TxF	TxP	MSE	RxL		CH2		1+0 CH2		middle	RxL	MSE	TxP	Tx
280	0 20	-36.3	-47.8	3 + 🔁	• 0032s	trong / 28M / 108	мь АСМ	0032strong / 28	M / 108Mb + 2	+ -46.8	-37.0	20	130
	LOC	AL									RE	MOTE	
Log	out int 5	m 35 s											
MID	Y Et	WIAN		thoos									
ATA		MEIGU	HATI	m									
ORT	- con co	141100	in-stra	SF	PI	SFRI	SFP3	SEDA	LAN1	LAN		LAN	
s	tatus			SFP m	odule	SFP module not present	SFP module not present	SFP module not present	LAN No LINK	LAN GL	it I	IAN G	oit LL
2 н	ot Stand	by			off	•	off	•	off	•		-	
N	lode			auto1	GX 🔻	auto1GX •	auto1GX •	auto1GX •	auto 🔻	auto	•	auto	•
E N	IDIX				-	-	-	~	auto 🔻	auto	•	auto	•
F	low Cont	rol 👘	E	fo	rce	force	force	force	off	off		off	
1	588			off	F 7	off T	off *	off *	off 🔻	off •		off 1	
5									LATIT	LANZ		LANS	
									WANa	GESWI		Note C	:11
											-	1	
1												CPU	_
	hannel S	alect		none	•	none T		none T	ETH2a T	ETH2h		EIT E	EI2
	namer o	Dort		none		inone .	none ·	none .	LIIIZa	LIII20		11 11 1	112
	onnecter	aPon			011		none	yva	na		want	u u	-
T	raffic Ch	annel			PTP2		EMM2	ETH	12a		ETH2	b	-
s	peed Lin	nit (j)			auto		0	2	0	6	20		
								-	/	_	-	-	
A	vailable	Speed							108	88 Mbps	2		

Figure 5.56 Example of port configuration in Endpoint IDU 2



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

TxF	TxP	MSE	RxL		middle	1+0 DUAL	CH1		RxL	MSE	TxP	TxF
7745	20	-41.4	-42.3	• 🔽 •	0032strong / 28M / 108Mb	ACM	0032strong / 28M / 108Mb +	٦.	-42.3	-40.9	20	7500
13066	20	-37.0	-46.9	• 2 •	0032strong / 28M / 108Mb	ACM	0032strong / 28M / 108Mb +	2 •	-47.1	-36.2	20	12800
	LOCA	AL.				FD	CH2			REM	IOTES	

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:

TxF TxP	MSE	RxL		CH1	1+0 CH1	middle	RxL	MSE	TxP	TxF
7500 20	-40.8	-42.3	• 🚺	0032strong / 28M / 108Mb	ACM	0032strong / 28M / 108Mb + 1	• -42.2	-41.4	20	7745
LOC	AL							RE	MOTE	

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:

TxF	TxP	MSE	RxL		CH2	1+0 CH2	middle	RxL	MSE	TxP	TxF
12800	20	-36.3	-47.3	•2•	0032strong / 28M / 108Mb	ACM	0032strong / 28M / 108Mb + 2 +	-46.8	-37.0	20	13066
	LOC	AL							REI	MOTE	

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 woks 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 '<u>Config->System->Mode</u>' 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.

No. of Concession, Name	TxF 1		ASE F	xL	W	P.loc.prim_13	Split 2+2		rem.prim_11:P	0.1	RxL	MSE	TxP	TxF
"A "	17800	24	0.0 -8	9.4	0	+ 0032strong / 60M / 227Mb	ACM		simple RX	- 🖸 -	-30.7	-36.4	muted	18810
SPAF	18100 m	uted -:	38.3 -4	9.0	8	× simple RX	ACM	0032stron	g / 60M / 227Mb	2	-87.4	0.0	muted	19110
	17800 m	uted	0.0 -8	9.9	0	× 0032strong / 60M / 227Mb	ACM		simple RX	.0.	-34.7	-36.5	muted	18810
	18100 m	uted ⊰	84.6 -5	4.6	8	× simple RX	ACM	0032stron	g / 60M / 227Mb	• 2	-88.6	0.0	0	19110
	LOCA	AL (prin	nary)		W	S:loc.sec_12	HSB/SD		rem.sec_10:S			REI	MOTES	
ADMIN permissions 🕞	Logout in	n: 3 h 5	9 m 19	s										Vrite 🦉
Status	Mode	Desc	ription	1	Date	&Time Advanced								
▲ Config Suctom	DESIGN O	ONFIG	URATIO	N			LOCAL (primary)				ACT	ION	(i)
Access	Design Typ	pe					Design	511 🔻				Ар	ply	
IP	DESIGN M	ODES					LOCAL (primary)				ACT	ION	(1)
Radio	Functional	Mode					Split 2	2+2 •				Ap	ply	
Alarms	Link Prote	ction D	iversit			ŀ	ISB/SD - Ho	ot standby	2			Ap	ply	
Maintenance	Link Aggre	egation	Divers	ty			FD	•			FO pe	er con	nected -	it's
> 100IS	Hot-Swap	Startu	p Devic	e Rol	e		Fixed prim	nary 🔹			a	utoma	tically.	
	RADIO MIC	DES				CHANNEL	1	C	HANNEL 2			ACT	ION	(i)
Sector State Sector						Tx Only	•	Rx	Only 🔻					
Date: Fn, 08.02.2019 Time: 14:34:31 Uptime: 0.00:08:57 Refresh status	Duplex Mo	ode				Caution: manually neighbour Radio Simple Rx m	set the RF Mode to ode	Caution: n neighbo Sim	nanually set t ur Radio Mod iple Tx mode	he RF le to		Ар	ply	

Figure 5.61 Example of Side A Primary IDU system configuration

 b) In web GUI <u>'Config->Radio->Parameters</u>' 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 <u>'Config->System->Mode</u>' page.

