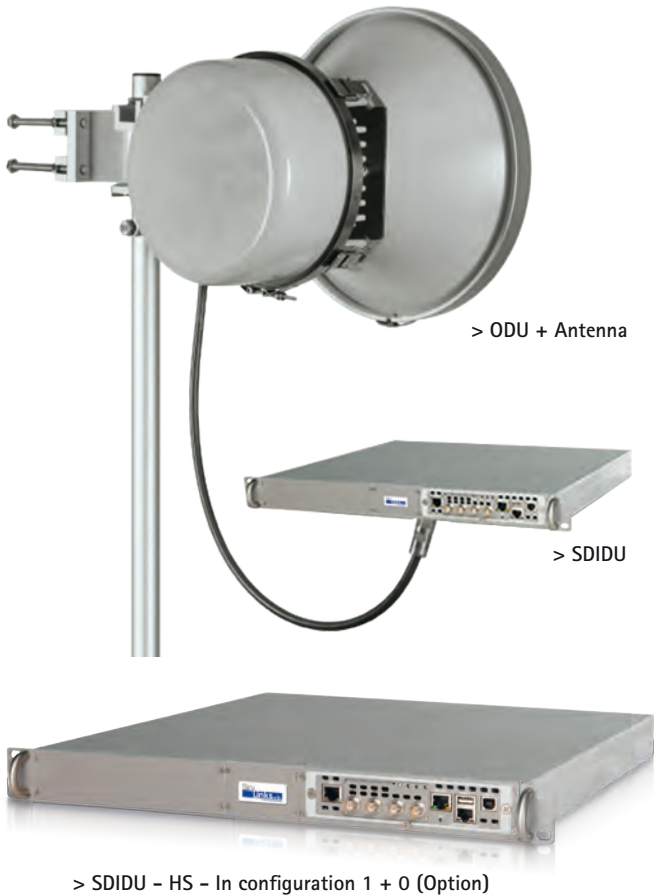
Frequency Diversity Configuration

In Protected Diversity mode, the link between each pair of modems is the same, as shown in Figure, providing complete redundancy. This arrangement requires bandwidth for both links and non-interference between the links, but it provides hitless receive and transmit switching. The SDIDU supports both frequency and spatial diversity. In frequency diversity, two frequencies are used to achieve non-interference. The proprietary framer chooses the best, or error-free, data stream and forwards it to the Line Interface Units (LIUs).





High Speed/Split Mount (IP native)



Main Features

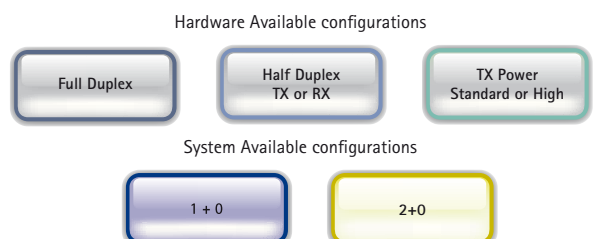
- Up to 310Mbps data throughput, full duplex.
- Available modulation schemes:
 - Programmable QPSK/6QAM/32QAM/64QAM/128QAM/256QAM.
- Available channel bandwidth:
 - ETSI standards : 7/14/28/40 and 56 MHz
 - ANSI standards : 10/20/30/40 and 50 MHz.
- Customer network data interface:
 - 1 x Gigabit Ethernet (100/1000Base-T)
 - 1.1 x 10/100BaseTX for data or management

Options

- 2 or 4 x ASI (BNC input/output)
- 1-2 x E1 / T1 plug-in extension module
- 1 x E3 / DS3 plug-in extension module

System Features

- The smallest IDU in the market! Possibility to place 2 IDUs in 1U 19" std. rack module.
- QPSK, 16 -256 QAM Modulation
- FEC – Forward Error Correction with Reed-Solomon Coding
- Built-in Adaptive Modulation system with dynamic capacity allocation and priority data transmission (PBPS – Packet Based Priority System)
- Asymmetrical data rates – different modulation setup for upstream and downstream
- On-line Ethernet packet compression with reduced length of frames allowing throughput efficiency increase up to 25%
- Two USB ports for connecting USB-flash disk or PC
- "In-Band"/"Out-of-Band" Management
- NAT, Proxy ARP support for effective IP management setup
- Large range of System and Ethernet Counters
- Adaptive Power Control ATCP
- Built-in Network Management System (NMS) – Web, SNMP, TELNET
- Built-in Bit Error Rate (BER) Tester + Built-in Spectrum analyzer



The SKYLINKS High Speed/Split Mount Radio System HS/SM provides a cost-effective solution to high capacity data transmission requirements. Operating in the licensed bands from 1.4 to 43GHz, it is composed by new very compact IDU and ODU with enhanced features that include line interface, alarms and diagnostics and network management interfaces.

Easy-to-install, HS/SM provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency.

Additionally, HS/SM features enhanced software allowing capacity / configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by mobile service providers, internet service providers (ISP), utilities, public telephone operators, local governments, TV networks and corporate users.

These SKYLINKS Digital Radios represent a new microwave architecture designed to address universal applications for GE platforms. The advanced technology is designed to provide flexibility to customers for their current and future Ethernet network needs.

It supports links for high speed wireless Ethernet networking.

It is spectrum and data rate scalable from 5 to 310 Mbps, giving opportunity to service providers and companies to trade-off system gain with spectral efficiency and channel availability for optimal network connectivity.

SKYLINKS HS/SM enables network operators (mobile and private), access service providers and government to provide a portfolio of secure, scalable wireless applications for data, video, and voice over IP (VoIP).

This family includes the following blocks: Indoor Unit (IDU), Outdoor Unit (ODU) and Antenna.

Mainly used Antennas are the Arkivator (previously Comhat) low profile to connect through a flex WG up to 11 GHz or directly connect with the patented WG interface from 13 to 38 GHz; other manufactures' aerials like, e.g., the Andrew Valuline™ might be used on custom requirement.

The Software Defined Indoor Unit is designed to be frequency independent, and the Outdoor Unit is designed to be capacity independent. The companion ODU can supports frequency bands from 1.4 to 43 GHz with high linearity allowing high order modulation scheme, high Output Power and low consumption.

The ODU is fully calibrated over the temperature range and operates down to -50°C (optional).

The ODU covers from QPSK up to 256QAM with very low Phase Noise and superior reliability (high MTBF).

The SDIDU supports 1+0 configuration and it is provided in a chassis arrangement 1U half-19" standard rack.

Additional features of the SDIDU is provision for a plug-in module to provide either 2xE1 or 1xE3 wayside channel interfaces.

The overall architecture consists of a single 1U "half size" rack mount Software Defined Indoor Unit (SDIDU) with a cable connecting to an Outdoor Unit (ODU) with an external antenna.

SYSTEM PARAMETERS

Frequency	4/6 GHz	7/8 GHz	10 GHz	11/13 GHz	15 GHz	18 GHz	23GHz	31/38 GHz
Standard	ETSI/FCC	ETSI	ETSI/FCC	ETSI	ETSI	ETSI/FCC	ETSI/FCC	ETSI/FCC
Operating Frequency (GHz)	3.7 to 4.42, 4.40 to 5.00 - 5.90 to 7.10	7.10 to 8.50	10.00 to 10.70	10,70 to 11,70 12.75 to 13.25	14.40 to 15.35	17.70 to 19.70	21.20 to 23.60 24.55 to 26.45	31.80 to 33.40 - 37.00 to 39.50
Channel BW 28 MHz Channel BW 56 MHz	128QAM STM-1 32QAM STM-1/128QAM 2*STM-1							
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	SDT / HI +27/+32 +24/+29 +22/+27		SDT / HI +26/+31 +23/+28 +21/+26		SDT +25 +22 +20	SDT +24 +21 +19	SDT +23 +20 +18	SDT +18 +15 +13
Rx Sensitivity (dBm) @10 ⁻⁶ BER 28 MHz, Mbps 56 MHz, 155/310Mbps	-70 dBm -72/-66 dBm		-69 dBm -71/-65 dBm		-69 dBm -71/-65 dBm	-67 dBm -69/-64 dBm		-66 dBm -68/-63 dBm
Frequency Stability	-----				0.0010%			
Background BER	-----				< 10 ⁻¹²			
Standard Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198							
	Power Supply ETSI EN 300 132-2							
	EMC / Safety ETSI EN 301 489 / IEC EN 60950							

PAYLOAD INTERFACE PARAMENTERS

E1/E3	Line Rate	1 or 2 x 2048/1 x 34.368 Mbps
	Interfaces	Optical Type SC single mode 1310nm, Electrical BNC
	Standards Compliances	Telcordia
Gigabit Ethernet	Line Rate	Full Duplex, scalable up to 310 Mbps
	Interfaces	G703 RJ45/BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X ASI TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX

CONFIGURATION

Supported Configurations	1+0 (1U), 1+1 (1U)
Radio Protection	Hot standby, hitless switching with frequency or space diversity



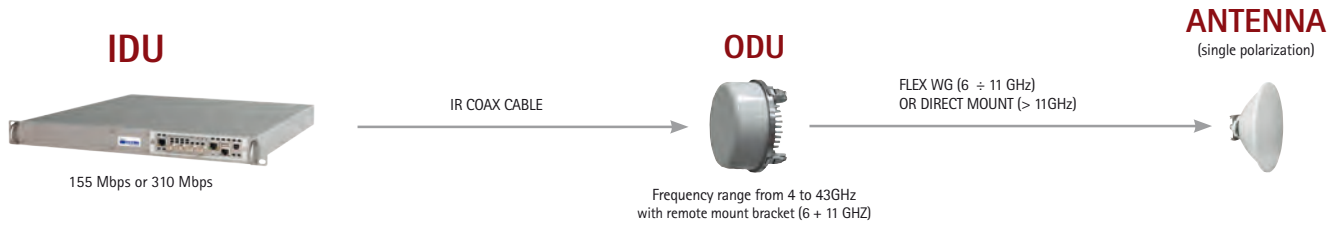
MECHANICAL/ENVIROMENTAL

Dimensions	IDU: Half 19" standard rack (1U), 210 x 44 x 210 mm. ODU: 260mm x 160mm
Weight	IDU: 2 Kg; ODU: 6.0 Kg
Operating Temperature	IDU: -5° to +45°C; ODU: -33° to +55°C (arctic Option -55°C)
Altitude	Up to 4500 meters
Humidity	IDU: 95% condensing; ODU: 100% all-weather
Power Inpu	-48V DC (-36V to -60V DC)
Power Consumption	IDU + ODU: Standard <25W, High <35W
Cooling	Natural convection
Coaxial Interfaces	IDU N-Type connector female, ODU N-Type connector female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna Interface	Standard Rectangular WG or Coaxial N-type connector (6-11 GHz); proprietary direct mount (13GHz and above)
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2 (IDU) - Part 1-4 Class 4.1 (ODU)

NETWORK MANAGEMENT

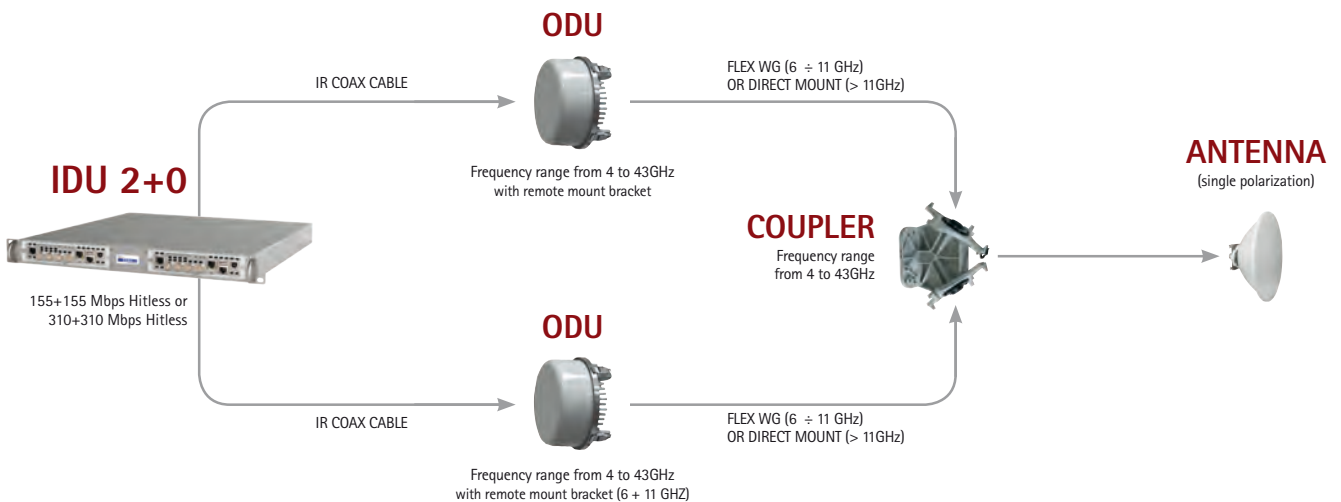
Support	SNMP, WEB based GUI, TELNET, ASCII console
Local Access	Ethernet 10/100 Base-T / RJ-45, RS232, USB-A, USB-B
Out-of-Band Management	115 Mbps
In-band Management	Via LAN
IP Addresses	Primary, secondary
IP Option	NAT, Proxy ARP
IP Utilities	Ping, telnet

