

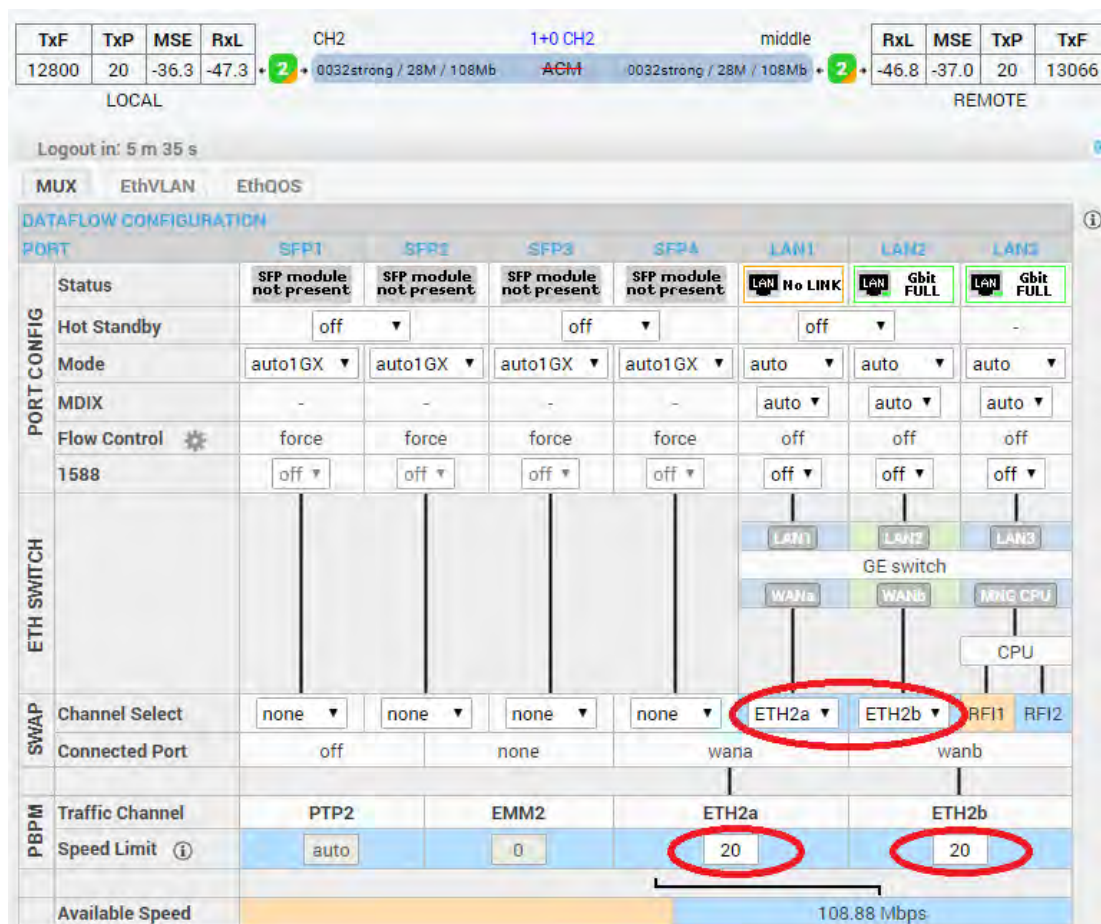


Figure 5.56 Example of port configuration in Endpoint IDU 2

13) Save new settings by pressing **Write** button.

The status of 1+0 Dual FD configuration is displayed in the header of the web GUI of the Repeater IDU:



Figure 5.57 Status of 1+0 Dual FD mode in Repeater IDU

The status of the Endpoint IDU 1 is displayed in the header of the web GUI:

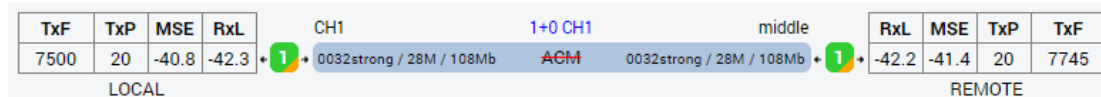


Figure 5.58 Status of 1+0 Ch1 mode in Endpoint IDU 1

The status of the Endpoint IDU 2 is displayed in the header of the web GUI:



Figure 5.59 Status of 1+0 Ch2 mode in Endpoint IDU 2

Example 9 – 1+1 HSB/SD Dual-band frequency protection scheme

The 1+1 HSB/SD (Hot Standby/Space Diversity) Dual-band frequency protection mode is specific mode which supports data transmission to one direction using one frequency channel/band, and for opposite direction another frequency channel/band. This mode allows even to have frequency channels of each direction in different frequency bands (for example – 7 GHz and 13 GHz frequency bands). Each frequency channel works in Simplex mode and is protected.

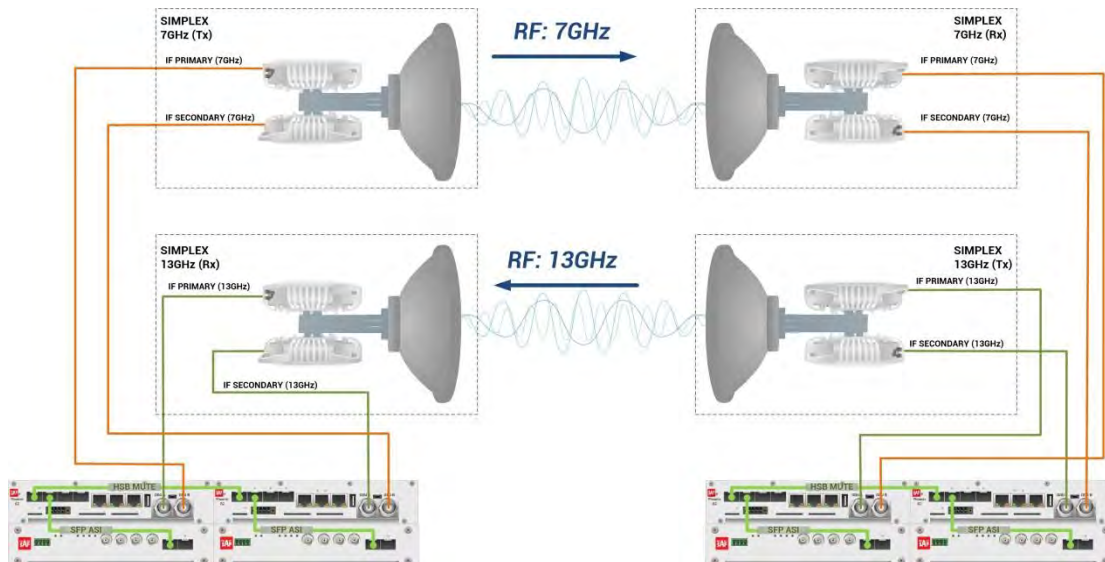


Figure 5.60 Example of 1+1 HSB/SD Dual-band frequency protection

In above mentioned scheme the ODUs and couplers can be substituted with IRFUs and IBUs combination if required by customer.

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 2+2', and Link diversity 'HSB/SD – hot standby' are selected on both link sides. One frequency channel works on Tx-only mode, but the second frequency channel works in Rx-only mode. The modulation is 32QAM in BW 60 MHz and the appropriate maximal data speed is about 227 Mbps per channel. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODUs per link.**



Both IDUs in each side of the link are interconnected with 2 optical cables on ports SFP1 and SFP2. 2.5 GB SFP modules must be used for this interconnection. SFP3 port is used for the IDU interconnection with ASI EMM module.

Configuration steps for 1+1 HSB/SD Dual-band frequency protection are following:

- 1) **IDU A (primary):**
 - a) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary'. As the link will use different frequency channels/bands for each direction then the Duplex Mode must be configured so that one of channels is in Tx mode, but the second channel is in Rx mode. In the example on Side A the Channel 1 is 'Tx-only' mode, and the Channel 2 is in 'Rx-only' mode.

Figure 5.61 Example of Side A Primary IDU system configuration

- b) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters. Frequency channel/band must be different for Channel 1 and Channel 2, and correspond to 'Tx-only' and 'Rx-only' Duplex mode settings in '[Config->System->Mode](#)' page.

Figure 5.62 Example of Side A Primary IDU radio configuration

- c) The ACM (Adaptive Coding and Modulation) must be disabled if Duplex modes "Tx only" and "Rx only" are used. In order to disable it, navigate to '[Config->Radio->ACM](#)' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

ADMIN permissions

Logout in: 17 m 18 s

Parameters ACM Advanced

ACM SETTINGS				CHANNEL 1	CHANNEL 2	Usual value	Note
ACM function		man p1		man p1		auto	
ACM Offset		0.0		0.0		0	-3.0 ... +3.0

Figure 5.63 Example of Side A Primary IDU ACM configuration

- d) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

ADMIN permissions

Logout in: 3 h 48 m 18 s

Addresses SNMP Advanced

MAIN ADDRESS SETTINGS		REQUIRED	CONFIGURED
Device IP / Mask		192.168.205.13 / 24	192.168.205.13/24
Default Gateway IP		192.168.205.1	192.168.205.1

OPTIONAL ADDRESS SETTINGS		REQUIRED	CONFIGURED
USB IP/Mask	☒ 10.10.11.10/24 ☐ 192.168.11.10/24		10.10.11.10/24
Fallback IP/Mask	☒ 10.10.10.10/24 ☐ 192.168.10.10/24		10.10.10.10/24

Undo Save

Figure 5.64 Example of Side A Primary IDU IP configuration

- e) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

The screenshot shows the SAF web GUI interface for IP NAT configuration. The left sidebar contains navigation links: ADMIN permissions, Status, Config (selected), System, Access, IP, Radio, Ports, Alarms, Maintenance, and Tools. The main content area is titled 'Config' and shows various configuration sections: STATIC ROUTES - INPUT VALUES, NAT - INPUT VALUES, RADIUS - INPUT VALUES, and SETTINGS. The NAT - INPUT VALUES section is expanded, showing a table with columns: Local_Port, Dest_IP/Port, Default NAT to remote, and a checkbox for WEB. The WEB checkbox is checked and highlighted with a red circle. The SETTINGS section shows a table with columns: Route, REQUIRED, and CONFIGURED. The CONFIGURED column contains the following text: default via 192.168.205.1, 1443 192.168.205.11.443, Default WEB NAT: on, (https://192.168.205.13:1443/, https://192.168.205.13:2443/), Default SSH NAT: off. The bottom of the page shows a 'Save' button.

Figure 5.65 Example of Side A Primary IDU IP NAT configuration

- f) Port group configuration must be done according to customer requirements. In this configuration when the Duplex modes “Tx-only” and “Rx-only” are used the remote management access via WAN port is not supported. That is why NAT configuration is required. In this example LAN1 port is used for the traffic, so LAN1 and WANa are grouped in the same group (Group 1). LAN2 and WANb are grouped in Group 2 and will not be used or can be intended for any other independent and separated user data traffic. LAN3 and MNG ports are grouped in Group3 for management access only via LAN3 port. Port grouping configuration is available in web GUI ‘[Config->Ports->EthVLAN](#)’ section

The screenshot shows the SAF web GUI interface for port grouping configuration. The left sidebar contains navigation links: ADMIN permissions, Status, Config (selected), System, Access, IP, Radio, Ports, Alarms, Maintenance, and Tools. The main content area is titled 'Config' and shows various configuration sections: MUX, EthVLAN (selected), EthQOS, and EMM. The EthVLAN section is expanded, showing a table with columns: VLAN MODE, LAN 1, LAN 2, LAN 3, MNG, WAN A, and WAN B. The 'Port Group' dropdown is set to 'group-1'. The 'Default VLAN' column contains the value 1. Below the table, there is a diagram showing the port grouping configuration: LAN1, LAN2, LAN3, WANa, WANb, and MNG CPU are grouped into three groups: group-1 (LAN1, WANa), group-2 (LAN2, WANb), and group-3 (LAN3, MNG CPU). The bottom of the page shows a 'Save' button.

Figure 5.66 Example of Side A Primary IDU port grouping

- g) In web GUI ‘[Config->Ports->MUX](#)’ specify Data channel and port speed for WAN (radio direction) port and SFP ports. In the example WANa port is connected to high priority data channel ‘ETH1a’ and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode ‘force2G5’

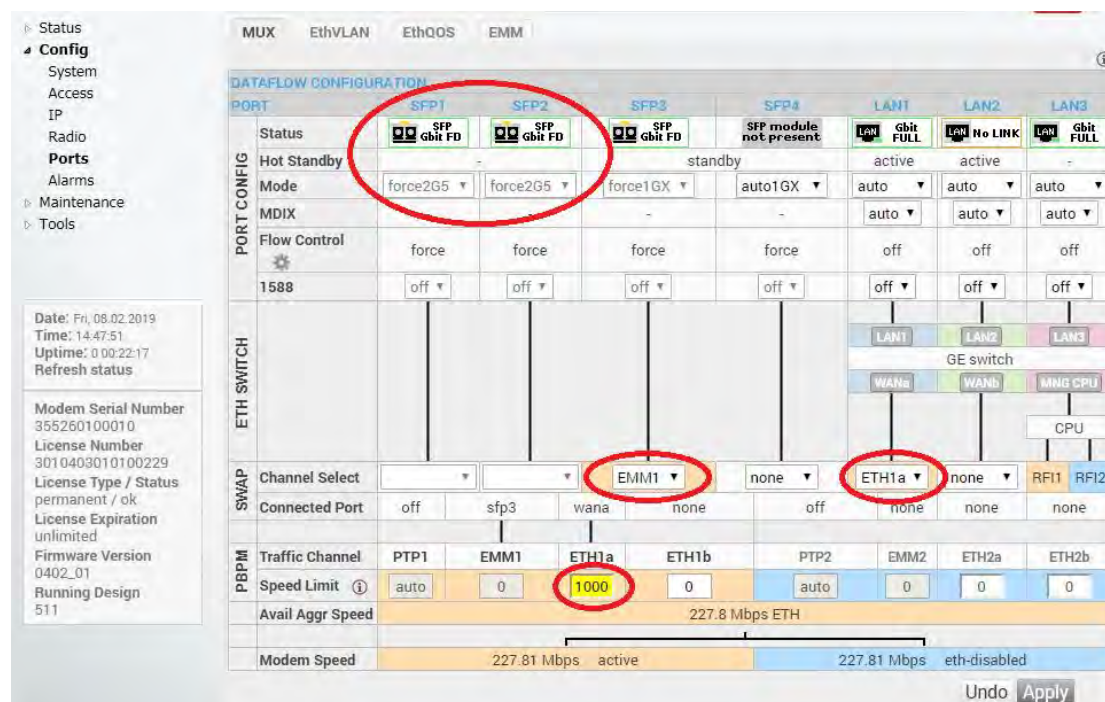


Figure 5.67 Example of Side A Primary IDU port configuration

- h) In web GUI '[Config->Ports->EMM](#)' configure the ASI traffic according to customer requirements. In the example one ASI traffic stream via ASI1 port is sent from side A to side B. In this case the ASI EMM configuration will be following: 'EMM Enable' and 'EMM Protection Failover' check-boxes must be checked. Also ASI EMM module 'Enable' check-box must be checked and 'Mode' set as "Rx"

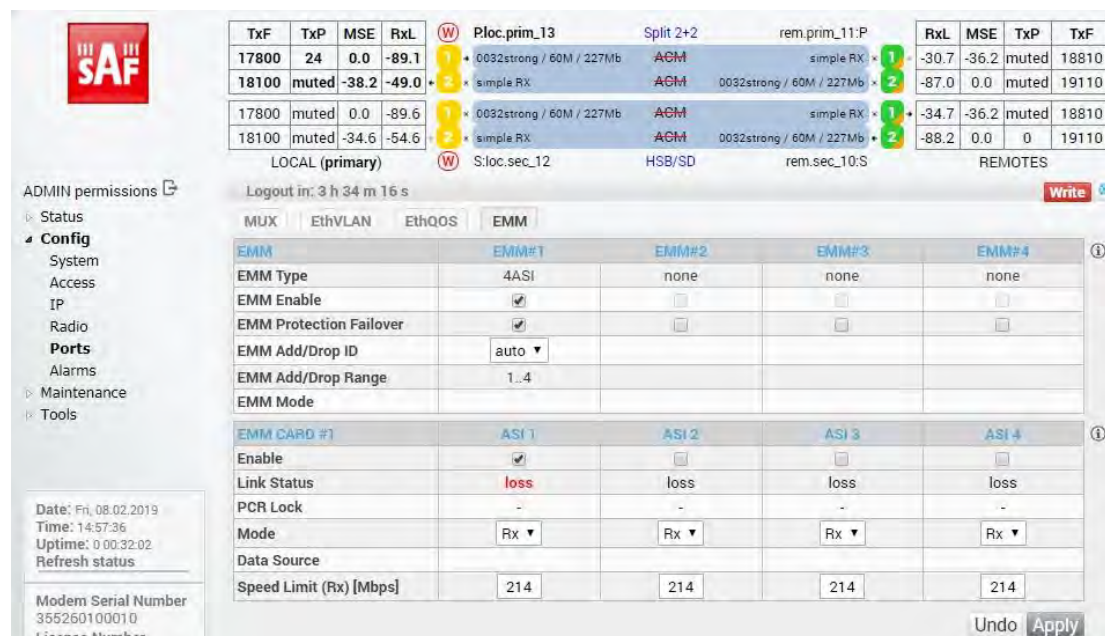


Figure 5.68 Example of Side A Primary IDU EMM configuration

- i) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

[Status](#)
[Config](#)
[System](#)
[Access](#)
[IP](#)
[Radio](#)
[Ports](#)
Alarms
[Maintenance](#)
[Tools](#)

Major		Minor		LOCAL (primary)		LOCAL		REMOTE		LOCAL		
WARNINGS		Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	THRESHOLDS		DETAILS			
Modem												
Modem Aggr/Prot	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem Data Sync	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem MSE Level	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	[dB]
Modem FER	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	[error_frm/10s]
Radio												
Radio RX Level	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	[dBm]
Radio TX Mute	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Ports												
Modem LAN1 Link	yes	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem LAN2 Link	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem LAN3 Link	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem SFP1 Link	no	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem SFP2 Link	no	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem SFP3 Link	yes	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Modem SFP4 Link	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
EMM#1 - 4AS1												
		Pri/Sec switch	CH 1		Peer (FO)	Direct RF	THRESHOLDS		DETAILS			
EMM HW+SW	no	☐	☐	☐	☐	☐	☐	☐	☐	☐	none	
SFP2 Link	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐		
P1 Link	yes	☒	☐	☐	☐	☐	☐	☐	☐	☐		
P1 Sync	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐		
P1 Idle	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐		
P1 Lock	yes	☐	☐	☐	☐	☐	☐	☐	☐	☐		

Date: Fri, 08.02.2019
 Time: 15:03:20
 Uptime: 0 00:37:46
[Refresh status](#)

Modem Serial Number
 355260100010
 License Number
 3010403010100229
 License Type / Status
 permanent / ok
 License Expiration
 unlimited
 Firmware Version
 0402_01
 Running Design
 511

Figure 5.69 Example of Side A Primary IDU alarm configuration

- j) Save new settings by pressing  button.
- 2) **IDU A (secondary):**
 - a) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed secondary'. As the link will use different frequency channels/bands for each direction then the Duplex Mode must be configured so that one of channels is in Tx mode, but the second channel is in Rx mode. In the example on Side A the Channel 1 is 'Tx-only' mode, and the Channel 2 is in 'Rx-only' mode



TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
17800	24	0.0	-88.8	1	→ D032strong / 60M / 227Mb	ACM	simple RX	1	-31.2	-36.2	muted	18810
18100	muted	-38.3	-48.8	2	→ simple RX	ACM	0032strong / 60M / 227Mb	2	-87.0	0.0	muted	19110
17800	muted	0.0	-89.6	1	→ D032strong / 60M / 227Mb	ACM	simple RX	1	-34.7	-36.3	muted	18810
18100	muted	-34.7	-54.4	2	→ simple RX	ACM	0032strong / 60M / 227Mb	2	-88.1	0.0	13	19110

LOCAL (secondary) S.loc.sec_12 HSB/SD rem.sec_10:S REMOTE(s)

Logout in: 19 m 52 s

ADMIN permissions

- Status
- Config**
 - System**
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
 - Maintenance
 - Tools

Date: Fri, 08.02.2019
Time: 15:10:25
Uptime: 0 00:44:57
[Refresh status](#)

Modem Serial Number

[Refresh](#)

Figure 5.70 Example of Side A Secondary IDU system configuration

- b) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters. Frequency channel/band must be different for Channel 1 and Channel 2, and correspond to 'Tx-only' and 'Rx-only' Duplex mode settings in '[Config->System->Mode](#)' page.

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17800	24	0.0	-88.8	1	0032strong / 60M / 227Mb	ACM	simple RX	-31.3	-36.3	muted	18810
18100	muted	-38.3	-48.9	2	simple RX	ACM	0032strong / 60M / 227Mb	-87.0	0.0	muted	19110
17800	muted	0.0	-89.5	1	0032strong / 60M / 227Mb	ACM	simple RX	-34.6	-36.3	muted	18810
18100	muted	-34.7	-54.4	2	simple RX	ACM	0032strong / 60M / 227Mb	-88.1	0.0	13	19110

LOCAL (secondary) S:loc.sec_12 HSB/SD rem.sec_10:S REMOTE(s)

Logout in: 16 m 36 s

Parameters ACM Advanced

MODEM	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	0032/strong	0032/strong	0032/strong	0032/strong
ACM Setting				
Advanced Setting	default	default		

RADIO	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	17800	18100	18810	19110
RX Frequency [MHz]	18810	19110	17800	18100
TX Power Limit [dBm]	20	13	20	13
TX Mute Config	auto	auto	auto	auto
ATPC Function				
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply local

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Fri, 08.02.2019

Time: 15:13:41

Uptime: 0 00:48:14

Refresh status

Modem Serial Number

355260100008

License Number

3010403010100227

License Type / Status

permanent / ok

Figure 5.71 Example of Side A Secondary IDU radio configuration

- c) The ACM (Adaptive Coding and Modulation) must be disabled if Duplex modes "Tx only" and "Rx only" are used. In order to disable it, navigate to '[Config->Radio->ACM](#)' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17800	13	0.0	-89.5	1	0032strong / 60M / 227Mb	ACM	simple RX	-41.7	-28.5	muted	18810
18100	muted	-39.2	-44.1	2	simple RX	ACM	0032strong / 60M / 227Mb	-87.1	0.0	-99.9	19110
17800	muted	0.0	-89.7	1	0032strong / 60M / 227Mb	ACM	simple RX	-46.0	-38.1	muted	18810
18100	muted	-36.7	-49.0	2	simple RX	ACM	0032strong / 60M / 227Mb	-88.7	0.0	muted	19110

LOCAL (secondary) S:loc.sec_12 HSB/SD rem.sec_10:S REMOTE(s)

Logout in: 19 m 38 s

Parameters ACM Advanced

ACM SETTINGS	CHANNEL 1	CHANNEL 2	Usual value	Note
ACM function	man p1	man p1	auto	
ACM Offset	0.0	0.0	0	-3.0 .. +3.0

Write

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Figure 5.72 Example of Side A Secondary IDU ACM configuration

- d) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

Figure 5.73 Example of Side A Secondary IDU IP configuration

- e) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

Figure 5.74 Example of Side A Secondary IDU IP NAT configuration

- f) Port group configuration must be done according to customer requirements. In this configuration when the Duplex modes "Tx-only" and "Rx-only" are used the remote management access via WAN port is not supported. That is why NAT configuration is required. In this example LAN1 port is used for the traffic, so LAN1 and WANa are grouped in the same group (Group 1). LAN2 and WANb are grouped in Group 2 and will not be used or can be intended for any other independent and separated user data traffic. LAN3 and MNG ports are grouped in Group3 for

management access only via LAN3 port. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section



Figure 5.75 Example of Side A Secondary IDU port grouping

- g) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode 'force2G5'