the second s	TxF TxP MSE R	xL (W) P.loc.pri	m_13	Split 2+2	rem.prim_11:P	RxL MSE TxP	TxF
"A"	17800 24 0.0 -8	9.2 • 0032stre	mg / 60M / 227Mb	ACM	simple RX × 1	-31.1 -36.3 muted 1	18810
SPAF	18100 muted -38.2 -4	8.9 • simple R	x	ACM	0032strong / 60M / 227Mb × 2	-87.1 0.0 muted 1	19110
	17800 muted 0.0 -8	9.8 🚺 × 0032stro	mg / 60M / 227Mb	ACM	simple RX × 1	+ -34.7 -36.4 muted 1	18810
	18100 muted -34.6 -5	4.5 simple R	x	ACM	0032strong / 60M / 227Mb + 2	-88.4 0.0 0 1	19110
	LOCAL (primary)	W S:loc.se	c_12	HSB/SD	rem.sec_10:S	REMOTES	
ADMIN permissions \mathbb{G}	Logout in: 3 h 48 m 58	5				W	rite 🔮
Status	Parameters ACM	Advanced					
▲ Config			LOCAL		RE	MOTE	(1)
Access	MODEM	CHANNEL	1	CHANNEL 2	CHANNEL 1	CHANNEL 2	
IP	Bandwidth	60000_02		50000_02 ▼	60000_02	60000_02	
Radio	Max RxACM Profile	0032/strong	• 00	032/strong 🔻	0032/strong *	0032/strong *	
Ports	ACM Setting	» 🌣		» 🌣	+		
Maintenance	Advanced Setting	default		default	+	*	
> Tools			LOCAL		RE	MOTE	(i)
	BADIO	CHANNEL T	() CH	ANNEL 2	() CHANNEL 7	CHANNEL 2	
	T/R Spacing	fixed 🔻	(i) fix	ed 🔻	(i) fixed	fixed	
Deter 51 DE DE DE DEE	TX Frequency [MHz]	17800	(j)	18100	(i) 18810	19110	
Time: 14:44:52	RX Frequency [MHz]	18810	(i)	19110	(i) 17800	18100	
Uptime: 0 00:19:17 Refresh status	TX Power Limit [dBm]	26	(i)	26	(i) 26	26	
	TX Mute Config	auto 🔻	a	ito 🔻	auto 🔻	auto 🔻	
Modem Serial Number	ATPC Function			0			
License Number	ATPC RX Level [dBm]	-55	(i)	-55	(j) -55	-65	
3010403010100229 License Type / Status permanent / ok	Refresh					Undo Apply loca	al

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 '<u>Config->Radio-</u> <u>>ACM</u>' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

and the second se	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	W	RxL	MSE	TxP	TxF
"A"	17800	13	0.0	-89.5	0	• 0032strong / 60M / 227Mb	ACM	simple RX	· 🚺 ·	-41.7	-28.7	muted	18810
SPAP	18100	muted	-39.2	-44.1	-2	× simple RX	ACM	0032strong / 60M / 227Mb	- 2	-87.2	0.0	13	19110
	17800	muted	0.0	-89.8	0	× 0032strong / 60M / 227Mb	ACM	simple RX		-46.0	-38.1	muted	18810
	18100	muted	-37.0	-49.0	- 2	× simple RX	ACM	0032strong / 60M / 227Mb	2	-88.7	0.0	muted	19110
	LC	OCAL (pi	rimary)		()	S:loc.sec_12	HSB/SD	rem.sec_10:S	W		RE	NOTES	
ADMIN permissions 🕒	Logot	it in: 17	m 18 :	5									Write 🤞
▶ Status	Paran	neters	ACI	N	Advar	nced							
4 Config	ACM S	ETTING	s			CHANNEL T	CHU	USI USI	ial valu	ie	1	Note	i
Access	ACM fu	inction			C	man p1 🔹	ma	in p1 🔹	auto				
IP	ACM O	ffset		1		0.0		0.0	0		-3.0	+3.0	

Figure 5.63 Example of Side A Primary IDU ACM configuration

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

The second second	TxF	TxP	MSE	RxL	W	P.loc.pri	im_13	Split 2+2	rem.p	rim_11:P	RxL	MSE	TxP	TxF
245	17800	24	0.0	-89.2	0	+ 0032str	ong / 60M / 227Mb	ACM	s	imple RX × 🚺	-31.0	-36.3	muted	18810
SPAF	18100	muted	-38.2	-49.0	-8	× simple P	RX.	ACM	0032strong / 60M	/ 227Mb × 🔁	-87.2	0.0	muted	19110
-	17800	muted	0.0	-89.7	0	× 0032str	ong / 60M / 227Mb	ACM	s	imple RX × 🚺 •	-34.6	-36.4	muted	18810
	18100	muted	-34.6	-54.5	0	× simple F	ax.	ACM	0032strong / 60M	/ 227Mb + 💈	-88.4	0.0	0	19110
	LC	OCAL (p	rimary)	1	W	S:loc.se	ec_12	HSB/SD	rem.:	sec_10:S		RE	MOTES	
ADMIN permissions 🗗	Logou	it în: 3 l	48 m	18 s									1	Nrite 🥬
> Status	Addre	sses	SNN	IP	Adva	nced								
▲ Config System	MAINA	ODRES	S SETT	TINGS			1	REQUIRED		C	ONFIGU	RED		(i)
Access	Device	IP / Ma	sk				192.16	8.205.13 /	24	192	168.205	13/24		
IP	Default	Gatewa	ay IP				192	.168.205.1		19	2.168.2	05.1		
Radio	OPTIO	AL AD	DRESS	SETTI	IGS		1	REQUIRED		C	DNFIGU	RED		1
Alarms Maintenance	USB IP	/Mask					 10.10. 192.16 	11.10/24 8.11.10/24	0	10	.10.11.1	0/24		
b Tools	Fallbac	k IP/Ma	ask				 10.10. 192.16 	10.10/24 8.10.10/24		10	10,10,1	0/24		
												Ur	do S	ave