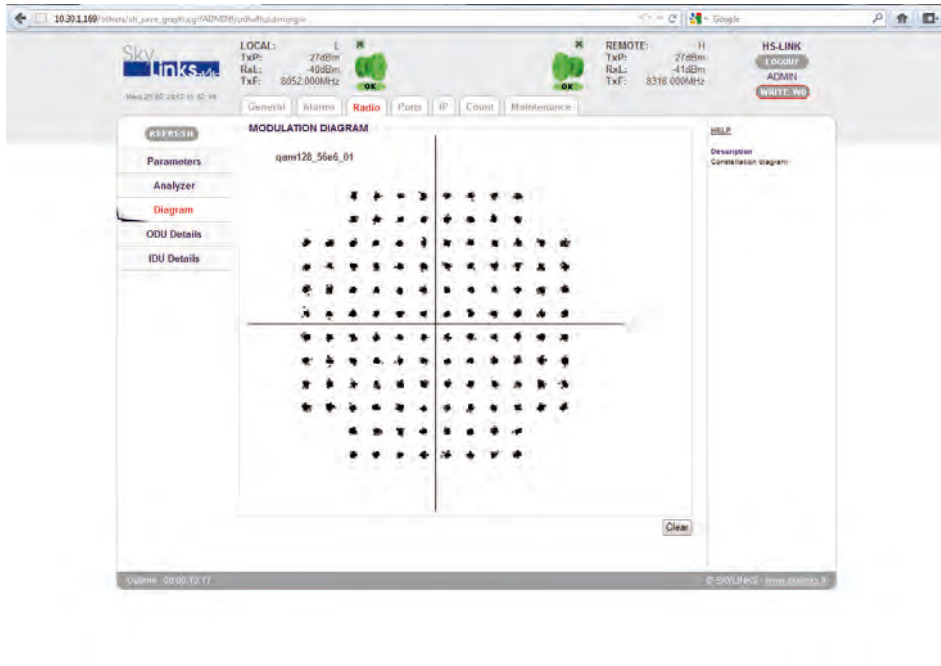
1+0 Basic Configuration



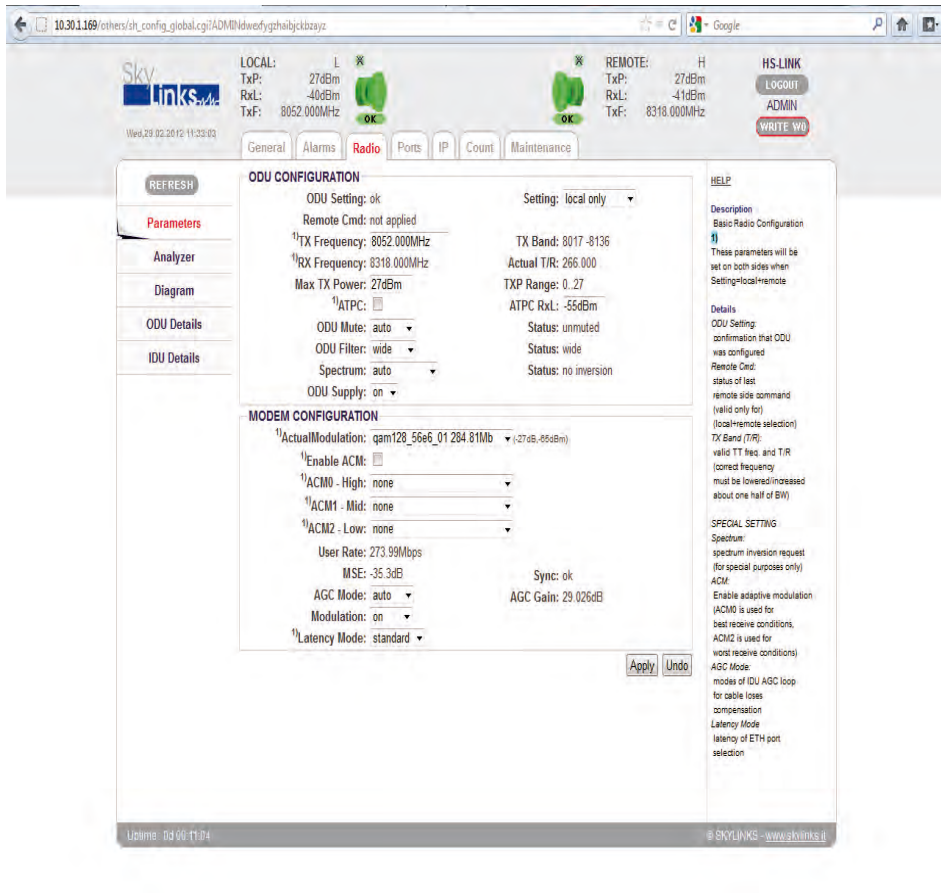
HS/SM 2+0

2+0 Capacity Doubler Configuration





GUI EXAMPLE



GUI EXAMPLE

High Speed/Full Indoor (IP native)



> HS-LINK/FI



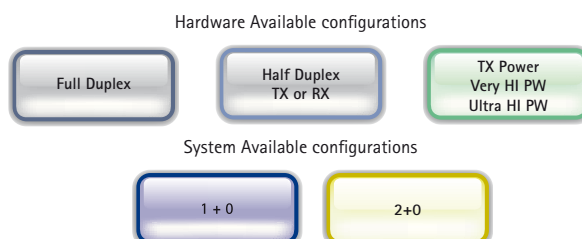
> ANTENNA

Main Features

- Up to 310Mbps data throughput, full duplex.
- Available modulation schemes:
 - Programmable QPSK/6QAM/32QAM/64QAM/128QAM/256QAM.
- Available channel bandwidth:
 - ETSI standards : 7/14/28/40 and 56 MHz
 - ANSI standards : 10/20/30/40 and 50 MHz.
- Customer network data interface:
 - 1 x Gigabit Ethernet (100/1000Base-T)
 - 1.1 x 10/100BaseTX for data or management

Options

- 2 or 4 x ASI (BNC input/output) OPTION
- 1-2 x E1 / T1 plug-in extension module OPTION
- 1 x E3 / DS3 plug-in extension module OPTION



The SKYLINKS High Speed/Full Indoor All-in-One MW Radio System provides a cost-effective solution to high capacity data transmission requirements. Operating in the licensed bands from 4 to 11GHz (lower frequencies down to 1,4GHz and higher up to 14GHz available upon request), it is fitted into a 2RU chassis where both modem and RF units are included. The result is a brand new equipment specifically designed for application where room saving is a constraint.

It has enhanced features that include line interface, alarms and diagnostics and network management interfaces.

The ASI interface is a PLUS that enhance this complete radio terminal into the broadcasting market as a top level, brilliant star.

Easy-to-install, All-in-One provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency.

Additionally, All-in-One features enhanced software allowing capacity/configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by mobile service providers, internet service providers (ISP), utilities, public telephone operators, local governments, TV networks and corporate users.

These SKYLINKS Digital Radios represent a new microwave architecture designed to address universal applications for GE platforms and thanks to the ASI interface to meet the most evolved broadcasters. The advanced technology is designed to provide flexibility to customers for their current and future networking needs.

It supports links for high speed wireless Ethernet networking, through the optional sw upgrade that delivers up to 310Mbps in a 56MHz ch BW (for this option a specific license has to be acquired).

It is spectrum and data rate scalable from 4 to 310Mbps, giving opportunity to service providers and companies to trade-off system gain with spectral efficiency and channel availability for optimal network connectivity.

SKYLINKS All-in-One enables broadcasters and network operators (mobile and private), private, defense and utilities, to provide a portfolio of secure, scalable wireless applications for data, video, and voice over IP (VoIP).

System Features

- Complete Digital Microwave System placed into a 2RU 19" std.
- QPSK, 16-256 QAM Modulation
- FEC – Forward Error Correction with Reed-Solomon Coding
- Built-in Adaptive Modulation system with dynamic capacity allocation and priority data transmission (PBPS – Packet Based Priority System)
- Asymmetrical data rates – different modulation setup for upstream and downstream
- On-line Ethernet packet compression with reduced length of frames allowing throughput efficiency increase up to 25%
- Two USB ports for connecting USB-flash disk or PC
- "In-Band"/"Out-of-Band" Management
- NAT, Proxy ARP support for effective IP management setup
- Large range of System and Ethernet Counters
- Adaptive Power Control ATCP
- Built-in Network Management System (NMS) – Web, SNMP, TELNET
- Built-in Bit Error Rate (BER) Tester + Built-in Spectrum analyzer

SYSTEM PARAMETERS

Frequency	4 GHz	6/7/8 GHz	10/11 GHz
Standards	ETSI/FCC	ETSI	ETSI/FCC
Operating Frequency (GHz)	3.8 to 4.2, 4.40 to 5.00 5.90 to 7.10	7.10 to 8.50	10.70 to 11.70
Channel BW 28 MHz Channel BW 56 MHz	128 QAM 157 Mbps 32 QAM 157 Mbps / 128 QAM 310 Mbps		
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	VHP / UHP +35/+40 +32/+37 +30/+35		VHP / UHP +34/+39 +31/+35 +29/+33
Rx Sensitivity (dBm) @ 10 ⁻⁶ BER 28 MHz, 157 Mbps 56 MHz, 157 / 310 Mbps	-70 -72 / -66		-69 -71 / -65
Frequency Stability	0.0010%		
Background BER	< 10 ⁻¹²		
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198		
	Power Supply ETSI EN 300 132-2		
	EMC / Safety ETSI EN 301 489 / IEC EN 60950		

PAYLOAD INTERFACE PARAMETERS

Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 310 Mbps
	Interfaces	1 x 10/100/1000 Base-T (RJ45) 1 x 10/100 base-T (RJ45)
	Maximum packet length	1632 Bytes
E1 / E3	Line Rate	1-2 x 2.048 / 1 x 34.368 Mbps
	Interfaces	G703 RJ45 / BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X AS TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX

MECHANICAL/ENVIRONMENTAL

Dimensions	standard rack (2U), 210 x 88 x 201mm			
Weight	Kg: 9,8 Kg			
Operating Temperature	-5° to +45°C			
Altitude	Up to 4500 meters			
Humidity	IDU: 95% non condensing			
Power Input	-48V DC (-36V to -60V DC)			
Power Consumption	< 140 Watts			
Cooling	Air Force Cooled			
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2			
Antenna Interface	4 GHz	6GHz	7/8 GHz	11 GHz
	UDR48/N-Type	UDR70 (CPR137)	UDR84	UDR100/120



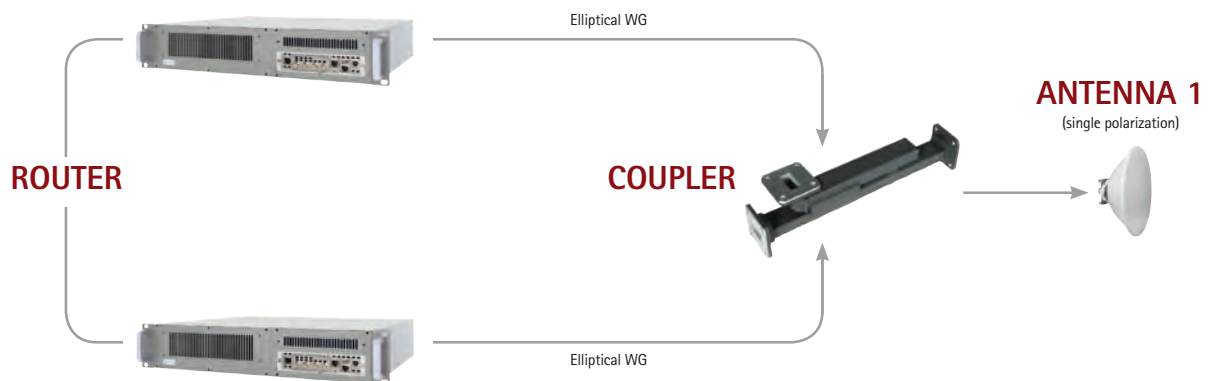
HS/F1 All-in-One 1+0

1+0 Basic Configuration



HS/F1 All-in-One 2+0

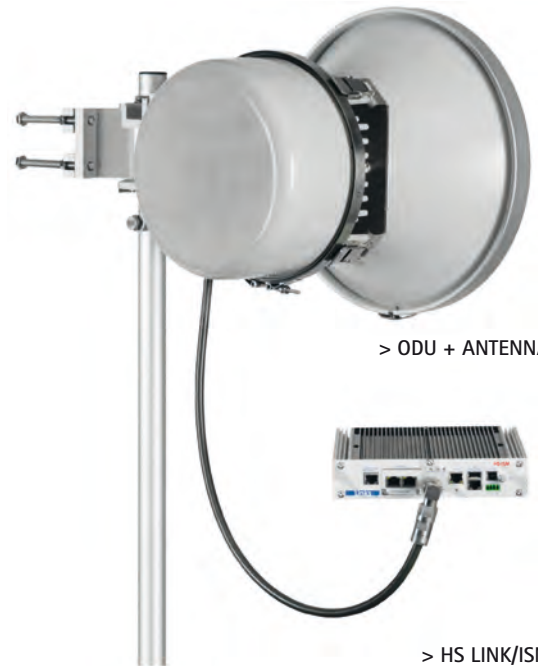
2+0 Capacity Doubler Configuration



High Speed-Link/ISM Bands 17 and 24GHz License-Exempt



> HS LINK/ISM



> ODU + ANTENNA

> HS LINK/ISM

Main Features

- Up to 310Mbps data throughput, full duplex.
- Available modulation schemes:
 - Programmable QPSK/16QAM/32QAM/64QAM/128QAM/256QAM.
- Available channel bandwidth:
 - ETSI standards : 7/14/28/40 and 56 MHz
 - ANSI standards : 10/20/30/40 and 50 MHz.
- Customer network data interface:
 - 1 x Gigabit Ethernet (100/1000Base-T)
 - 1 x 10/100BaseTX for data or management

