

Digital Radio System/Split Mount (Hybrid)



> SDIDU

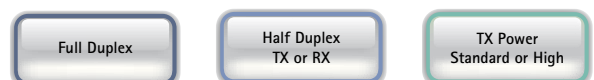


> ODU + Antenna

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

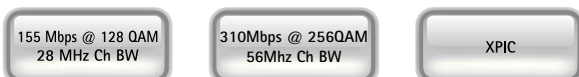


System Available configurations



Default

Option



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



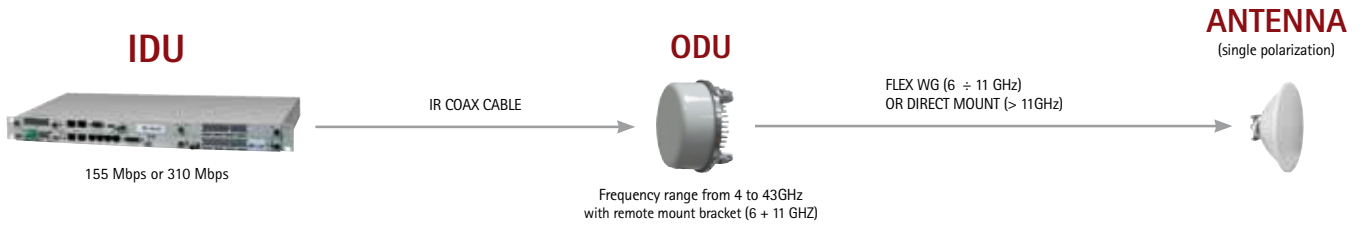
MECHANICAL/ENVIRONMENTAL

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

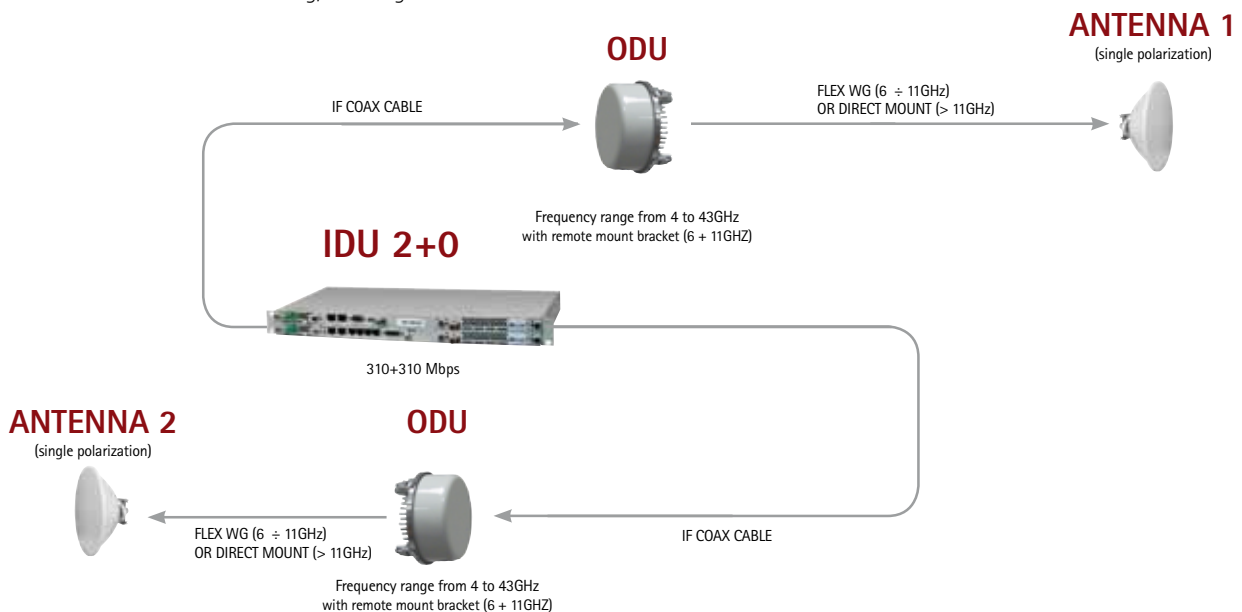
1+0 Basic Configuration



DRS/SM 2+0 EAST/WEST

2+0 East/West Configuration

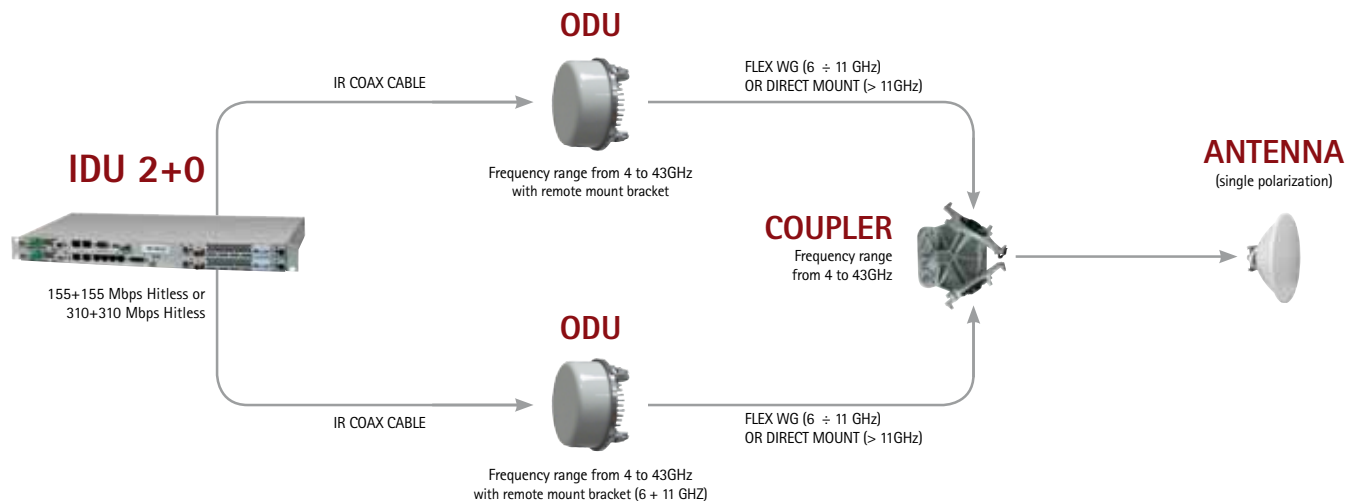