Figure 5.64 Example of Side A Primary IDU IP configuration

e) In web GUI '<u>Config->IP->Advanced</u>' 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 second second	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17800	24	0.0	-89.2	0	+ 0032strong / 60M / 227	мь АСМ	simple RX × 🚺	-31.0	-36.3	muted	18810
SPAP	18100	muted	-38.2	-49.0	• 2	× simple BX	ACM	0032strong / 60M / 227Mb × 2	-87.2	0.0	muted	19110
_	17800	muted	0.0	-89.7		* 0032strong / 60M / 227	мь АСМ	simple RX × 🔰	-34.6	-36.4	muted	18810
	18100	muted	-34.6	-54.5		× simple BX	ACM	0032strong / 60M / 227Mb • 名	-88.4	0.0	0	19110
	LC	CAL (p	rimary)		W	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕒	Logou	it in: 3 h	48 m	18 s								Write 🙎
D Status	Addre	sses	SNM	Р	Advar	nced						
▲ Config Suptom	STATIO	ROUTE	S-IN	UT VA	LUES							(1)
Access	Routed	IP/MA	SK									
IP	Gatewa	y IP								Ad	d Del	ete
Radio	NAT-1		ALUES									(j
Alarms	Local_F	Port Des	t_IP.Po	rt			1		Add	Delet	te Del	All
Maintenance	Default	NAT to	remot	e		@ WE	B SSH				1	Set
> 10015	RADIUS	S - INPL	TVAL	JES								(1)
	IP.dest	port Sec	String	timeou	ıt				Add	Delet	te Del	All
	SETTIN	IGS				REQUIRED		CON	FIGURE	D		(1)
Date: Fn, 08.02.2019 Time: 14:45:32	Route							default via 192.168.205	.1			
Uptime: 0 00:19:57 Refresh status	NAT							1443 192.168.205.11.44 Default WEB NAT: on (https://192.168.205.13	13 1:1443/			
Modem Serial Number								https://192.168.205.13 Default SSH NAT: off	:2443/)			
License Number	Radius	Server										
3010403010100229 License Type / Status											S	ave

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 '<u>Config->Ports->EthVLAN</u>' section

Same and State	TxF	TxP	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prin	L11:P 🛞	RxL	MSE	TxP	TxF
"A"	17800	13 -	34.5	-56.0 •	0	0032strong / 60M / 2	227Mb ACM	0032strong / 60M / 2	227Mb × 🚺 •	-41.6	-38.7	muted	18810
SAF	18100	13 -	-34.3	-56.1 +	2	0032strong / 60M / 2	227МЬ АСМ	0032strong / 60M / 2	227Mb × 2.	-41.8	-38.4	muted	19110
	17800 m	nuted -	-30.2	-61.1	0	0032strong / 60M / 2	227мь АСМ	0032strong / 60M / 2	27Mb • 🕕 •	-46.4	-38.2	6	18810
	18100 m	nuted -	-29.4	-60.7	2	0032strong / 60M / 3	227Mb ACM	0032strong / 60M / 2	227Mb • 2 •	-47.0	-37.7	6	19110
	LOCA	AL (pri	mary)			S:loc.sec_12	HSB/SD	rem.sec	c_10:S		REI	MOTES	
ADMIN permissions 🕞	Logout i	in: 19 n	n 39 s										Write 🙆
Status	MUX	EthV	LAN	Eth	os	EMM							
▲ Config	VLAN MO	DE	I	LANT		LAN 2	LAN 3	MNG	WAN	A	1	WAN B	1
Access	Port Mode	e	bas	ic	•	basic •	basic 🔻	basic 🔻	basic	•	bas	sic	•
IP	Port Grou	ip	gro	oup-1 •		group-2 🔻	group-3 🔻	group-3 *	group-1	*	gr	oup-2 🔻	1
Radio	Default VI	LAN		1		1	1	1	1			1	
Alarmo						(CONTRACT)	(T200770)	000000	1				
N Maintenance						LANT	LUNZ	LANS					
> Tools							GE switch	n	-				
						WANa	WAN5	MNG CPU					

Figure 5.66 Example of Side A Primary IDU port grouping

g) In web GUI '<u>Config->Ports->MUX</u>' 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'

 Status Config 	N	IUX EthVLAN	EthQOS	EMM						0
System	DA	TAELOW CONFIGUE	ATION							0
Access	PO	BT	SEPT	SFP2		FP3	SFPA	LANT	LAN2	LAN3
Radio		Status	Gbit FD	Gbit FD	00	SFP Gbit FD	SFP module not present	LAN Gbit FULL	LAN No LINK	Gbit FULL
Ports	9	Hot Standby		-)	stand	iby	active	active	-
Alarms	ONF	Mode	force2G5 *	force2G5	force	e1GX v	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
Maintenance Tools	TCO	MDIX	-	-		-	-	auto 🔻	auto 🔻	auto 🔻
5 TOOIS	POR	Flow Control	force	force	f	orce	force	off	off	off
		1588	off 🔻	off 7	0	off 🔻	off *	off 🔻	off 🔻	off 🔻
Date: Fri, 08.02.2019 Time: 14.47:51 Uptime: 0.0:22:17 Bafface: b. status	псн							LANT	LAW2 GE switch	LANS
Herresh status	SW							WANa	WAND	MING CPU
Modem Serial Number 355260100010 License Number	ETH									CPU
3010403010100229	4	Channel Select	1 ,	1	EM	IM1		ETH1a Y	none T	REI1 BEI2
permanent / øk	SWA	Connected Port	off	cfn2	Wana	Done	off	0000	nono	nono
License Expiration		connected Port	011	sips	wana	none	011	Hone	lione	none
Firmware Version	W	Traffic Channel	PTP1	EMM1	ETH1a	ETH1b	PTP2	EMM2	ETH2a	ETH2b
0402_01 Bunning Design	PBP	Speed Limit (j)	auto	0	1000	0	auto	0	0	0
511		Avail Aggr Speed			\smile	227.1	B Mbps ETH			
					-		1	6		
		Modem Speed		227.81 Mb	ps active	1		227.81 Mbps	eth-disabled	1
									Undo	Apply