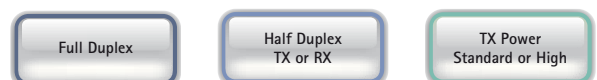
Options

- 2 or 4 x ASI (BNC input/output)
- 1-2 x E1 / T1 plug-in extension module
- 1 x E3 / DS3 plug-in extension module

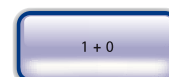
Product Features

- Simple configuration reduces deployment time and lowers installation costs
- Compact and Lightweight
- Superior reliability - High MTBF
- Fully Calibrated Outdoor Unit with >30 dB Tx Dynamic Range
- 1U "half size" Indoor Unit

Hardware Available configurations



System Available configurations



Default

Option

155 Mbps @ 128 QAM
28 MHz Ch BW

310Mbps @ 256QAM
56Mhz Ch BW



The SKYLINKS Digital Radio System HS/ISM™ provides a cost-effective solution to high capacity data transmission requirements. Operating in **the unlicensed bands 17 and 24GHz**, it is composed by new very compact IDU and ODU with enhanced features that include line interface, alarms and diagnostics and network management interfaces.

Easy-to-install, HS/ISM provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency.

Additionally, HS/ISM features enhanced software allowing capacity / configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by internet service providers (ISP).

The ODU antenna front-end is equipped with a orthogonal circular WG transformer for operating in cross-polarization mode. This solution allows for wider available Bandwidth and low order branching filters for better Receive Sensitivity and higher Output Power

It supports links for high speed wireless Ethernet networking.

It is spectrum and data rate scalable from 5 to 310 Mbps, giving opportunity to service providers and companies to trade-off system gain with spectral efficiency and channel availability for optimal network connectivity.

SKYLINKS HS/ISM enables access service providers to provide a portfolio of secure, scalable wireless applications for data, video, and voice over IP (VoIP). This family includes the following blocks: Indoor Unit (IDU), Outdoor Unit (ODU) and Antenna. Antennas are directly connected through a patented WG interface.

The Software Defined Indoor Unit is designed to be frequency independent, the Outdoor Units are designed to offer the best alternative solution to the "bridging" equipments actually working in the saturated 5GHz Wi-Fi bands.

The ODU covers from QPSK up to 256QAM with very low Phase Noise and superior reliability (high MTBF).

The SDIDU supports 1+0 configuration and it is provided in a chassis arrangement 1U half-19" standard rack.

Additional features of the SDIDU is provision for a plug-in module to provide either 2xE1 or 1xE3 wayside channel interfaces.

The overall architecture consists of a single 1U "half size" rack mount Software Defined Indoor Unit (SDIDU) with a cable connecting to an Outdoor Unit (ODU) with an external antenna.

System Features

- The smallest IDU in the market! Possibility to place 2 IDUs in 1U 19" std. rack module.
- QPSK, 16 - 256 QAM Modulation
- FEC – Forward Error Correction with Reed-Solomon Coding
- Built-in Adaptive Modulation system with dynamic capacity allocation and priority data transmission (PBPS – Packet Based Priority System)
- Asymmetrical data rates – different modulation setup for upstream and downstream
- On-line Ethernet packet compression with reduced length of frames allowing throughput efficiency increase up to 25%
- Two USB ports for connecting USB-flash disk or PC
- "In-Band"/"Out-of-Band" Management
- NAT, Proxy ARP support for effective IP management setup
- Large range of System and Ethernet Counters
- Adaptive Power Control ATCP
- Built-in Network Management System (NMS) – Web, SNMP, TELNET
- Built-in Bit Error Rate (BER) Tester + Built-in Spectrum analyzer

- **5.4–5.8GHz sub-bands available upon request**

- 30, 60 and 90 cm diameter parabolic antenna, according to the distance between the 2 link terminals and to the required payload/link availability %

SYSTEM PARAMETERS

Frequency	17 GHz	24 GHz
Standards	ETSI/FCC	ETSI/FCC
Operating Frequency (GHz)	17.10 to 17.30	24.00 to 25.24
Channel BW 28 MHz Channel BW 56 MHz	128 QAM 157 Mbps 32 QAM 157 Mbps / 128 QAM 310 Mbps	
Tx Power dBm (adjustable from/to) QPSK 16, 32, 64QAM 128, 256QAM	-24/+13 -24/+10 -24/+8	-24/+10 -24/+7 -24/+5
Rx Sensitivity dBm @ 10-6 BER/128QAM 20 MHz, 100Mbps 28 MHz, 157Mbps 40 MHz, 200Mbps 56 MHz, 300Mbps	-73 -70 -71 -66	-73 -70 -71 -66
Frequency Stability	0.0010%	
Background BER	< 10-12	
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198	
	Power Supply ETSI EN 300 132-2	
	EMC / Safety ETSI EN 301 489 / IEC EN 60950	

PAYLOAD INTERFACE PARAMENTERS

Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 310 Mbps
	Interfaces	1 x 10/100/1000 Base-T (RJ45) 1 x 10/100 base-T (Rj45)
	Maximum packet lenght	1632 Bytes
E1 / E3	Line Rate	1-2 x 2.048 / 1 x 34.368 Mbps
	Interfaces	G703 RJ45 / BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X ASI TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX



MECHANICAL/ENVIROMENTAL

Dimensions	IDU: "HALF" 19" standard rack (1U), 210 x 44 x 201mm ODU: D 260mm x H 160mm
Weight	IDU: 2 Kg; ODU: 6.0 Kg
Operating Temperature	IDU: -5° to +45°C; ODU: -33° to +55°C (Arctic option -50°C)
Altitude	Up to 4500 meters
Humidity	IDU: 95% condensing; ODU: 100% all-weather
Power Input	-48V DC (-36V to -60V DC)
Power Consumption	IDU + ODU < 40 Watts
Cooling	Natural convection
Coaxial Interfaces	IDU N-type female, ODU N-type female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna Interface	Proprietary direct mount (Circular Waveguide)
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2 (IDU) - Part 1-4 Class 4.1 (ODU)

NETWORK MANAGEMENT

Support	SNMP, WEB based GUI, TELNET, ASCII console
Local Access	Ethernet 10/100 Base-T / RJ-45, RS232, USB-A, USB-B
Out-of-Band Management	115 Mbps
In-band Management	Via LAN
IP Addresses	Primary, secondary
IP Option	NAT, Proxy ARP
IP Utilities	Ping, telnet

Single Elements



Single Elements for High Capacity Microwave Systems

Full and Half Duplex, 155/310/620Mbps, Split Mount or Full Indoor



Software Defined Indoor Unit (Hybrid Modem) up to 620Mbps - XPIC



> SDIDU - DRS - In configuration 1 + 0



> SDIDU - DRS - In configuration 1 + 1

Main Features

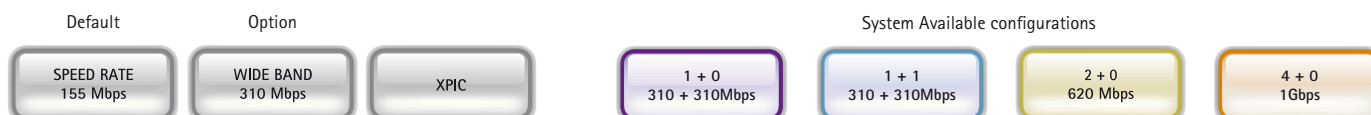
- Support for multiple configurations for both PDH and SDH:
 - 1+0, 1+1 protection/diversity
 - Hot Standby
 - East/West Repeater (2 + 0)
- Selectable Spectral Efficiency of 0.8 to 6.25 bits/Hz (including FEC and spectral shaping effects).
- QPSK, 16 -256 QAM Modulation Link Provisioning.
- Powerful Trellis Coded Modulation concatenated with Reed-Solomon.
- Error Correction.
- Built-in Adaptive Equalizer.
- Support of Data Orderwire Channels:
 - Up to 19.2 kbps asynchronous RS-232
 - 64 kbps synchronous RS422
- Adaptive Power Control.
- Built-in Network Management System (NMS).
- Consecutive Point ring architecture.
- Built-in Bit Error Rate (BER) performance monitoring.

The DRS Software Defined IDU provides high capacity transmission, flexibility, features, and convenience for wireless digital communications networks. The DRS SDIDU represents a new microwave architecture that is designed to address universal applications for both PDH and SDH platforms. This advanced technology platform is designed to provide the flexibility to customers for their current and future network needs.

The DRS SDIDU family is based upon a common platform to support a wide range of network interfaces and configurations. It supports links for 16/32/42/63 x E1/T1, 1/2 x 100BaseTX Ethernet, DS-3/E-3/STS-1, 1000BaseTX Ethernet, and 1/2 x STM-1/OC-3. The SDIDU™ is spectrum and data rate scalable, enabling service providers or organizations to trade-off system gain with spectral efficiency and channel availability for optimal network connectivity. DRS SDIDU enables network operators (mobile and private), government and access service providers to offer a portfolio of secure, scalable wireless applications for data, video, and Voice over IP (VoIP).

The Software Defined IDU™ includes integrated Operations, Administration, Maintenance, and Provisioning (OAM&P) functionality and design features enabling simple commissioning when the radio network is initially set up in the field at the customer's premises. Furthermore, a highlight of DRS SDIDU is scalability and the capability to support a ring-type architecture. This ring or consecutive point radio architecture is self-healing in the event of an outage in the link and automatically re-routes data traffic, thereby ensuring that service to the end user is not interrupted.

The Software Defined IDU™ supports 1+0 and 1+1 protection and ring architectures in a single 1 RU chassis. The modem and power supply functions are supported using easily replaceable plug-in modules. An additional feature of the SDIDU™ is provision for a second plug-in modem/IF module to provide repeater or east/west network configurations.



The major functions of the SDIDU™ can be summarized as follows:

- I/O Processing - The SDIDU comes with a standard I/O capability that includes support for up to 16xT1/E1 and 2x100Base-TX user payloads, 2x100Base-TX for SNMP, and voice orderwire. In addition, option cards for DS-3/E3/STS-1, 1-2 x STM-1/OC-3, and 4xDS-3/E3/STS-1 may be added. The SDIDU architecture is flexible and allows for the addition of other I/O types in the future.
- Switch/Framing - The SDIDU™ includes an Ethernet Switch and a proprietary Framers that are designed to support 1+1 protection switching, ring architecture routing, and overall network control functions.
- Network Processor - The SDIDU includes a Network Processor which performs SNMP and Network Management functions.
- Modem/IF - The SDIDU™ Modem performs forward-error-correction (FEC) encoding, PSK/QAM modulation and demodulation, equalization, and FEC decoding functions. The IF chain provides a 350 MHz carrier and receives a 140 MHz carrier. The multiplexer function is built into an appliqué that resides in the Modem/IF Module. Two modems can be used for 1+1 protection or ring architectures.
- Power Supply - The SDIDU power supply accepts -48 Vdc and supplies the SDIDU™ and ODU with power. A second redundant power supply may be added as an optional module.
- Signal Timing - STM-1 and E1/T1 signals that are received by an SDIDU over the link for transmitting out the front-panel interfaces have their Tx timing recovered from the respective STM-1 or E1/T1 signal. In this manner the STM-1 and E1/T1 signals are through-timed from the transmitting SDIDU™.