The Software Defined IDU supports a 2+0, or east-west, configuration that allows a consecutive point architecture to be achieved with only a single 1 RU chassis at each location. In this configuration the SDIDU contains two modems and may contain two power supplies. One modem is referred to as the west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

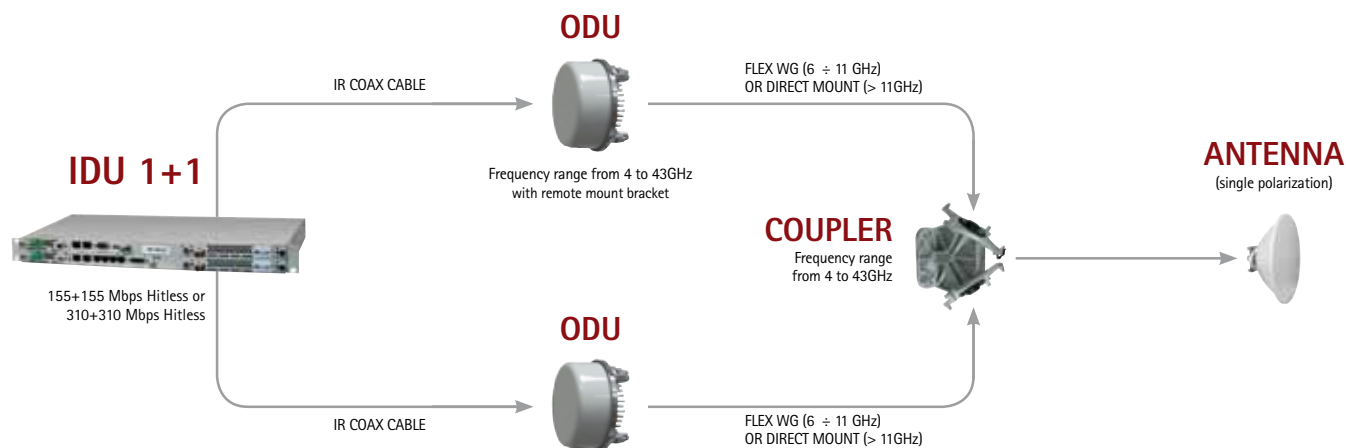
The SDIDU is capable of aggregating link bandwidth in 2+0 mode to achieve up to 600 Mbps Ethernet throughput when used with the Wideband Modem/IF modules in 56MHz with 128-QAM capable ODUs. The 2+0 East/East configuration allows for the doubling of the throughputs. When configured for 2+0 East/East, 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

