

## 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

Hardware Available configurations

Full Duplex

Half Duplex  
TX or RX

TX Power  
Very HI PW  
Ultra HI PW

System Available configurations

1 + 0

1+1  
HSB/SD/FD

2+0  
E/E or E/W or XPIC

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 $\Omega$ balanced or 75 $\Omega$ 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

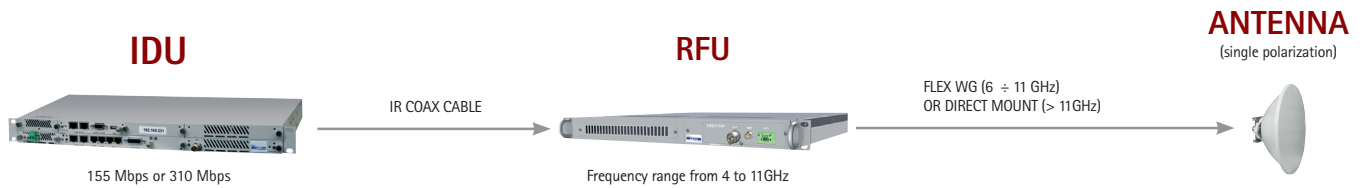
#### MECHANICAL/ENVIRONMENTAL

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

#### NETWORK MANAGEMENT & CONFIGURATIONS

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

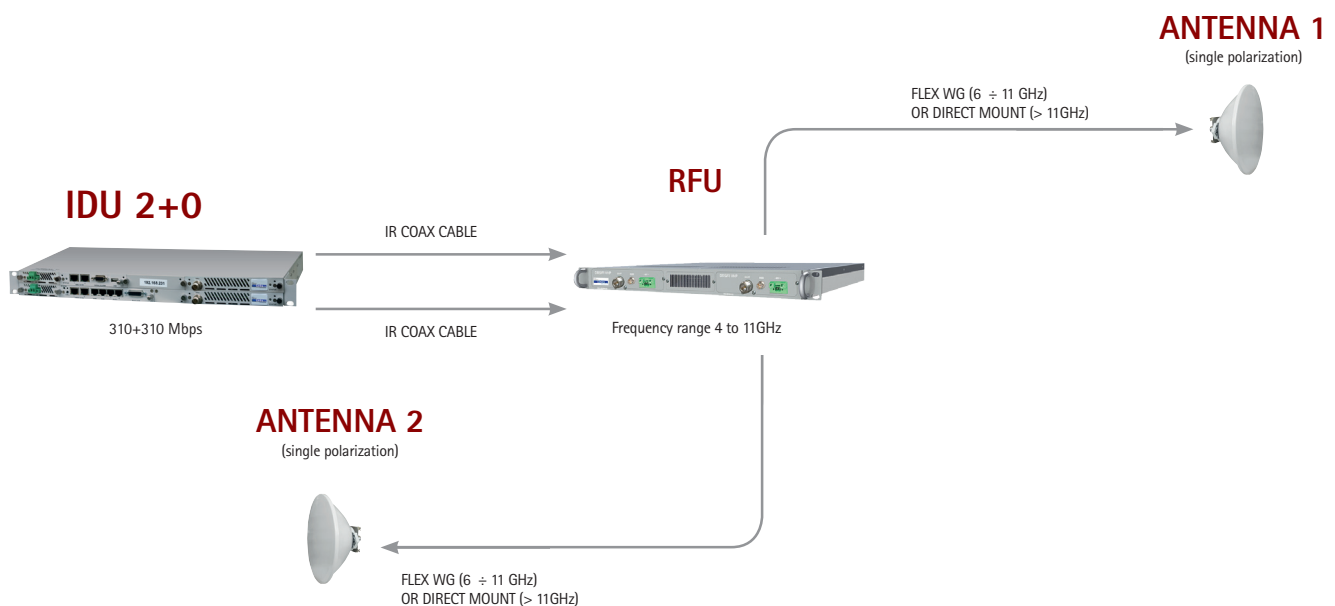
## 1+0 Basic Configuration



# DRS/F1 2+0 EAST/WEST

## 2+0 East/West Configuration

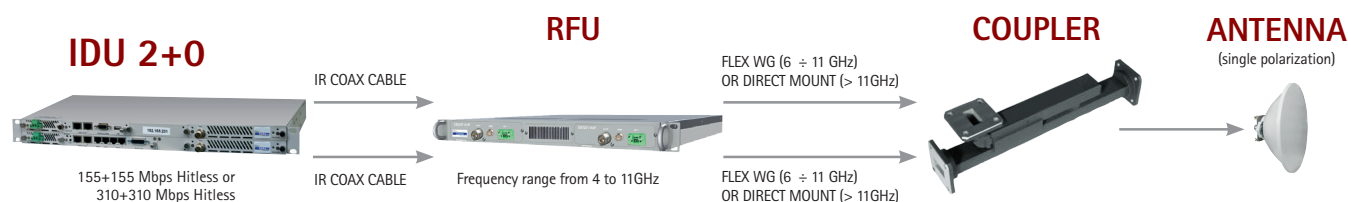
The Software Defined IDU supports a 2+0, or east-west, configuration that allows a consecutive point architecture to be achieved with only a single 1 RU chassis at each location. In this configuration the SDIDU contains two modems and may contain two power supplies. One modem is referred to as the west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

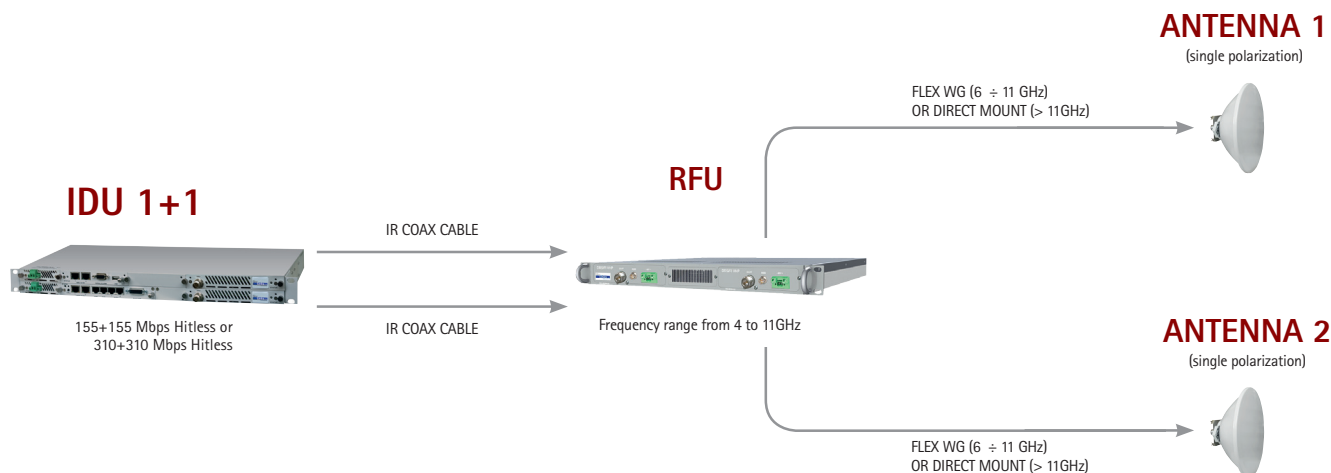
## Protected Non-Diversity Configuration (Hot Standby)

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).