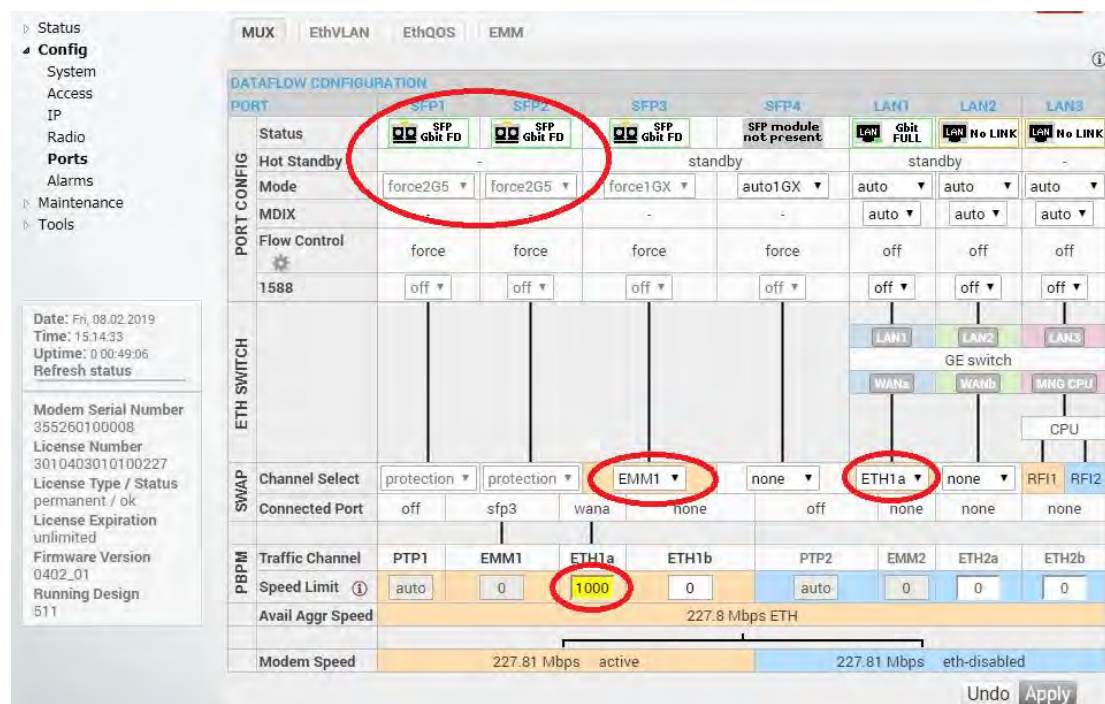


Figure 5.76 Example of Side A Secondary IDU port configuration

- h) In web GUI '[Config->Ports->EMM](#)' configure the ASI traffic according to customer requirements. In the example one ASI traffic stream via ASI1 port is sent from side A to side B. In this case the ASI EMM configuration will be following: 'EMM Enable' and 'EMM Protection Failover' check-boxes must be checked. Also ASI EMM module 'Enable' check-box must be checked and 'Mode' set as "Rx"

ADMIN permissions

Status
 Config
 System
 Access
 IP
 Radio
 Ports
 Alarms
 Maintenance
 Tools

Date: Fri, 08.02.2019
Time: 15:15:18
Uptime: 0 00:49:50
Refresh status

Modem Serial Number
355260100008
License Number

Logout in: 14 m 59 s Write

MUX | EthVLAN | EthQOS | EMM

EMM	EMM#1	EMM#2	EMM#3	EMM#4
EMM Type	4ASI	none	none	none
EMM Enable	☒	☐	☐	☐
EMM Protection Failover	☒	☐	☐	☐
EMM Add/Drop ID	auto			
EMM Add/Drop Range	1..4			
EMM Mode				

EMM CARD #1	ASI 1	ASI 2	ASI 3	ASI 4
Enable	☒	☐	☐	☐
Link Status	loss	loss	loss	loss
PCR Lock	-	-	-	-
Mode	Rx	Rx	Rx	Rx
Data Source				
Speed Limit (Rx) [Mbps]	214	214	214	214

Undo Apply

Figure 5.77 Example of Side A Secondary IDU EMM configuration

- i) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

Status
 Config
 System
 Access
 IP
 Radio
 Ports
 Alarms
 Maintenance
 Tools

Date: Fri, 08.02.2019
Time: 15:16:06
Uptime: 0 00:50:38
Refresh status

Modem Serial Number
355260100008
License Number
3010403010100227
License Type / Status
permanent / ok
License Expiration
unlimited
Firmware Version
0402_01
Running Design
511

Major | Minor

WARNINGS	Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	THRESHOLDS	DETAILS
Modem							
Modem Aggr/Prot	no	☐	☐	☐	☐		
Modem Data Sync	no	☐	☐	☐	☐		
Modem MSE Level	no	☐	☐	☐	☐	-25	-25
Modem FER	no	☐	☐	☐	☐	10	10
Radio							
Radio RX Level	no	☐	☐	☐	☐	-75	-75
Radio TX Mute	no	☐	☐	☐	☐		
Ports							
Modem LAN1 Link	yes	☒	☐	☐	☐		
Modem LAN2 Link	yes	☐	☐	☐	☐		
Modem LAN3 Link	no	☐	☐	☐	☐		
Modem SFP1 Link	no	☒	☐	☐	☐		
Modem SFP2 Link	no	☒	☐	☐	☐		
Modem SFP3 Link	yes	☒	☐	☐	☐		
Modem SFP4 Link	yes	☐	☐	☐	☐		
EMM#1 - 4ASI							
EMM HW+SW	no	☐	☐	☐	☐		none
SFP2 Link	yes	☐	☐	☐	☐		
P1 Link	yes	☒	☐	☐	☐		
P1 Sync	yes	☐	☐	☐	☐		
P1 Idle	yes	☐	☐	☐	☐		

Write

Figure 5.78 Example of Side A Secondary IDU alarm configuration

- j) Save new settings by pressing Write button.
- 3) IDU B (primary):
- a) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link

Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary'. As the link will use different frequency channels/bands for each direction then the Duplex Mode must be configured so that one of channels is in Tx mode, but the second channel is in Rx mode. In the example on Side B the Channel 1 is 'Rx-only' mode, and the Channel 2 is in 'Tx-only' mode

Table 1: Radio Parameters

TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:P	W	RxL	MSE	TxP	TxF
18810	muted	-36.2	-31.0	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-88.9	0.0	24	17800
19110	24	0.0	-87.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-32.6	-20.2	muted	18100
18810	muted	-36.3	-34.7	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.5	0.0	muted	17800
19110	muted	0.0	-88.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-38.3	-36.3	muted	18100

Table 2: Configuration Parameters

Mode	Description	Date&Time	Advanced
DESIGN CONFIGURATION			
Design Type	Design 511		Apply
DESIGN MODES			
Functional Mode	Split 2+2		Apply
Link Protection Diversity	HSB/SD - Hot standby		Apply
Link Aggregation Diversity	FD		FO peer connected - it's role will be set automatically.
Hot-Swap Startup Device Role	Fixed primary		
RADIO MODES			
CHANNEL 1		CHANNEL 2	
Duplex Mode	Rx Only	Tx Only	Apply

Figure 5.79 Example of Side B Primary IDU system configuration

- b) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters. Frequency channel/band must be different for Channel 1 and Channel 2, and correspond to 'Tx-only' and 'Rx-only' Duplex mode settings in '[Config->System->Mode](#)' page.

Table 3: Radio Parameters

TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:P	W	RxL	MSE	TxP	TxF
18810	muted	-36.2	-31.1	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-88.8	0.0	24	17800
19110	24	0.0	-87.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-32.6	-20.7	muted	18100
18810	muted	-36.3	-34.5	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.5	0.0	muted	17800
19110	muted	0.0	-88.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-38.1	-35.9	muted	18100

Table 4: Configuration Parameters

Parameters	ACM	Advanced
MODEM		
Bandwidth	60000_02	60000_02
Max RxACM Profile	0032/strong	0032/strong
ACM Setting	default	default
Advanced Setting	default	default
RADIO		
T/R Spacing	fixed	fixed
TX Frequency [MHz]	18810	19110
RX Frequency [MHz]	17800	18100
TX Power Limit [dBm]	26	26
TX Mute Config	auto	auto
ATPC Function		
ATPC RX Level [dBm]	-55	-55

Figure 5.80 Example of Side B Primary IDU radio configuration

- c) The ACM (Adaptive Coding and Modulation) must be disabled if Duplex modes “Tx only” and “Rx only” are used. In order to disable it, navigate to ‘[Config->Radio->ACM](#)’ in the web GUI and set ACM function to “man p1” on both Channels. This setting disables the ACM

TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:P	W	RxL	MSE	TxP	TxF
18810	muted	-28.5	-41.7	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.5	0.0	13	17800
19110	13	0.0	-87.1	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-44.2	-39.1	muted	18100
18810	muted	-38.1	-46.1	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.7	0.0	muted	17800
19110	muted	0.0	-88.6	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-49.0	-36.9	muted	18100

Figure 5.81 Example of Side B Primary IDU ACM configuration

- d) In web GUI ‘[Config->IP->Addresses](#)’ set the IP address of the device. The IP address must be different for each IDU

TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:P	W	RxL	MSE	TxP	TxF
18810	muted	-36.2	-31.1	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-88.8	0.0	24	17800
19110	24	0.0	-87.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-32.6	-20.7	muted	18100
18810	muted	-36.3	-34.5	1	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.5	0.0	muted	17800
19110	muted	0.0	-88.0	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-38.1	-35.9	muted	18100

Figure 5.82 Example of Side B Primary IDU IP configuration

- e) In web GUI ‘[Config->IP->Advanced](#)’ set ‘WEB’ option as Default NAT to remote. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the remote primary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:1443>

The screenshot shows the SAF web GUI interface. On the left is a sidebar with navigation options: ADMIN permissions, Status, Config (System, Access, IP, Radio, Ports, Alarms), Maintenance, and Tools. The main area displays the 'Config' section for IP NAT. It includes sections for 'STATIC ROUTES - INPUT VALUES', 'NAT - INPUT VALUES', and 'RADIUS - INPUT VALUES'. The 'NAT - INPUT VALUES' section has a 'Default NAT to remote' field with a 'WEB' checkbox checked and highlighted by a red circle. Below this is a 'SETTINGS' table with columns 'REQUIRED' and 'CONFIGURED'. The 'CONFIGURED' column shows 'Default WEB NAT: on' with a link to 'https://192.168.205.13:1443/1443/'. At the bottom left, there is a status box showing 'Date: Fri, 08.02.2019', 'Time: 13:19:59', 'Uptime: 0 00:53:50', and 'Refresh status'. Below that are 'Modem Serial Number: 355260100009' and 'License Number: 3010403010100228'.

Figure 5.83 Example of Side B Primary IDU IP NAT configuration

- f) Port group configuration must be done according to customer requirements. In this configuration when the Duplex modes "Tx-only" and "Rx-only" are used the remote management access via WAN port is not supported. That is why NAT configuration is required. In this example LAN1 port is used for the traffic, so LAN1 and WANa are grouped in the same group (Group 1). LAN2 and WANb are grouped in Group 2 and will not be used or can be intended for any other independent and separated user data traffic. LAN3 and MNG ports are grouped in Group3 for management access only via LAN3 port. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section

The screenshot shows the SAF web GUI interface with the 'EthVLAN' tab selected. The main area displays the 'VLAN MODE' table with columns for 'LAN 1', 'LAN 2', 'LAN 3', 'MNG', 'WAN A', and 'WAN B'. The 'Port Mode' is set to 'basic' for all ports. The 'Port Group' is set to 'group-1' for LAN 1, 'group-2' for LAN 2, 'group-3' for LAN 3, 'group-1' for WAN A, and 'group-2' for WAN B. The 'Default VLAN' is set to 1 for all ports. Below the table is a diagram showing the port connections: LAN1, LAN2, LAN3, WANa, WANb, and MNG CPU are connected to a 'GE switch'.

Figure 5.84 Example of Side B Primary IDU port grouping

- g) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode 'force2G5'

Figure 5.85 Example of Side B Primary IDU port configuration

- h) In web GUI '[Config->Ports->EMM](#)' configure the ASI traffic according to customer requirements. In the example one ASI traffic stream via ASI1 port is sent from side A to side B. In this case the ASI EMM configuration will be following: 'EMM Enable' and 'EMM Protection Failover' check-boxes must be checked. Also ASI EMM module 'Enable' check-box must be checked and 'Mode' set as "Tx". The Data Source in this case must be specified as 'Remote Ch1'

Figure 5.86 Example of Side B Primary IDU EMM configuration

- i) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must

be checked in order to initiate the switch-over in case of failure of any of those interfaces

▷ Status
 ▲ **Config**
 System
 Access
 IP
 Radio
 Ports
Alarms
 ▷ Maintenance
 ▷ Tools

Date: Fri, 08.02.2019
 Time: 13:23:13
 Uptime: 0 00:57:04
 Refresh status

Modem Serial Number
 355260100009
 License Number
 3010403010100228
 License Type / Status
 permanent / ok
 License Expiration
 unlimited
 Firmware Version
 0402_01
 Running Design
 511

Major	Minor	LOCAL (primary)				LOCAL	REMOTE	LOCAL			
WARNINGS		Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	THRESHOLDS				DETAILS
Modem											
Modem Aggr/Prot	no		☐	☒	☒	☒	☒				
Modem Data Sync	no	☐	☒	☐	☒	☒	☒	☒	☒		
Modem MSE Level	no	☐	☒	☐	☒	☒	☒	☒	☒	-25 ⓘ	-25 ⓘ [dB]
Modem FER	no	☐	☒	☐	☒	☒	☒	☒	☒	10 ⓘ	10 ⓘ [error_frm/10s]
Radio											
Radio RX Level	no	☐	☒	☐	☒	☒	☒	☒	☒	-75 ⓘ	-75 ⓘ [dBm]
Radio TX Mute	no	☐	☒	☐	☒	☒	☒	☒	☒		
Ports											
Modem LAN1 Link	yes		☒	☒	☒	☒	☒				
Modem LAN2 Link	yes		☐	☒	☒	☒	☒				
Modem LAN3 Link	no		☐	☒	☒	☒	☒				
Modem SFP1 Link	no		☒	☒	☒	☒	☒				
Modem SFP2 Link	no		☒	☒	☒	☒	☒				
Modem SFP3 Link	yes		☒	☒	☒	☒	☒				
Modem SFP4 Link	yes		☐	☒	☒	☒	☒				

EMM#1 - 4ASI	Pri/Sec switch	CH 1	Peer (FO)	Direct RF	LOCAL	
					THRESHOLDS	DETAILS
EMM HW+SW	no	☐	☒	☒		none
SFP2 Link	yes	☐	☒	☒		
P1 Link	yes	☒	☒	☒		
P1 Sync	yes	☐	☒	☒		
P1 Idle	yes	☐	☒	☒		

Figure 5.87 Example of Side B Primary IDU alarm configuration

j) Save new settings by pressing button.

4) **IDU B (secondary):**

- a) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed secondary'. As the link will use different frequency channels/bands for each direction then the Duplex Mode must be configured so that one of channels is in Tx mode, but the second channel is in Rx mode. In the example on Side B the Channel 1 is 'Rx-only' mode, and the Channel 2 is in 'Tx-only' mode

ADMIN permissions

▷ Status

▲ **Config**

System

Access

IP

Radio

Ports

Alarms

▷ Maintenance

▷ Tools

Date: Fri, 08.02.2019
Time: 15:26:03
Uptime: 0 00:59:20
Refresh status

Modem Serial Number:
Refresh Undo

TxF	TxP	MSE	RxL																	
18810	muted	-36.1	-31.0	1	Prem.prim_11	Split 2+2	loc.prim_13:P	1	RxL	MSE	TxP	TxF								
19110	24	0.0	-86.7	2	simple RX	ACM	0032strong / 60M / 227Mb	1	-88.8	0.0	24	17800								
18810	muted	-36.2	-34.8	1	0032strong / 60M / 227Mb	ACM	simple RX	2	-32.7	-20.8	muted	18100								
19110	muted	0.0	-88.1	2	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.5	0.0	muted	17800								
19110	muted	0.0	-88.2	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-38.3	-36.3	muted	18100								

LOCAL (secondary) W S:rem.sec_10 HSB/SD loc.sec_12:S W REMOTE(s)

Logout in: 19 m 35 s Write

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (secondary) ACTION i

Design Type Design 511 Apply

DESIGN MODES LOCAL (secondary) ACTION i

Functional Mode Split 2+2 Apply

Link Protection Diversity HSB/SD - Hot standby Apply

Link Aggregation Diversity FD FO peer connected - it's role will be set automatically.

Hot-Swap Startup Device Role Fixed secondary

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION i

Duplex Mode Apply

Caution: manually set the RF neighbour Radio Mode to Simple Tx mode

Caution: manually set the RF neighbour Radio Mode to Simple Rx mode

Figure 5.88 Example of Side B Secondary IDU system configuration

- b) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters. Frequency channel/band must be different for Channel 1 and Channel 2, and correspond to 'Tx-only' and 'Rx-only' Duplex mode settings in '[Config->System->Mode](#)' page

ADMIN permissions

▷ Status

▲ **Config**

System

Access

IP

Radio

Ports

Alarms

▷ Maintenance

▷ Tools

Date: Fri, 08.02.2019
Time: 15:27:11
Uptime: 0 01:00:28
Refresh status

Modem Serial Number 355260100011
License Number 3010403010100230
License Type / Status permanent / ok

TxF	TxP	MSE	RxL																	
18810	muted	-36.1	-30.9	1	Prem.prim_11	Split 2+2	loc.prim_13:P	1	RxL	MSE	TxP	TxF								
19110	24	0.0	-86.8	2	simple RX	ACM	0032strong / 60M / 227Mb	1	-88.8	0.0	24	17800								
18810	muted	-36.2	-34.7	1	0032strong / 60M / 227Mb	ACM	simple RX	2	-32.8	-20.7	muted	18100								
19110	muted	0.0	-88.2	2	simple RX	ACM	0032strong / 60M / 227Mb	1	-89.4	0.0	muted	17800								
19110	muted	0.0	-88.2	2	0032strong / 60M / 227Mb	ACM	simple RX	2	-38.2	-36.2	muted	18100								

LOCAL (secondary) W S:rem.sec_10 HSB/SD loc.sec_12:S W REMOTE(s)

Logout in: 19 m 24 s Write

Parameters ACM Advanced

MODEM LOCAL REMOTE i

CHANNEL 1 CHANNEL 2 CHANNEL 1 CHANNEL 2

Bandwidth 60000_02 60000_02 60000_02 60000_02

Max RxACM Profile 0032/strong 0032/strong 0032/strong 0032/strong

ACM Setting - -

Advanced Setting default default - -

RADIO LOCAL REMOTE i

CHANNEL 1 CHANNEL 2 CHANNEL 1 CHANNEL 2

T/R Spacing fixed fixed fixed fixed

TX Frequency [MHz] 18810 19110 17800 18100

RX Frequency [MHz] 17800 18100 18810 19110

TX Power Limit [dBm] 20 13 20 13

TX Mute Config auto auto auto auto

ATPC Function ☐ ☐ ☐ ☐

ATPC RX Level [dBm] -55 -55 -55 -55

Refresh Undo Apply local

Figure 5.89 Example of Side B Secondary IDU radio configuration

- c) The ACM (Adaptive Coding and Modulation) must be disabled if Duplex modes "Tx only" and "Rx only" are used. In order to disable it, navigate to '[Config->Radio->ACM](#)' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM



Figure 5.90 Example of Side B Secondary IDU ACM configuration

- d) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU



Figure 5.91 Example of Side B Secondary IDU IP configuration

- e) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the remote secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:3443>

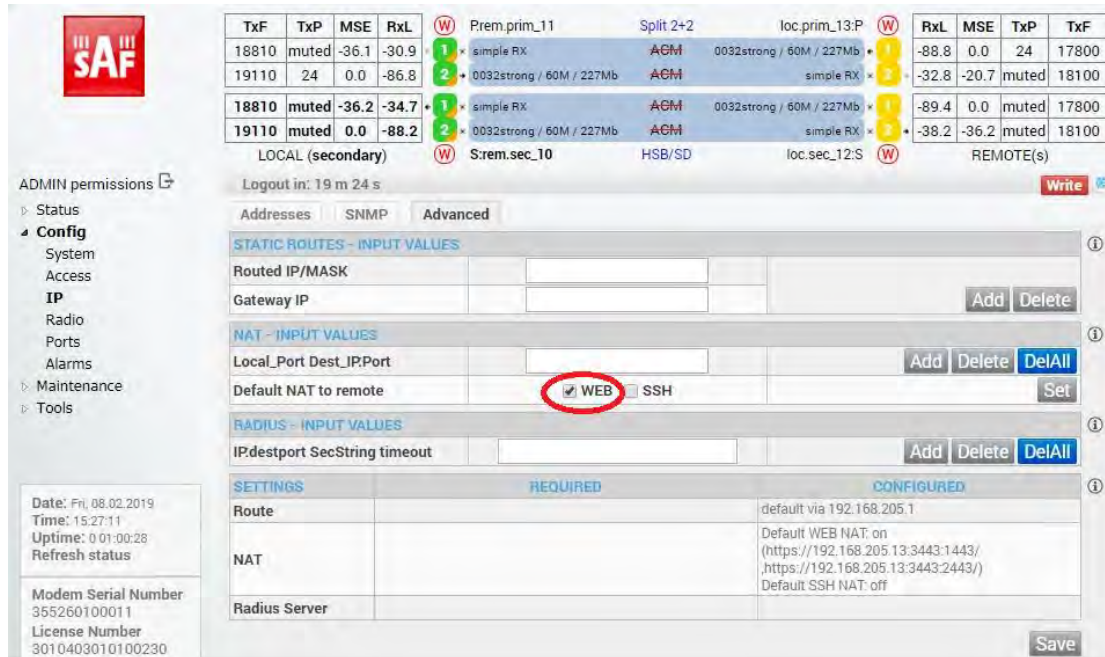


Figure 5.92 Example of Side B Secondary IDU IP NAT configuration

- f) Port group configuration must be done according to customer requirements. In this configuration when the Duplex modes “Tx-only” and “Rx-only” are used the remote management access via WAN port is not supported. That is why NAT configuration is required. In this example LAN1 port is used for the traffic, so LAN1 and WANa are grouped in the same group (Group 1). LAN2 and WANb are grouped in Group 2 and will not be used or can be intended for any other independent and separated user data traffic. LAN3 and MNG ports are grouped in Group3 for management access only via LAN3 port. Port grouping configuration is available in web GUI [‘Config->Ports->EthVLAN’](#) section

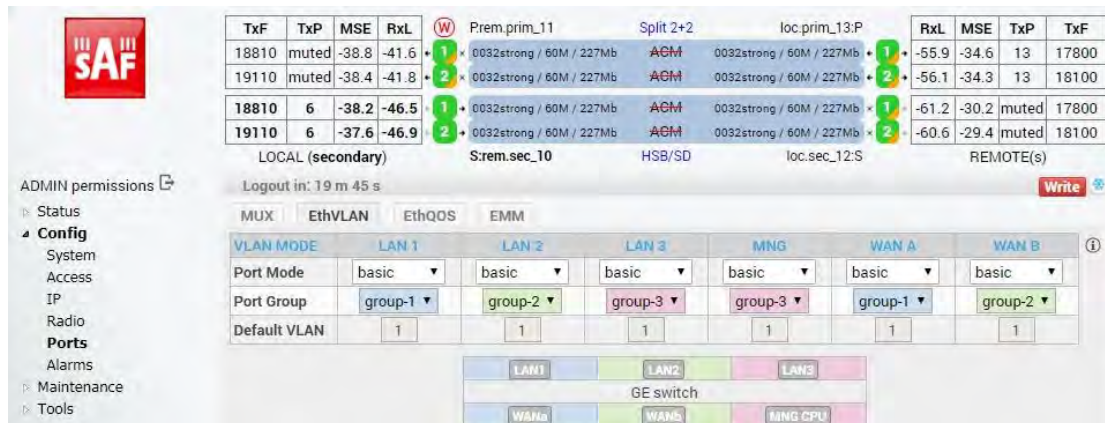


Figure 5.93 Example of Side B Secondary IDU port grouping

- g) In web GUI [‘Config->Ports->MUX’](#) specify Data channel and port speed for WAN (radio direction) port and SFP ports. In the example WANa port is connected to high priority data channel ‘ETH1a’ and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode ‘force2G5’

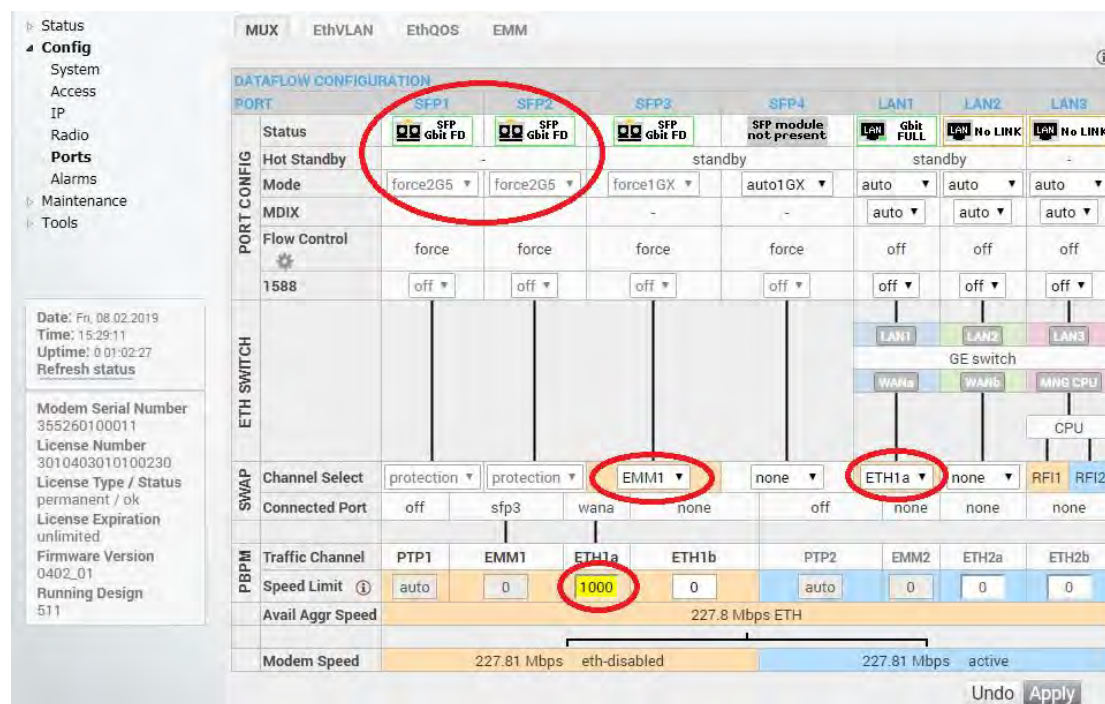


Figure 5.94 Example of Side B Secondary IDU port configuration

- h) In web GUI '[Config->Ports->EMM](#)' configure the ASI traffic according to customer requirements. In the example one ASI traffic stream via ASI1 port is sent from side A to side B. In this case the ASI EMM configuration will be following: 'EMM Enable' and 'EMM Protection Failover' check-boxes must be checked. Also ASI EMM module 'Enable' check-box must be checked and 'Mode' set as "Tx". The Data Source in this case must be specified as 'Remote Ch1'



Figure 5.95 Example of Side B Secondary IDU EMM configuration

- i) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

[Status](#)
[Config](#)
[System](#)
[Access](#)
[IP](#)
[Radio](#)
[Ports](#)
[Alarms](#)
[Maintenance](#)
[Tools](#)

Date: Fri, 08.02.2019
Time: 15:30:10
Uptime: 0 01:03:26
[Refresh status](#)

Modem Serial Number
355260100011
License Number
3010403010100230
License Type / Status
permanent / ok
License Expiration
unlimited
Firmware Version
0402_01
Running Design
511

Major	Minor	LOCAL (secondary)			LOCAL	REMOTE	LOCAL		
WARNINGS		Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	THRESHOLDS		DETAILS
Modem									
Modem Aggr/Prot		no	☐	☒	☒	☒			
Modem Data Sync		no	☐	☒	☒	☒			
Modem MSE Level		no	☐	☒	☒	☒	-25	☒	-25 ☒ [dB]
Modem FER		no	☐	☒	☒	☒	10	☒	10 ☒ [error_fm/10s]
Radio									
Radio RX Level		no	☐	☒	☒	☒	-75	☒	-75 ☒ [dBm]
Radio TX Mute		no	☐	☒	☒	☒			
Ports									
Modem LAN1 Link		yes	☒	☒	☒	☒			
Modem LAN2 Link		yes	☐	☒	☒	☒			
Modem LAN3 Link		no	☐	☒	☒	☒			
Modem SFP1 Link		no	☒	☒	☒	☒			
Modem SFP2 Link		no	☒	☒	☒	☒			
Modem SFP3 Link		yes	☒	☒	☒	☒			
Modem SFP4 Link		yes	☐	☒	☒	☒			

	LOCAL (secondary)		REMOTE	LOCAL	LOCAL		
EMM#1 - 4AS1	Pri/Sec switch	CH 1	Peer (Fo)	Direct RF	THRESHOLDS		DETAILS
EMM HW+SW	no	☐	☒	☒			none
SFP2 Link	yes	☐	☒	☒			
P1 Link	yes	☒	☒	☒			
P1 Sync	yes	☐	☒	☒			
P1 Idle	yes	☐	☒	☒			

Figure 5.96 Example of Side B Secondary IDU alarm configuration

j) Save new settings by pressing  button.