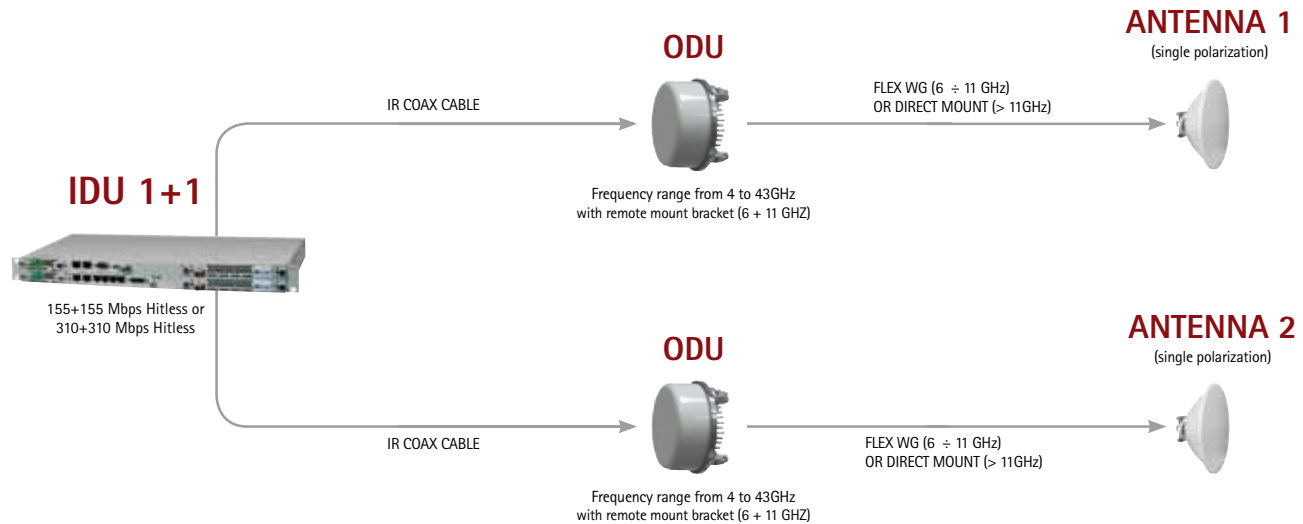
Protected Non-Diversity (Hot Standby)

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

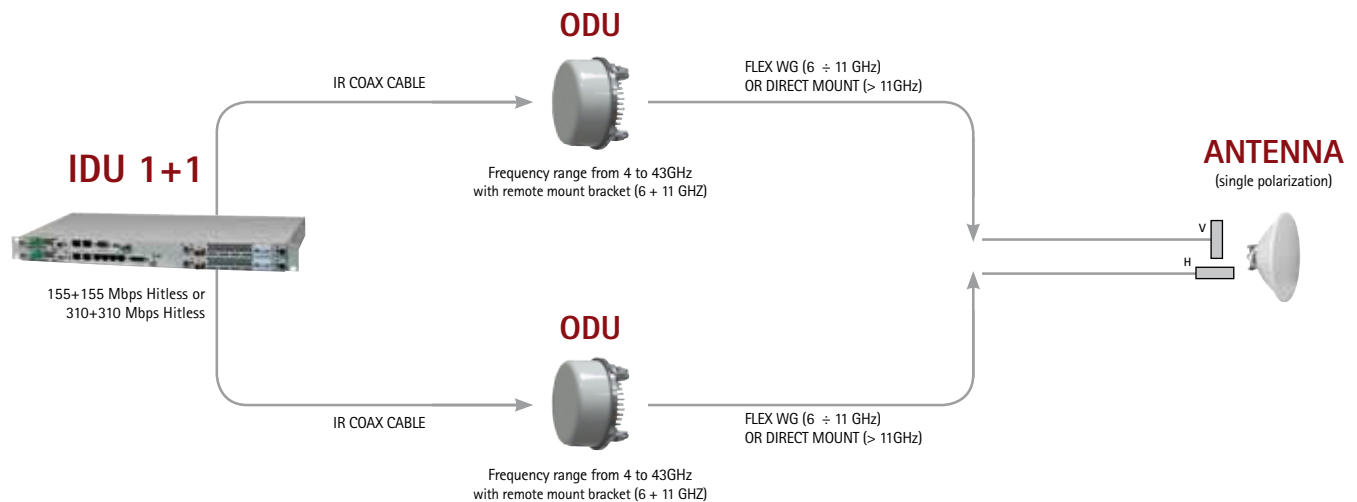
In Protected Diversity mode, the link between each pair of modems is the same, as shown in Figure, providing complete redundancy. This arrangement requires bandwidth for both links and non-interference between the links, but it provides hitless receive and transmit switching. The SDIDU supports both 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).