Figure 5.67 Example of Side A Primary IDU port configuration

h) In web GUI '<u>Config->Ports->EMM</u>' 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"

The second s	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17800	24	0.0	-89.1	0	0032strong / 60M / 227Mb	ACM	simple RX × 🚺 -	-30.7	-36.2	muted	18810
SPAF	18100	muted	-38.2	-49.0		* simple RX	ACM	0032strong / 60M / 227Mb × 2	-87.0	0.0	muted	19110
	17800	muted	0.0	-89.6	0	× 0032strong / 60M / 227Mb	ACM	simple RX × 🚺 •	-34.7	-36.2	muted	18810
	18100	muted	-34.6	-54.6	-8	simple RX	ACM	0032strong / 60M / 227Mb • 2	-88.2	0.0	0	19110
	LC	OCAL (p	rimary)	ê -	W	S:loc.sec_12	HSB/SD	rem.sec_10:S	-	RE	MOTES	
ADMIN permissions 🕞	Logou	nt in: 3 h	34 m	16 s							1	Write 🖉
Status	MUX	Eth	VLAN	Eth	QOS	EMM						
▲ Config	EMM					EMM#T	EMIM#2	EMM#3		EM	M#4	(i)
Access	EMM T	ype				4ASI	none	none		no	ne	
IP	EMM E	nable				1		1				
Radio	EMM P	rotectio	n Faild	ver						Ē	3	
Ports	EMM A	dd/Droj	DID			auto 🔻						
Alarms	EMM A	dd/Droj	Rang	e		14						
 Maintenance Tools 	EMM M	lode										
10013	EMM C	ABD #1				ASI 1	ASI 2	ASI 3		As	414	1
	Enable							0			1	
	Link St	atus				loss	loss	loss		lo	SS	
Date: Fri, 08.02.2019	PCR Lo	ock				-					-	
Time: 14:57:36	Mode					Rx 🔻	Rx 🔻	Rx 🔻		R>		
Refresh status	Data So	ource										
Madam David Mumb	Speed	Limit (R	x) [Mb	os]		214	214	214		2	14	
355260100010 License Number										Und	do Ap	ply

Figure 5.68 Example of Side A Primary IDU EMM configuration

 In web GUI '<u>Config->Alarms->Minor</u>' 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

Config	Major Minor				1000		-						10
System Access	WARNINGS	Pri/Sec switch	CH 1	GH 2	LOCAL Peer (FO)	Dire	ore al	Ţ	HRES	HOLDS	ICAL	DETAILS	(1)
Radio	Modem												
Ports	Modem Aggr/Prot	no	(-									
Alarms	Modem Data Sync	no											
Maintenance	Modem MSE Level	по						-25	(i)	-25	í	[dB]	
> Tools	Modem FER	no						10	(i)	10	(i)	[error_frm/10s]	i i
	Radio		-										1
	Radio RX Level	no					0	-75	(i)	-75	(i)	[dBm]	1
Date' Fri 08.02.2019	Radio TX Mute	no		0					1.0		1.0	-	-
Time: 15:03:20	Ports			_									
Uptime: 0 00:37:46 Befrech statue	Modem LAN1 Link	yes	0										
nencon status	Modem LAN2 Link	yes	1	1.6									
Modem Serial Number	Modem LAN3 Link	no		10		0							
355260100010	Modem SFP1 Link	no	1	20			·						
3010403010100229	Modem SFP2 Link	no	6	20									
License Type / Status	Modem SFP3 Link	yes		20/									
permanent / ok	Modem SFP4 Link	yes		10	0	0							
unlimited		1	OCAL (prin	mary)	REMOTE	LOCA	L			LO	CAL		(i)
Firmware Version 0402_01	EMM#1-4ASI	Pri/Se switch	c. 1	CH1	Peer (FO)	Dired	n	THE	RESHO	LDS		DETAILS	
511	EMM HW+SW	no										none	1
	SFP2 Link	yes	-	0.0									
	P1 Link	yes	C		•								
	P1 Sync	yes											
	P1 Idle	yes											
	P1 Lock	yes											
	D2 Link	Vac				-							

Figure 5.69 Example of Side A Primary IDU alarm configuration

j) Save new settings by pressing Write button.

- 2) IDU A (secondary):
 - a) In web GUI '<u>Config->System->Mode</u>' 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



Figure 5.70 Example of Side A Secondary IDU system configuration

 b) In web GUI '<u>Config->Radio->Parameters</u>' 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 '<u>Config->System->Mode</u>' page.

Concerning and	TxF	TxP	MSE	RxL	W	P.loc.pri	m_13		Split 2+	2	rei	m.prim_11	:P	RxL	MSE	TxP	TxF
"A #	17800	24	0.0	-88.8		+ 0032str	ong / 60M	/ 227Mb	ACM			simple F	ix × 🚺-	-31.3	-36.3	muted	18810
3/11	18100	muted	-38.3	-48.9	.8	* simple F	RX.		ACM	003	2strong / I	50M / 227N	16 × 2	-87.0	0.0	muted	19110
	17800	muted	0.0	-89.5		× 0032str	ong / 60M	/ 227Mb	ACM			simple F	x × 🚺 •	-34.6	-36.3	muted	18810
	18100	muted	-34.7	-54.4		* simple P	X		ACM	003	2strong / I	50M / 227N	16 • 🔁	-88.1	0.0	13	19110
	LOC	CAL (see	condary	()	W	S:loc.se	c_12		HSB/SE	þ	re	em.sec_10	:S	-	REN	AOTE(s)	1
DMIN permissions 🕞	Logou	it in: 16	m 36 s													1	Vrite
Status	Paran	neters	ACI	N	Advan	nced											_
Config							100	A1					OCL	INTE			0
System	MODEN	VI			C	ANNEL	1	CH	ANNEL	2		HANNEL	1	IUIE	CHAN	NEL 2	_
Access	Bandwi	idth			60	000 02	•	600	00 02	•		60000 0	2		6000	0.02	
Radio	Max Da	ACM D	rofile		002	2/ctrops		0023	/ctropo		00	20/etrop		L.	0000	roog ¥	
Ports	Achte	CAGIVI PI	rome	-	003	z/strong		0032	/strong		00	32/SHOI	g *	10	032/51	iong *	_
Alarms	ACM S	etting		-		* O			» 😰	_	-				-		
Maintenance	Advand	ed Sett	ing			default		(lefault								
Tools	RADIO						LOC	AL					REN	OTE			(
	(MALING)				CHAN	INEL T	í	CHAN	NEL 2	(i)	10	HANNEL	Τ.		CHAN	NEL 2	
	T/R Sp	acing			fixed	• 1	(1)	fixed		í		fixed			fix	ed	
	TX Free	quency	[MHz]		17	800	(1)	181	00	(i)		18810			191	10	
Date: Fn 08:02:2019 Time: 15:13:41	RX Free	quency	[MHz]		18	810	(i)	191	10	(i)		17800	1		181	00	
Uptime: 0 00:48:14 Befrech status	TX Pow	ver Limi	t [dBm]	i i	1	20	(i)	1	3	(i)		20	1		7:	3	
nencon status	TX Mut	e Confi	a		auto	• •		auto			ſ	auto	•		auto		
Modem Serial Number	ATPC F	unction	1		Í			E.C.S.	1		-	1-1	-		1	1	
License Number	ATPC F	X Leve	[dBm]		-	55	i	-5	5	(i)		-55	1		-5	5	
3010403010100227 License Type / Status	Refre	sh												Une	do A	pply lo	cal