- 5) Reboot all 4 IDUs after successful reconfiguration
- 6) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' in both Primary IDUs in order to enable protection mode



TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prim_11:P
17800	24	0.0	-89.0	1	0032strong / 60M / 227Mb	ACM	simple RX
18100	muted	-38.3	-49.0	2	simple RX	ACM	0032strong / 60M / 227Mb
17800	muted	0.0	-89.5	1	0032strong / 60M / 227Mb	ACM	simple RX
18100	muted	-34.6	-54.4	2	simple RX	ACM	0032strong / 60M / 227Mb

LOCAL (primary)
S.loc.sec_12
HSB/SD
rem.sec_10:S

RxL	MSE	TxP	TxF
-31.1	-36.2	muted	18810
-87.0	0.0	muted	19110
-34.6	-36.3	muted	18810
-88.1	0.0	0	19110

ADMIN permissions
Write

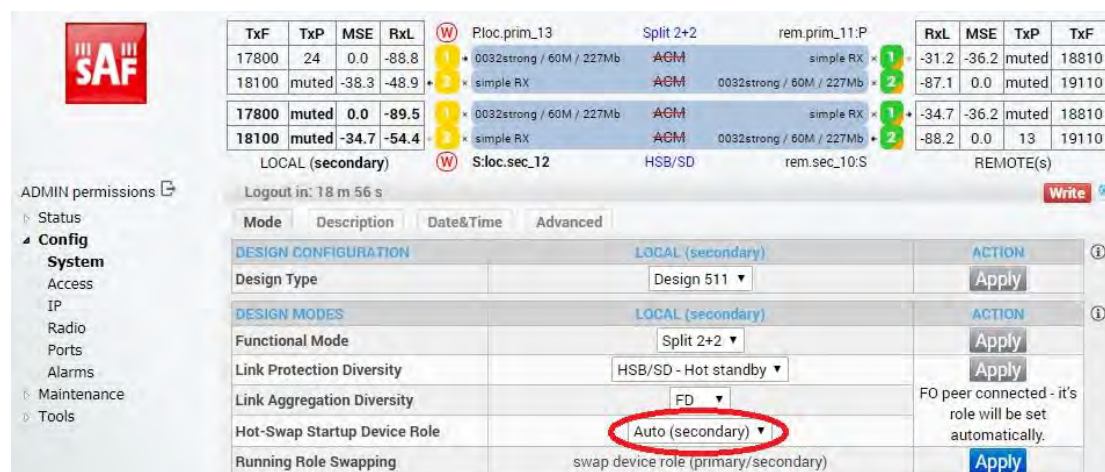
- Status
- **Config**
- System
- Access
- IP
- Radio
- Ports
- Alarms
- Maintenance
- Tools

Logout in: 3 h 39 m 55 s

Mode	Description	Date&Time	Advanced
DESIGN CONFIGURATION			
Design Type	LOCAL (primary)	Design 511	ACTION
DESIGN MODES			
Functional Mode	LOCAL (primary)	Split 2+2	ACTION
Link Protection Diversity	HSB/SD - Hot standby		ACTION
Link Aggregation Diversity	FD		FO peer connected - it's role will be set automatically.
Hot-Swap Startup Device Role	Auto (primary)		
Running Role Swapping	swap device role (primary/secondary)		Apply

Figure 5.97 Example of Primary IDUs system configuration in Auto mode

- 7) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto secondary' in both Secondary IDUs in order to enable protection mode



ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
 - Maintenance
 - Tools

Logout in: 18 m 56 s Write

TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
17800	24	0.0	-88.8		0032strong / 60M / 227Mb	AGM	simple RX		-31.2	-36.2	muted	18810
18100	muted	-38.3	-48.9		simple RX	AGM	0032strong / 60M / 227Mb		-87.1	0.0	muted	19110
17800	muted	0.0	-89.5		0032strong / 60M / 227Mb	AGM	simple RX		-34.7	-36.2	muted	18810
18100	muted	-34.7	-54.4		simple RX	AGM	0032strong / 60M / 227Mb		-88.2	0.0	13	19110

LOCAL (secondary) S.loc.sec_12 HSB/SD rem.sec_10:S REMOTE(s)

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (secondary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (secondary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity HSB/SD - Hot standby Apply

Link Aggregation Diversity FD Apply

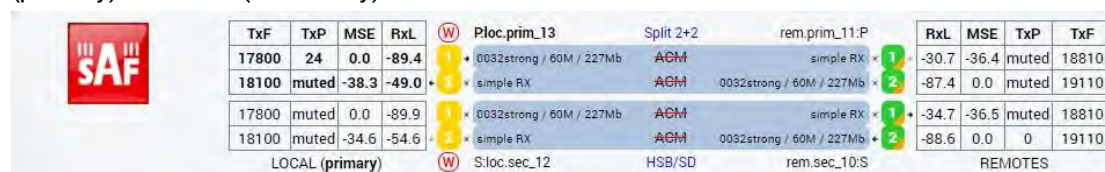
Hot-Swap Startup Device Role **Auto (secondary)** FO peer connected - it's role will be set automatically.

Running Role Swapping swap device role (primary/secondary) Apply

Figure 5.98 Example of Secondary IDUs system configuration in Auto mode

- 8) Save new settings by pressing  button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):



ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
 - Maintenance
 - Tools

Logout in: 18 m 56 s Write

TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
17800	24	0.0	-89.4		0032strong / 60M / 227Mb	AGM	simple RX		-30.7	-36.4	muted	18810
18100	muted	-38.3	-49.0		simple RX	AGM	0032strong / 60M / 227Mb		-87.4	0.0	muted	19110
17800	muted	0.0	-89.9		0032strong / 60M / 227Mb	AGM	simple RX		-34.7	-36.5	muted	18810
18100	muted	-34.6	-54.6		simple RX	AGM	0032strong / 60M / 227Mb		-88.6	0.0	0	19110

LOCAL (primary) S.loc.sec_12 HSB/SD rem.sec_10:S REMOTES

Figure 5.99 Status of 1+1 HSB/SD Dual-band frequency mode

Example 10 – 2+2 FD aggregation HSB/SD protection scheme

The 2+2 FD (Frequency Diversity) aggregation HSB/SD (Hot Standby/Space Diversity) protection mode is the mode supporting link aggregation which is protected using HSB/SD protection method. In this case two data Channels are used for data aggregation (Channel 1 and Channel 2). Each channel uses its own radio frequency channel (FD), and each channel is protected.

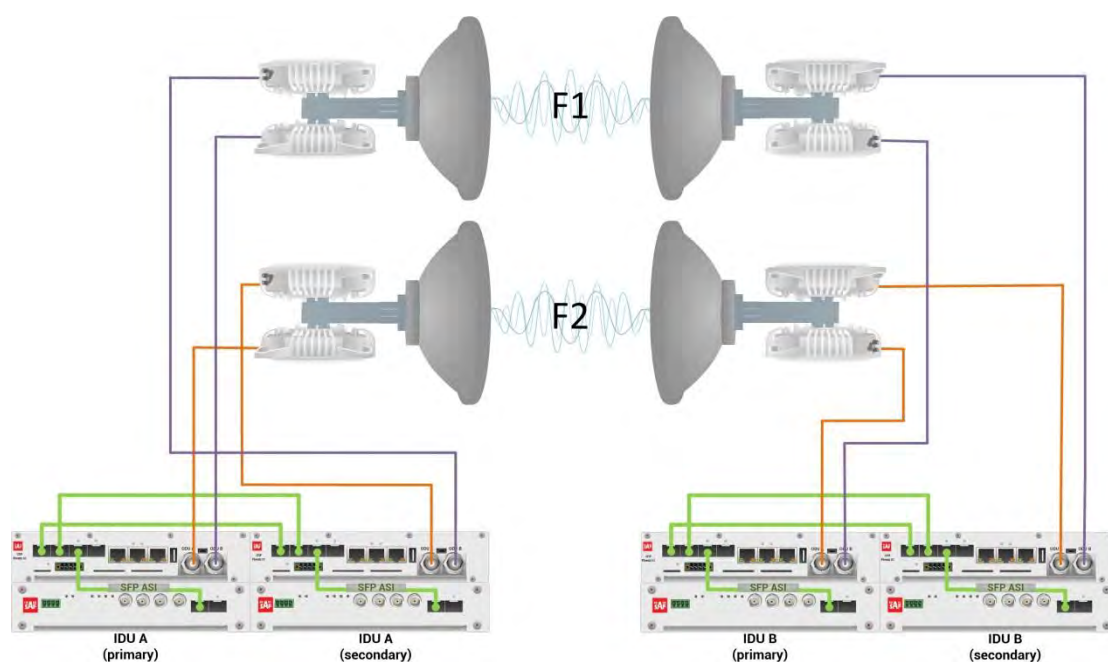


Figure 5.100a Example of 2+2 FD aggregation HSB/SD protection scheme

Figure 5.100a shows 2+2 FD aggregation HSB/SD protection scheme where IF interconnections between IDUs and ODUs provides HSB connection diagram. Two frequency channels are used in the same polarization. Couplers are used to interconnect 2 ODUs to one antenna.

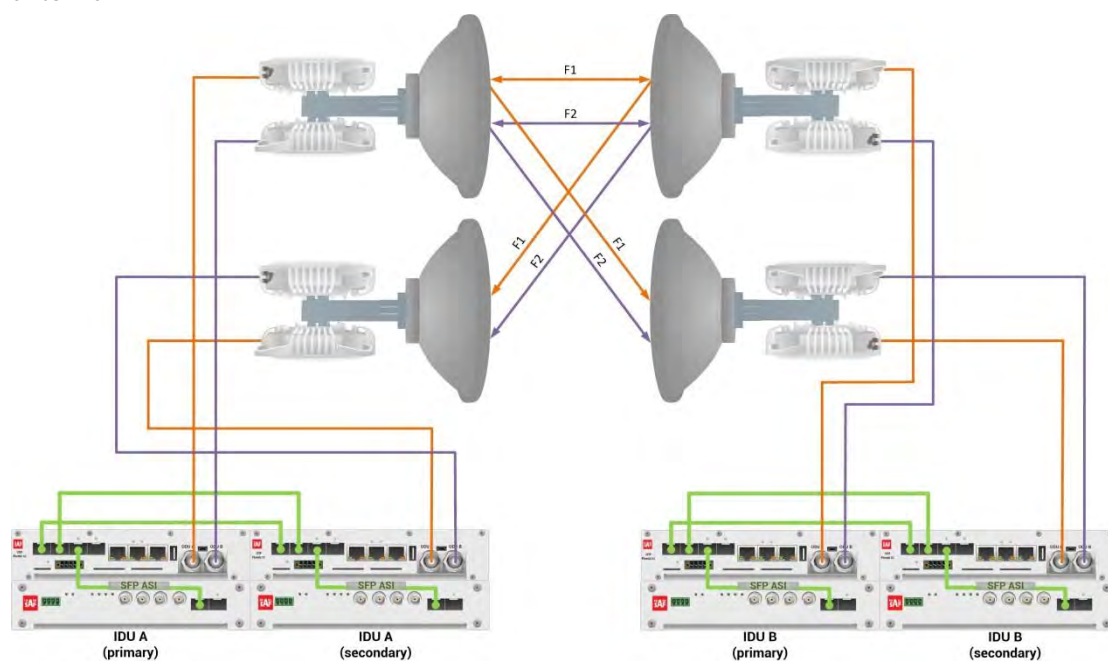


Figure 5.100b Example of 2+2 FD aggregation HSB/SD protection scheme

Figure 5.100b shows 2+2 FD aggregation HSB/SD protection scheme where IF interconnections between IDUs and ODUs provides SD connection diagram. Two frequency channels are used in the same polarization. Couplers are used to interconnect 2 ODUs to one antenna.

In both above mentioned schemes the ODUs and couplers can be substituted with IRFUs and IBUs combination if required by customer.

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 2+2', Link Aggregation Diversity 'FD' and Link Protection Diversity 'HSB/SD – hot standby' are selected on both sides of the link. The modulation is 32QAM in BW 60 MHz and the appropriate maximal data speed is about 227 Mbps per channel. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODU's per link.**



Both IDUs in each side of the link are interconnected with 2 optical cables on ports SFP1 and SFP2. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 2+2 FD aggregation HSB/SD protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs.

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF	
17800	muted	-34.7	-55.9	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-54.2	-36.2	muted
18100	muted	-39.3	-44.1	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-53.8	-34.0	13
17800	6	-30.1	-61.0	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-58.2	-32.4	6
18100	6	-36.9	-49.7	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-59.0	-30.9	muted

LOCAL (primary) S:loc.sec_12 HSB/SD rem.sec_10:S REMOTES

Logout in: 15 m 52 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity HSB/SD - Hot standby Apply

Link Aggregation Diversity FD

Hot-Swap Startup Device Role Fixed primary

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION

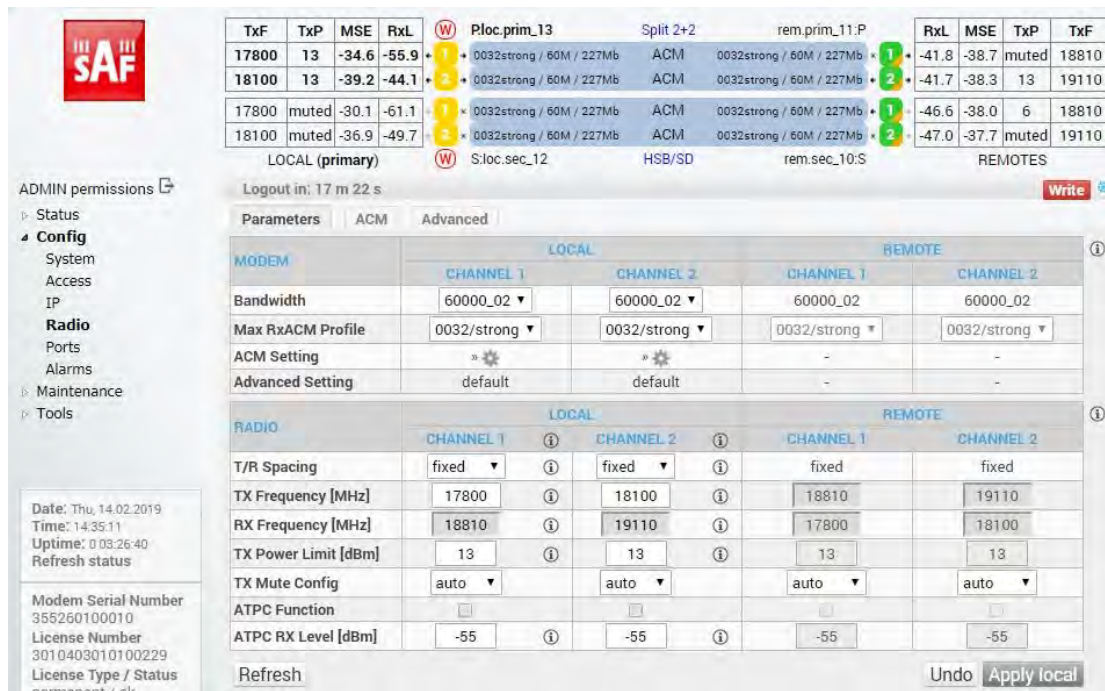
Duplex Mode Bidirectional Bidirectional Apply

Refresh Undo

Date: Thu, 14.02.2019
Time: 14:30:25
Uptime: 0 03:21:53

Figure 5.101 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Choose different frequency channels for Channel 1 and Channel 2



ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Thu, 14.02.2019
Time: 14:35:11
Uptime: 0 03:26:40
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status
permanent / ok

Logout in: 17 m 22 s

Parameters ACM Advanced

MODEM	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	0032/strong	0032/strong	0032/strong	0032/strong
ACM Setting			-	-
Advanced Setting	default	default	-	-

RADIO	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	17800	18100	18810	19110
RX Frequency [MHz]	18810	19110	17800	18100
TX Power Limit [dBm]	13	13	13	13
TX Mute Function	auto	auto	auto	auto
ATPC Function	☐	☐	☐	☐
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply local

Figure 5.102 Example of Radio configuration

- 3) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU



ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Thu, 14.02.2019
Time: 14:35:11
Uptime: 0 03:26:40
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status
permanent / ok

Logout in: 19 m 49 s

Addresses SNMP Advanced

MAIN ADDRESS SETTINGS	REQUIRED	CONFIGURED
Device IP / Mask	192.168.205.13 / 24	192.168.205.13/24
Default Gateway IP	192.168.205.1	192.168.205.1

OPTIONAL ADDRESS SETTINGS	REQUIRED	CONFIGURED
USB IP/Mask	☒ 10.10.11.10/24 ☐ 192.168.11.10/24	10.10.11.10/24
Fallback IP/Mask	☒ 10.10.10.10/24 ☐ 192.168.10.10/24	10.10.10.10/24

Undo Save

Figure 5.103 Example of IP configuration

- 4) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

The screenshot shows the 'Config' section of the Phoenix G2 IDU web GUI, specifically the 'IP' configuration page. The 'Default NAT to remote' section has the 'WEB' checkbox checked and highlighted with a red circle. The 'RADIUS - INPUT VALUES' section is also visible. The 'SETTINGS' table shows the 'NAT' configuration with the 'Default WEB NAT' set to 'on'.

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17800	13	-34.6	-56.0	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-41.8	-38.7	18810
18100	13	-39.2	-44.1	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-41.8	-38.4	19110
17800	muted	-30.2	-60.9	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-46.6	-38.0	18810
18100	muted	-36.9	-49.7	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-47.0	-37.6	19110

LOCAL (primary) S:loc.sec_12 HSB/SD rem.sec_10:S REMOTES

Logout in: 19 m 49 s

Addresses | SNMP | Advanced

STATIC ROUTES - INPUT VALUES

Routed IP/MASK

Gateway IP

Add Delete

NAT - INPUT VALUES

Local_Port Dest_IP/Port

Default NAT to remote ☒ WEB ☐ SSH

Add Delete DelAll Set

RADIUS - INPUT VALUES

IP:destport SecString timeout

Add Delete DelAll

SETTINGS REQUIRED CONFIGURED

Route default via 192.168.205.1

NAT 1443 192.168.205.11:443

Default WEB NAT: on

(https://192.168.205.13:1443/)

(https://192.168.205.13:2443/)

Default SSH NAT: off

Radius Server

Save

Figure 5.104 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI [Config->Ports->EthVLAN](#) section and must be done in all Phoenix G2 IDUs

The screenshot shows the 'Config' section of the Phoenix G2 IDU web GUI, specifically the 'Ports' configuration page. The 'EthVLAN' tab is selected. The 'Port Group' column shows 'group-1' for LAN1 and 'group-2' for LAN2. The 'Default VLAN' column shows '1' for LAN1 and '1' for LAN2. The 'Port Mode' column shows 'basic' for all ports.

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17800	13	-34.6	-55.9	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-41.8	-38.7	18810
18100	13	-39.2	-44.0	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-41.7	-38.3	19110
17800	muted	-30.2	-61.0	1	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	1	-46.6	-38.0	18810
18100	muted	-36.9	-49.8	2	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb	2	-46.9	-37.7	19110

LOCAL (primary) S:loc.sec_12 HSB/SD rem.sec_10:S REMOTES

Logout in: 15 m 0 s

MUX | EthVLAN | EthQOS | EMM

VLAN MODE LAN 1 LAN 2 LAN 3 MNG WAN A WAN B

Port Mode basic basic basic basic basic basic

Port Group group-1 group-2 group-3 group-3 group-1 group-2

Default VLAN 1 1 1 1 1 1

LAN1 LAN2 LAN3

GE switch

WANa WANb MNG CPU

Figure 5.105 Example of port grouping

- 6) In web GUI [Config->Ports->MUX](#) specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode 'force2G5'

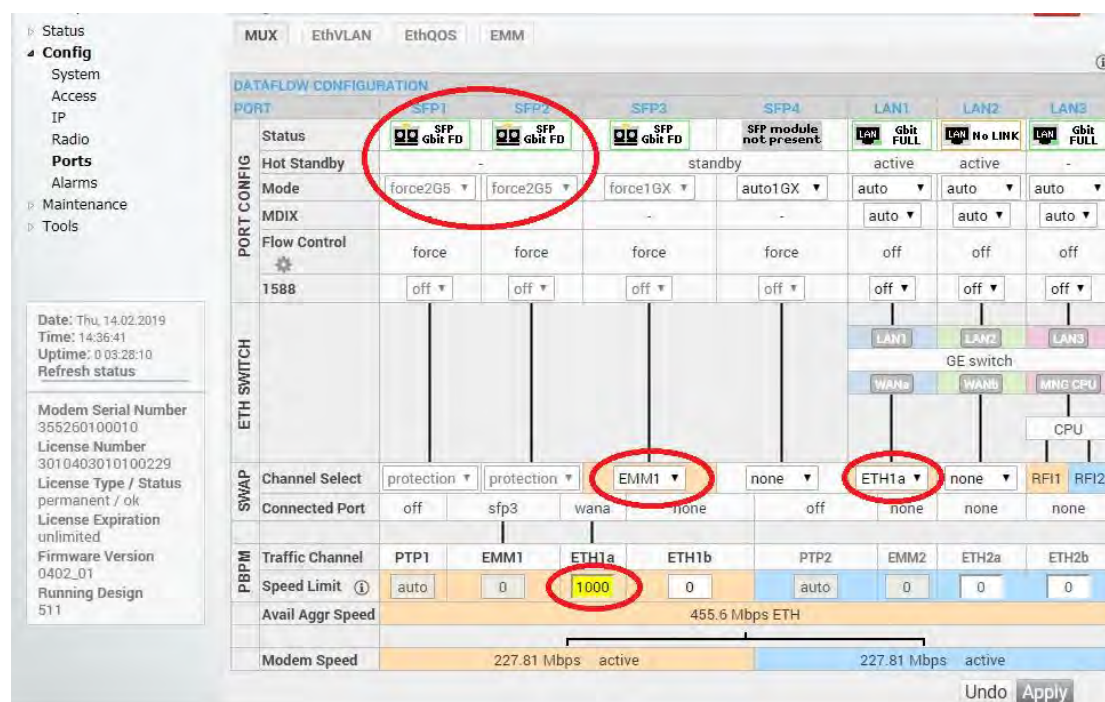


Figure 5.106 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm checkboxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