STM-1

- The SDIDU™ meets G.703, G.957 (S-1.1), G.825 for the STM-1/OC-3 signals passed across the RF link. Performance monitoring is not provided as the SDIDU™ does not act as a regenerator. The SDIDU™ does not support add/drop MUX (ADM) capability. The SDIDU™ does support terminal MUX capability.

Gigabit Ethernet

- Scalable Ethernet data rates up to 300 Mbps can be achieved with a Gigabit Ethernet scalable SDIDU™ (see Table 2-4). Data rates up to 155 Mbps are available with the Standard Modem/IF module (CCM-4900) and data rates up to 300 Mbps are available with the Wideband Modem I/F module (CCM-4960).
- The SDIDU™ may be configured to aggregate Ethernet bandwidth across two or four links when operating as 2+0 or 4+0, allowing for a total throughput of up to 600 Mbps or 1000 Mbps, respectively (Section 2.14.1).

SDIDU GigE Ethernet throughput Examples by modulation and bandwidth

Bandwidth/Modulation	30MHz	40MHz	50MHz	56MHz
QPSK	30 Mbps	45 Mbps	55 Mbps	60 Mbps
16-QAM	80 Mbps	100 Mbps	130 Mbps	160 Mbps
32-QAM	100 Mbps	130 Mbps	160 Mbps	200 Mbps
64-QAM	125 Mbps	160 Mbps	200 Mbps	250 Mbps
128-QAM	150 Mbps	200 Mbps	250 Mbps	300 Mbps

Options

- Embedded SNMP Agent with 2 port 10/100 Base-T Hub.
- Network Management System.
- Integrated Crosspoint switch up to 160E1.
- Integrated STM-1 MUX-DEMUX.
- Scalable Ethernet.
- Proprietary quick-release circular waveguide interface.
- PDH Options
 - Up to 16 x E1/T1
 - 100BaseTX/Ethernet: Scalable 1-100 Mbps
 - DS-3/E-3/STS-1 (option; consult factory for availability)
- Super PDH Options
 - Up to 32/42/63 x E1/T1
- Ethernet Options
 - 100 BaseTX/Ethernet: Scalable 1-155 Mbps
 - 1000BaseTX/Ethernet Scalable 1-300 Mbps
- SDH Options
 - 1-2 x SDH STM-1/OC-3 SONET
- Support for multiple configurations for both PDH and SDH
 - 1+0, 1+1 protection/diversity
 - Hot Standby
 - East/West Repeater (2 + 0)
- Optional STM-1 Mux/Demux: allows the SDIDU™ to extract up to 63 E1 (or 84 T1) from an STM-1. In conjunction with an integrated Crosspoint Switch, up to 223 E1 (284 T1s) can be mapped any-to-any between front-panel ports, STM-1, and RF link(s).



PAYLOAD INTERFACE PARAMETERS

SDH	Line Rate	1 or 2 STM-1/OC3 155.52 Mbps
	Interfaces	Optical Type SC single mode 1310nm, Electrical BNC
	Standards Compliances	Telcordia
Ethernet	Line Rate	Full Duplex, scalable up to 100 Mbps
	Interfaces	100 Base-Tx or 1000 Base Tx for Gigabit Ethernet
	Standards Compliances	IEEE 802.3

CONFIGURATION

Supported Configurations	1+0, 1+1 (1U), 2+0 (1U)
Radio Protection	Hot standby, hitless switching with frequency or space diversity

MECHANICAL/ENVIRONMENTAL

Dimensions	IDU: 19" standard rack (1U), 445 x 238.5 x 44.5mm ODU: 240mm x 240mm x 70mm
Weight	IDU: 4 Kg; ODU: 6.0 Kg
Operating Temperature	IDU: -5° to +45°C; ODU: -33° to +55°C
Altitude	Up to 4500 meters
Humidity	IDU: 95% condensing; ODU: 100% all-weather
Power Input	-48V DC (-36V to -60V DC)
Power Consumption	IDU: < 25 watts; ODU: <25 watts
Cooling	Air forced Cooled
Coaxial Interfaces	IDU TNC female, ODU N-type female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna Interface	Antenna Interface Coaxial N-type connector (6-11 GHz); proprietary direct mount (13GHz and above)
Standards Compliance	ETSI ETS 300 019

NETWORK MANAGEMENT

Support	SNMP, Fully featured MIB, WEB based GUI, Embedded HTML server, CLI
Local Access	Ethernet 10/100 Base-T / RJ-45
Control Channel	In band





Software Defined Indoor Unit (IP Modem) up to 620Mbps



> SDIDU - HS - In configuration 1 + 0 (Option)



> SDIDU - HS - In configuration 2 + 0 (Option)

Main Features

Up to 310Mbps data throughput, full duplex.

Available modulation schemes:

Programable QPSK/6QAM/32QAM/64QAM/128QAM/256QAM.

- Available channel bandwidth:
 - > ETSI standards : 7/14/28/40 and 56 MHz
 - > ANSI standards : 10/20/30/40 and 50 MHz.
- Customer network data interface:
 - > 1 x Gigabit Ethernet (100/1000Base-T)
 - > 1 x 10/100BaseTX for data or management
 - > 1-2 x E1 / T1 plug-in extension module
 - > 1 x E3 / DS3 plug-in extension moexternal mux
 - > 4 x ASI In/Out (half duplex) or 2 x TX + 2 x RX (full duplex)
- Configuration:
 - Mix of TDM + Ethernet / Ethernet only / TDM only
 - Capacity is dynamically allocated between E1/T1/E3/DS3 channels and Ethernet
- IF/ODU interface
 - N-type connector standard configuration 350 / 140 MHz IF ODUs.

HS-IDU is a software defined Indoor Unit optimized for high speed Ethernet networking with optional combination of side channels for E1/T1 or E3/T3 line interfaces, thanks to plug-in cards to add to the basic unit.

Thanks to the scalable concept, this system offers the flexibility to increase the transmission capacity depending on application needs. The system provides full range of modulation schemes from QPSK to 256QAM, arbitrary bandwidth selection in respect to both ETSI and ANSI standards and data throughput rates up to 310 Mbps.

In the typical Split -Mount configuration ODUs can be connected to the IDU over standard intermediate Tx and Rx IF frequencies (+DC pw supply + telemetry) through a coax connections. Link management is supported via a web GUI and SNMP with custom MIB.

Applications

- Digital microwave systems optimized for Ethernet traffic transmission /mix Ethernet + TDM
- Non-standard applications based on customer specific requirements also available

Other Features

- Management
 - > IP based (HTTP via web GUI, SNMP with MIB, Telnet)
 - > 1 x USB A for mass storage device (FW upgrade, backup,..)
 - > 1 x USB B serial port
 - > 1 x RS-232 serial port

Default

Option

SPEED RATE
155 Mbps

WIDE BAND
310 Mbps

System Available configurations

1 + 0
155 or 310Mbps

2 + 0
620 Mbps



PAYLOAD INTERFACE PARAMETERS

Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 310 Mbps
	Interfaces	1 x 10/100/1000 Base-T (RJ45) 1 x 10/100 base-T (Rj45)
	Maximum packet length	1632 Bytes
E1 / E3	Line Rate	1-2 x 2.048 / 1 x 34.368 Mbps
	Interfaces	G703 RJ45 / BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X AS TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX

MECHANICAL/ENVIRONMENTAL

Dimensions	IDU: "HALF"19" standard rack (1U), 210 x 44 x201mm ODU: D 260mm x H 160mm
Weight	IDU: 2 Kg; ODU: 6.0 Kg
Operating Temperature	IDU: -5° to +45°C; ODU: -33° to +55°C (Arctic option -50°C)
Altitude	Up to 4500 meters
Humidity	IDU: 95% condensing; ODU: 100% all-weather
Power Input	-48V DC (-36V to -60V DC)
Power Consumption	IDU + ODU < 45 Watts
Cooling	Natural convection
Coaxial Interfaces	IDU N-type female, ODU N-type female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna Interface	Coaxial N-type connector (6-11 GHz); proprietary direct mount (13GHz and above)
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2 (IDU) - Part 1-4 Class 4.1 (ODU)

Outdoor Unit for Digital MW Radio Systems 4 to 38GHz Frequency Range



> ODU

Main Features

- High Linearity allowing highest order modulation schemes..
- Very low power Consumption.
- Compact and Lightweight.
- Very low Phase Noise.
- SW Selectable BW.
- Superior reliability - High MTBF.
- Fully Calibrated over the temperature range.
- Proprietary quick release WG Antenna Interface.

Options

- HP version (available up to 13GHz)
- WB version for 56 ch. BW operation
- -50 °C (-58 °F) Operational.
- Customized IF Frequency / Telemetry Interface.
- Customer Specific IDU Interface.
- 17 & 24GHz cross polarization versions for licence-exempt ISM bands

The Outdoor Unit provides a flexible and cost-effective solution to System Integrators for PDH and SDH radio systems; operating in the licensed bands from 4 to 38 GHz, the ODU Family is the best solution for fast time to market, highest performances and reliability.

The 17 and 24 GHz Cross ODU are specifically designed to meet the requirements of the ISM bands. They operate with Tx and Rx Crosspolarized through an OMT into a circular Waveguide.

The ODU is SW configurable ODU, settings and readings are available through Customer Specific Telemetry Protocol. A built in microcontroller provides full calibration of Transmit Power and Receive Signal Level (RSL) by means precise and reliable algorithms. Additionally, the ODU enhanced software allows inventory modules ID, setting and fine tuning of several parameters and downloadable field upgrades.

The advanced features and enhanced capabilities of the ODU make it the ideal solution for Radio Links from 2 to 310 Mbps capacity, with modulation schemes from QPSK to 128 QAM and channel BW from 3.5 to 56 MHz.

The small size of the modules allows to eventually fit them into the customer standard ODU housing, upon request.



FREQUENCY SPECIFIC ODU PARAMETERS

Frequency	Standard	Operating Frequency (GHz)	TX Output Power dBm - STD (HI)			Noise Figure
			QPSK	16, 32, 64QAM	128, 256QAM	
4GHz	ETSI/FCC	3,80 to 5,80	+27 (+32)	+24 (+29)	+22 (+27)	<4 dB
6GHz	ETSI/FCC	5.90 to 6.40				
7/8GHz	ETSI	7,10 to 8.50				
10/11GHz	ETSI/FCC	10.00 to 10.70	+26 (+31)	+23 (+28)	+21 (+26)	<4,5 dB
11GHz	ETSI/FCC	10.70 to 11.70				
13GHz	ETSI	12.75 to 13.25				
15GHz	ETSI	14.40 to 15.35	+25	+22	+20	<4.5 dB
18GHz	ETSI/FCC	17.70 to 19.70	+23	+21	+18	<5.5 dB
23GHz	ETSI/FCC	21.20 to 23.60	+22	+19	+17	<5.5 dB
26GHz	ETSI/FCC	24.50 to 26.50	+21	+18	+16	<6.0 dB
38GHz	ETSI/FCC	37.00 to 39.50	+18	+15	+13	<6.5 dB
17GHz	ISM band	17.10 to 17.30	adjustable from -24 to +7			<5.0 dB
24GHz	Unlicensed	24.00 to 24.25	adjustable from -24 to +5			<5.0 dB

Note: HP Option output power between brackets

ODU PARAMETERS

TX IF interface	350 MHz, -5 to -33dBm	
Rx IF Interface	140 MHz, -12 +/-2 dB over the AGC Range	
Telemetry Interface	Customer specific	
Power control Range	>25 dB	
Power setting resolution	0,5 dB	
Power setting accuracy	2 dB	
Rx AGC Range	-20 to -90 dBm	
SSB tx/rx Phase Noise	4 - 6 - 7 - 8 GHz	11 - 13 - 15 GHz
dBc@10KHz	-82	-80
dBc@100KHz	-103	-100
dBc@1MHz	-123	-120
Synthesizer Step	0,25 MHz	
Frequency Stability	2,5 ppm	
Standard Compliance	Radio ESTI EN 302 217, EN 301 216, EN 301 128, EN 300 198	
	Power Supply ETSI EN 300 132-2	
	EMC / Safety ETSI EN 301 489 / IEC EN 60950	

MECHANICAL / ENVIRONMENTAL

Dimensions	D 260mm, H 160mm
Weight	6.0 kg
Operating Temperature	-33° to +55°C
Altitude	Up to 4500 meters
Humidity	100% all weather
Power Input	-48V DC (-36 to -62V DC)
Power Consumption	<25watts, <35W for HP option
Cooling	Natural convection
Coaxial Interfaces	N-type female
IDU-ODU Cable	Belden 9913/RG-8, up to 300m
Antenna interface	Coaxil N-type connector (6-11 GHz); proprietary direct mount (13 GHz and above)
Standards Compliance	ETSI ETS 300 019

RF Unit/Full-Indoor for Digital MW Radio Systems Very High Power 4 to 11GHz Frequency Range



> RFU - In 1+0 configuration

Main Features

- High linearity allows high order modulation scheme
- Ultra High Output Power
- Low current consumption
- Very low Phase Noise
- Superior reliability- High MTBF
- Fully calibrated over the temperature range

Options

- Custom Branchings for 1+1 HSB and FD
- SW selectable BW
- Customer specific IDU Interface
- Customized IF Frequency/Telemetry interface

The RFU - FI™ Full Indoor RF Unit provides a flexible and cost effective OEM solution to System Integrators for SDH radio systems; operating from 4 to 11 GHz, the RFU - FI™ family is your solution for fast time to market, highest performances and reliability.