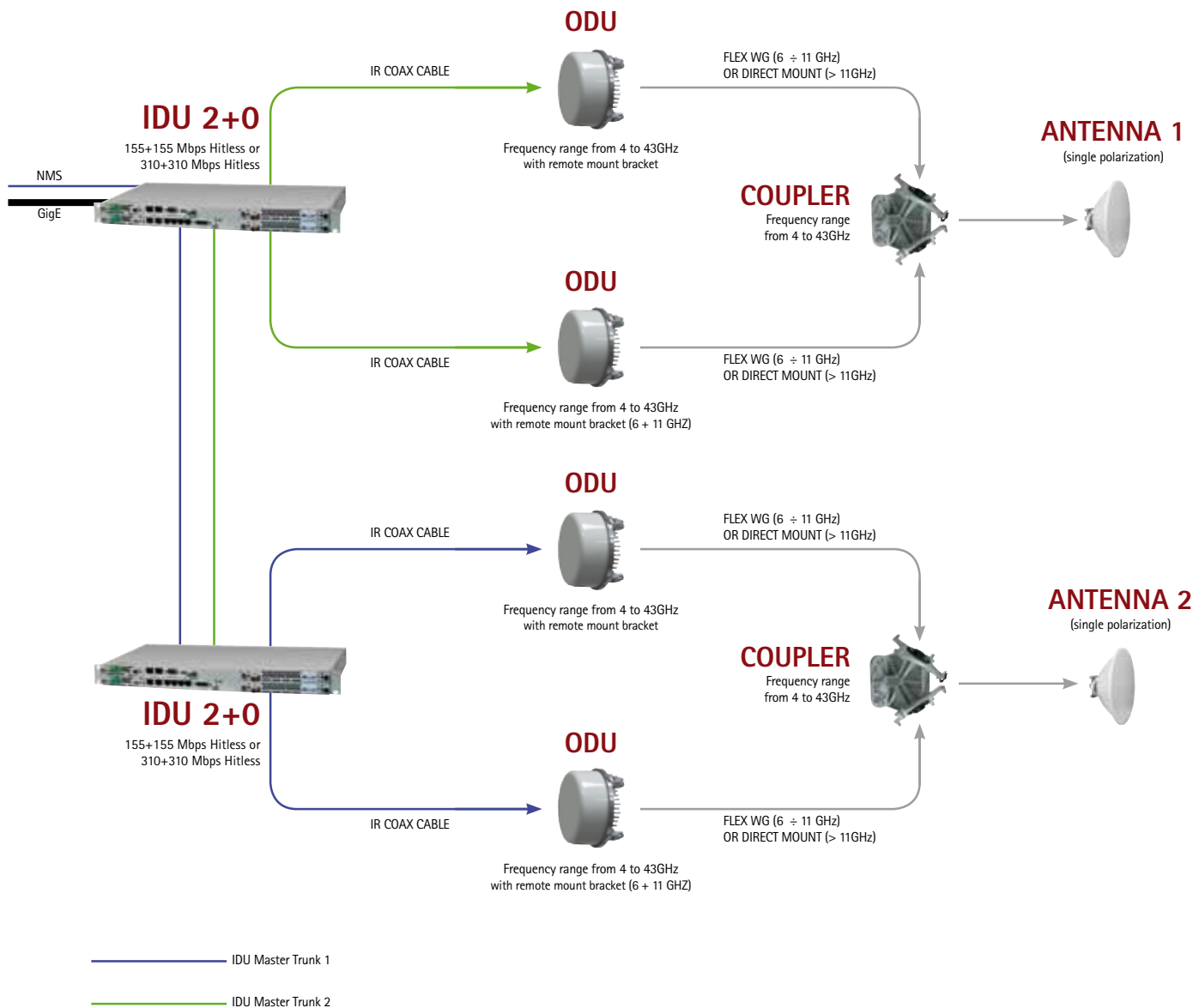
DRS/SM 4+0 EAST/EAST

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.