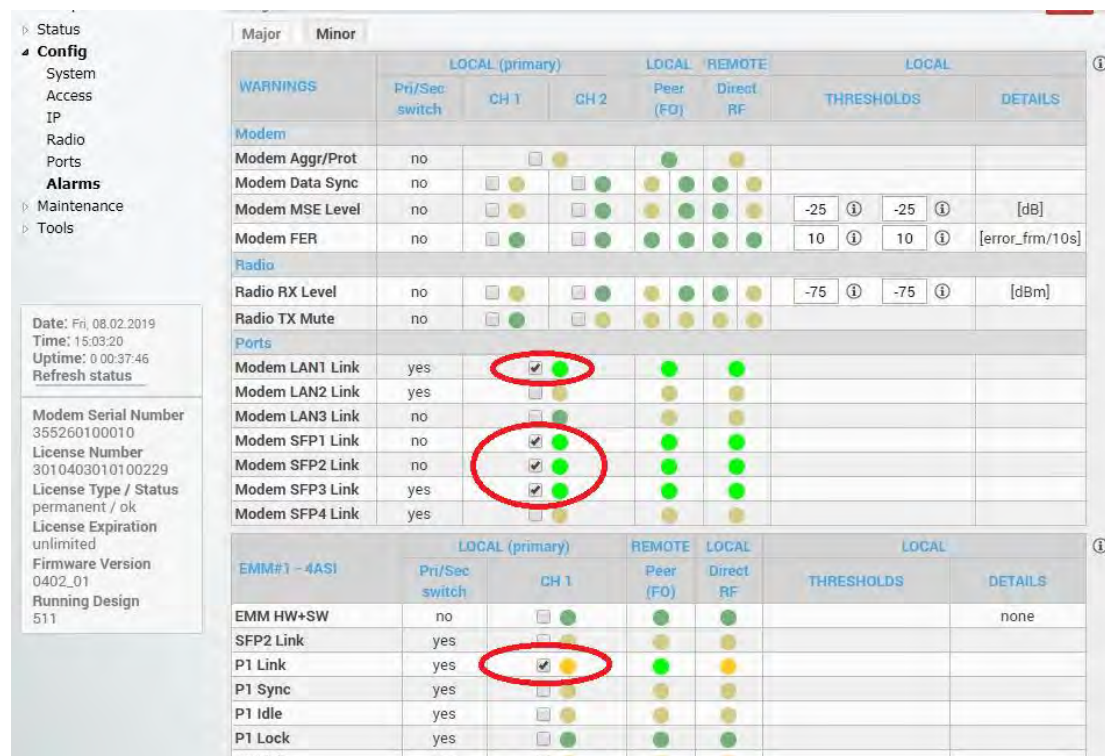


Figure 5.107 Example of alarm configuration

- 9) Save new settings by pressing  button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI [Config->System->Mode](#) set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs

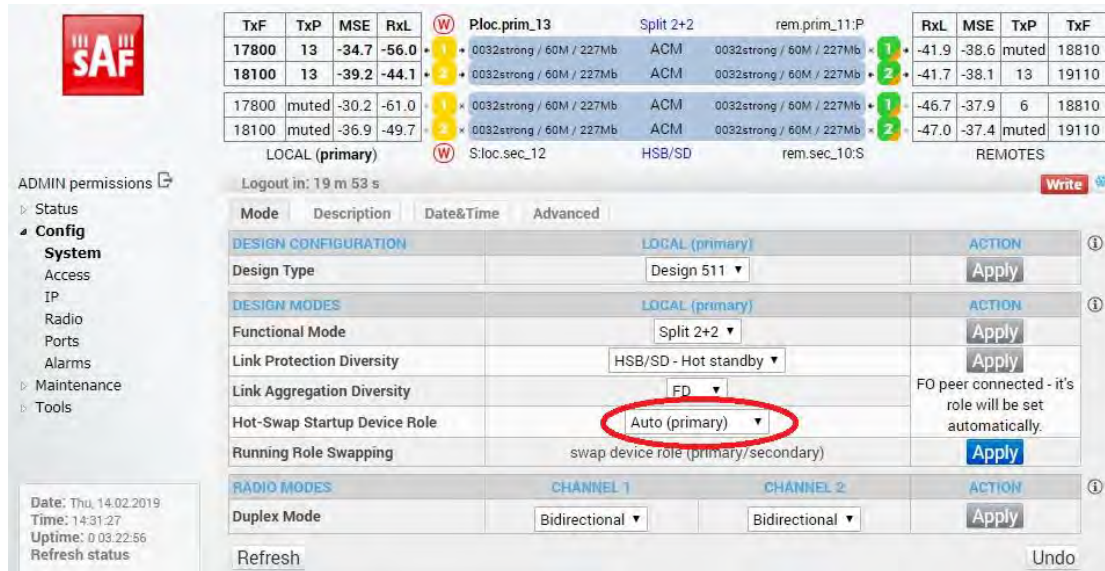


Figure 5.108 Example of system configuration in Auto mode

- 12) Save new settings by pressing button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):

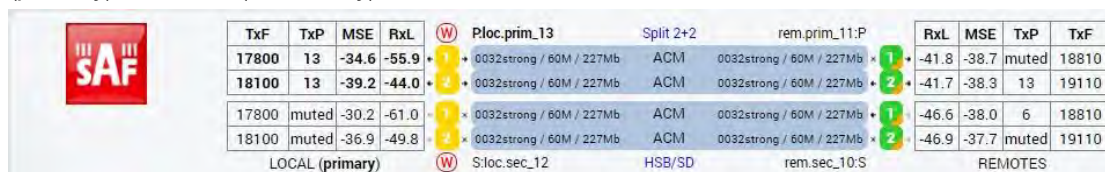


Figure 5.109 Status of 2+2FD aggregation HSB/SD protection mode

Example 11 – 2+2 FD aggregation FD protection scheme

The 2+2 FD (Frequency Diversity) aggregation FD (Frequency Diversity) protection mode is the mode supporting link aggregation which is protected using FD protection method. In this case two data Channels are used for data aggregation (Channel 1 and Channel 2) and two Channels are used for protection of aggregation channels. Each channel – aggregation and protection uses its own radio frequency channel (FD), in total 4 frequency channels are used.

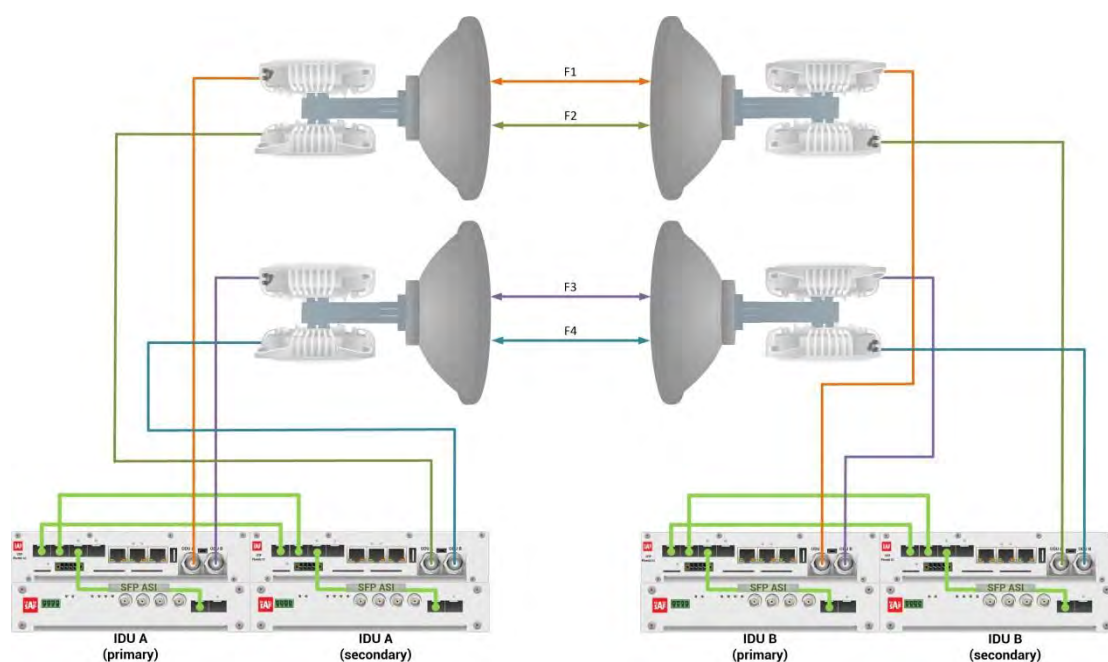


Figure 5.110a Example of 2+2 FD aggregation FD protection scheme

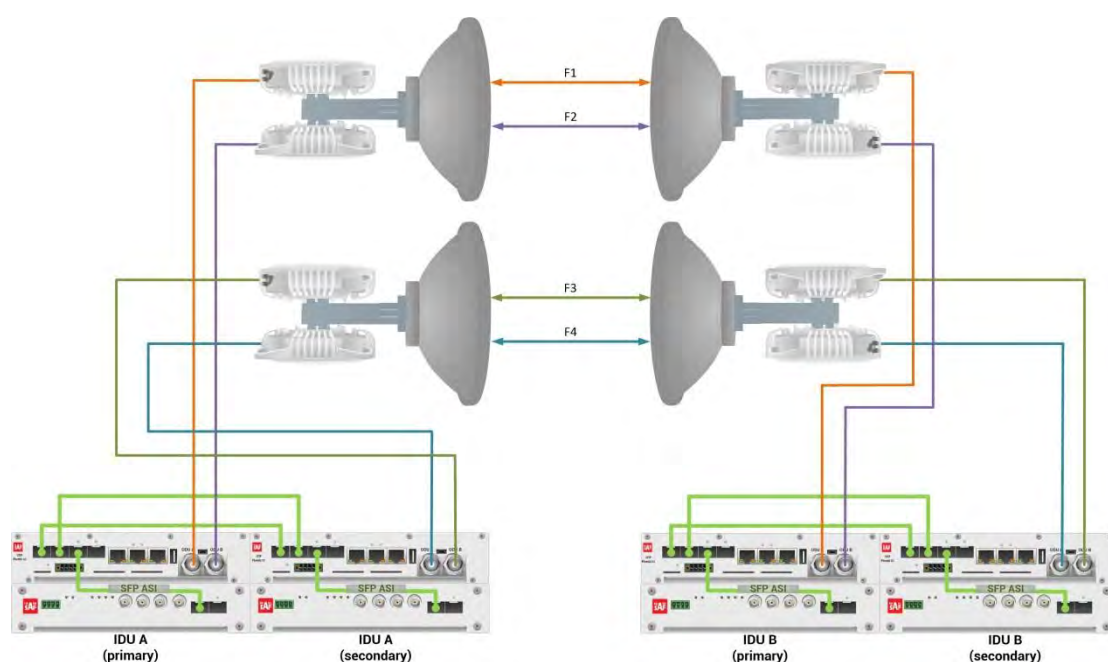


Figure 5.110b Example of 2+2 FD aggregation FD protection scheme

Figures 5.110a and 5.110b show 2+2 FD aggregation FD protection scheme where four frequency channels are used in the same polarization. Couplers are used to interconnect 2 ODUs to one antenna.

In both above mentioned schemes the ODUs and couplers can be substituted with IRFUs and IBUs combination if required by customer.

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 2+2', Link Aggregation Diversity 'FD' and Link Protection Diversity 'FD – Freq. diversity' are selected on both sides of the link. The modulation is 1024QAM in BW 60 MHz and the appropriate maximal data speed is about 455 Mbps per channel. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODUs per link.**



Both IDUs in each side of the link are interconnected with 2 optical cables on ports SFP1 and SFP2. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 2+2 FD aggregation FD protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'FD – Freq. diversity', Link Aggregation Diversity 'FD'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17790	15	-38.7	-41.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-39.9	-38.7	15	18800
17890	15	-39.1	-41.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-40.0	-38.4	15	18900
17990	18	-38.5	-48.9	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-47.2	-38.6	18	19000
18190	18	-36.5	-50.3	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-47.3	-36.7	18	19200

LOCAL (primary) S.loc.sec_12 FD rem.sec_10:S REMOTES

Logout in: 17 m 11 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity FD - Freq. diversity Apply

Link Aggregation Diversity FD Apply

Hot-Swap Startup Device Role Fixed primary

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION

Duplex Mode Bidirectional Bidirectional Apply

Refresh Undo

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Tue, 19.02.2019
Time: 14:53:18
Uptime: 0 00:27:07
Refresh status

Figure 5.111 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Choose different frequency channels for Channel 1 and Channel 2 in both Primary IDUs and another different frequency channels for Channel 1 and Channel 2 in both secondary IDUs

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17790	15	-38.7	-41.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-39.9	-38.8	15	18800
17890	15	-39.0	-41.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-40.1	-38.5	15	18900
17990	18	-38.5	-48.8	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-47.2	-38.4	18	19000
18190	18	-36.5	-50.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-47.3	-36.8	18	19200

LOCAL (primary) S.loc.sec_12 FD rem.sec_10:S REMOTES

Logout in: 18 m 57 s

Parameters ACM Advanced

MODEM LOCAL REMOTE

CHANNEL 1 CHANNEL 2 CHANNEL 1 CHANNEL 2

Bandwidth 60000_02 60000_02 60000_02 60000_02

Max RxACM Profile 1024/strong 1024/strong 1024/strong 1024/strong

ACM Setting

Advanced Setting default default - -

RADIO LOCAL REMOTE

CHANNEL 1 CHANNEL 2 CHANNEL 1 CHANNEL 2

T/R Spacing fixed fixed fixed fixed

TX Frequency [MHz] 17790 17890 18800 18900

RX Frequency [MHz] 18800 18900 17790 17890

TX Power Limit [dBm] 15 15 15 15

TX Mute Config auto auto auto auto

ATPC Function

ATPC RX Level [dBm] -55 -55 -55 -55

Refresh Undo Apply to local & remote

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Tue, 19.02.2019
Time: 14:56:59
Uptime: 0 00:30:49
Refresh status

Modem Serial Number 355260100010
License Number 3010403010100229
License Type / Status

Figure 5.112 Example of Primary IDU Radio configuration

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Tue, 19.02.2019
Time: 14:57:04
Uptime: 0 00:31:15
Refresh status

Modem Serial Number: 355260100008
License Number: 3010403010100227
License Type / Status: permanent / ok

Logout in: 13 m 18 s

Parameters ACM Advanced

MODEM

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	1024/strong	1024/strong	1024/strong	1024/strong
ACM Setting			-	-
Advanced Setting	default	default	-	-

RADIO

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	17990	18190	19000	19200
RX Frequency [MHz]	19000	19200	17990	18190
TX Power Limit [dBm]	18	18	18	18
TX Mute Config	auto	auto	auto	auto
ATPC Function				
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply to local & remote

Figure 5.113 Example of Secondary IDU Radio configuration

- 3) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Tue, 19.02.2019
Time: 14:57:04
Uptime: 0 00:31:15
Refresh status

Modem Serial Number: 355260100008
License Number: 3010403010100227
License Type / Status: permanent / ok

Logout in: 19 m 49 s

Addresses SNMP Advanced

MAIN ADDRESS SETTINGS

	REQUIRED	CONFIGURED
Device IP / Mask	192.168.205.13 / 24	192.168.205.13/24
Default Gateway IP	192.168.205.1	192.168.205.1

OPTIONAL ADDRESS SETTINGS

	REQUIRED	CONFIGURED
USB IP/Mask	☒ 10.10.11.10/24 ☐ 192.168.11.10/24	10.10.11.10/24
Fallback IP/Mask	☒ 10.10.10.10/24 ☐ 192.168.10.10/24	10.10.10.10/24

Undo Save

Figure 5.114 Example of IP configuration

- 4) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

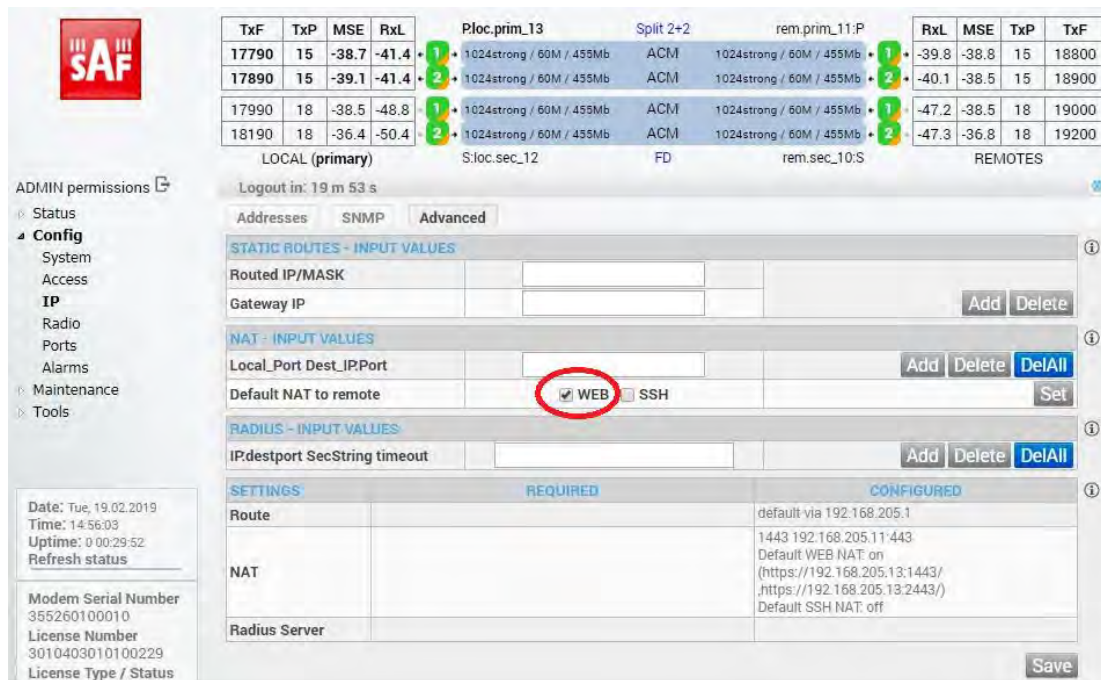


Figure 5.115 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section and must be done in all Phoenix G2 IDUs

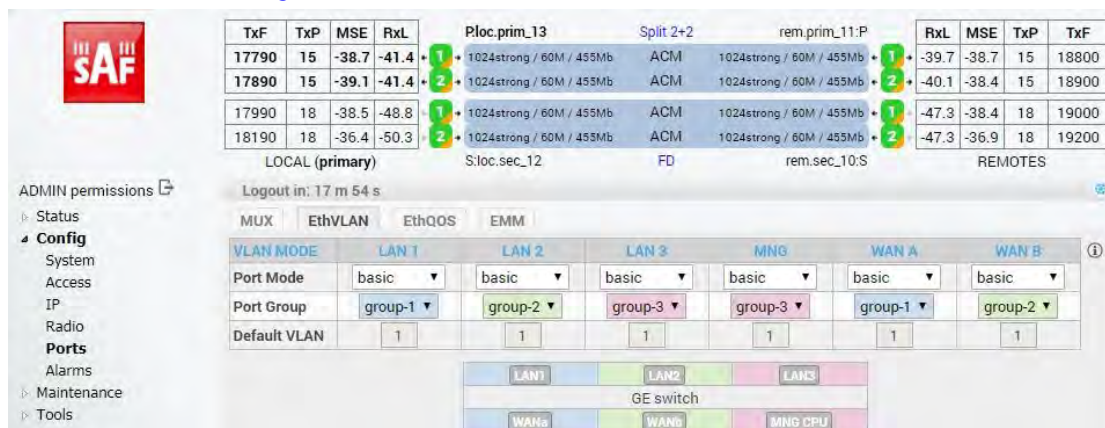


Figure 5.116 Example of port grouping

- 6) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode 'force2G5'

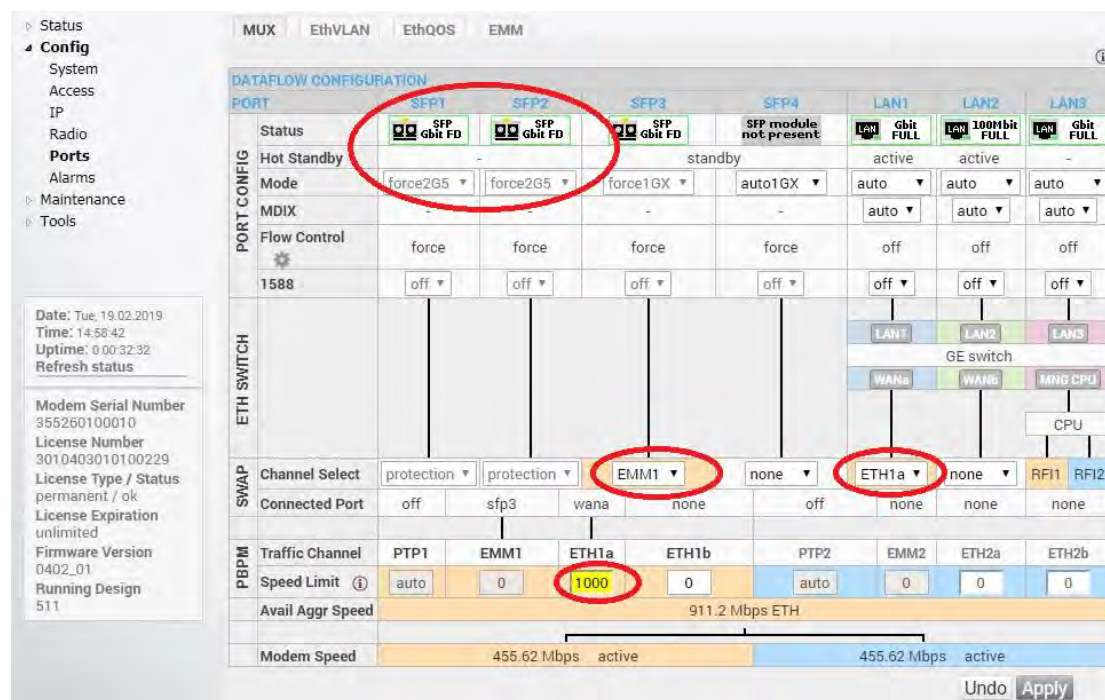


Figure 5.117 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm checkboxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

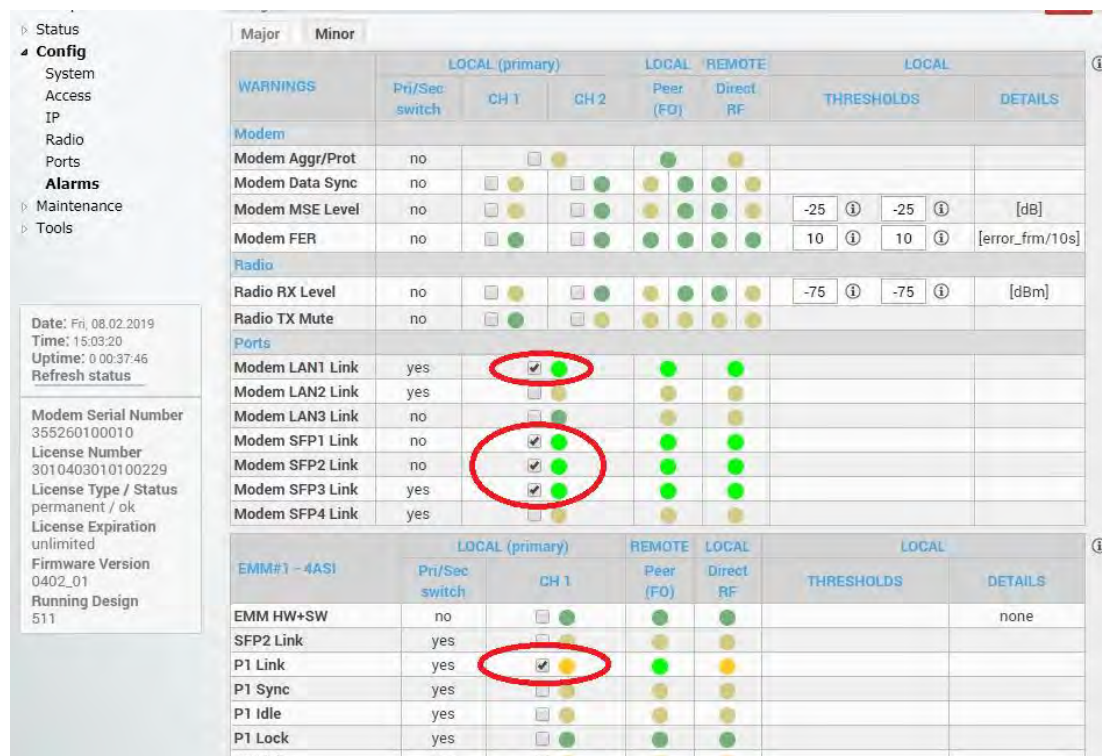
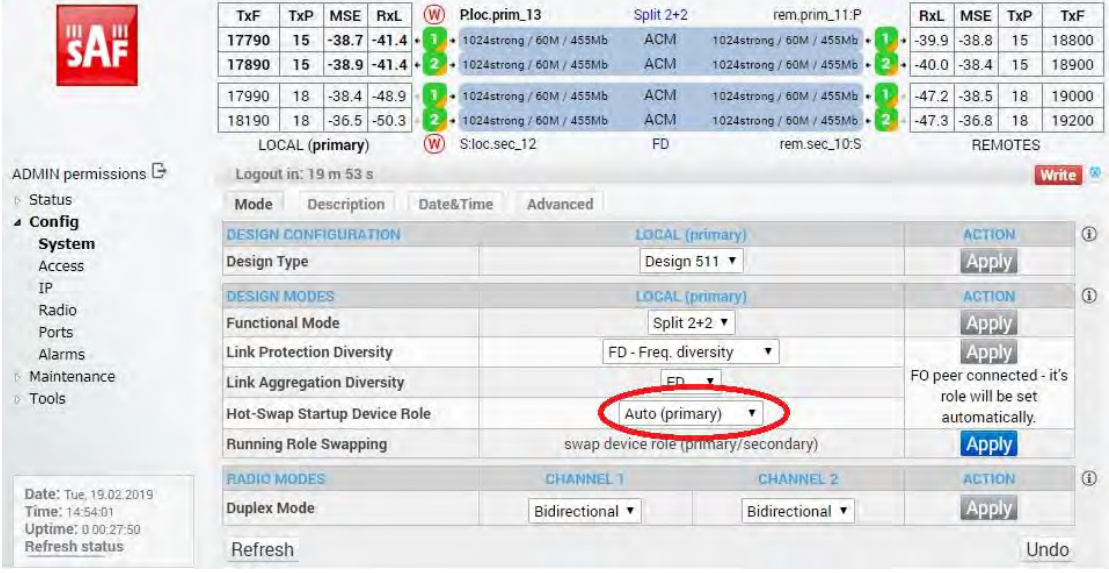


Figure 5.118 Example of alarm configuration

- 9) Save new settings by pressing  button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs



The screenshot shows the web GUI for the Phoenix G2 IDU. The 'Config' menu is expanded, and 'System' is selected. The 'Mode' configuration page is displayed. The 'Hot-Swap Startup Device Role' is set to 'Auto (primary)', which is circled in red. The 'Running Role Swapping' is set to 'swap device role (primary/secondary)'. The 'Design Type' is 'Design 511'. The 'Functional Mode' is 'Split 2+2'. The 'Link Protection Diversity' is 'FD - Freq. diversity'. The 'Link Aggregation Diversity' is 'FD'. The 'Duplex Mode' is 'Bidirectional'. The 'Refresh' button is at the bottom left, and the 'Undo' button is at the bottom right. The 'Write' button is at the top right.