RFU - FI™ is a SW configurable RF Unit for Full Indoor system available in 1+0 and 1+1 Space and Frequency Diversity. Custom solutions for 1+1 Hot Stand-by and Frequency diversity are available on application.

The advanced features and enhanced capabilities of the RFU - FI™ make it the ideal solution for Radio Links from Super PDH to 2xSTM-1 and Gigabit Ethernet, from QPSK to 128 QAM and from 10 to 56 MHz channel BW.

Default

Option

Hardware Available configurations

STANDARD
28 MHz Ch BW

WIDE BAND
56 MHz Ch BW

Full Duplex

Half Duplex
TX or RX

TX Power
Very HI PW



FREQUENCY SPECIFIC PARAMETERS

Frequency	Standard	Operating Frequency (GHz)	TX Output Power dBm			Noise Figure
			QPSK	16, 32, 64QAM	128, 256QAM	
4Ghz	ETSI/FCC	4,40 to 5,00	+35	+32	+30	< 4,0 dB
6Ghz	ETSI/FCC	5,90 to 7.10	+35	+32	+30	<4 dB
7Ghz	ETSI	7,10 to 7,70				
8Ghz	ETSI	7,70 to 8,50				
10/11Ghz	ETSI/FCC	10,15 to 10,65 10,70 to 11,70	+34	+31	+29	<4,5 dB

VHP PARAMETERS

TX IF interface	350 MHz, -5 to -33dBm		
Rx IF Interface	140 MHz, -12 +/-2 dB over the AGC Range		
Telemetry Interface	Customer specific		
Power control Range	>25 dB		
Power setting resolution	0,5 dB		
Power setting accuracy	2 dB		
Rx AGC Range	-20 to -90 dBm		
SSB tx/rx Phase Noise	4 - 6 - 7 - 8 GHz	11 GHz	
dBc@10KHz	-82	-80	
dBc@100KHz	-103	-100	
dBc@1MHz	-123	-120	
Synthesizer Step	0,25 MHz		
Frequency Stability	2,5 ppm		
Standard Compliance	Radio ESTI EN 302 217, EN 301 216, EN 301 128, EN 300 198		
	Power Supply ETSI EN 300 132-2		
	EMC / Safety ETSI EN 301 489 / IEC EN 60950		

MECHANICAL / ENVIRONMENTAL

Dimensions	19" Rack 6U 482 mm x266mm x 126mm			
Weight	8,5 Kg			
Operatimng Temperature	-5 to +45° C			
Altitude	Up to 4500 meters			
Humidity	0 to 95% non-condensing			
Power Input	-48V DC (-36V to -62V DC)			
Power Consumption	< 55W for each TX/RX			
Cooling	Natural convection			
IF/Telemetry Interface	N-type female			
Antenna Interface	4 GHz	6GHz	7/8 GHz	11 GHZ
	UDR48/N-Type	UDR70 (CPR137)	UDR84	UDR120
Standards Compliance	ETSI ETS 300 019			

RF Unit/Full-Indoor for Digital MW Radio Systems Ultra High Power 4 to 11GHz Frequency Range



> RFU – In 1+0 configuration

Main Features

- High linearity allows high order modulation scheme
- Ultra High Output Power
- Low current consumption
- Very low Phase Noise
- Superior reliability- High MTBF
- Fully calibrated over the temperature range

Options

- Custom Branchings for 1+1 HSB and FD
- SW selectable BW
- Customer specific IDU Interface
- Customized IF Frequency/Telemetry interface

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The advanced features and enhanced capabilities of the RFU – FI™ make it the ideal solution for Radio Links from Super PDH to 2xSTM-1 and Gigabit Ethernet, from QPSK to 128 QAM and from 10 to 56 MHz channel BW.

Default

Option

Hardware Available configurations

STANDARD
28 MHz Ch BW

WIDE BAND
56 MHz Ch BW

Full Duplex

Half Duplex
TX or RX

TX Power
Ultra HI PW



FREQUENCY SPECIFIC PARAMETERS

Frequency	Standard	Operating Frequency (GHz)	TX Output Power dBm			Noise Figure
			QPSK	16, 32, 64QAM	128, 256QAM	
4Ghz	ETSI/FCC	4,40 to 5,00	+40	+37	+35	< 4,0 dB
6Ghz	ETSI/FCC	5,90 to 7.10	+40	+37	+35	<4 dB
7Ghz	ETSI	7,10 to 7,70				
8Ghz	ETSI	7,70 to 8,50				
10/11Ghz	ETSI/FCC	10,15 to 10,65 10,70 to 11,70	+38	+35	+33	<4,5 dB

RFU-FI-PARAMETERS

TX IF interface	350 MHz, -5 to -33dBm		
Rx IF Interface	140 MHz, -12 +/-2 dB over the AGC Range		
Telemetry Interface	Customer specific		
Power control Range	>25 dB		
Power setting resolution	0,5 dB		
Power setting accuracy	2 dB		
Rx AGC Range	-20 to -90 dBm		
SSB tx/rx Phase Noise	4 - 6 - 7 - 8 GHz	11 GHz	
dBc@10KHz	-82	-80	
dBc@100KHz	-103	-100	
dBc@1MHz	-123	-120	
Synthesizer Step	0,25 MHz		
Frequency Stability	2,5 ppm		
Standard Compliance	Radio ESTI EN 302 217, EN 301 216, EN 301 128, EN 300 198		
	Power Supply ETSI EN 300 132-2		
	EMC / Safety ETSI EN 301 489 / IEC EN 60950		

MECHANICAL / ENVIRONMENTAL

Dimensions	19" Rack 6U 482 mm x266mm x 126mm			
Weight	9,8 Kg			
Operatimng Temperature	-5 to +45° C			
Altitude	Up to 4500 meters			
Humidity	0 to 95% non-condensing			
Power Input	-48V DC (-36V to -62V DC)			
Power Consumption	< 155 W			
Cooling	Natural convection			
IF/Telemetry Interface	N-type female			
Antenna Interface	4GHz	6GHz	7/8GHz	11GHZ
	UDR48/N-Type	UDR70 (CPR137)	UDR84	UDR120
Standards Compliance	ETSI ETS 300 019			

All-in-One, for MW Radio System (IP native) Very High Power



> HS/FI All-in-One

System Features

- Complete Digital Microwave System placed into a 2U 19" std. rack module.
- QPSK, 16 –256 QAM Modulation
- FEC – Forward Error Correction with Reed-Solomon Coding
- Built-in Adaptive Modulation system with dynamic capacity allocation and priority data transmission (PBPS – Packet Based Priority System)
- Asymmetrical data rates – different modulation setup for upstream and downstream
- On-line Ethernet packet compression with reduced length of frames allowing throughput efficiency increase up to 25%
- Two USB ports for connecting USB-flash disk or PC
- "In-Band"/"Out-of-Band" Management
- NAT, Proxy ARP support for effective IP management setup
- Large range of System and Ethernet Counters
- Adaptive Power Control ATCP
- Built-in Network Management System (NMS) – Web, SNMP, TELNET
- Built-in Bit Error Rate (BER) Tester + Built-in Spectrum analyzer

The SKYLINKS Digital Radio System All-in-One provides a cost-effective solution to high capacity data transmission requirements. Operating in the licensed bands from 4 to 11 GHz, it is fitted into a 2RU chassis where both modem and RF units are included. The result is a brand new equipment specifically designed for application where room saving is a constraint.

It has enhanced features that include line interface, alarms and diagnostics and network management interfaces.

The ASI interface is a PLUS that enhances this complete radio terminal into the broadcasting market as a top level, brilliant star.

Easy-to-install, All-in-One provides user accessibility functions including Transmit Power, Receive Signal Level (RSL), and operating frequency. Additionally, All-in-One features enhanced software allowing capacity/configuration upgrade, downloadable field upgrades and an optional embedded SNMP agent for advanced network management capabilities, making it the ideal solution for networks operated by mobile service providers, internet service providers (ISP), utilities, public telephone operators, local governments, TV networks and corporate users. These SKYLINKS Digital Radios represent a new microwave architecture designed to address universal applications for GE platforms and thanks to the ASI interface to meet the most evolved broadcasters. The advanced technology is designed to provide flexibility to customers for their current and future networking needs.

It supports links for high speed wireless Ethernet networking, through the optional sw upgrade that delivers up to 310Mbps in a 56MHz ch BW (for this option a specific license has to be acquired).

It is spectrum and data rate scalable from 5 to 310Mbps, giving opportunity to service providers and companies to trade-off system gain with spectral efficiency and channel availability for optimal network connectivity.

SKYLINKS All-in-One enables broadcasters and network operators (mobile and private), access service providers and government to provide a portfolio of secure, scalable wireless applications for data, video, and voice over IP (VoIP).

Default

Option

Hardware Available configurations

155 Mbps @ 128 QAM
28 MHz Ch BW

310Mbps @ 256QAM
56MHz Ch BW

Full Duplex

Half Duplex
TX or RX

TX Power
Very HI PW



SYSTEM PARAMETERS

Frequency	4 GHz	6/7/8 GHz	10/11 GHz
Standards	ETSI/FCC	ETSI	ETSI/FCC
Operating Frequency (GHz)	3.8 to 4.2, 4.40 to 5.00 5.90 to 7.10	7.10 to 8.50	10.70 to 11.70
Channel BW 28 MHz Channel BW 56 MHz	128 QAM 157Mbps 32QAM 157Mbps / 128QAM 310Mbps		
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	+35 +32 +30		+34 +31 +29
Rx Sensitivity (dBm) @ 10-6 BER 28 MHz, 157 Mbps 56 MHz, 157 / 310 Mbps	-70 -72		-69 -71
Frequency Stability	0.0010%		
Background BER	< 10-12		
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198		
	Power Supply ETSI EN 300 132-2		
	EMC / Safety ETSI EN 301 489 / IEC EN 60950		

PAYLOAD INTERFACE PARAMENTERS

Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 310 Mbps
	Interfaces	1 x 10/100/1000 Base-T (RJ45) 1 x 10/100 base-T (Rj45)
	Maximum packet lenght	1632 Bytes
E1 / E3	Line Rate	1-2 x 2.048 / 1 x 34.368 Mbps
	Interfaces	G703 RJ45 / BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X AS TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX

MECHANICAL/ENVIROMENTAL

Dimensions	standard rack (2U), 210 x 88 x201mm			
Weight	Kg: 9,8 Kg			
Operating Temperature	-5° to +45°C			
Altitude	Up to 4500 meters			
Humidity	IDU: 95% non condensing			
Power Input	-48V DC (-36V to -60V DC)			
Power Consumption	< 75 Watts			
Cooling	Air Force Cooled			
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2			
Antenna Interface	4GHz	6GHz	7/8GHz	11GHZ
	UDR48/N-Type	UDR70 (CPR137)	UDR84	UDR120

All-in-One, for MW Radio System (IP native) Ultra High Power



> HS/FI All-in-One

System Features

- Complete Digital Microwave System placed into a 2U 19" std. rack module.
- QPSK, 16 –256 QAM Modulation
- FEC – Forward Error Correction with Reed–Solomon Coding
- Built-in Adaptive Modulation system with dynamic capacity allocation and priority data transmission (PBPS – Packet Based Priority System)
- Asymmetrical data rates – different modulation setup for upstream and downstream
- On-line Ethernet packet compression with reduced length of frames allowing throughput efficiency increase up to 25%
- Two USB ports for connecting USB-flash disk or PC
- "In-Band"/"Out-of-Band" Management
- NAT, Proxy ARP support for effective IP management setup
- Large range of System and Ethernet Counters
- Adaptive Power Control ATCP
- Built-in Network Management System (NMS) – Web, SNMP, TELNET
- Built-in Bit Error Rate (BER) Tester + Built-in Spectrum analyzer

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SKYLINKS All-in-One enables broadcasters and network operators (mobile and private), access service providers and government to provide a portfolio of secure, scalable wireless applications for data, video, and voice over IP (VoIP).