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 '<u>Config->Radio-</u> <u>>ACM</u>' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

and the second	TxF	TxP	MSE	RxL	W Ploc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
282	17800	13	0.0	-89.5	0032strong / 60M / 227Mb	ACM	simple RX × 🚺		41.7	-28.5	muted	18810
SPIP	18100	muted	-39.2	-44.1	2 × simple RX	ACM	0032strong / 60M / 227Mb • 2		87.1	0.0	-99.9	19110
	17800	muted	0.0	-89.7	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 × 2	-	88.7	0.0	muted	19110
	LOC	CAL (sec	ondar	y)	W S:loc.sec_12	HSB/SD	rem.sec_10:S	V		REN	IOTE(s)	
ADMIN permissions 🕞	Logo	it in: 19	m 38 :	5								Vrite @
> Status	Paran	neters	AC	M	dvanced							
4 Config System	ACMS	ETTING	S		CHANNEL T	CH	INNEL 2 Usual I	value	z	1	Note	(i)
Access	ACM fu	nction			(man p1 🔹	ma	in p1 🔹 aut	to				
IP	ACM O	ffset			0.0		0.0 0			-3.0	+3.0	

Figure 5.72 Example of Side A Secondary IDU ACM configuration

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

	TxF	TxP	MSE	RxL	W	P.loc.prim_13		Split 2+2	i	em.prim_11:	P	RxL	MSE	TxP	TxF
282	17800	24	0.0	-88.8		+ 0032strong / 60N	/ / 227Mb	ACM		simple R	x × 🚺 -	-31.1	-36.2	muted	18810
SPAP	18100	muted	-38.3	-48.7	12	× simple RX		ACM	0032strong	/ 60M / 227M	• × 2	-87.0	0.0	muted	19110
	17800	muted	0.0	-89.4		× 0032strong / 60M	/ / 227Mb	ACM		simple R	x × 🚺 •	-34.5	-36.2	muted	18810
	18100	muted	-34.7	-54.4	12	* simple RX		ACM	0032strong	/ 60M / 227M	• 🔁	-88.0	0.0	13	19110
	LOC	CAL (sec	ondary	()	W	S:loc.sec_12		HSB/SD		rem.sec_10:	S		REN	AOTE(s)	
ADMIN permissions 🕞	Logou	nt in: 17	m 48 s	1										1	Write 🔮
> Status	Addre	sses	SNM	IP	Adva	nced									
System	MAINA	DORES	S SET	INGS			R	EQUIRED			CO	NFIGU	RED		(1)
Access	Device	IP / Ma	sk				192.168	.205.12	24		192	168.205	12/24		
IP	Default	Gatewa	ay IP				192.	168.205.1			19	2.168.2	05.1		
Radio	OPTION	AL ADI	RESS	SETTI	NGS		R	EQUIRED			CC	NFIGU	RED		1
Alarms	USB IP	/Mask					 10.10.1 192.168 	1.10/24 8.11.10/24	6		10	10.11.1	0/24		
Tools	Fallbac	k IP/Ma	sk				10.10.1 192.168	0.10/24			10	10.10.1	0/24		

Figure 5.73 Example of Side A Secondary IDU IP configuration

e) In web GUI '<u>Config->IP->Advanced</u>' 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

Concession of the	TxF	TxP	MSE	Bxl	W	Ploc.prim 13	Split 2+2		rem.prim 11:P	BxL	MSE	TxP	TxF
Ш А Ш	17800	24	0.0	-88.8	ň	+ 0032strong / 60M / 227Mb	ACM		simple BX +	-31.1	-36.2	muted	18810
SAF	18100	muted	-38.3	-48.7		× simple RX	ACM	0032st	rong / 60M / 227Mb \star 💈	-87.0	0.0	muted	19110
_	17800	muted	0.0	-89.4	0	× 0032strong / 60M / 227Mb	ACM		simple RX × 🚺	• -34.5	-36.2	muted	18810
	18100	muted	-34.7	-54.4	-0	× simple RX	ACM	0032st	rong / 60M / 227Mb 🔹 2	-88.0	0.0	13	19110
	LOC	AL (see	condary	1)	W	S:loc.sec_12	HSB/SD		rem.sec_10:S		REN	AOTE(s)	
ADMIN permissions 🕞	Logou	t in: 17	m 48 s									1	Vrite 🔮
> Status	Addres	sses	SNM	P	Adva	nced							
Config	STATIC	ROUTE	S - INF	UTVA	LUES								1
System Access	Routed	IP/MA	SK										
IP	Gatewa	y IP									Ade	d Dele	te
Radio	-	ADD IT A	ALLICO			1		-			Section 1		0
Ports	Level F	APUT V	ALUES	-						Maal	Delet	Dal	
Alarms	LOCal_P	on Des	SCIP.PO	n						Aud	Delei	e Dei	AU
 Tools 	Default	NAT to	remote	9		WEB WEB	SSH					2	et
	RADIUS	S-INPL	IT VALL	JES									(i)
	IP.destp	port See	String	timeou	ıt					Add	Delet	te Del	All
	SETTIN	GS				REQUIRED			CON	FIGURE	D	-	1
Date: Fri, 08.02.2019	Route								default via 192.168.20	5.1			
Uptime: 0.00:47:02 Refresh status	NAT								Default WEB NAT: on (https://192.168.205.1 https://192.168.205.1	3:2443:14 3:2443:24	143/ 143/)		
Modem Serial Number	Radius	Server			-				Detault SSH NAT: OT				
License Number 3010403010100227	Lines								1			S	ave