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF	
17790	15	-38.7	-41.4	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-39.9	-38.8	15	18800
17890	15	-38.9	-41.4	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-40.0	-38.4	15	18900
17990	18	-38.4	-48.9	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-47.2	-38.5	18	19000
18190	18	-36.5	-50.3	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-47.3	-36.8	18	19200

LOCAL (primary) S.loc.sec_12 FD rem.sec_10:S REMOTES

Logout in: 19 m 53 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity FD - Freq. diversity Apply

Link Aggregation Diversity FD FO peer connected - it's role will be set automatically.

Hot-Swap Startup Device Role Auto (primary) Apply

Running Role Swapping swap device role (primary/secondary) Apply

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION

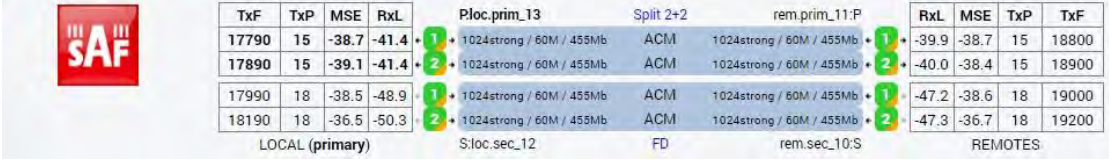
Duplex Mode Bidirectional Bidirectional Apply

Refresh Undo

Figure 5.119 Example of system configuration in Auto mode

- 12) Save new settings by pressing  button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):



The screenshot shows the web GUI for the Phoenix G2 IDU. The 'Status' page is displayed. The 'LOCAL (primary)' status is shown in bold. The 'Ploc.prim_13' is 'Split 2+2'. The 'rem.prim_11:P' is 'rem.prim_11:P'. The 'S.loc.sec_12' is 'FD'. The 'rem.sec_10:S' is 'rem.sec_10:S'. The 'REMOTES' status is shown in bold.

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF	
17790	15	-38.7	-41.4	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-39.9	-38.7	15	18800
17890	15	-39.1	-41.4	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-40.0	-38.4	15	18900
17990	18	-38.5	-48.9	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-47.2	-38.6	18	19000
18190	18	-36.5	-50.3	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-47.3	-36.7	18	19200

LOCAL (primary) S.loc.sec_12 FD rem.sec_10:S REMOTES

Figure 5.120 Status of 2+2 FD aggregation FD protection mode

Example 12 – 2+2 XPIC aggregation HSB/SD protection scheme

The 2+2 XPIC (Cross-polarization Interference Cancellation) aggregation HSB/SD (Hot-standby/Space Diversity) protection mode is the mode supporting link aggregation which is protected using HSB/SD protection method. In this case two data Channels are used for data aggregation (Channel 1 and Channel 2) and two Channels are used for protection of aggregation channels. All channels – aggregation and protection works on the same one frequency channel.

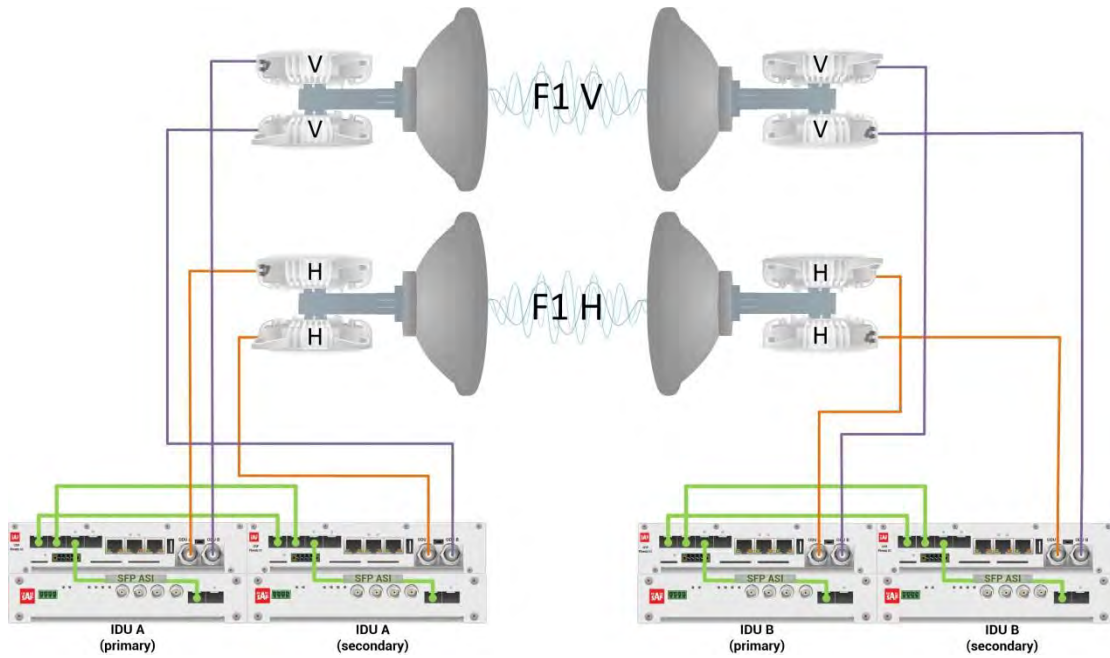


Figure 5.121a Example of 2+2 XPIC aggregation HSB/SD protection scheme

Figure 5.121a shows 2+2 XPIC aggregation HSB/SD protection scheme where IF interconnections between IDUs and ODUs provides HSB connection diagram. One frequency channel is used in both Horizontal and Vertical polarizations. Couplers are used to interconnect 2 ODUs to one antenna in this scheme. In this connection scheme the ODUs and couplers can be substituted with IRFUs and IBUs combination if required by customer.

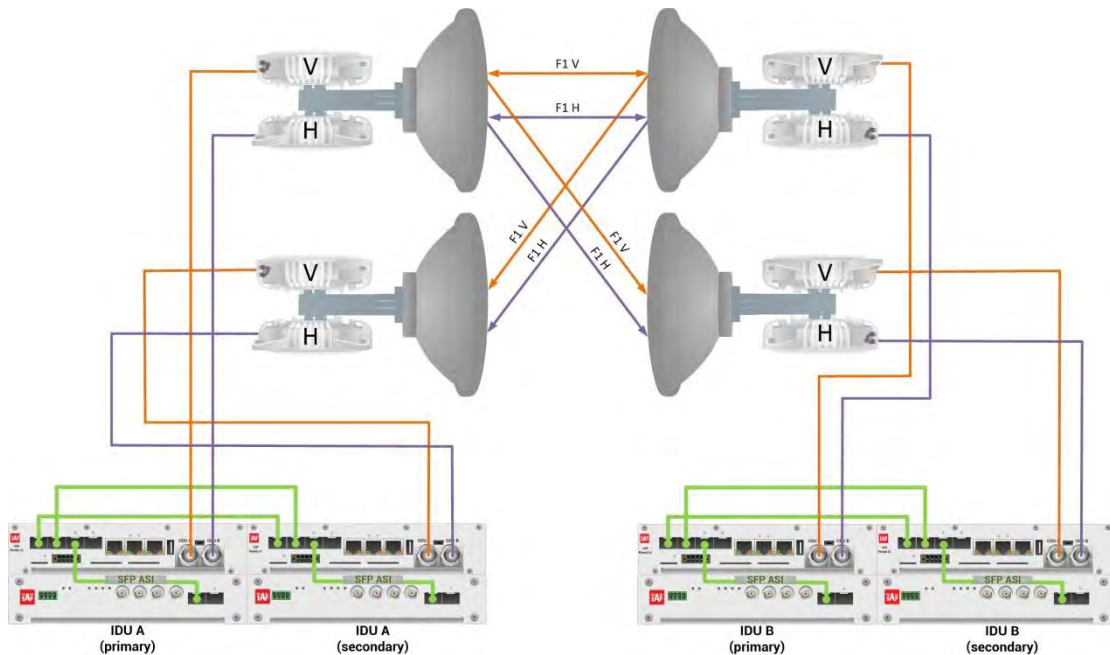


Figure 5.121b Example of 2+2 XPIC aggregation HSB/SD protection scheme

Figure 5.121b shows 2+2 XPIC aggregation HSB/SD protection scheme where IF interconnections between IDUs and ODUs provides SD connection diagram. One frequency channel is used in both Horizontal and Vertical polarizations. OMTs are used to interconnect 2 ODUs to one antenna in this scheme.

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 2+2', Link Aggregation Diversity 'XPIC' and Link Protection Diversity

'HSB/SD-Hot standby' are selected on both sides of the link. The modulation is 1024QAM in BW 60 MHz and the appropriate maximal data speed is about 455 Mbps per channel. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODUs per link.**



Both IDUs in each side of the link are interconnected with 2 optical cables on ports SFP1 and SFP2. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 2+2 XPIC aggregation HSB/SD protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'HSB/SD – Hot standby', Link Aggregation Diversity 'XPIC'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs

Figure 5.122 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Set the same one frequency channel for Channel 1 and Channel 2 in both Primary and Secondary IDUs.

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Wed, 20.02.2019
Time: 11:06:15
Uptime: 0 00:53:30
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status
Permanent / ok

Logout in: 1 h 58 m 38 s

Parameters ACM Advanced

MODEM	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	1024/strong	1024/strong	1024/strong	1024/strong
ACM Setting			-	-
Advanced Setting	default	default	-	-

RADIO	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	17990	17990	19000	19000
RX Frequency [MHz]	19000	19000	17990	17990
TX Power Limit [dBm]	15	15	15	15
TX Mute Config	auto	auto	auto	auto
ATPC Function	☐	☐	☐	☐
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply local

Figure 5.123 Example of Radio configuration

- 3) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Wed, 20.02.2019
Time: 11:06:15
Uptime: 0 00:53:30
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status
Permanent / ok

Logout in: 1 h 59 m 52 s

Addresses SNMP Advanced

MAIN ADDRESS SETTINGS	REQUIRED	CONFIGURED
Device IP / Mask	192.168.205.13 / 24	192.168.205.13/24
Default Gateway IP	192.168.205.1	192.168.205.1

OPTIONAL ADDRESS SETTINGS	REQUIRED	CONFIGURED
USB IP/Mask	☒ 10.10.11.10/24 ☐ 192.168.11.10/24	10.10.11.10/24
Fallback IP/Mask	☒ 10.10.10.10/24 ☐ 192.168.10.10/24	10.10.10.10/24

Undo Save

Figure 5.124 Example of IP configuration

- 4) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

Date: Wed, 20.02.2019
Time: 11:05:02
Uptime: 0 00:52:16
Refresh status

Model Serial Number
355260100010
License Number
3010403010100229
License Type / Status

Logout in: 1 h 59 m 52 s

Addresses SNMP Advanced

STATIC ROUTES - INPUT VALUES

Routed IP/MASK

Gateway IP

Add Delete

NAT - INPUT VALUES

Local_Port Dest_IP/Port

Default NAT to remote ☒ WEB ☐ SSH

Add Delete DelAll Set

RADIUS - INPUT VALUES

IP/destport SecString timeout

Add Delete DelAll

SETTINGS

	REQUIRED	CONFIGURED
Route		default via 192.168.205.1
NAT		1443 192.168.205.11-443 Default WEB NAT: on (https://192.168.205.13:1443/ https://192.168.205.13:2443/) Default SSH NAT: off
Radius Server		

Save

Figure 5.125 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI [‘Config->Ports->EthVLAN’](#) section and must be done in all Phoenix G2 IDUs

ADMIN permissions

- Status
- Config
 - System
 - Access
 - IP
 - Radio
 - Ports
 - Alarms
- Maintenance
- Tools

MUX EthVLAN EthQOS EMM

VLAN MODE

	LAN 1	LAN 2	LAN 3	MNG	WAN A	WAN B
Port Mode	basic	basic	basic	basic	basic	basic
Port Group	group-1	group-2	group-3	group-3	group-1	group-2
Default VLAN	1	1	1	1	1	1

LAN1 LAN2 LAN3

WANa WANb MNG CPU

GE switch

Figure 5.126 Example of port grouping

- 6) In web GUI [‘Config->Ports->MUX’](#) specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel ‘ETH1a’ and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode ‘force2G5’



Figure 5.127 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm checkboxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

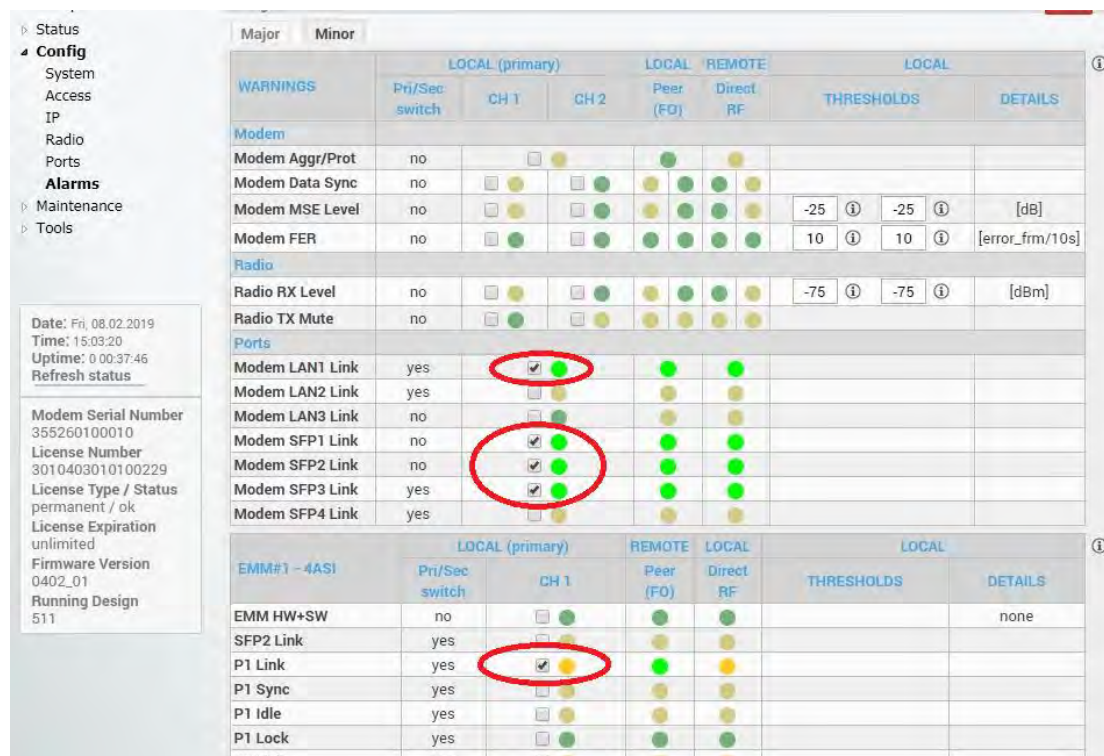
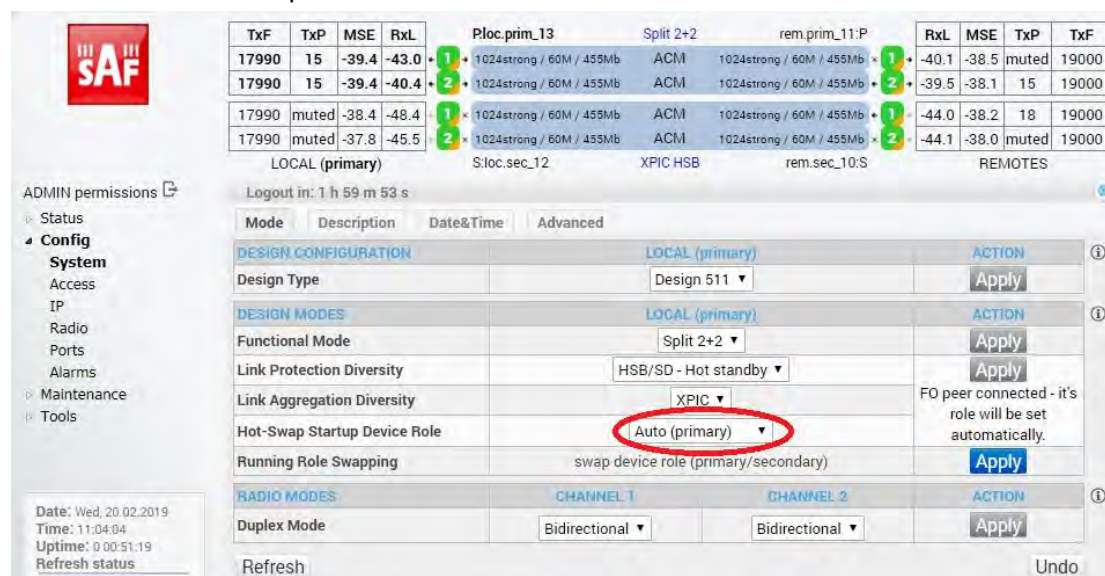


Figure 5.128 Example of alarm configuration

- 9) Save new settings by pressing  button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs



The screenshot shows the 'System' configuration page in the Phoenix G2 IDU web GUI. The 'Hot-Swap Startup Device Role' is set to 'Auto (primary)', which is circled in red. The 'Running Role Swapping' is set to 'swap device role (primary/secondary)'. The 'Design Type' is 'Design 511'. The 'Functional Mode' is 'Split 2+2'. The 'Link Protection Diversity' is 'HSB/SD - Hot standby'. The 'Link Aggregation Diversity' is 'XPIC'. The 'Duplex Mode' is 'Bidirectional'. The 'Status' section shows the system is in 'LOCAL (primary)' mode. The 'Tools' section shows the system is in 'Auto (primary)' mode.

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17990	15	-39.4	-43.0	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-40.1	-38.5	muted	19000
17990	15	-39.4	-40.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-39.5	-38.1	15	19000
17990	muted	-38.4	-48.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-44.0	-38.2	18	19000
17990	muted	-37.8	-45.5	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-44.1	-38.0	muted	19000

LOCAL (primary) S.loc.sec_12 XPIC HSB rem.sec_10:S REMOTES

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Wed, 20.02.2019

Time: 11:04:04

Uptime: 0 00:51:19

Refresh status

Logout in: 1 h 59 m 53 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity HSB/SD - Hot standby Apply

Link Aggregation Diversity XPIC Apply

Hot-Swap Startup Device Role Auto (primary) Apply

Running Role Swapping swap device role (primary/secondary) Apply

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION

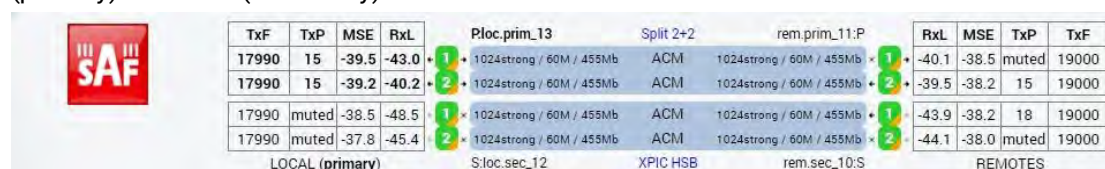
Duplex Mode Bidirectional Bidirectional Apply

Refresh Undo

Figure 5.129 Example of system configuration in Auto mode

- 12) Save new settings by pressing  button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):



The screenshot shows the 'Status' page in the Phoenix G2 IDU web GUI. The 'LOCAL (primary)' status is displayed in bold. The 'Status' section shows the system is in 'LOCAL (primary)' mode. The 'Tools' section shows the system is in 'Auto (primary)' mode.

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
17990	15	-39.5	-43.0	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-40.1	-38.5	muted	19000
17990	15	-39.2	-40.2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-39.5	-38.2	15	19000
17990	muted	-38.5	-48.5	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-43.9	-38.2	18	19000
17990	muted	-37.8	-45.4	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-44.1	-38.0	muted	19000

LOCAL (primary) S.loc.sec_12 XPIC HSB rem.sec_10:S REMOTES

Figure 5.130 Status of 2+2 XPIC aggregation HSB/SD protection mode

Example 13 – 2+2 XPIC aggregation FD protection scheme

The 2+2 XPIC (Cross-polarization Interference Cancellation) aggregation FD (Frequency Diversity) protection mode is the mode supporting link aggregation which is protected using FD protection method. In this case two data Channels are used for data aggregation (Channel 1 and Channel 2) and two Channels are used for protection of aggregation channels. Both Aggregation Channels use the same one frequency channel, both Protection channels use another frequency channel for FD protection.

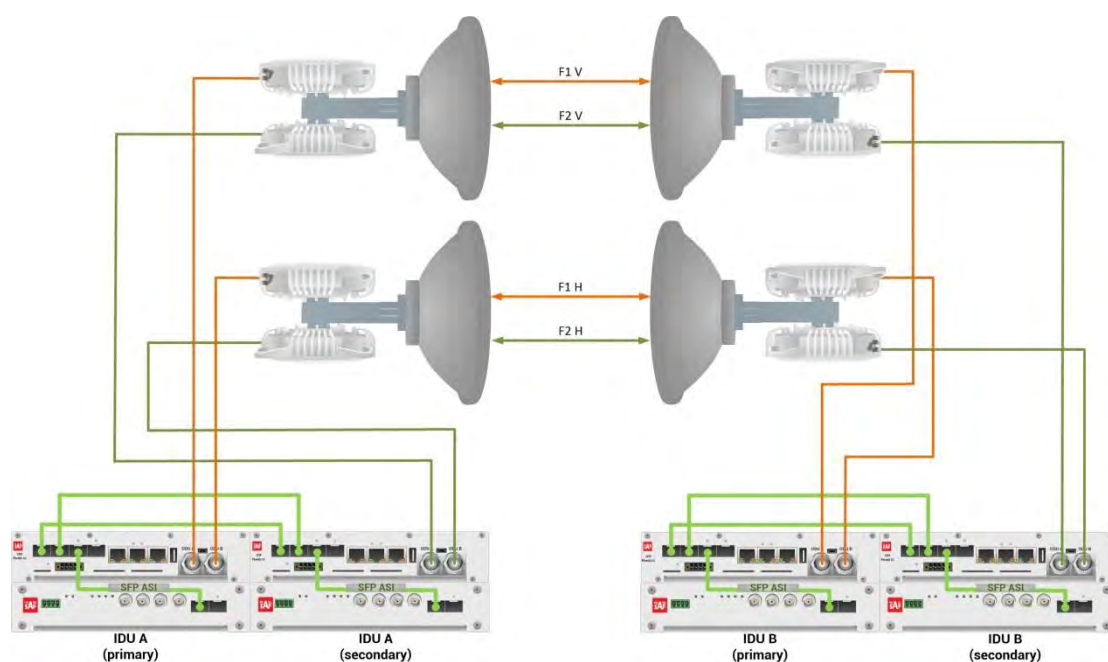


Figure 5.131a Example of 2+2 XPIC aggregation FD protection scheme

Figure 5.131a shows 2+2 XPIC aggregation FD protection scheme where one frequency channel is used in both Horizontal and Vertical polarizations for Primary IDU/ODUs, and another frequency channel is used in both polarizations for Secondary IDU/ODUs. Couplers are used to interconnect 2 ODUs to one antenna in this scheme. In this connection scheme the ODUs and couplers can be substituted with IRFUs and IBUs combination if required by customer.