Default

Option

Hardware Available configurations

155 Mbps @ 128 QAM
28 MHz Ch BW

310Mbps @ 256QAM
56Mhz Ch BW

Full Duplex

Half Duplex
TX or RX

TX Power
Ultra HI PW



SYSTEM PARAMETERS

Frequency	4 GHz	6/7/8 GHz	10/11 GHz
Standards	ETSI/FCC	ETSI	ETSI/FCC
Operating Frequency (GHz)	3.8 to 4.2, 4.40 to 5.00 5.90 to 7.10	7.10 to 8.50	10.70 to 11.70
Channel BW 28 MHz Channel BW 56 MHz	128 QAM 157 Mbps 32 QAM 157 Mbps / 128 QAM 310 Mbps		
Tx Power (dBm) QPSK 16, 32, 64QAM 128, 256QAM	+40 +37 +35		+39 +35 +33
Rx Sensitivity (dBm) @ 10-6 BER 28 MHz, 157 Mbps 56 MHz, 157 / 310 Mbps	-70 -66		-69 -65
Frequency Stability	0.0010%		
Background BER	< 10-12		
Standards Compliance	Radio ETSI EN 302 217, EN 301 216, EN 301 128, EN 300 198		
	Power Supply ETSI EN 300 132-2		
	EMC / Safety ETSI EN 301 489 / IEC EN 60950		

PAYLOAD INTERFACE PARAMETERS

Gigabit Ethernet	Line Rate	Full-Duplex, scalable up to 310 Mbps
	Interfaces	1 x 10/100/1000 Base-T (RJ45) 1 x 10/100 base-T (Rj45)
	Maximum packet length	1632 Bytes
E1 / E3	Line Rate	1-2 x 2.048 / 1 x 34.368 Mbps
	Interfaces	G703 RJ45 / BNC
	Test Utility	Loopback, Internal BER tester
ASI	Half-Duplex-TX	4 X AS TX
	Half-Duplex-RX	4 X ASI RX
	Full-Duplex	2X ASI TX + 2X ASI RX

MECHANICAL/ENVIRONMENTAL

Dimensions	standard rack (2U), 210 x 88 x201mm			
Weight	Kg: 9,8 Kg			
Operating Temperature	-5° to +45°C			
Altitude	Up to 4500 meters			
Humidity	IDU: 95% non condensing			
Power Input	-48V DC (-36V to -60V DC)			
Power Consumption	< 175 Watts			
Cooling	Air Force Cooled			
Standards Compliance	ETSI ETS 300 019, Part 1-3 Class 3.2			
Antenna Interface	4GHz	6GHz	7/8GHz	11GHZ
	UDR48/N-Type	UDR70 (CPR137)	UDR84	UDR120

Network Management System



It is a NMS software, based on the client-server configuration.

NetPOD is a real multi-user system, with infinite real time access available, that can also be split into zones, regions, and accessed according to hierarchical levels. Username and password will grant access rights on a input-by-input or equipment base

NetPod

A complete suite...to manage your network in a easy and safe way

NetPOD increases the value of your maintenance simplifying diagnostics with an 'up to the input' interface. NetPOD is modular, and thanks to a series of PIMs (Plug In Modules) it can be customized, to fit any network size and maintenance structure. Any user can start with a very basic and easy to use system, and grow up to a very comprehensive and detailed surveillance system. NetPOD is simple and quick to configure, while always granting total control! NetPOD is actually supervising over 3000 installations around the world, collecting mission critical data and making it available on demand to operators ANYWHERE.

Don't loose control!

NetPOD is smart! ... it features controlled logging of users, events storing, dispatching warnings to technicians (e-mail, SMS), collecting alarms, setting alarm hierarchy, local and remote automation, tools data analysis and reports, providing complete documentation of every event. The user can log into the system only after authentication: access can be achieved with a client application (NetPOD Supervisor) using a TCP socket. Access can be local (LAN) or remote (Internet). The platform is planned to provide the maximum safety and privacy: also for companies that offer the management of the network in outsourcing or as a service. Everyone can gain advantage from NetPOD.

A software module for every need

NetPOD is a modular suite that can grow according to management requirements. PIM (Plug-in modules) is the name of the additional software modules: they do not require additional installations, the activation key is embedded in the license.

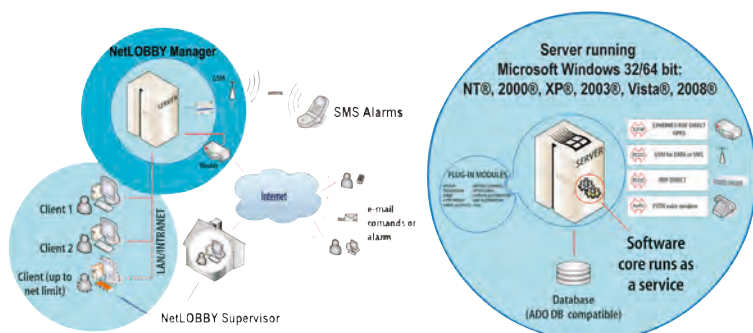
Main Features

Centralized structure, client-server type:

NetPOD Manager: the server that runs as a system service and gathers information from the remote sites

NetPOD Supervisor: the client for the management and the supervision. TCP/IP connection enables fast performances

- Access to the information is controlled by multi-level authentication; access is set site by site, and user by user, granting complete safety.
- Advanced instruments for data analysis
- Quick installation, easy to use
- Maximum system configuration flexibility, allows setup of control and monitoring instruments, without needing qualified staff
- Scalable from a few inputs to thousands of I/Os: easily upgradeable.
- SNMP interface totally integrated inside the GUI: complete management of the devices supporting SNMP, transforming it in a real NMS
- 24/7/365 screening, with real-time functions to dispatch alarms to the technicians via email, SMS, phone call: totally user customizable
- Configurations Management with files called 'devices' that can be imported/exported
- Searching, configuration, updating and controlling devices made simple with an intuitive graphical interface
- Monitoring made simple using hierarchical maps that can be customized, both in view and hierarchy
- Share notes with other users about operations on the network or on the equipment
- Data export to MS Office™ Excel™



LICENSE EXTENSION
Improve efficiency and coordination of maintenance activities
Optimize sites and equipment management thru the analysis of statistics, and enhance problem solving
Efficiently and rapidly manage the economics of your network, leaving the operators concentrated on problem solving
User-friendly and charming user interface: could it be easier ?
An investment that will be very quickly repaid
Power and reliability, designed by people that know what broadcasters want.

LICENSE EXTENSION	
At any time you can expand NetPOD license on:	
Client number:	the maximum number of simultaneous access of clients to the system
RDF number:	the maximum number of RDF managed by the NetPOD
Agent Number:	the maximum number of configurable Agent
OID:	the maximum number of configurable OID
PIM:	any additional Plug-in Module

SPECIFICATIONS
NETPOD NMS BASIC SERIES
Ideal for small and medium installations
1 server application, 1 client access, expandable on demand
Until 256 IP-RDF with 13000 OID-I/O
DBMS: MS Access / MS SQL Server
NETPOD NMS GOLD SERIES
Ideal for medium and large installations
No IP limit / no OID limit
DBMS: MS SQL Server



Minimum system requirements

Platform

- NetPOD® Client & Server has been developed for Windows® environment and has been written in Borland® Delphi with strict object oriented programming techniques

Server – NetPOD Manager

- Characteristics Single processor (1.0 GHz, cache of 1 MB), 512MB RAM, HD 40 GB
- Operating system From MS Windows 2000 Professional (SP1) to Windows Vista (x32 or x64)
- and Windows Server 2008 (x32 or x64)
- Data storage: MS Access (MS Office license is not required) or MS SQL Server 2000 or better (MS SQL Server license not included)
- Network Ethernet TCP/IP 10/100 Mbps for client access

Client – NetPOD Supervisor

- (the client can run on the server machine if necessary – only for small systems)
- Characteristics CPU Pentium® 333 MHz or better, 128 MB RAM, 30 MB free HDD space
- Operating system from MS Windows 2000 Professional (SP1) to Windows Vista (x32 or x64)
- Network Ethernet 10/100 Mbps

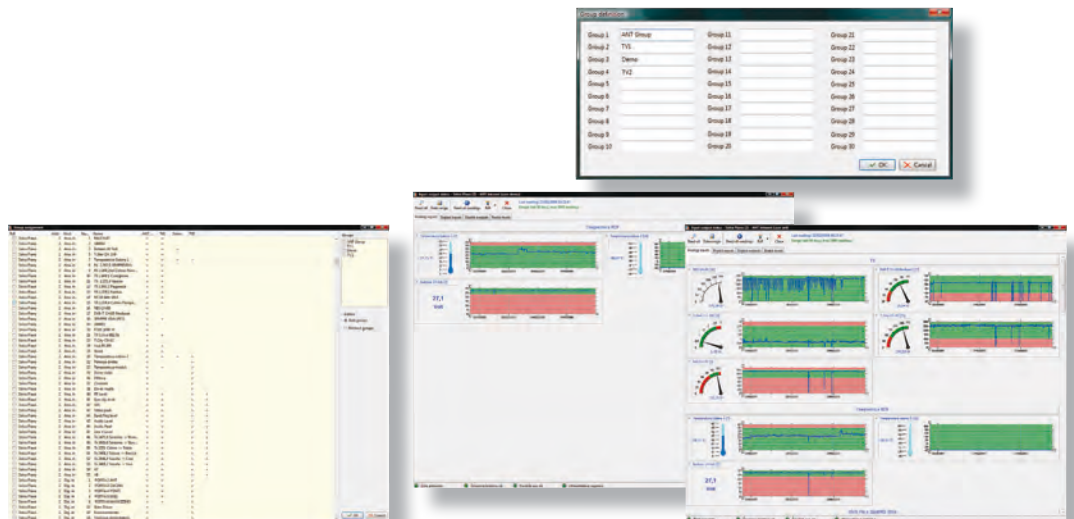
NETPOD: Plug-In Module (PIM)

SPECIFICATIONS		
PIM	Ordering Code	Description
Groups	PIM-GRP	Allows to set each I/O in specific groups; the I/O can then be seen exclusively by the users that belong to the specified group
Technicians	PIM-TEC	The system dispatches alarms and warnings to a list of technicians, via SMS, email and voice phone calls. The dispatch can be activated for any single I/O and, in case the Group PIM is installed, it will be sent only to the technician belonging to the groups defined for the I/O
SNMP	PIM-SNMP	Enables the control of devices using the SNMP protocol. This PIM makes the NetPOD a real NMS software where you can have the complete managing of your network
HTTP Proxy	PIM-HTTP	Allows to get access to the web interface of a device connected via TCP
Programmed Output	PIM-RTCC	RTCC schedules the operations to be executed at an exact time/date from the remote RDF. The user can configure operations to be performed at a preset time periodically or only once
Matrix Control	PIM-MX	Enables the user to quickly configure and easily control audio/video or IF SIGNAL MATRIXES. Any brand of routing matrix can be used, serial protocols must be submitted to ANT Group's technical dept
CDMA /GPRS	PIM-CDGP	It enables the software to use the CDMA/GPRS modems for data connection with RDF
Server Automation	PIM-AUTO	Allows to create server automation operations. Automation operations are server-side and alarm driven, so unlimited numbers of automation routines are possible with any combination and control
UDS	PIM-UDS	Stands for User Definable Screens. Enables the creation of customized views, where the user can configure I/Os to be visualized with the aid of a charming graphics
RDF Automation	PIM-RAUTO	Allows to create local automation operations (on site) to be performed by the RDF

Grant user access to specific I/Os

This software module enables user group management. The Group PIM establishes a relationship between users and selected I/Os on a RDF: any member of a group will be able to view only inputs, outputs, and/or to send commands belonging to his group. Every input can be associated to 1 or more groups and, in the same way, every user can be associated to 1 or more groups. In addition, the user can be associated to read groups and/or write groups so, for example, a user can read group 1 and 2 but can only command outputs on group 2.

Group PIM and Technician PIM can be used together, so that technicians belonging to a group will be able to receive alarms (SMS, email, phone call) from I/Os on a RDF belonging to the same group. At the same time, alarms generated from unauthorized inputs will not be seen, in order not to distract him. The Group PIM is very useful for maintenance service providers: an RDF in a site can supervise multiple broadcasters, even in competition between them; anyone will be able to read and control its own set of I/O, without any access to other data or commands.