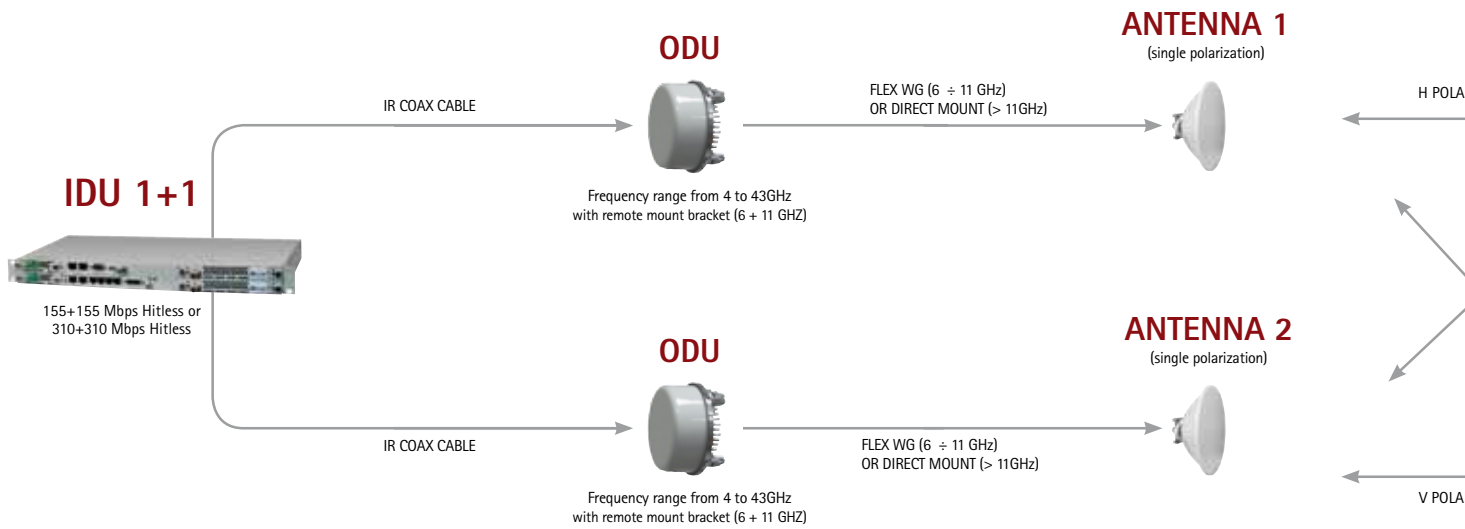
In the event of a link failure, throughput will only be reduced by one-quarter, and traffic on the failed link will be automatically re-routed to the remaining links.