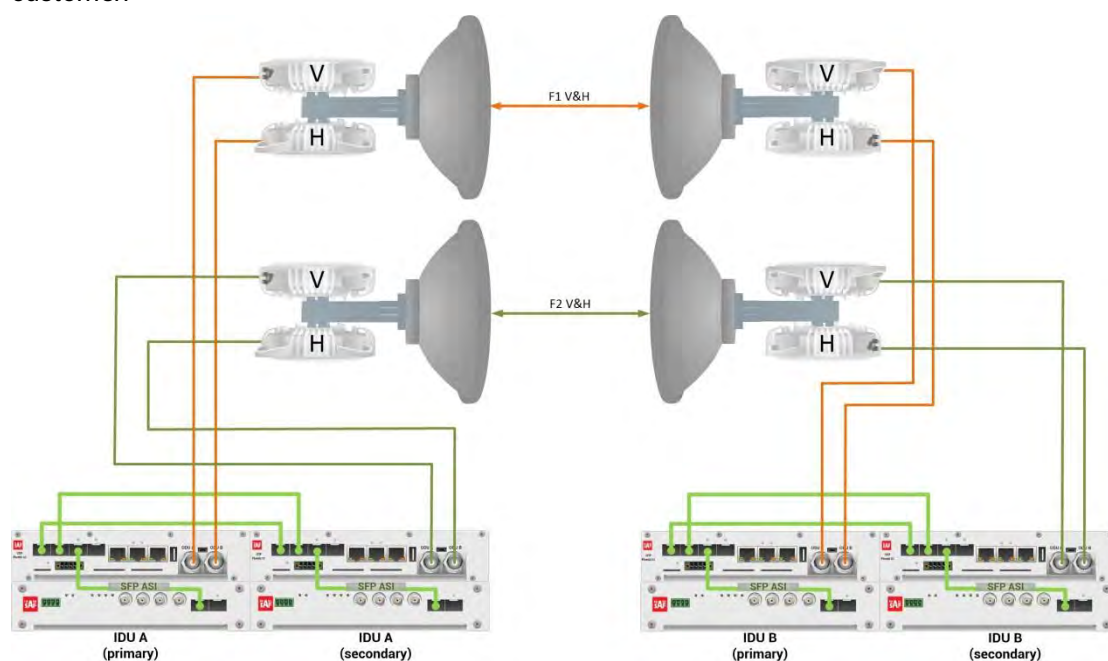


Figure 5.131b Example of 2+2 XPIC aggregation FD protection scheme

Figure 5.131b shows 2+2 XPIC aggregation FD protection scheme where one frequency channel is used in both Horizontal and Vertical polarizations for Primary IDU/ODUs, and another frequency channel is used in both polarizations for Secondary IDU/ODUs. OMTs are used to interconnect 2 ODUs to one antenna in this scheme.

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 2+2', Link Aggregation Diversity 'XPIC' and Link Protection Diversity 'FD – Freq. diversity' are selected on both sides of the link. The modulation is 1024QAM in BW 60 MHz and the appropriate maximal data speed is about 455 Mbps per channel. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODU's per link.**



Both IDUs in each side of the link are interconnected with 2 optical cables on ports SFP1 and SFP2. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 2+2 XPIC aggregation FD protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 2+2', Link Protection Diversity 'FD – Freq. diversity', Link Aggregation Diversity 'XPIC'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs

TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF		
17990	15	-38.7	-40.8	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-40.0	-38.5	15	19000
17990	15	-39.3	-40.3	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-39.6	-38.1	15	19000
18100	18	-37.7	-49.8	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-46.8	-38.3	18	19110
18100	18	-36.5	-48.9	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-46.6	-36.8	18	19110

LOCAL (primary) S.loc.sec_12 XPIC rem.sec_10:S REMOTES

Logout in: 19 m 31 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 2+2 Apply

Link Protection Diversity FD - Freq. diversity Apply

Link Aggregation Diversity XPIC

Hot-Swap Startup Device Role Fixed primary

RADIO MODES CHANNEL 1 CHANNEL 2 ACTION

Duplex Mode Bidirectional Bidirectional Apply

Refresh Undo

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Wed, 20.02.2019
Time: 11:21:08
Uptime: 0 01:08:23

Figure 5.132 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Set the same one frequency channel for Channel 1 and Channel 2 in both the Primary IDUs and another frequency channel for Channel 1 and Channel 2 in the Secondary IDUs

ADMIN permissions

▶ Status

▲ **Config**

System

Access

IP

Radio

Ports

Alarms

▶ Maintenance

▶ Tools

Date: Wed, 20.02.2019
Time: 11:24:00
Uptime: 0 01:11:14
Refresh status

Modem Serial Number: 355260100010
License Number: 3010403010100229
License Type / Status: permanent / ok

Logout in: 18 m 36 s

Parameters ACM Advanced

LOCAL (primary)				REMOTE			
TxF	TxP	MSE	RxL	TxF	TxP	MSE	RxL
17990	15	-38.6	-40.8	19000	15	-38.4	-40.1
17990	15	-39.3	-40.3	19000	15	-38.0	-39.5
18100	18	-37.8	-49.8	19110	18	-38.2	-46.8
18100	18	-36.5	-48.9	19110	18	-36.9	-46.4

Split 2+2

rem.prim_11:P

S.loc.sec_12

XPIC

rem.sec_10:S

MODEM

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	1024/strong	1024/strong	1024/strong	1024/strong
ACM Setting	✖	✖	-	-
Advanced Setting	default	default	-	-

RADIO

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	17990	17990	19000	19000
RX Frequency [MHz]	19000	19000	17990	17990
TX Power Limit [dBm]	15	15	15	15
TX Mute Config	auto	auto	auto	auto
ATPC Function	☐	☐	☐	☐
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply to local & remote

Figure 5.133 Example of Primary IDU Radio configuration

ADMIN permissions

▶ Status

▲ **Config**

System

Access

IP

Radio

Ports

Alarms

▶ Maintenance

▶ Tools

Date: Wed, 20.02.2019
Time: 11:24:05
Uptime: 0 01:11:42
Refresh status

Modem Serial Number: 355260100008
License Number: 3010403010100227
License Type / Status: permanent / ok

Logout in: 16 m 19 s

Parameters ACM Advanced

LOCAL (secondary)				REMOTE(s)			
TxF	TxP	MSE	RxL	TxF	TxP	MSE	RxL
17990	15	-38.7	-40.8	19000	15	-38.5	-40.0
17990	15	-39.3	-40.2	19000	15	-38.0	-39.5
18100	18	-37.7	-49.8	19110	18	-38.3	-46.7
18100	18	-36.4	-48.9	19110	18	-36.8	-46.5

Split 2+2

rem.prim_11:P

S.loc.sec_12

XPIC

rem.sec_10:S

MODEM

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
Bandwidth	60000_02	60000_02	60000_02	60000_02
Max RxACM Profile	1024/strong	1024/strong	1024/strong	1024/strong
ACM Setting	✖	✖	-	-
Advanced Setting	default	default	-	-

RADIO

	LOCAL		REMOTE	
	CHANNEL 1	CHANNEL 2	CHANNEL 1	CHANNEL 2
T/R Spacing	fixed	fixed	fixed	fixed
TX Frequency [MHz]	18100	18100	19110	19110
RX Frequency [MHz]	19110	19110	18100	18100
TX Power Limit [dBm]	18	18	18	18
TX Mute Config	auto	auto	auto	auto
ATPC Function	☐	☐	☐	☐
ATPC RX Level [dBm]	-55	-55	-55	-55

Refresh Undo Apply to local & remote

Figure 5.134 Example of Secondary IDU Radio configuration

- 3) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

Figure 5.135 Example of IP configuration

- 4) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

Figure 5.136 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN

ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section and must be done in all Phoenix G2 IDUs

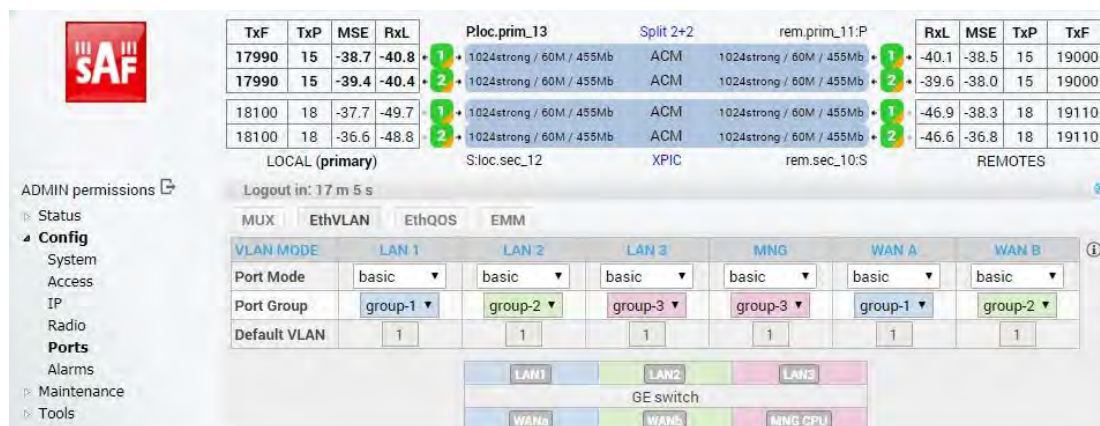


Figure 5.137 Example of port grouping

- 6) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 and SFP2 ports must be automatically indicated as connected in Mode 'force2G5'

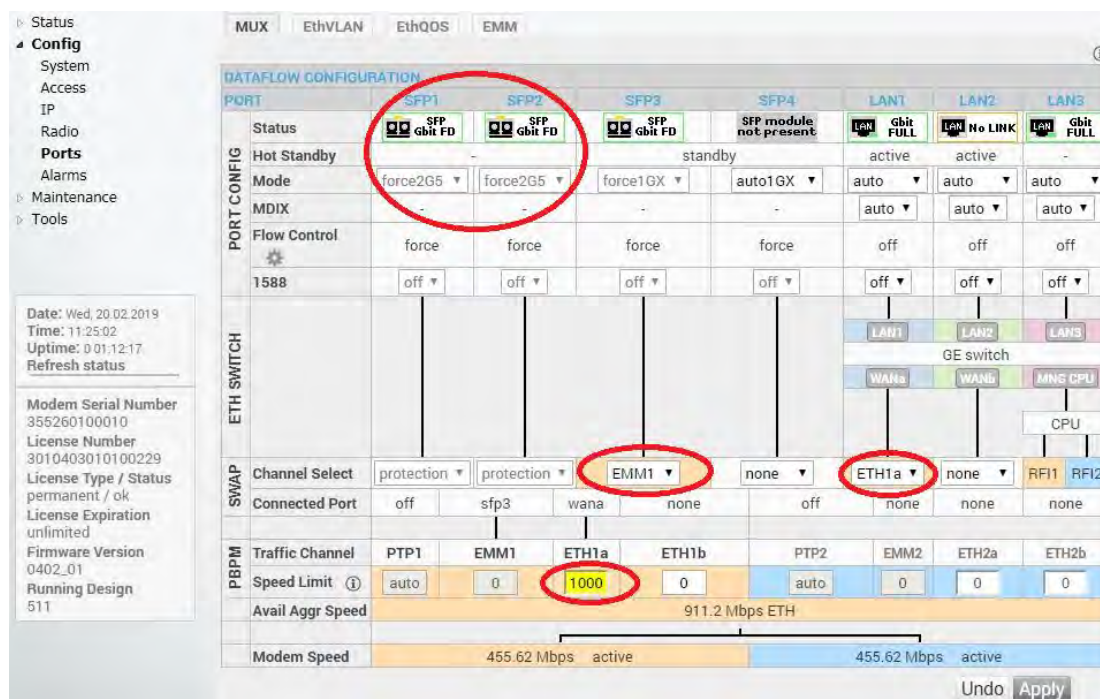


Figure 5.138 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP2, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

Alarms Configuration Table

Category	Alarm Name	Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	THRESHOLDS	DETAILS
Modem	Modem Aggr/Prot	no						
	Modem Data Sync	no						
	Modem MSE Level	no					-25	[dB]
	Modem FER	no					10	[error_frm/10s]
	Radio RX Level	no					-75	[dBm]
Ports	Modem LAN1 Link	yes	☒					
	Modem LAN2 Link	yes	☒					
	Modem LAN3 Link	no						
	Modem SFP1 Link	no	☒					
	Modem SFP2 Link	no	☒					

Figure 5.139 Example of alarm configuration

- 9) Save new settings by pressing **Write** button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs

System Configuration Table

Mode	Description	Date&Time	Advanced	ACTION
DESIGN CONFIGURATION	Design Type	Design 511		Apply
DESIGN MODES	Functional Mode	Split 2+2		Apply
	Link Protection Diversity	FD - Freq. diversity		Apply
	Link Aggregation Diversity	XPIC		Apply
	Hot-Swap Startup Device Role	Auto (primary)		Apply
	Running Role Swapping	swap device role (primary/secondary)		Apply
RADIO MODES	Duplex Mode	Bidirectional		Apply

Figure 5.140 Example of system configuration in Auto mode

- 12) Save new settings by pressing **Write** button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):



TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
17990	15	-38.7	-40.8	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-40.1	-38.5	15	19000
17990	15	-39.4	-40.4	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-39.6	-38.0	15	19000
18100	18	-37.7	-49.7	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	1	-46.9	-38.3	18	19110
18100	18	-36.6	-48.8	2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	2	-46.6	-36.8	18	19110
LOCAL (primary)					S.loc.sec_12	XPIC	rem.sec_10:S		REMOTES			

Figure 5.141 Status of 2+2 XPIC aggregation FD protection mode

Example 14 – 1+1 HSB/SD Full protection scheme

The 1+1 HSB/SD (Hot Standby/Space Diversity) full protection mode besides the ODU, IDU-ODU cable and modem failure protection adds protection also against HW failures such as IDU power failure, ETH port failure, Primary-EMM and Secondary interconnection failure and EMM failure. When any of these events occurs the Secondary IDU is automatically reconfigured to become Primary IDU and its data ports are automatically enabled for traffic while the original primary, now the secondary, is simultaneously set so the Tx direction is still working but received data from EMM ports are dropped out.

The usage of an external ETH switch with automatic ARP table flushing is required for proper LAN and SFP2 data switch-over. To avoid an unnecessary data drop the new Primary unit will remain in its Primary role even when the original reason for switching has disappeared. Note that the LAN3 port is intended for management connection and it cannot be protected (automatically enabled/disabled) like other ports

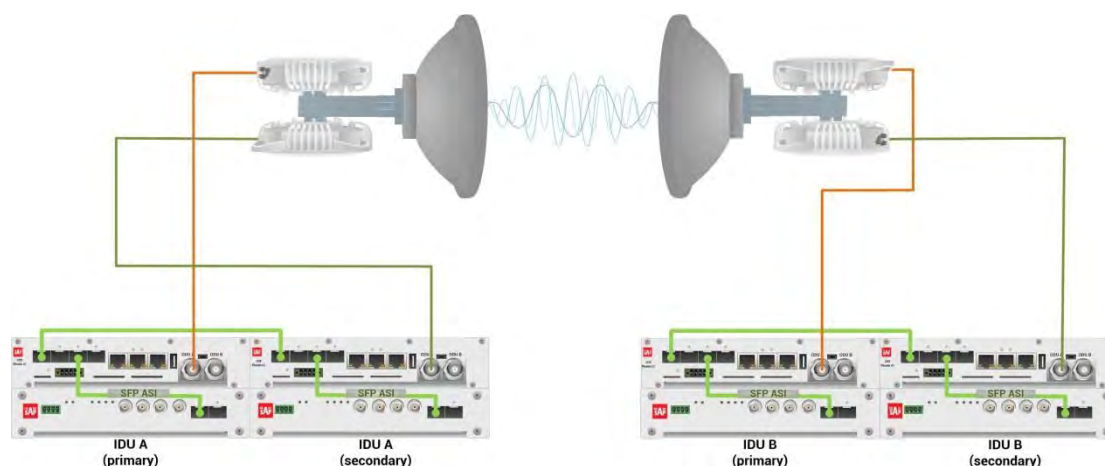


Figure 5.142a Example of 1+1 HSB full protection scheme

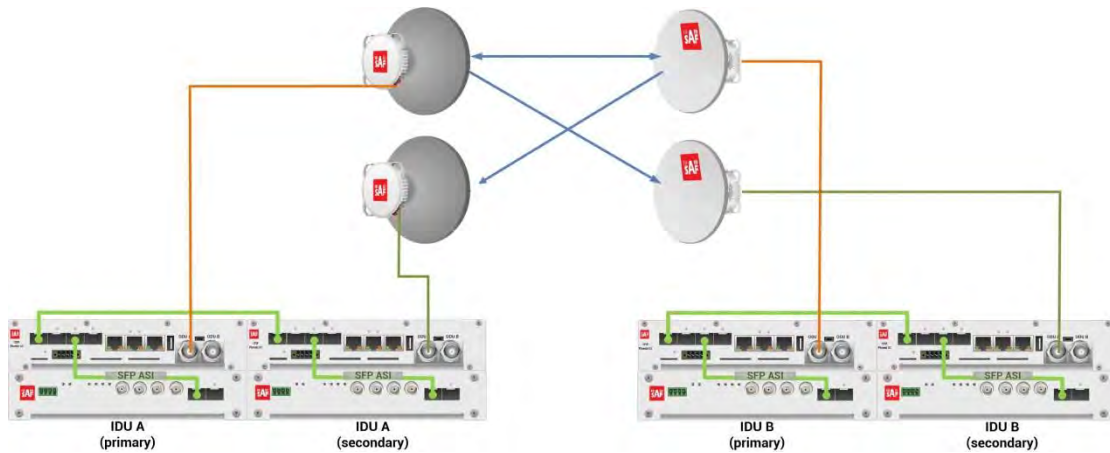


Figure 5.142b Example of 1+1 SD full protection scheme

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 1+1', Link Protection Diversity 'HSB/SD – Hot standby' are selected on both sides of the link. The modulation is 1024QAM in BW 60 MHz and the appropriate maximal data speed is about 455 Mbps. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODU's per link.**



Both IDUs in each side of the link are interconnected with optical cable on ports SFP1. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 1+1 HSB/SD full protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 1+1', Link Protection Diversity 'HSB/SD – Hot standby'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
17800	15	-38.8	-41.2	1	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-39.7	-38.8	15	18810
17800	muted	-38.2	-46.8	2				-43.6	-38.4	muted	18810

LOCAL (primary) S.loc.sec_12 HSB/SD rem.sec_10:S REMOTES

Logout in: 19 m 51 s

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 1+1 Apply

Link Protection Diversity HSB/SD - Hot standby Apply

Hot-Swap Startup Device Role Fixed primary Apply

FO peer connected - it's role will be set automatically.

RADIO MODES CHANNEL 1 ACTION

Duplex Mode Bidirectional Apply

Refresh Undo

Date: Thu, 21.02.2019
Time: 13:55:35
Uptime: 0 03:11:26

Figure 5.143 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Set the same one frequency channel in all Phoenix G2 IDUs

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Thu, 21.02.2019
Time: 14:01:20
Uptime: 0 03:17:11
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status

Logout in: 17 m 51 s

Parameters | ACM | Advanced

LOCAL (primary)		REMOTE	
CHANNEL 1		CHANNEL 1	
Bandwidth	60000_02	60000_02	
Max Rx ACM Profile	1024/strong	1024/strong	
ACM Setting			
Advanced Setting	default		
RADIO		RADIO	
CHANNEL 1		CHANNEL 1	
T/R Spacing	fixed	fixed	
TX Frequency [MHz]	17800	18810	
RX Frequency [MHz]	18810	17800	
TX Power Limit [dBm]	15	15	
TX Mute Config	auto	auto	
ATPC Function			
ATPC RX Level [dBm]	-55	-55	

Refresh

Undo Apply to local & remote

Figure 5.144 Example of Radio configuration

- 3) In web GUI 'Config->IP->Addresses' set the IP address of the device. The IP address must be different for each IDU

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Thu, 21.02.2019
Time: 14:01:20
Uptime: 0 03:17:11
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status

Logout in: 19 m 40 s

Addresses | SNMP | Advanced

MAIN ADDRESS SETTINGS		REQUIRED		CONFIGURED	
Device IP / Mask	192.168.205.13 / 24			192.168.205.13/24	
Default Gateway IP	192.168.205.1			192.168.205.1	
OPTIONAL ADDRESS SETTINGS		REQUIRED		CONFIGURED	
USB IP/Mask	10.10.11.10/24			10.10.11.10/24	
Fallback IP/Mask	10.10.10.10/24			10.10.10.10/24	

Undo Save

Figure 5.145 Example of IP configuration

- 4) In web GUI 'Config->IP->Advanced' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

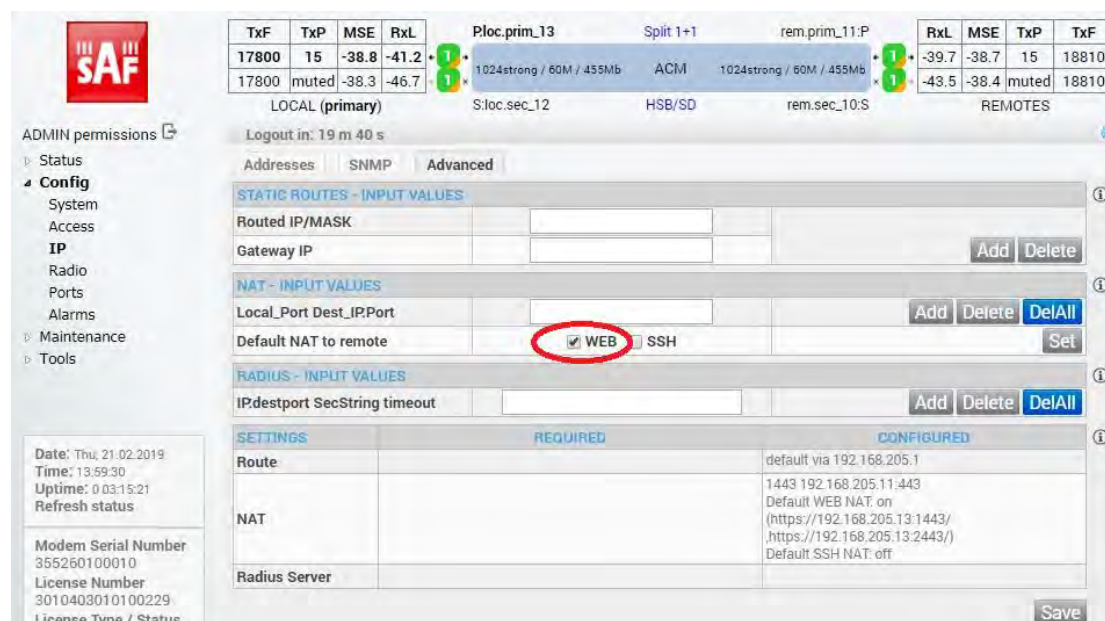


Figure 5.146 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section and must be done in all Phoenix G2 IDUs



Figure 5.147 Example of port grouping

- 6) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 port must be automatically indicated as connected in Mode 'force2G5'

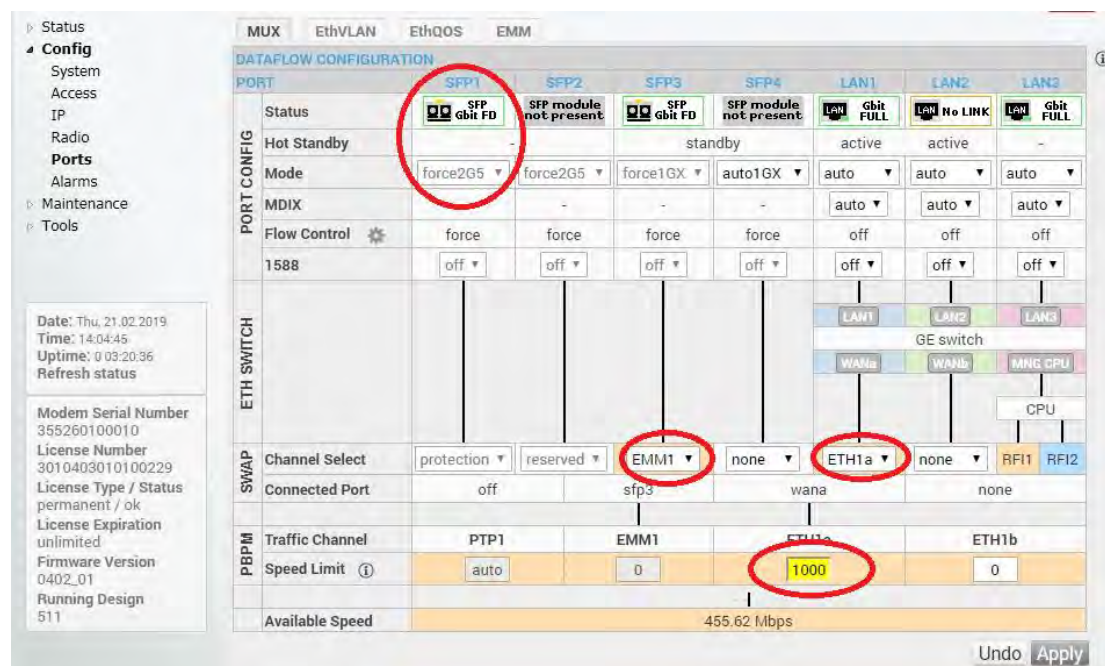


Figure 5.148 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

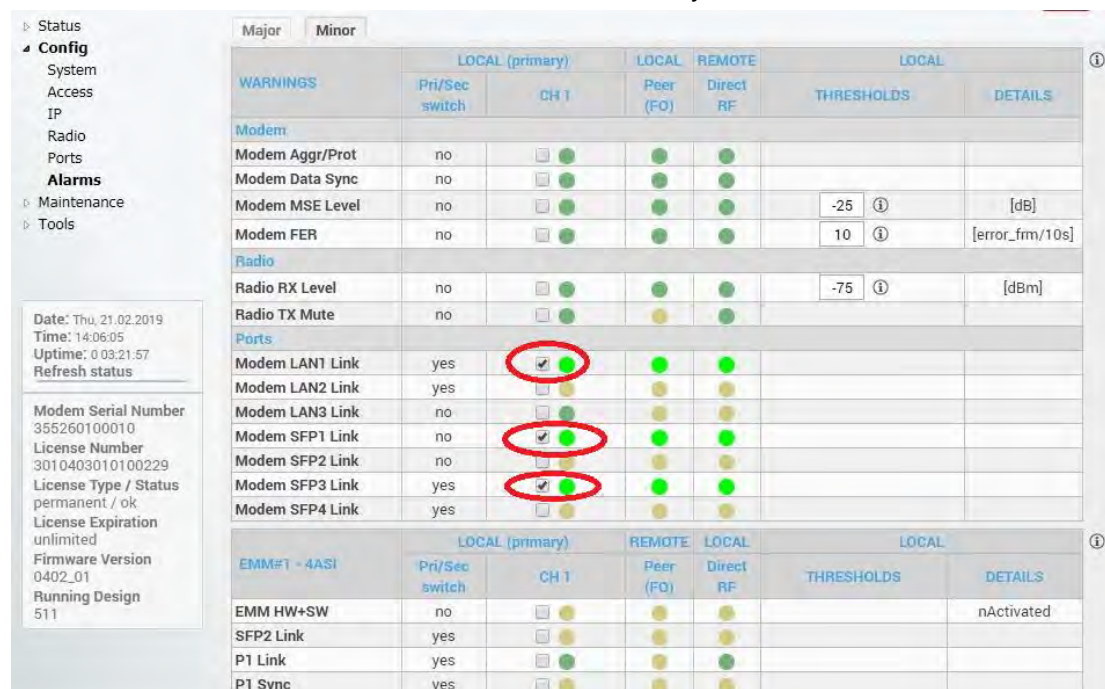


Figure 5.149 Example of alarm configuration

- 9) Save new settings by pressing **Write** button.
- 10) Reboot all 4 IDUs after successful reconfiguration