SPECIFICATIONS

Up to 30 groups

Read/Write permission tool on each group

Easily configurable

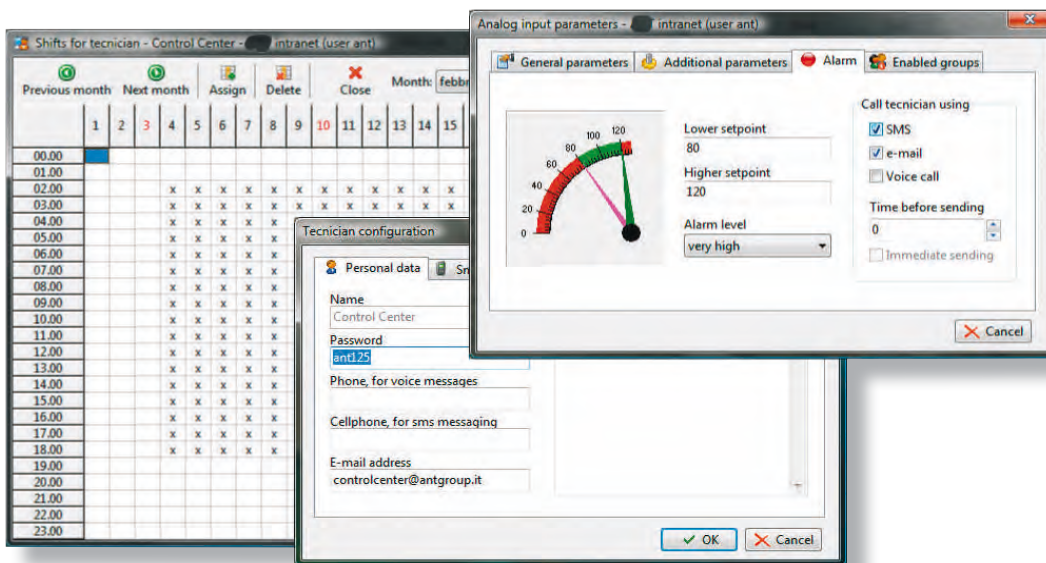
Technician PIM compatible



Extend alarm forwarding rules

This PIM adds to the system a new kind of user archive called the technician list. Technicians are not properly system users but can interact with the system by phone, SMS or e-mail. A system administrator can assign a technician to the list. The program can be used to assign transfers and areas of responsibility to each technician.

When an alarm or a prealarm arises, the system can be configured to send voice alarms, e-mails, SMS and to wait a preset time for a return call to confirm the reception. If the confirmation call is not received, the alarm can be sent to another technician on the list ... or... to his boss! The system administrator will assign a series of technicians to the manager, associating each one with one or more RDFs he is responsible for: only the alarms or pre-alarms coming from an assigned RDF will be received from a set technician. The Technician PIM is a powerful tool, very useful to broadcasters with large or small networks. Technicians can be divided in geographical or technical areas of responsibility so that, for example, RF technicians won't be disturbed by electrical problems, and so on. All commands, response and alarms sent/received by a technician are logged.



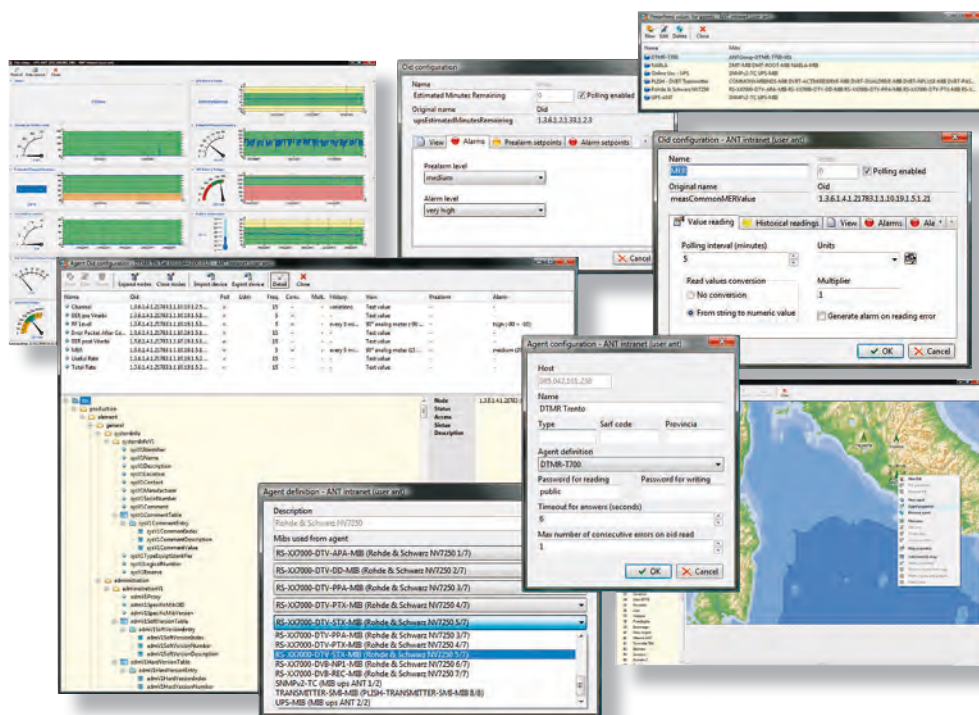
SPECIFICATIONS

- No limit to technicians list dimensions
- System alarms are configurable (text, language)
- Customizable alarm messages
- Work-transfers configurable for each technician in the list
- Communication media: SMS, e-mail, phone call; more possible on request

Enable NetPOD to the Simple Network Management Protocol (SNMP)

The software module allows to easy integrating into NetPOD software all devices supporting the SNMP protocol.

SNMP PIM enables the advanced SNMP management. You can now take advantage of tools that allow you to quickly and easily work with MIBs, to configure the control agent, to set-up the trap, and more: it's also possible to set alarms depending on configured OID, to display the achieved history of information coming from the device, etc. SNMP PIM adds the benefits of the SNMP protocol interface to the NetPOD management: data storage and backup, mailing and SMS dispatch to technicians when an alarm or a trap happens, system access by authentication, device displayed on synoptic map, tool for statistical analysis, etc. With SNMP PIM, the NetPod SW will, in the same integrated system, supervise and manage in real time both SNMP interfaces and any RDF remote controlled device, to have a "one shot" complete view and supervision of the network and all its peripherals. A number of SNMP PIM is already active, with thousand of device managed: a lot of broadcaster's technicians have appreciated the power and simplicity of this software module.



SPECIFICATIONS
NetPOD NMS Basic Series
For little and medium installations
Max 256 IP and 13000 OID
DBMS: MS Access / MS SQL Server
NetPOD NMS Gold Series
For medium and large installations
No IP limits / No OID limits
DBMS: MS SQL Server
Common Characteristics
DBMS data storage
MIB management in any format and MIB storage in standard XML format
Management of predefined Agent definition and stored Agent
Advanced OID configuration
Alarm configuration on OID
Advanced Trap configuration



Integrates the direct management of devices configurable via web browser

The complexity of last generation equipment has led to the development of easier and userfriendly configuration interfaces. The web technology solves this need, becoming in fact the quickest and easiest way to modify the functioning parameters of the equipment. Unfortunately, for security purposes or more simply for network structure problems, some equipment could be on a private network or on a public network but encapsulated inside a VPN (virtual private network), and therefore not reachable via internet. The "http proxy" module overcomes this obstacle allowing the management of web server enabled equipment for the NetPOD interface. Moreover, the SW module II modulo is transparent to the internet, as it allows to access the equipment without knowing its IP address, as it is safe, as it allow the connection only if you have an access authorization. The access is simple and user-friendly: as soon as you have opened the widow of the selected device, a button will invite you to ask for access to the web server.

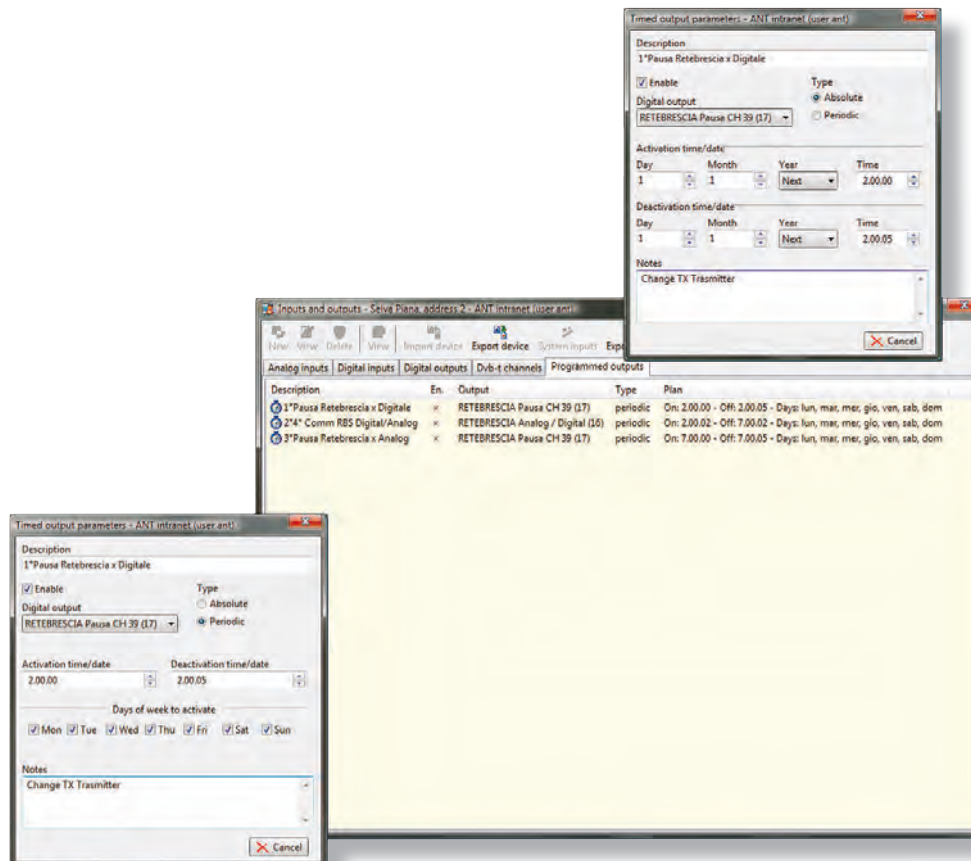
SPECIFICATIONS
To connect a web interface of an equipment not directly reachable via internet;
Access depend on user privileges;
IP address of the equipment to connect not needed;

To activate commands at preset timetables

The timed outputs module allow the supervisor to set up the SET and the RESET of a RDF output at a preset time or even to enable an 'automation program' periodically. Periodical activation can be programmed daily or according to a weekly timetable.

The module is therefore very useful whenever you want that the RDF execute a command, or a sequence of commands, autonomously at preset times (absolute programming) or at regular intervals (periodic programming).

When the intervention time has to be precise, with additional hardware you can lock it to a GPS reference, and have the command executed within the fraction of a second.



SPECIFICATIONS

You can program up to 16 outputs/programs for any RDF Commands program is stored inside the RDF and executed autonomously; this guarantees that the program is executed also when the communication is down

You can set weekly or daily programs



Switching matrixes remote management

The Matrix Control Module allows configuring and managing switching matrixes to route audio, video and IF signals. The module has an editor and a display editor to configure the matrix and to display its status. The editor allows setup the matrix network and the signal routing. A simple click will then be enough to make the system find the best routing for the signal. The control system is composed of a RDF with a dedicated firmware, to be installed where the matrix is mounted, and of a matrix that must have a serial control interface, with available protocol. Matrix management can be performed via trunked Radio, GSM/GPRS/CDMA or via IP connection.



SPECIFICATIONS

Standard Matrixes :

10-300 MHz 4 x 4 IF MATRIX (IFM-0404)

10-300 MHz 8 x 8 IF MATRIX (IFM-0808)

10-300 MHz 12 x 12 IF MATRIX (IFM-1212)

Custom protocols for other matrix models and suppliers option

User-friendly interface-dedicated window interface

Real time matrix diagnostic

Real time site telemetry

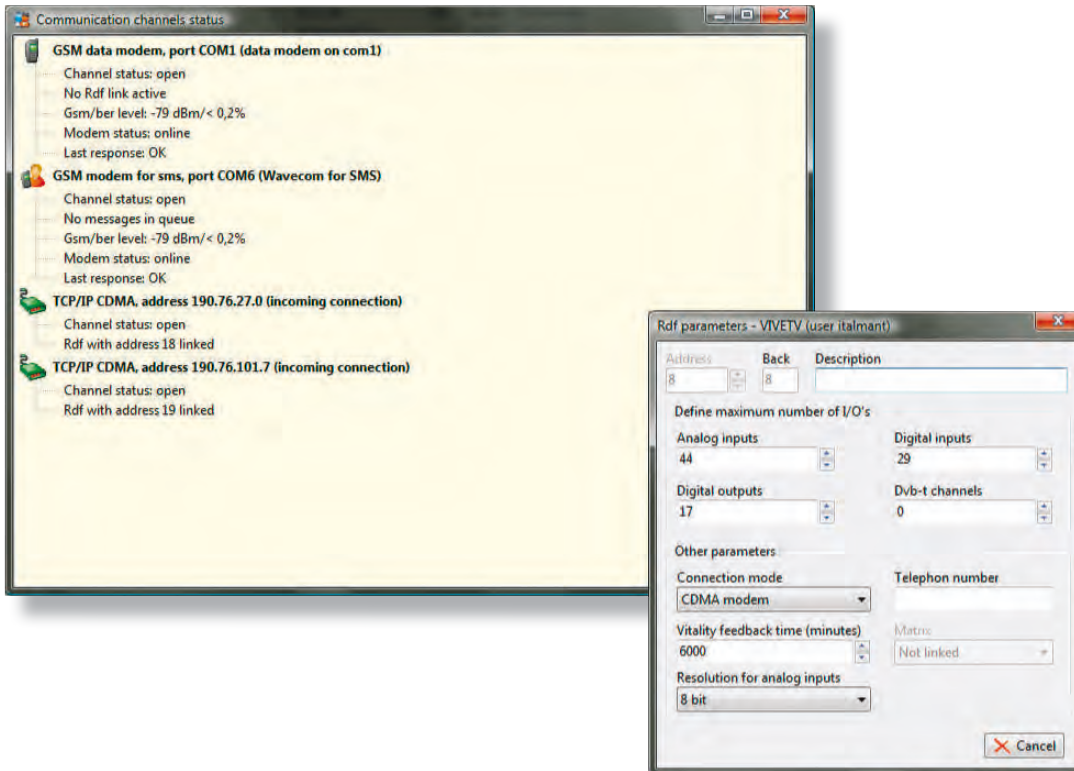
Same NetPod alarm choice (SMS, E-mail, etc...)