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

and the second	TxF T	xP I	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prim_	11:P 🛞	RxL	MSE	TxP	TxF
"A	17800	13 -	34.6	-55.9	•0	0032strong / 60M / 22	27Mb ACM	0032strong / 60M / 22	7Mb x 🚺 •	-41.6	-38.8	muted	18810
SAF	18100 1	13 -	34.3	-56.1	•2	0032strong / 60M / 22	27M6 ACM	0032strong / 60M / 22	7Mb × 2+	-41.8	-38.4	muted	19110
	17800 mu	uted -	30.3	-61.1	.0	0032strong / 60M / 23	27мь АСМ	0032strong / 60M / 22	7мь 🛛 🚺	-46.5	-38.2	6	18810
	18100 mu	uted -	29.4	-60.7	12	0032strong / 60M / 22	27мь АСМ	0032strong / 60M / 22	7Mb • 2 •	-47.0	-37.7	6	19110
	LOCAL	(seco	ondary	1)		S:loc.sec_12	HSB/SD	rem.sec_	10:S	-	REN	IOTE(s)	
ADMIN permissions 🕒	Logout in	:19 п	n 41 s										1
> Status	MUX	EthVI	LAN	Eth	QOS	EMM							
Config System	VLAN MOD	DE	1	LAN T		LAN 2	LAN 3	MNG	WAN	A	1	WAN B	0
Access	Port Mode		bas	sic	•	basic 🔻	basic 🔻	basic 🔻	basic		bas	sic	•
IP	Port Group		gr	oup-1	•	group-2 🔻	group-3 •	group-3 🔻	group-1		gr	oup-2	
Radio	Default VL	AN		1		1	1	1	1			1	
Alarmo						Lange and Lange	Carriera	(1997)					
Alaritis						LAMI	LAN2	LANS					
Maintonanco													
						- Card		LEAGE					

management access only via LAN3 port. Port grouping configuration is available in web GUI '<u>Config->Ports->EthVLAN</u>' section

Figure 5.75 Example of Side A Secondary IDU port grouping

g) In web GUI '<u>Config->Ports->MUX</u>' 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'

System	-									(
Access	DA	TAFLOW CONFIGUR	NOITAR	COM		EDa	OFTIN	LANT	1.0.00	1.0.012
IP Dadia	Pu	Status	DD chin FD	DD chip r		SFP	SFP module	Carl Gbit	TEN No LINK	Lan No LIN
Ports	0	Hot Standby	GDIE PU	Golt Fi		stand	hot present	etai	odby	and the second
Alarms	NFI	Mode	force265	force2G5	T force	elGX V	auto1GX V	auto T	auto T	auto
Maintenance	CO.	MDIX						auto T	auto V	auto V
Tools	PORT	Flow Control	force	force	f	orce	force	off	off	off
		1588	off 🔻	off v	0	off 🔻	off 🔻	off 🔻	off 🔻	off 🔻
Date: Fri, 08.02.2019 Time: 15.14.33 Uptime: 0.00:49:06 Pofrach.status	псн							LANT	GE switch	CANS
nellesii status	WS							WANE	WAND	MNG CPU
Modem Serial Number 355260100008	ETH									CPU
License Number 3010403010100227					-	-		1		
License Type / Status	AP	Channel Select	protection	 protection 	* EM	IM1 •	none 🔻	ETH1a 🔻	none 🔻	RFI1 RFI
permanent / ok License Expiration	SV	Connected Port	off	sfp3	wana	none	off	none	none	none
unlimited Firmware Version	W	Traffic Channel	PTP1	EMM1	ETHIa	ETHID	PTP2	EMM2	ETH2a	ETH2b
0402_01 Rupping Decign	PBP	Speed Limit (i)	auto	0	1000	0	auto	0	0	0
511	-	Avail Aggr Speed				227.8	Mbps ETH			1
		33 1					1			
		Modem Speed		227.81 Mt	ops active	i i	2	27.81 Mbps	eth-disabled	1

Figure 5.76 Example of Side A Secondary IDU port configuration

h) In web GUI '<u>Config->Ports->EMM</u>' 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"

Concerned V	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17800	24	0.0	-88.8	0	• 0032strong / 60M / 227Mb	AGM	simple RX × 1	-31.2	-36.2	muted	18810
SPAF	18100	muted	-38.3	-48.7	•	simple RX	ACM	0032strong / 60M / 227Mb × 2	-87.0	0.0	muted	19110
	17800	muted	0.0	-89.5	0	0032strong / 60M / 227Mb	AGM	simple RX × 🚺	-34.6	-36.2	muted	18810
	18100	muted	-34.7	-54.3	-8	simple RX	ACM	0032strong / 60M / 227Mb + 2	-88.1	0.0	13	19110
	LOC	CAL (see	ondar	y)	W	S:loc.sec_12	HSB/SD	rem.sec_10:S		REN	AOTE(s)	
ADMIN permissions 🕒	Logo	rt in: 14	m 59 s	5							1	Write 🛛 🏶
Status	MUX	Eth	VLAN	Eth	QOS	EMM						
▲ Config	EMM					EMIMET	EMM#2	EMM#3		EM	M#4	(1)
Access	EMM T	ype				4ASI	none	none		no	one	
IP	EMM E	nable						1				
Radio	EMM P	rotectio	n Faild	over								
Ports	EMM A	dd/Droj	DID			auto 🔻						
Alarms	EMM A	dd/Droj	Rang	e		14						
Maintenance Tools	EMM N	lode										
1000	EMMO	ARD #1				ASIT	ASI 2	ASI 3		As	51.4	(1)
	Enable									l		
	Link St	atus				loss	loss	loss		lo	SS	
Date: Fri, 08.02.2019	PCR Lo	ock					-	-			-	
Time: 15:15:18	Mode					Rx 🔻	Rx 🔻	Rx 🔻		R	•	
Refresh status	Data S	ource										
the loss of the state	Speed	Limit (R	x) [Mb	ps]		214	214	214		2	14	
355260100008 License Number										Un	do Ap	ply