- 11) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs

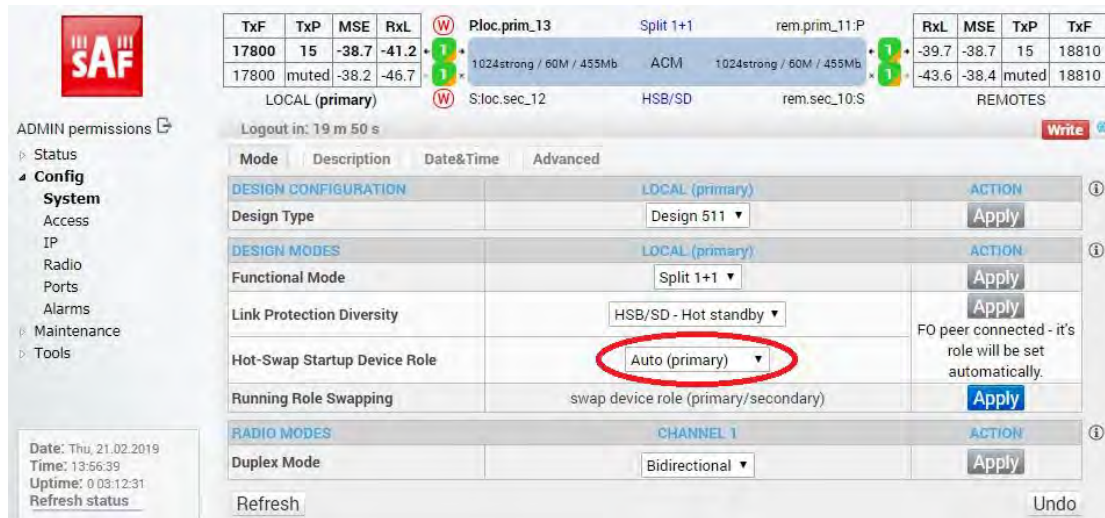


Figure 5.150 Example of system configuration in Auto mode

- 12) Save new settings by pressing  button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):

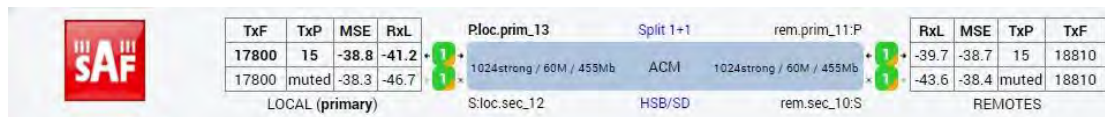


Figure 5.151 Status of 1+1 HSB/SD protection mode

Example 15 – 1+1 FD Full protection scheme

The 1+1 FD (Frequency Diversity) full protection mode besides the ODU, IDU-ODU cable and modem failure protection adds protection also against HW failures such as IDU power failure, ETH port failure, Primary-EMM and Secondary interconnection failure and EMM failure. When any of these events occurs the Secondary IDU is automatically reconfigured to become Primary IDU and its data ports are automatically enabled for traffic while the original primary, now the secondary, is simultaneously set so the Tx direction is still working but received data from EMM ports are dropped out.

The usage of an external ETH switch with automatic ARP table flushing is required for proper LAN and SFP2 data switch-over. To avoid an unnecessary data drop the new Primary unit will remain in its Primary role even when the original reason for switching has disappeared. Note that the LAN3 port is intended for management connection and it cannot be protected (automatically enabled/disabled) like other ports

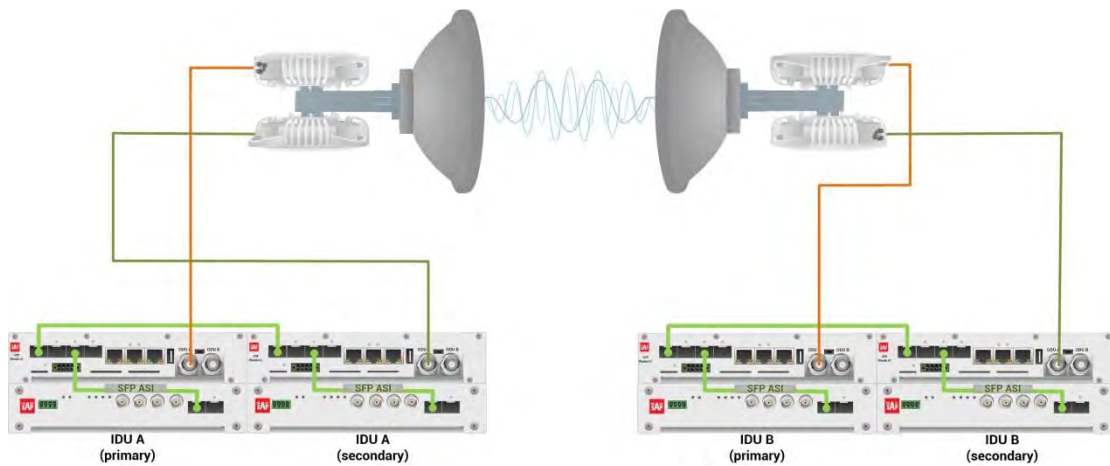


Figure 5.152 Example of 1+1 FD full protection scheme

This concrete example describes an application where the Design Type 'Design 511', Functional mode 'Split 1+1', Link Protection Diversity 'FD – Freq. diversity' are selected on both sides of the link. The modulation is 1024QAM in BW 60 MHz and the appropriate maximal data speed is about 455 Mbps. ASI traffic is passed through the link. **This scheme requires four Phoenix G2 IDUs and eight ODUs per link.**



Both IDUs in each side of the link are interconnected with optical cable on ports SFP1. 2.5 GB SFP modules must be used for this interconnection. SFP3 or SFP4 port can be used for the IDU interconnection with ASI EMM module.

Configuration steps for 1+1 FD full protection are following:

- 1) In web GUI '[Config->System->Mode](#)' choose design type 'Design 511', Functional mode 'Split 1+1', Link Protection Diversity 'FD – Freq. diversity'. The setting Hot-Swap Startup device Role during the configuration must be set as 'Fixed primary' on both Primary IDUs and as 'Fixed secondary' on both Secondary IDUs. The Duplex Mode must be set to 'Bidirectional' for both channels on all Phoenix G2 IDUs

TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 1+1	rem.prim_11-P	W	RxL	MSE	TxP	TxF
17800	15	-38.8	-41.3	•	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	•	-39.6	-38.8	15	18810
18000	18	-38.3	-49.2	•	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	•	-47.3	-38.6	18	19010

LOCAL (primary) S.loc.sec_12 FD rem.sec_10:S REMOTES

Logout in: 19 m 10 s

Mode Description Date&Time Advanced

DESIGN CONFIGURATION LOCAL (primary) ACTION

Design Type Design 511 Apply

DESIGN MODES LOCAL (primary) ACTION

Functional Mode Split 1+1 Apply

Link Protection Diversity FD - Freq. diversity Apply

Hot-Swap Startup Device Role Fixed primary

RADIO MODES CHANNEL 1 ACTION

Duplex Mode Bidirectional Apply

Refresh Undo

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Thu, 21.02.2019

Time: 14:13:15

Uptime: 0 03:29:07

Figure 5.153 Example of System configuration

- 2) In web GUI '[Config->Radio->Parameters](#)' configure basic radio and modem parameters in all Phoenix G2 IDUs. Set one frequency channel on the Primary link and another frequency channel for the Secondary link (FD) in all Phoenix G2 IDUs

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Thu, 21.02.2019
Time: 14:15:55
Uptime: 0 03:31:47
Refresh status

Modem Serial Number
355260100010
License Number
3010403010100229
License Type / Status
permanent / ok

Logout in: 18 m 42 s

Parameters ACM Advanced

MODEM

LOCAL CHANNEL 1

REMOTE CHANNEL 1

Bandwidth 60000_02 60000_02

Max RxACM Profile 1024/strong 1024/strong

ACM Setting -

Advanced Setting default

RADIO

LOCAL CHANNEL 1

REMOTE CHANNEL 1

T/R Spacing fixed fixed

TX Frequency [MHz] 17800 18810

RX Frequency [MHz] 18810 17800

TX Power Limit [dBm] 15 15

TX Mute Config auto auto

ATPC Function

ATPC RX Level [dBm] -55 -55

Refresh Undo Apply to local & remote

Figure 5.154 Example of Primary Radio configuration

ADMIN permissions

Status

Config

System

Access

IP

Radio

Ports

Alarms

Maintenance

Tools

Date: Thu, 21.02.2019
Time: 14:16:04
Uptime: 0 03:32:20
Refresh status

Modem Serial Number
355260100008
License Number
3010403010100227
License Type / Status
permanent / ok

Logout in: 16 m 9 s

Parameters ACM Advanced

MODEM

LOCAL CHANNEL 1

REMOTE CHANNEL 1

Bandwidth 60000_02 60000_02

Max RxACM Profile 1024/strong 1024/strong

ACM Setting -

Advanced Setting default

RADIO

LOCAL CHANNEL 1

REMOTE CHANNEL 1

T/R Spacing fixed fixed

TX Frequency [MHz] 18000 19010

RX Frequency [MHz] 19010 18000

TX Power Limit [dBm] 18 18

TX Mute Config auto auto

ATPC Function

ATPC RX Level [dBm] -55 -55

Refresh Undo Apply to local & remote

Figure 5.155 Example of Secondary Radio configuration

- 3) In web GUI '[Config->IP->Addresses](#)' set the IP address of the device. The IP address must be different for each IDU

Figure 5.156 Example of IP configuration

- 4) In web GUI '[Config->IP->Advanced](#)' set 'WEB' option as Default NAT to remote in all Phoenix G2 IDUs. This will enable management access to other IDUs in the link via NAT.



With NAT configured it is possible to access other IDUs management in the link via IP address of one of IDUs and default NAT ports. Following default NAT ports are possible: 2443 (for local secondary IDU), 1443 (for remote primary IDU), 3443 (for remote secondary IDU). The example of accessing the local secondary IDU via the local primary IDU IP address in this case is: <https://192.168.205.13:2443>

Figure 5.157 Example of IP NAT configuration

- 5) Port group configuration must be done according to customer requirements. The requirement in this example is to have one LAN port for Ethernet traffic. In this case LAN1 port will be used for the Ethernet traffic – it must be allocated in one group with one of WAN ports, in this case it is WANa port (Group1). LAN3 port will be used for management access, it is allocated in one group with MNG port (Group3). As the NAT is used for remote management access, it is not necessary to add management access ports to any of WAN ports. LAN2 and WANb ports will not be used in this example and will be allocated in Group2. Port grouping configuration is available in web GUI '[Config->Ports->EthVLAN](#)' section and must be done in all Phoenix G2 IDUs

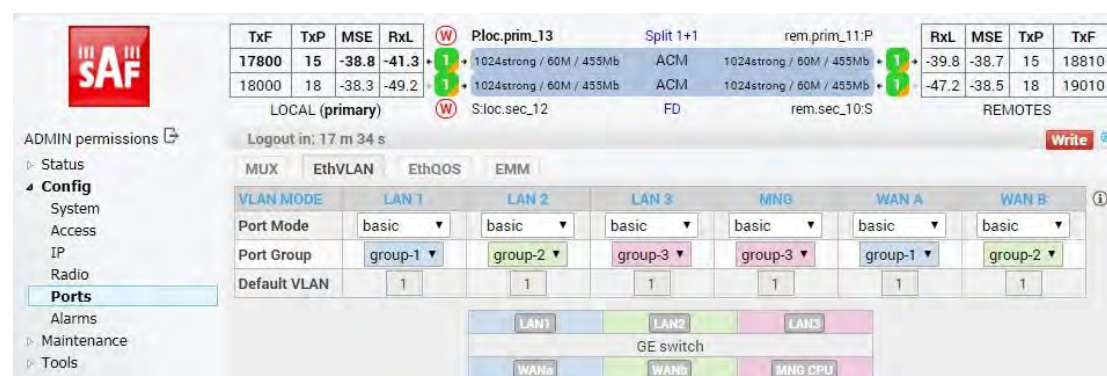


Figure 5.158 Example of port grouping

- 6) In web GUI '[Config->Ports->MUX](#)' specify Data channel and port speed for WAN (radio direction) port and SFP ports in all Phoenix G2 IDUs. In the example WANa port is connected to high priority data channel 'ETH1a' and is set on full speed limit 1000 Mbps. The SFP3 port is connected to EMM channel. If both IDUs (Primary and Secondary) are interconnected successfully, the SFP1 port must be automatically indicated as connected in Mode 'force2G5'

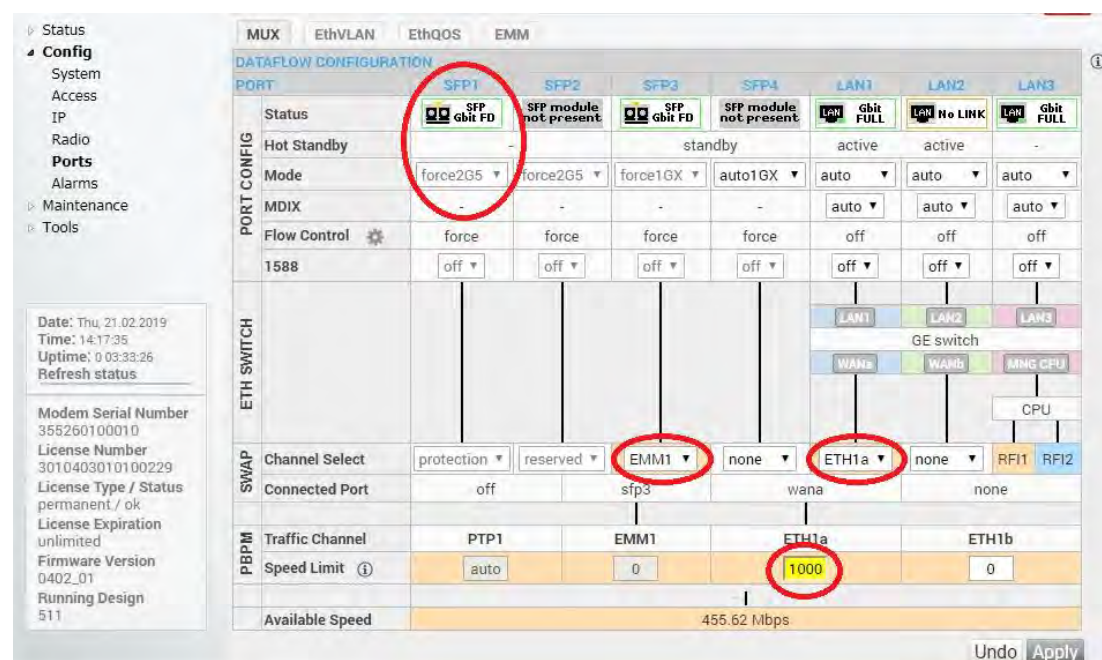


Figure 5.159 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '[Config->Ports->EMM](#)' in all Phoenix G2 IDUs.
- 8) In web GUI '[Config->Alarms->Minor](#)' configure interface (LAN, SFP, ASI port) alarms which will be used for protection switchover in all Phoenix G2 IDUs. In the example LAN1, SFP1, SFP3 and ASI Port 1 are used. Those interface port alarm check-boxes must be checked in order to initiate the switch-over in case of failure of any of those interfaces

Figure 5.160 Example of alarm configuration

- 9) Save new settings by pressing **Write** button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '[Config->System->Mode](#)' set Hot-Swap Startup device Role to 'Auto primary' for both Primary IDUs and to 'Auto Secondary' for both Secondary IDUs in order to enable protection mode on all Phoenix G2 IDUs

Figure 5.161 Example of system configuration in Auto mode

- 1) Save new settings by pressing **Write** button.

The status of the link and its configuration is displayed in the header of the web GUI. The status of the IDU which currently is monitored is displayed in Bold and is indicated as LOCAL (primary) or LOCAL (secondary):



Figure 5.162 Status of 1+1 FD protection mode

Example 16 – VLAN configuration

The example will describe the VLAN configuration in Phoenix G2 IDUs. In this case the VLAN requirement is following: VLAN ID 100 will be user traffic via LAN1 port and trunked through the link; VLAN ID 200 will be used for Phoenix G2 management (MNG port) access via LAN1 port. WANA port will be used for radio/remote side access. All mentioned ports are grouped in Group 1. The same VLAN configuration must be applied on both side IDUs.

Configuration steps are following:

- 1) In web GUI [Config->System->EthVLAN](#) the 'Port Mode' for all ports must be set to "basic" option – this is transparent mode and VLAN mode is disabled:

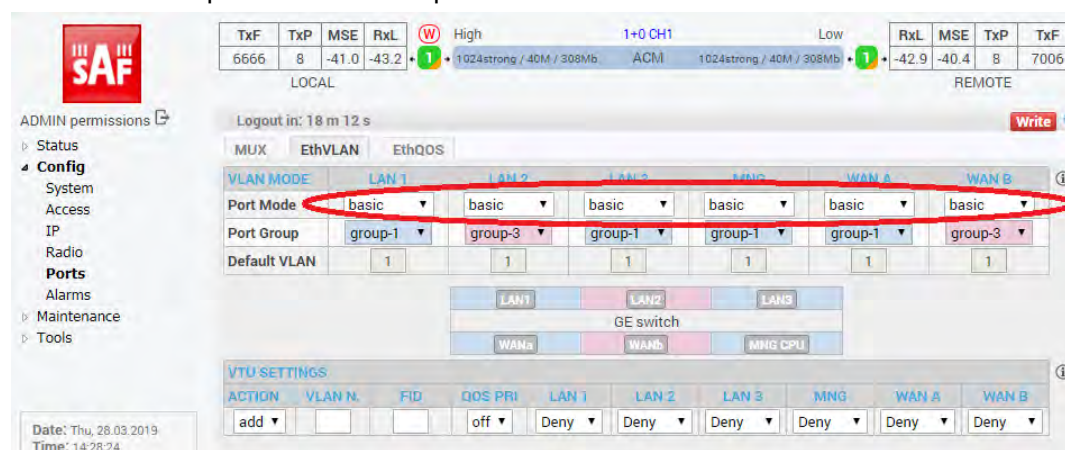


Figure 5.163 Port mode configuration before VLAN ID configuration

- 2) In the same web page in VTU Settings add user traffic VLAN ID 100 tag for LAN1 and WANA ports by choosing option "Tag" in appropriate dropdowns and press [Apply](#) button:

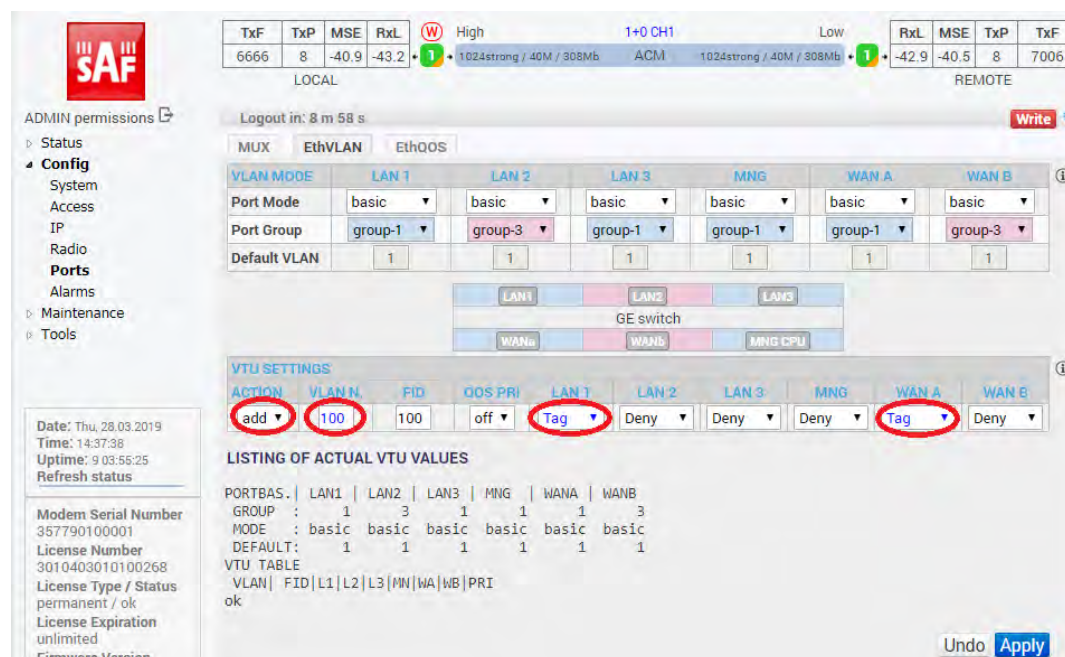


Figure 5.164 Traffic VLAN configuration

- 3) The new applied VLAN ID will be indicated in VTU table:

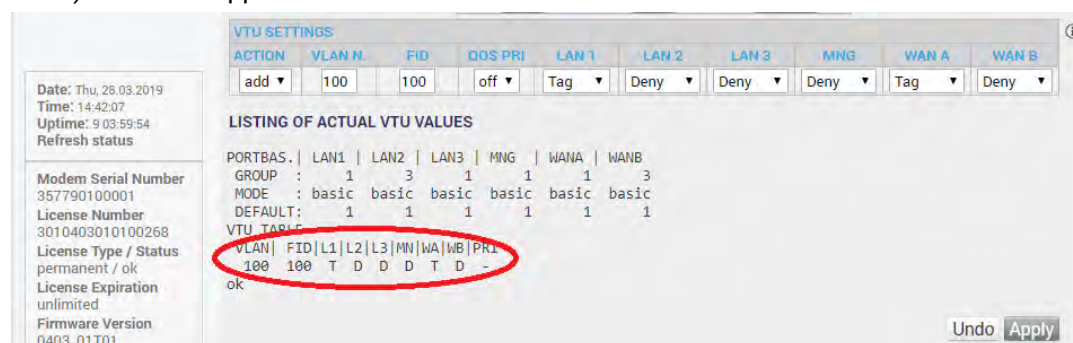


Figure 5.165 Traffic VLAN configuration

- 4) Add management VLAN ID 200 tag for LAN1 and WANa ports by choosing option "Tag" in appropriate dropdowns. Choose "Untag" in MNG port dropdown. Press **Apply** button. The new configured VLAN ID will be indicated in VTU table and VLAN ID 200 will be indicated as default VLAN for MNG port:

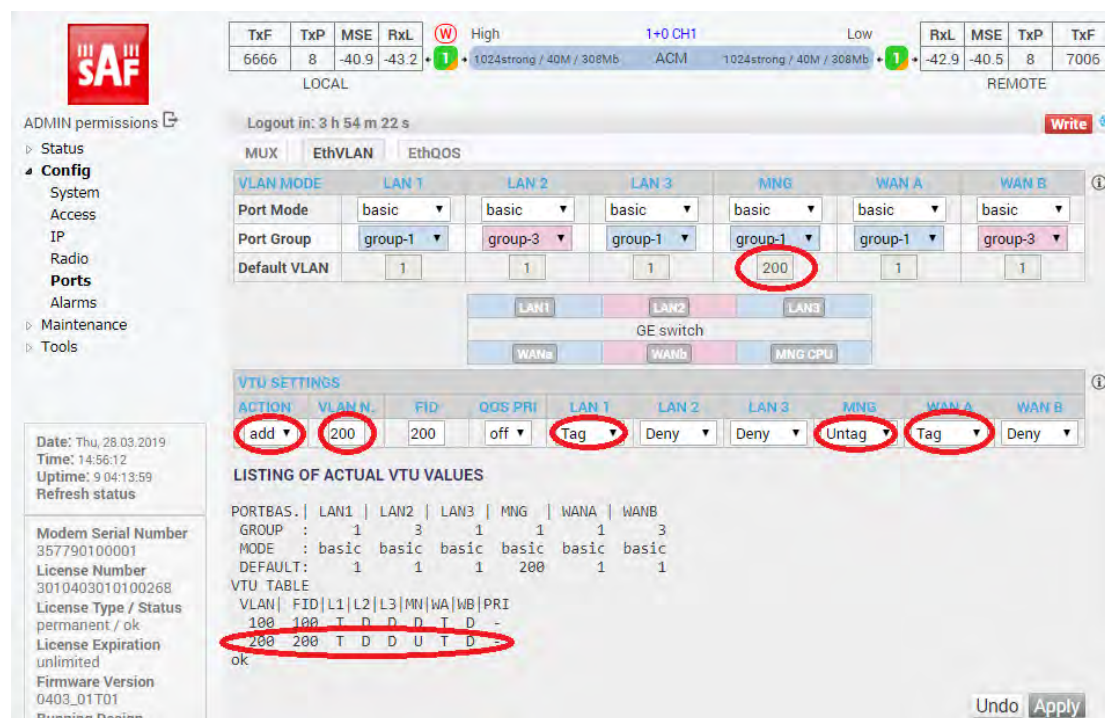


Figure 5.166 Management VLAN configuration

- 5) After configuring VLAN IDs, in the same page enable VLAN mode by setting "Port Mode" for each involved port: set "trunk" mode for LAN1 and WANa port, set "access" mode for MNG port and press **Apply** button:



Figure 5.167 VLAN mode enabling

- 6) After applying those settings the management connection between the IDU and computer will be lost, reconnect to the IDU via external switch with appropriate VLAN configuration (VLAN ID 200 for management access)
- 7) After successful VLAN configuration save new settings by pressing **Write** button.