GPRS & CDMA modem management module

The GPRS (General packet radio service) and the CDMA (Code Division Multiple Access) use the internet over GSM (GPRS) and internet over CDMA to carry data from one remote site data concentrator (RDF) to the control center. At any connection the telecom network manager assigns an IP address, and this IP address changes every new connection. That's why we have designed a dedicated SW to manage these connections.

The IP address of the control center is fixed. This module has an additional exclusive feature: it can setup the connection at request or when necessary.

This feature will let you spare a lot of money with your telecom provider, when the data traffic is computed on the time used instead of on the data amount. In addition the module stores a log-file of the connections.



SPECIFICATIONS

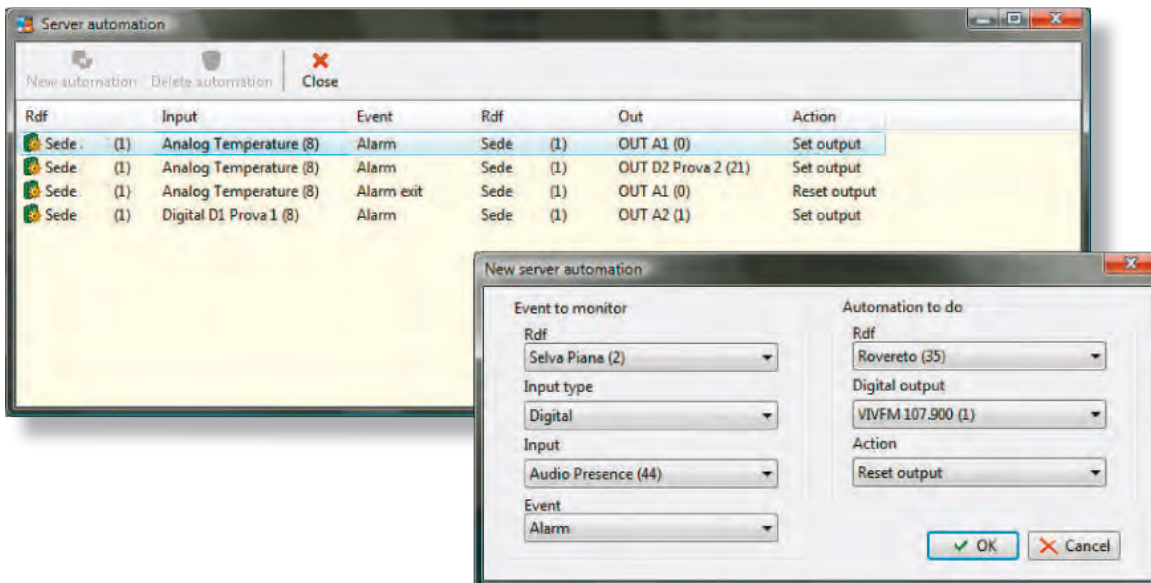
- No limit to the number of RDF controlled via GPRS or CDMA;
- Continue or "at need" connections
- Log file of the connections
- IP address of the control center easily configured on the RDF



SW Module designed for local and remote automation

The "PIM Server Automation" module allows creating, in an easy and intuitive way, any "server side" automation.

It means that the automation is not stored in the peripheral, like using "PIM RDF Automation", but it is stored in the system database, inside the NetPOD Manager software. The great advantage of this SW module resides inside this characteristic: as seen as the automation is stored in the server, you can create an unlimited number of automation routines, with any combination and control possibility. The unlimited power of the automation will, in fact, controls any analog/digital input, alarmed or pre-alarmed, of any RDF and can run a command on any output of any RDF, including itself. We talk of Alarm/Pre-alarm because the automation works according to both thresholds, when from a programmed input an alarm/pre-alarm arrives or when the alarm/pre-alarm stops.



SPECIFICATIONS

- You can create an unlimited number of automations in an easy and intuitive way
- You can command an output on the same RDF where you are controlling the input, or in any other RDF of the network
- On the same input you can create more automations that will command different outputs on different RDF
- The user can intervene at any time on the outputs and send a manual command, without disabling the automation
- Automations are a very powerful mean of creating automation routines

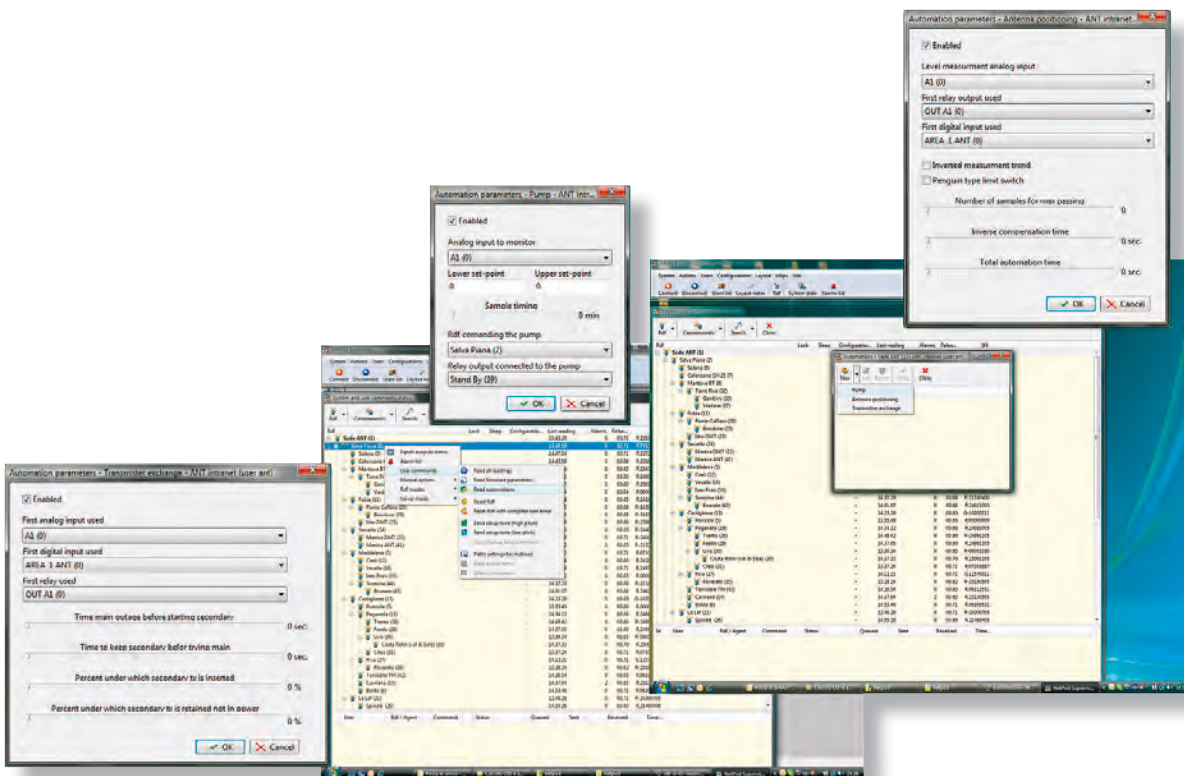
To add local and remote automations managed by and performed on the RDF

The "RDF Automations PIM" enables and configures in an easy way some automation routines that the RDF can perform on its own. You can create and store in the peripheral some "automations" and the RDF will perform them without asking or needing to connect to the control center, while using the "Server Automations PIM" local automations are anyway stored and launched in the system software NetPod Manager. Automations will be started following an event or a level measurement and a set input and can start on the RDF itself or on other RDF, according to the automation type, without any intervention of the control center. The automation can end automatically or after the input level, that has started the automation, return inside e set limit.

Actually the following automations can be managed: Pumps management: an analog input signal controls the start/stop of the automation and sets/resets an output on the same or on another RDF of the network, according to a preset couple of thresholds.

A typical application is the level control of a reservoir, where when the level goes beyond a limit a pump will be activated until the nominal level is reached again; the pump can be in the same site (same RDF) or remote (another RDF), miles away.

Antenna positioning: with a single command, equivalent to activating a relays, you can move horizontally a directional antenna with rotor in order to find the maximum signal level. Transmitter switchover: you can build the basic switching logic between main and backup without a dedicated device. On request, we can build additional and custom automation macros into the RDF.



SPECIFICATIONS

- Up to Nr. 8 automations for any RDF
- Simple and user friendly editor to build the automation cycle
- Completely stand-alone automation, without need to be connected to the control center
- Any automation can be built remotely by the control center and downloaded to the RDF using the connection network
- Any automation can be built on a PC with NetPod SW installed and downloaded to the RDF using the PC serial port



The UDS module is a very powerful graphical instrument allowing the user to easily and completely configure graphic windows: in other words, the user can define on the system custom windows and views while data arrive from a number of sites. The editor allows also to insert one or more background images or "devices", and to connect inputs and outputs to them. The UDS, in fact, provides a powerful tool to concentrate in one single window a number of data according to user priorities and to build windows displaying custom status summaries: data arriving from the field often arrive in a confused manner, and therefore they are difficult to interpret. The UDS module solves any views need: more than ordering and eventually eliminating useless data, it allows to associate different data typologies (analog inputs, digital inputs, enumerated values and outputs) and to put them in the same window. For example, UDS can be used to concentrate all temperature measurements or radio links of a number of broadcasting sites, or to monitor the complete STL chain from the studio to the last transmitter, or to design a command panel to manage switching matrices, or to see the status of a transmitter as you were in front of it. All this can be set in one or "n" UDS windows.



SPECIFICATIONS

Simple and intuitive configuration

"n" windows UDS definable

You can insert any input/output in any UDS

You can add name/description to any window / item

You can create UDS shared among any user that can access the system

Group PIM fully integrated: so, any configured measures is available to the logged user depending on Group PIM setup

Accessories

Antennas

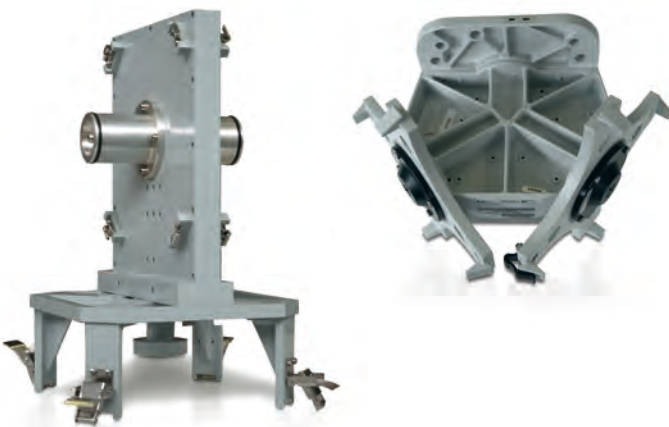


Main Features

- 0.3, 0.6, 0.8, 0.9, 1.2, 1.8, 2 and 3 m. Available for Direct Mount Option to the ODU (patented Circular WG solution, for Freq.>11 GHz) or for Remote Mount Bracket (for ODU installation).

Ask to our Technical Department for specific Data Sheet.

Directional Couplers



Main Features

- The Directional Couplers are designed to allow both mechanical and electrical connections to the same antenna of two radio equipments in configuration 1+1 hot stand-by.

Ask to our Technical Department for specific Data Sheet.

Brackets



Main Features

- Mandatory for Antenna without Direct Mount Adaptor.
- Available in several types and configurations.

Ask to our Technical Department for specific Data Sheet.



Batteries and Chargers



Main Features

Ask to our Technical Department for specific Data Sheet.

Installation Kits



Main Features

Skylinks can provide all the installation kits: cables, wave-guides, connectors, flanges and others.
Ask to our Technical Department for specific Data Sheet.

Professional Routers



Main Features

Ask to our Technical Department for specific Data Sheet.

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