Figure 5.77 Example of Side A Secondary IDU EMM configuration

 i) In web GUI <u>'Config->Alarms->Minor</u>' 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	Major Minor											
System		LOC	AL (second	lary)	LOCAL	REMOTE			LO	CAL		(i)
Access	WARNINGS	Pri/Sec switch	CH 1	CH 2	Peer (FO)	Direct RF	т	HRESI	HOLDS		DETAILS	
Radio	Modem											
Ports	Modem Aggr/Prot	no	- 13									
Alarms	Modem Data Sync	no										
Maintenance	Modem MSE Level	no					-25	(i)	-25	(i)	[dB]	
> Tools	Modem FER	no					10	1	10	(i)	[error_frm/10s]	
	Radio											
	Radio RX Level	no	0.				-75	1	-75	(i)	[dBm]	
Date: Fri. 08.02.2019	Radio TX Mute	no		0.								
Time: 15:16:06	Ports											
Uptime: 0 00:50:38 Befresh status	Modem LAN1 Link	yes	0	•	•	•						
Tierreon otatao	Modem LAN2 Link	yes										
Modem Serial Number	Modem LAN3 Link	no										
355260100008	Modem SFP1 Link	no		•								
3010403010100227	Modem SFP2 Link	no		•)		•						
License Type / Status	Modem SFP3 Link	yes		-	•	•						
permanent / ok	Modem SFP4 Link	yes										
unlimited		LO	CAL (secon	dary)	REMOTE	LOCAL			LO	CAL		(i)
Firmware Version 0402_01 Bumping Design	EMM#1 - 4ASI	Pri/Sec switch		тно	Peer (FO)	Direct RF	THE	ESHO	LDS		DETAILS	
511	EMM HW+SW	no	E								none	
	SFP2 Link	yes	1	10								
	P1 Link	yes	C									
	P1 Sync	yes										
	P1 Idle	yes	E									

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 '<u>Config->System->Mode</u>' 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

	TxF	TxP	MSE	RxL	W	P.rem.prim_11	Split 2+2	lo	c.prim_13:P	W	RxL	MSE	TxP	TxF
WA #	18810	muted	-36.2	-31.0		simple RX	ACM	0032strong / t	iOM / 227Mb		-88.9	0.0	24	17800
SPAF	19110	24	0.0	-87.0	2	0032strong / 60M / 227M	ь АСМ		simple RX	· 🕗 ·	-32.6	-20.2	muted	18100
	18810	muted	-36.3	-34.7		simple RX	ACM	0032strong / 6	iOM / 227Mb	-	-89.5	0.0	muted	17800
	19110	muted	0.0	-88.0	2	0032strong / 60M / 227M	ь АСМ		simple RX	× 🕗 •	-38.3	-36.3	muted	18100
	LC	OCAL (p	rimary)	W	Strem.sec_10	HSB/SD	1	oc.sec_12:S	W	-	RE	MOTES	
ADMIN permissions 🕒	Logou	ut in: 19	m 55 :	5										Write 🔮
D Status	Mode	De	scripti	on	Dates	Time Advanced								
▲ Config System	DESIG	N CONF	GURA	TION			LOCAL (primary)				ACT	ION	(i)
Access	Design	Туре					Design	511 •				Ap	ply	
IP	DESIG	N MODE	S				LOCAL (primary)				ACT	ION	(1)
Ports	Functio	onal Mo	de				Split :	2+2 🔻				Ар	piy	
Alarms	Link Pr	rotection	n Diver	sity			HSB/SD - Ho	ot standby 🔻				Ар	ply	
Maintenance	Link Ag	ggregati	on Div	ersity			FD				FO pe	er con	nected -	it's
b Tools	Hot-Sw	vap Star	tup De	vice Ro	le		Fixed prin	nary 🔻			a	utoma	tically.	
	RADIO	MODES				CHANNE	LI	CHA	NNEL 2			ACT	ION	(i)
Date: Fri 08.02 2019						Rx Only	•	Tx On	ly ▼					
Time: 13:18:48 Uptime: 0 00:52:39 Refresh status	Duplex	Mode				Caution: manually neighbour Radio Simple Tx r	y set the RF 5 Mode to node	Caution: mai neighbour Simple	nually set tl Radio Mod e Rx mode	ne RF e to		Ар	ply	
Modem Serial Number	Refre	sh											Ur	obi

Figure 5.79 Example of Side B Primary IDU system configuration

 b) In web GUI '<u>Config->Radio->Parameters</u>' 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 '<u>Config->System->Mode</u>' page.