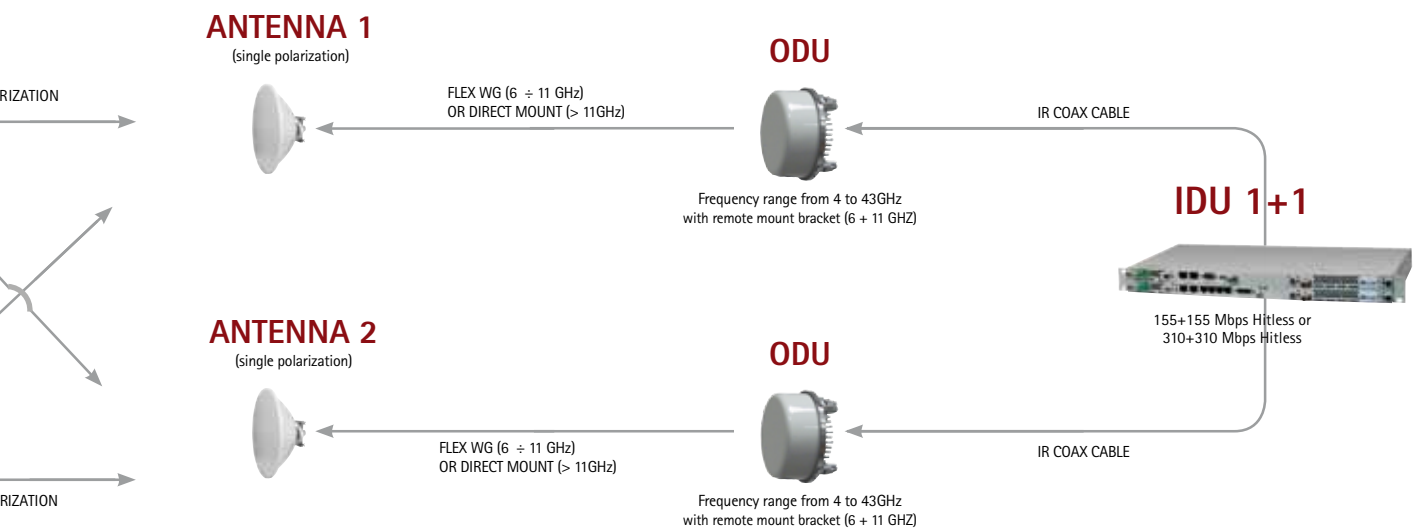


2+0 XPIC

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.





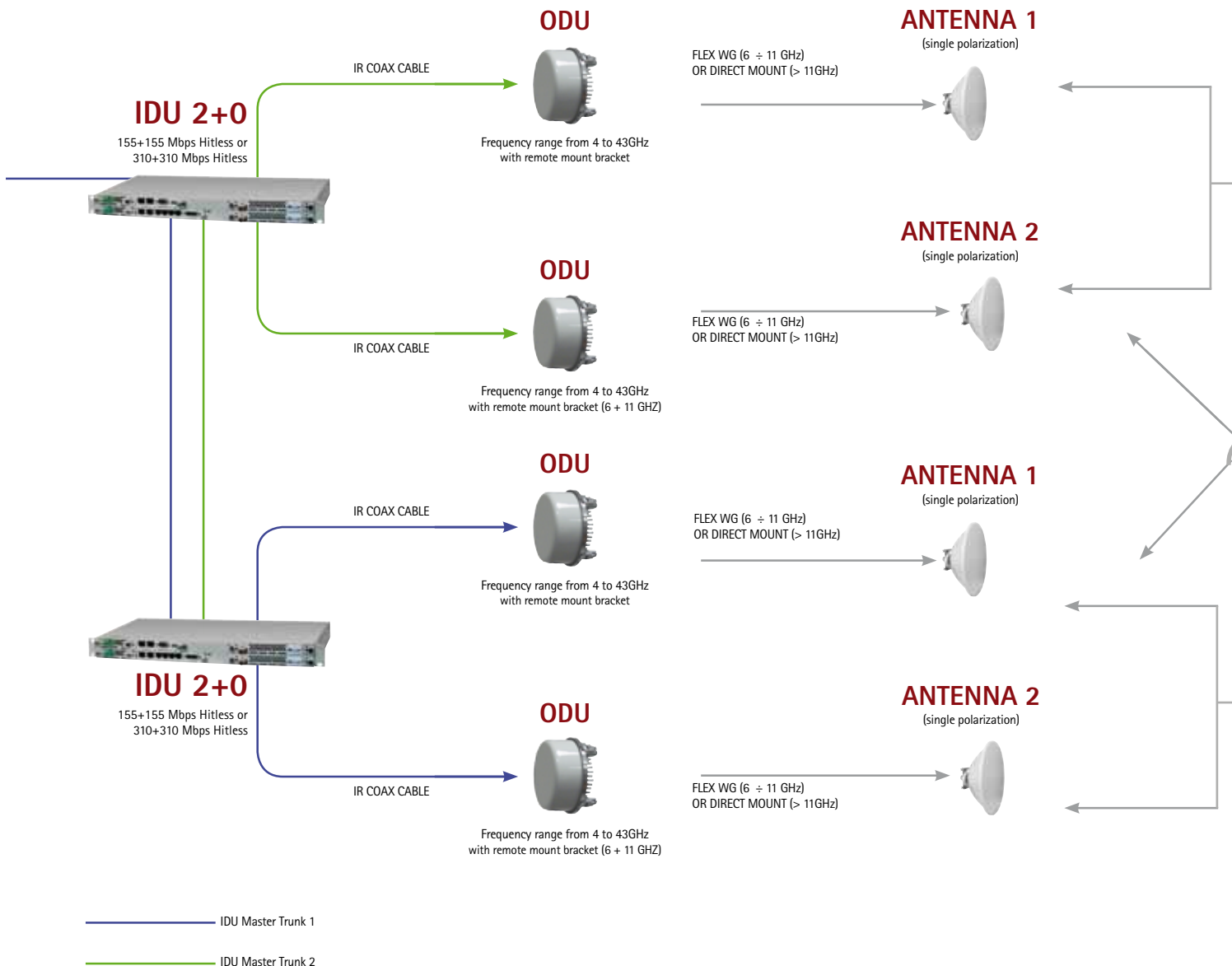
2+2 XPIC (Transmitter Switching)