Appendix A: TECHNICAL SPECIFICATION

Phoenix G2		
General		
Concept / form factor		Split Mount
Frequency bands		2/2.3*GHz, 4GHz, U4GHz, L6GHz, U6GHz 7GHz, 8GHz, 11GHz, 13GHz, 18GHz, 23GHz, 38GHz
Capacity	Up to 900 Mbps in 2+0 configuration	
	452 Mbps at 60 MHz 1024QAM 1+0	
Max modulation		1024QAM
Configurations		1+0, 1+1 HSB/SD/FD, 2+0 (Layer 1 aggregation), 2+0 XPIC, 2+2 (with two IDUs), 1+1 HSB/SD/FD Full redundancy (with two IDUs)
ACM and ATPC		Yes
Channel bandwidth		ETSI: from 7 MHz, up to 56 MHz FCC: from 10 MHz, up to 60 MHz
Ports		
Ethernet traffic	3x RJ-45	10/100/1000Base-T
	4x SFP	1000BaseSX/LX 2x SFP ports also work as Extension/Protection ports
Ethernet Management Access		1x 10/100/1000Base-T, RJ-45
Serial port for configuration		USB B (alternative IP port)
Flash memory port		USB A
ODU port		2x N-Type Female
DC power port		Single block 4 pole
Ethernet		
Switch type		Managed Gigabit Ethernet Layer 2
Max frame size		64 to 2048 bytes, up to 10240 bytes for Jumbo mode
MAC table		8192 entries; automatic learning and aging
Packet buffer		125KB , non-blocking store&forward
Flow Control		802.3x
VLAN support		802.1Q, up to 4096 VLANs
QinQ (Double Tagging)		Yes
QoS		64 level DiffServ (DSCP) or 8 level 802.1p mapped in 4 prioritization queues with VLAN support, IPv6 Traffic Class
Synchronization		PTP 1588v2
Management features		
Protocols		via WEB GUI (HTTP/HTTPS), CLI (Telnet/SSH), NMS (SNMP v2c/v3), Serial interface (USB IP port)
Access		In-band (via VLAN) Out-of-band (115 kbps)

	Phoenix G2
SNMP	Yes, SNMP traps, MIB, SNMP v2c/3
Element Management System (EMS)	Web based, HTTP/HTTPS
Mechanical & Electrical	
Temperature Range / Humidity	-5 °C to +45 °C / 23 °F to 113 °F / 0% to 95%
Dimensions: HxWxD	½ width 1U (44 x 220 x 240 mm) / (1.73 x 8.66x 9.45 in)
Weight	2.2 kg / 4.9 lb
Max. power consumption	IDU only: <30W IDU + 2xODU: <180W
IDU-ODU connection	Maximum permissible IF cable attenuation = 15dB, N-Type connectors
DC port	-40.5V to -57V DC
IDU compliance	
Operation	ETSI EN 300 019, Part 1-3, Class 3.2
Storage	ETSI EN 300 019, Part 1-1, Class 1.2
Transportation	ETSI EN 300 019, Part 1-2, Class 2.3
Power	EN 300 132-2
Radio frequency IDU+ODU	EN 302 217-2-2
EMC	EN 301 489-1, EN 301 489-3
Safety	IEC 60950-1/EN 60950-1

*2.3GHz radio unit complies with FCC part 27

Maximum Tx Power [dBm] for Phoenix G2*:

Modulation	2/2.3 GHz**	4/U4 GHz	L6/U6 GHz	7 GHz	8 GHz	11 GHz	13 GHz	18 GHz	23 GHz	38 GHz
4 QAM	+35	+33	+19/+27/ +33	+19/+27/ +32	+19/+27/ +31	+19/+25/ +29	+19/+25/ +28	+19/+ 26	+19	+17
16 QAM	+34	+32	+18/+26/ +32	+18/+26/ +31	+18/+26/ +30	+18/+24/ +28	+18/+24/ +27	+18/+ 25	+18	+16
32 QAM	+33	+31	+17/+25/ +31	+17/+25/ +30	+17/+25/ +29	+17/+23/ +27	+17/+23/ +26	+17/+ 24	+17	+15
64 QAM	+32	+30	+16/+24/ +30	+16/+24/ +29	+16/+24/ +28	+16/+22/ +26	+16/+22/ +25	+16/+ 23	+16	+14
128 QAM	+32	+30	+16/+24/ +30	+16/+24/ +29	+16/+24/ +28	+16/+22/ +26	+16/+22/ +25	+16/+ 23	+16	+14
256 QAM	+31	+29	+15/+23/ +29	+15/+23/ +28	+15/+23/ +27	+15/+21/ +25	+15/+21/ +24	+15/+ 22	+15	+13
512 QAM	+30	+28	+14/+22/ +28	+14/+22/ +27	+14/+22/ +26	+14/+20/ +24	+14/+20/ +23	+14/+ 21	+14	+12
1024 QAM	+27	+25	+11/+19/ +25	+11/+19/ +24	+11/+19/ +23	+11/+17/ +21	+11/+17/ +20	+11/+ 18	+11	+9

* Preliminary data

** 2.3GHz radio unit complies with FCC part 27

PhoeniX G2 RSL Thresholds and Capacity for ETSI channels*

Bandwidth, MHz	Modulation	2/2.3 GHz**	U4GHz	L6GHz	U6GHz	7GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps
		Guaranteed RSL Threshold, dBm									
7	4QAM StrongFEC	-91	-92	-92	-89,5	-90,5	-87,5	-88,5	-91	-89	10
	16QAM StrongFEC	-85	-86	-86	-83	-84	-82	-82,5	-85	-82,5	20
	32QAM StrongFEC	-82	-83	-83	-80	-81,5	-79	-79	-81,5	-79	25
	64QAM StrongFEC	-79	-80	-80	-76,5	-78	-76	-76	-78,5	-76	30
	128QAM StrongFEC	-75,5	-76,5	-76,5	-72,5	-74,5	-73,5	-73	-74,5	-72,5	35
14	4QAM StrongFEC	-88	-89	-89	-87	-87,5	-85	-87	-89	-87	21
	16QAM StrongFEC	-81,5	-82,5	-82,5	-81	-81	-80	-80	-82	-80	42
	32QAM StrongFEC	-78,5	-79,5	-79,5	-77,5	-78	-76,5	-77	-79	-77,5	53
	64QAM StrongFEC	-75,5	-76,5	-76,5	-75	-75,5	-74	-74	-76	-74,5	63
	128QAM StrongFEC	-72,5	-73,5	-73,5	-72	-72,5	-71	-71,5	-73	-71,5	74
	256QAM StrongFEC	-69,5	-70,5	-70,5	-68,5	-69,5	-68,5	-68	-70	-68,5	85
20	4QAM StrongFEC	-86,5	-87,5	-87,5	-86	-86	-84	-85,5	-87,5	-85	30
	16QAM StrongFEC	-80,5	-81,5	-81,5	-79	-79,5	-79	-79	-81,5	-78,5	61
	32QAM StrongFEC	-77,5	-78,5	-78,5	-76	-77	-75,5	-76	-78	-75,5	76
	64QAM StrongFEC	-74,5	-75,5	-75,5	-73	-74	-72,5	-73	-75	-72,5	91
	128QAM StrongFEC	-71	-72	-72	-70	-71	-69,5	-69,5	-72	-69,5	107
	256QAM StrongFEC	-68	-69	-69	-67,5	-68,5	-66,5	-66,5	-69	-67	122
	512QAM StrongFEC	-65	-66	-66	-64,5	-65	-63,5	-64	-66	-63,5	137
28	1024QAM StrongFEC	-62	-63	-63	-60,5	-61	-61	-60	-62	-59,5	152
	4QAM StrongFEC	-85	-86	-86	-84	-84,5	-83,5	-84	-86,5	-83,5	43
	16QAM StrongFEC	-78,5	-79,5	-79,5	-77,5	-78	-78	-77,5	-79,5	-77,5	86
	32QAM StrongFEC	-75,5	-76,5	-76,5	-74,5	-75,5	-75	-74,5	-76	-74,5	108
	64QAM StrongFEC	-73	-74	-74	-71,5	-72,5	-72	-71,5	-73	-71,5	129
	128QAM StrongFEC	-69,5	-70,5	-70,5	-68,5	-69,5	-69	-68,5	-70,5	-68,5	151
	256QAM StrongFEC	-67	-68	-68	-66	-66,5	-66	-65,5	-67	-65,5	172
	512QAM StrongFEC	-63,5	-64,5	-64,5	-62,5	-63,5	-62,5	-63	-63,5	-62	194
40	1024QAM StrongFEC	-61	-62	-62	-59,5	-60	-59,5	-59	-61	-59	216
	4QAM StrongFEC	-83,5	-84,5	-84,5	-83	-83	-82	-82	-84	-82	61
	16QAM StrongFEC	-77	-78	-78	-76	-76,5	-76	-75,5	-77	-75,5	122
	32QAM StrongFEC	-74,5	-75,5	-75,5	-73	-73,5	-73	-72,5	-74,5	-72,5	152
	64QAM StrongFEC	-71,5	-72,5	-72,5	-70	-71	-70	-69,5	-71	-69,5	183
	128QAM StrongFEC	-68,5	-69,5	-69,5	-67	-68	-67	-66,5	-68,5	-66,5	214
	256QAM StrongFEC	-65,5	-66,5	-66,5	-64	-65	-64,5	-63,5	-65	-63,5	244
	512QAM StrongFEC	-62,5	-63,5	-63,5	-61,5	-62	-60,5	-60,5	-62	-60,5	275
56	1024QAM StrongFEC	-59,5	-60,5	-60,5	-58,5	-58	-58	-57,5	-58,5	-57	305
	4QAM StrongFEC	-82	-83	-83	-80,5	-81,5	-81	-81	-82	-80,5	87
	16QAM StrongFEC	-75,5	-76,5	-76,5	-74	-75	-74,5	-74,5	-75,5	-74	174
	32QAM StrongFEC	-73	-74	-74	-71,5	-72	-71,5	-71,5	-72,5	-71	217
	64QAM StrongFEC	-70	-71	-71	-68,5	-69	-68,5	-68	-69,5	-68,5	261
	128QAM StrongFEC	-67	-68	-68	-65,5	-66,5	-65,5	-65,5	-67	-65	304
	256QAM StrongFEC	-64	-65	-65	-62	-63,5	-63	-62	-63,5	-61,5	348
	512QAM StrongFEC	-60,5	-61,5	-61,5	-59,5	-60,5	-59,5	-59	-60,5	-58,5	392
1024QAM StrongFEC		-57,5	-58,5	-58,5	-56	-56,5	-56,5	-56	-56,5	-55,5	435

* Preliminary data

** 2.3GHz radio unit complies with FCC part 27

Phoenix G2 RSL Thresholds and Capacity for FCC channels*

Bandwidth, MHz	Modulation	2GHz**	U4GHz	L6GHz	U6GHz	7GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps
Guaranteed RSL Threshold, dBm											
10	4QAM StrongFEC	-89.5	-90.5	-88.5	-88.5	-87	-88	-90	-88	-89	15
	16QAM StrongFEC	-83.5	-84.5	-82	-82.5	-81	-81.5	-83.5	-82.5	-82.5	30
	32QAM StrongFEC	-80	-81	-79	-79.5	-78.5	-78.5	-80	-79	-79.5	38
	64QAM StrongFEC	-77.5	-78.5	-76	-76.5	-75.5	-75.5	-77	-76	-76.5	45
	128QAM StrongFEC	-74.5	-75.5	-73.5	-73.5	-73	-72.5	-73.5	-72.5	-74	53
20	4QAM StrongFEC	-86.5	-87.5	-86	-86	-84	-85.5	-87.5	-85	-86	30
	16QAM StrongFEC	-80.5	-81.5	-79	-79.5	-79	-79	-81.5	-78.5	-79.5	61
	32QAM StrongFEC	-77.5	-78.5	-76	-77	-75.5	-76	-78	-75.5	-76.5	76
	64QAM StrongFEC	-74.5	-75.5	-73	-74	-72.5	-73	-75	-72.5	-73	91
	128QAM StrongFEC	-71	-72	-70	-71	-69.5	-69.5	-72	-69.5	-69.5	107
	256QAM StrongFEC	-68	-69	-67.5	-68.5	-66.5	-66.5	-69	-67	-67	122
	512QAM StrongFEC	-65	-66	-64.5	-65	-63.5	-64	-66	-63.5	-63.5	137
25	1024QAM StrongFEC	-62	-63	-60.5	-61	-61	-60	-62	-59.5	-59.5	152
	4QAM StrongFEC	-85.5	-86.5	-84.5	-85	-83.5	-85	-87.5	-84	-84.5	37
	16QAM StrongFEC	-79.5	-80.5	-78	-79	-78	-78	-81	-78	-78	74
	32QAM StrongFEC	-76.5	-77.5	-75	-75.5	-75	-75.5	-78	-75	-75	93
	64QAM StrongFEC	-73.5	-74.5	-72	-73	-72	-72	-75	-71.5	-72	111
	128QAM StrongFEC	-70.5	-71.5	-69	-70	-69.5	-69	-72	-69	-69.5	130
	256QAM StrongFEC	-67.5	-68.5	-66.5	-67	-66.5	-66	-68.5	-66	-66.5	148
	512QAM StrongFEC	-64.5	-65.5	-63.5	-64	-63	-63	-65.5	-63	-63.5	167
30	1024QAM StrongFEC	-61.5	-62.5	-60	-61	-60	-59.5	-62	-59.5	-59.5	186
	4QAM StrongFEC	-84.5	-85.5	-83.5	-84	-82.5	-83	-85	-83.5	-84.5	45
	16QAM StrongFEC	-78.5	-79.5	-77	-78	-77.5	-76.5	-78	-77	-77.5	91
	32QAM StrongFEC	-75.5	-76.5	-74	-75	-74	-74	-75	-74.5	-74.5	114
	64QAM StrongFEC	-72.5	-73.5	-71	-72	-71.5	-70.5	-73	-70.5	-71.5	137
	128QAM StrongFEC	-69.5	-70.5	-68.5	-69.5	-68.5	-68	-70	-68	-69	160
	256QAM StrongFEC	-66.5	-67.5	-65.5	-66	-66	-64.5	-66.5	-64.5	-66	183
	512QAM StrongFEC	-63.5	-64.5	-62.5	-63	-61.5	-61.5	-63.5	-61.5	-62.5	206
40	1024QAM StrongFEC	-60.5	-61.5	-59	-59.5	-59.5	-58.5	-60	-59	-58.5	229
	4QAM StrongFEC	-83.5	-84.5	-83	-83	-82	-82	-84	-82	-83	61
	16QAM StrongFEC	-77	-78	-76	-76.5	-76	-75.5	-77	-75.5	-76.5	122
	32QAM StrongFEC	-74.5	-75.5	-73	-73.5	-73	-72.5	-74.5	-72.5	-73	152
	64QAM StrongFEC	-71.5	-72.5	-70	-71	-70	-69.5	-71	-69.5	-70.5	183
	128QAM StrongFEC	-68.5	-69.5	-67	-68	-67	-66.5	-68.5	-66.5	-68	214
	256QAM StrongFEC	-65.5	-66.5	-64	-65	-64.5	-63.5	-65	-63.5	-64.5	244
	512QAM StrongFEC	-62.5	-63.5	-61.5	-62	-60.5	-60.5	-62	-60.5	-61	275
50	1024QAM StrongFEC	-59.5	-60.5	-58.5	-58	-58	-57.5	-58.5	-57	-57.5	305
	4QAM StrongFEC	-82.5	-83.5	-81.5	-82	-81.5	-81	-83	-81	-82	75
	16QAM StrongFEC	-76.5	-77.5	-75	-75.5	-75	-74.5	-76.5	-74.5	-75	151
	32QAM StrongFEC	-73.5	-74.5	-72	-73	-72	-71.5	-73.5	-71.5	-72.5	189
	64QAM StrongFEC	-70.5	-71.5	-69	-70	-69	-68.5	-71	-68.5	-69	227
	128QAM StrongFEC	-67.5	-68.5	-66	-67	-66	-65.5	-68	-65.5	-67	265
	256QAM StrongFEC	-64.5	-65.5	-63	-64	-63.5	-62.5	-64.5	-62.5	-63.5	303
	512QAM StrongFEC	-61.5	-62.5	-60.5	-61	-60	-60	-61.5	-59.5	-60.5	341
60	1024QAM StrongFEC	-58.5	-59.5	-57	-57	-56.5	-56.5	-58	-56.5	-57.5	379
	4QAM StrongFEC	-81.5	-82.5	-81	-81	-80.5	-81	-80.5	-80.5	-81	90
	16QAM StrongFEC	-75.5	-76.5	-74	-74	-74	-74.5	-74	-73.5	-74.5	180
	32QAM StrongFEC	-72.5	-73.5	-71	-71.5	-71	-71.5	-70.5	-70.5	-72	226
	64QAM StrongFEC	-69.5	-70.5	-68.5	-68.5	-68	-67.5	-68.5	-68	-69	271
	128QAM StrongFEC	-66.5	-67.5	-65.5	-63.5	-65	-64.5	-65.5	-65	-66	316
	256QAM StrongFEC	-64	-65	-62.5	-62.5	-62.5	-62	-62.5	-61.5	-63	361
	512QAM StrongFEC	-60.5	-61.5	-59.5	-59.5	-59	-59	-59.5	-58.5	-59.5	407
60	1024QAM StrongFEC	-57.5	-58.5	-56.5	-56.5	-56	-55.5	-56	-55.5	-56	452

* Preliminary data

** 2.3GHz radio unit complies with FCC part 27

Appendix B: ASI EMM TECHNICAL SPECIFICATION

CFIP-ASI-EXT	
EAGMEXA4	External ASI module for Phoenix G2 IDU, 4x BNC, 2x SFP ports
ASI	Unbalanced, 75 ohm
Scalability	Cascading up to four external modules
Ports	
IDU connection	1x SFP port 1000Base-SX (proprietary GigE protocol)
Connection to next External module	1x SFP port 1000Base-SX (proprietary GigE protocol)
ASI ports	4x BNC
DC port	Industrial power connector
Mechanical & Electrical	
Dimensions: HxWxD	½ width 1U (45 x 210 x 240 mm) / (1.77 x 8.27 x 9.45 in)
Weight	1.3 kg / 2.87 lb
Max. power consumption	IDU: <9 W
DC port	-20V to -60V DC

Appendix C: E1/T1 EMM TECHNICAL SPECIFICATION

CFIP-16E1/T1-EXT	
EAGMEX16	16E1/T1 external module for Phoenix G2 IDU, 16xRJ-45, 2xSFP ports
16x E1/T1	G.703-E1 balanced 120ohm for E1 mode G.703-E1 unbalanced 75 ohm for E1 mode T1.102-T1/100 ohm for T1 mode
Scalability	Cascading up to four external modules
Ports	
IDU connection	1x SFP port 1000Base-SX (proprietary GigE protocol)
Connection to next External module	1x SFP port 1000Base-SX (proprietary GigE protocol)
E1 ports	16x RJ-45
DC port	Industrial power connector
Mechanical & Electrical	
Dimensions: HxWxD	½ width 1U (45 x 210 x 240 mm) / (1.77 x 8.27 x 9.45 in)
Weight	1.3 kg / 2.87 lb
Max. power consumption	IDU: <9 W
DC port	-20V to -60V DC

Appendix D: IRFU TECHNICAL SPECIFICATION

Ports	
Antenna	A) N-Type or flange B) SMA Tx and Rx ports
IF to IDU	SMA
RSSI	2-port for multi-meter
Power	2-pin power port (alternative to IF port)
Mechanical & Electrical	
Operational use	Conforms to ETSI EN 300 019 Class 3.1E, IP20, NEMA 1
Temperature Range	-33°C to +55°C
Dimensions: HxWxD / weight	19" 2U rack 90x430x260 / 5.8 kg
IF port surge protection	Conforms to ETSI EN 301 489-1; EN 61000-4-5; IEC 61000-4-5
Input DC voltage	-40.5V to -57V DC (conforms to ETSI EN 300 132-2)
Max. power consumption	SP: 13-27 W; HP: 21-39 W; VHP: 39-55W

ABBREVIATIONS

ACM	– Adaptive Coding and Modulation
AES	– Advanced Encryption Standard
ANSI	– American National Standards Institute
ASI	– Asynchronous Serial Interface
ATPC	– Automatic Transmit Power Control
AWG	– American Wire Gauge
BER	– Bit-Error Ratio
BNC	– Bayonet Neill-Concelman connector
CDE	– Cable Discharge Events
CLI	– Command-Line Interface
CPE	– Customer-premises equipment
CRC	– Cyclic Redundancy Check
CW	– Continuous Wave
DC	– Direct Current
DSCP	– Differentiated Services Code Point
DVB	– Digital Video Broadcasting
EMM	– External Multiplexer Module
ESD	– Electrostatic Discharge
ETH	– Ethernet
ETSI	– European Telecommunications Standards Institute
FCC	– The Federal Communications Commission
FD	– Frequency Diversity
FEC	– Forward Error Correction
FER	– Frame Errors
FO	– Fiber Optics
GND	– Grounding
GUI	– Graphical User Interface
HP	– High Power
HSB	– Hot Standby
HTTPS	– Hypertext Transfer Protocol Secure
HW	– Hardware
IDU	– Indoor Unit
IF	– Intermediate Frequency
IRFU	– Indoor Radio Frequency Unit
ITU-T	– International Telecommunication Union – Telecommunication Standardization Sector
JSC	– Joint Stock Company
LAN	– Local Area Network
LED	– Light-Emitting Diode
MAC	– Media Access Control
MDI/MDX	– Medium Dependent Interface / Medium Dependent Interface Crossover
MIB	– Management Information Base
M/N	– Model Number
MNG	– Management
MPEG	– Moving Picture Experts Group

MSE – Mean Square Error
MUX – Multiplexer
NAT – Network Address Translation
NTP – Network Time Protocol
ODU – Outdoor Unit
OQPRI – Queue Priority override
PBPM – Priority Based Packet Multiplexer
PC – Personal Computer
P/N – Part Number
PRI – Priority
Pri/Sec – Primary/Secondary
PTP – Precision Time Protocol
RF – Radio Frequency
RSL – Received Signal Level
RSS – Radio Standards Specification
RSSI – Received Signal Strength Indicator
Rx – Receive
SD – Space Diversity
SFP – Small Form-factor Pluggable
SMA – SubMiniature version A connector
SNMP - Simple Network Management Protocol
S/N – Serial Number
SP – Standard Power
SSH – Secure Shell
SW – Software
SyncE – Synchronous Ethernet
QAM - Quadrature amplitude modulation
QoS – Quality of Service
QPRI – Queue Priority
QPSK – Quadrature Phase-shift Keying
TCP/IP – Internet Protocol Suite (Transmission Control Protocol / Internet Protocol)
TDM – Time-Division Multiplexing
Tx – Transmit
TV – Television
USB – Universal Serial Bus
VHP – Very High Power
VLAN – Virtual Local Area Network
VTU – VLAN rules table: VLAN Tagged/Untagged
XPIC – Cross-polar Interference Cancellation



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