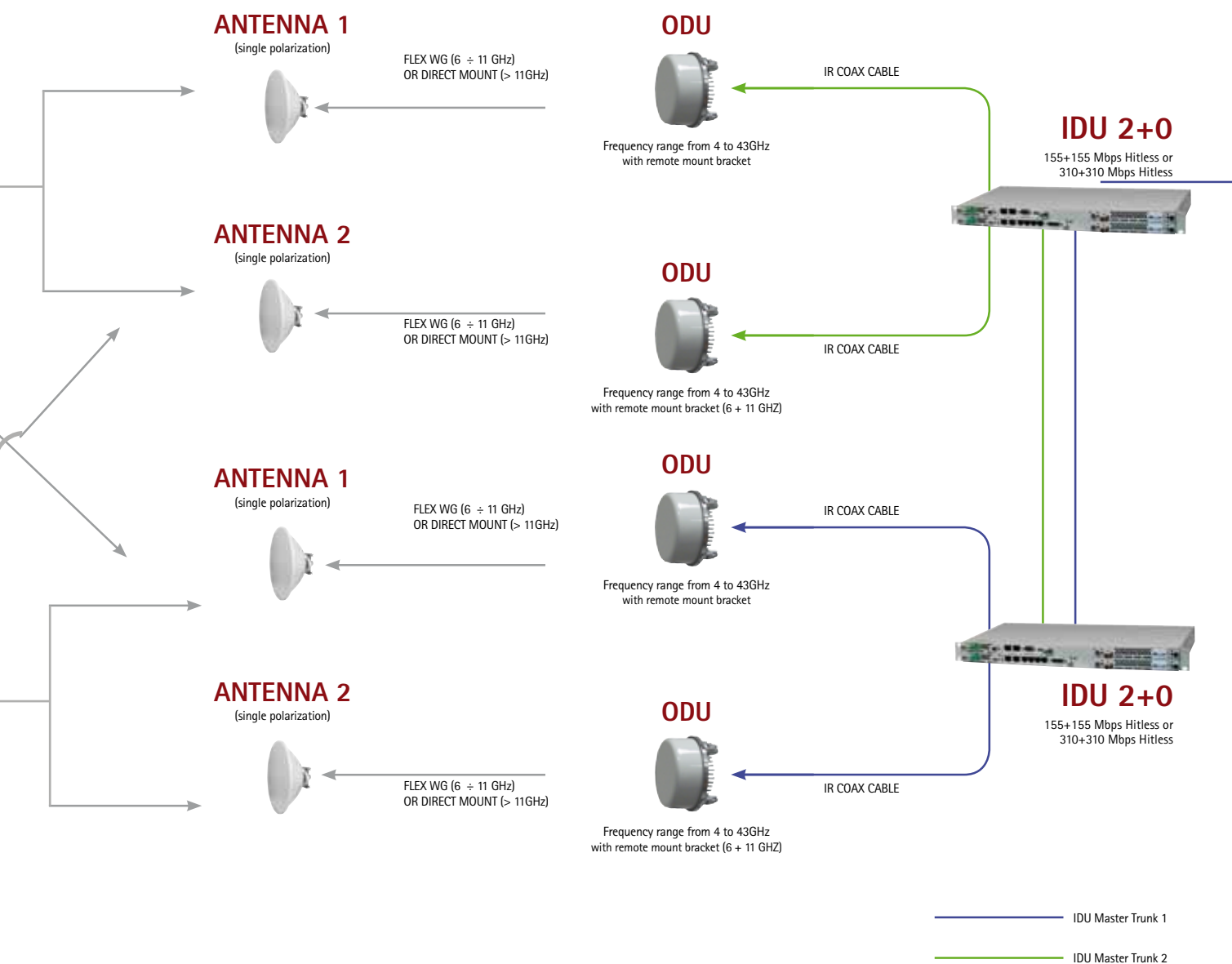
When configured into 2+2 XPIC mode, the DRS SDIDU shall perform transmitter switching as actually implemented for 1+1 transmitter switching. This includes, but is not limited to:

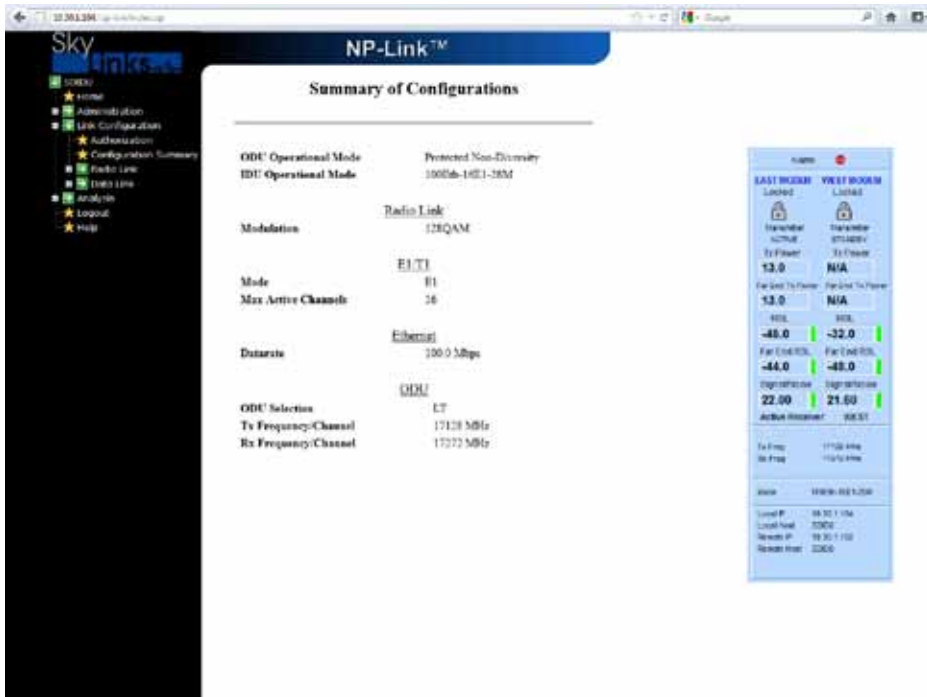
- ODU alarm switching
- ODU disconnect switching
- Manual switching via GUI, CLI, and SNMP
- Remote protection switching

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

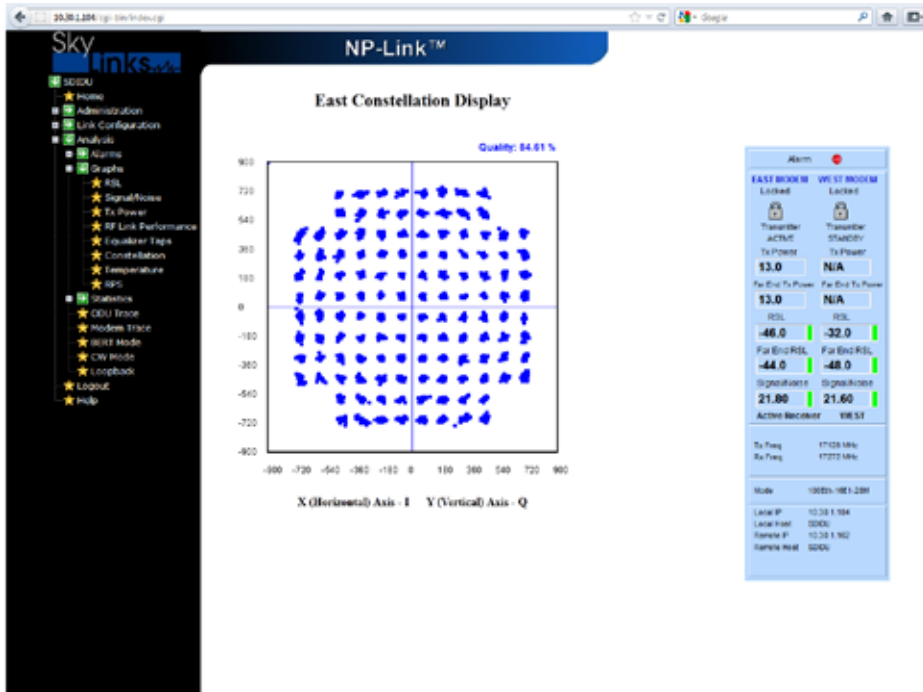
Each modem shall maintain a "Local protection state", which shall be bad if any of the Protection switching criteria is currently met, and good otherwise. Each modem shall report its "Local protection state" to the XPIC partner modem via the XPIC Serdes interface. The other modem shall track this as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