The second s	TxF	TxP	MSE	RxL	W	P.rem.pri	m_11		Split 2+3	2	1	oc.prim_13:F	W	RxL	MSE	TxP	TxF
" A #	18810	muted	-36.2	-31.1		simple BX			ACM	0032	strong /	60M / 227Mb	- 🚺	-88.8	0.0	24	17800
SPAF	19110	24	0.0	-87.0	2	0032stron	ng / 60M /	/ 227Mb	ACM			simple RX		-32.6	-20.7	muted	18100
	18810	muted	-36.3	-34.5		simple RX	C.		ACM	0032	strong /	60M / 227Mb	× 🚺	-89.5	0.0	muted	17800
	19110	muted	0.0	-88.0	2	0032stron	g / 60M /	/ 227Mb	ACM			simple RX	k 🔁 -	-38.1	-35.9	muted	18100
	LC	DCAL (p	rimary)	ĸ	W	S:rem.see	c_10		HSB/SE)		loc.sec_12:S	W	-	RE	MOTES	
ADMIN permissions 🕞	Logo	ut in: 19	m 26 s														Write
Status	Paran	neters	ACI	N	Advan	ced											
Config	hanne						LOC	AL					REA	IOTE			(1)
Access	MODE	VI			CH	ANNEL 1		CH	ANNEL	2		CHANNEL			CHAN	NEL 2	
IP	Bandw	idth			600	000_02 ▼		60	000_02			60000_02			6000	0_02	
Radio	Max R	ACM P	rofile		0032	2/strong	•	003	2/strong	•	0	032/strong	π	0	032/st	rong 🔻	
Ports	ACM S	etting				* 🍄			» 🕸			÷			-		
Maintenance	Advand	ced Sett	ing		9	default			default			-			-		
> Tools	-						LOC	AL					REA	TOTE			(j
	RADIO				CHAN	INEL T	í	CHAN	INEL 2	(i)		CHANNEL			CHAN	NEL 2	
	T/R Sp	acing			fixed	•	í	fixed	•	í		fixed			fix	ed	
Date: 5- 00.03 2010	TX Free	quency	[MHz]		18	810	1	19	110	(i)		17800			181	00	
Time: 13:19:59	RX Fre	quency	[MHz]		17	800	í	18	100	(1)		18810			191	10	
Uptime: 0 00:53:50 Refresh status	TX Pow	ver Limi	t [dBm]		2	26	(1)	2	6	(i)		26			2	6	
	TX Mut	te Confi	g		auto	•		auto	•			auto 🔻			auto	•	
Modem Serial Number 355260100009	ATPC F	unction	ı		6	1		Ī	9							1	
License Number	ATPC F	RX Leve	[dBm]		-{	55	i	4	55	(1)		-55			-5	5	
3010403010100228 License Type / Status	Refre	sh												Und	io 🔺	pply lo	cal

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 '<u>Config->Radio-</u> <u>>ACM</u>' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

and the second second	TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:F	W	RxL	MSE	TxP	TxF
"A"	18810	muted	-28.5	-41.7	- 🖸	× simple RX	ACM	0032strong / 60M / 227Mb	•	-89.5	0.0	13	17800
SPAP	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	.0	× simple RX	ACM	0032strong / 60M / 227Mb	- 0	-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
	LC	OCAL (p	rimary)		W	Strem.sec_10	HSB/SD	loc.sec_12:	5 W		REI	NOTES	
ADMIN permissions 🕒	Logot	ıt in: 19	m 43 s	š									Write 🚺
▶ Status	Paran	neters	ACI	M	Adva	nced							
a Config	ACM S	ETTING	S		-	PREMIUSE T	CHI	MINEL 2 U	aial val	ue	1	Note	(i
Access	ACM fu	inction			C	man p1 🔹 🔪	(ma	in p1 •	auto				
IP	ACM O	ffset				0.0	-	0.0	0		-3.0) +3.0	
D - d'-													

Figure 5.81 Example of Side B Primary IDU ACM configuration

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

Succession of the second	TxF	TxP	MSE	RxL	W	Pre	em.prim_11	Split 2+2	loc.prim	_13:P	W	RxL	MSE	TxP	TxF
"A #	18810	muted	-36.2	-31.1	-0	× sin	nple RX	ACM	0032strong / 50M / 2	27Mb		-88.8	0.0	24	17800
SPAF	19110	24	0.0	-87.0	2	+ 00	32strong / 60M / 227Mb	ACM	sim	le RX	×	-32.6	-20.7	muted	18100
	18810	muted	-36.3	-34.5	•	× sin	nple RX	ACM	0032strong / 60M / 2	27Mb	× 🚺	-89.5	0.0	muted	17800
	19110	muted	0.0	-88.0	2	× 00	32strong / 60M / 227Mb	ACM	sim	le RX	×E	-38.1	-35.9	muted	18100
	LC	CAL (pr	rimary))	W	S:n	em.sec_10	HSB/SD	loc.sec	_12:S	W		RE	MOTES	
ADMIN permissions 🕞	Logou	it in: 19	m 26 s	5											Write
▷ Status	Addre	sses	SNN	IP	Adva	anced	1								
Config	MAIN	ODRES	S SETT	TINGS			F	EQUIRED			C	ONFIGL	IRED		(i)
Access	Device	IP / Ma	sk				192.16	3.205.11	24		192	2.168.205	5.11/24		
IP	Default	Gatewa	ay IP				192	168.205.1			1	92.168.2	205.1		
Radio	OPTION	AL ADI	DRESS	SETT	NGS		F	EQUIRED			Ċ	ONFIGU	IRED		(1)
Alarms	USB IP.	/Mask					 10.10.1 192.16 	1.10/24 8.11.10/24			1	0.10.11.1	0/24		
⊳ Tools	Fallbac	k IP/Ma	sk				10.10.1 192.16	0.10/24			1	0.10.10.1	0/24		

Figure 5.82 Example of Side B Primary IDU IP configuration

e) In web GUI '<u>Config->IP->Advanced</u>' 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

and the second second	TxF	TxP	MSE	RxL	W	P.rem.prim_11	Split 2+2	loc.prim.	13:P W	RxL	MSE	TxP	TxF
"A #	18810 r	nuted	-36.2	-31.1	- 🖸	simple RX	ACM	0032strong / 60M / 2	7Mb •	-88.8	0.0	24	17800
SPAF	19110	24	0.0	-87.0	2	• 0032strong / 60M / 227Mb	ACM	simp	e RX x 2	-32.6	-20.7	muted	18100
_	18810 r	nuted	-36.3	-34,5	· 🚺	s simple RX	ACM	0032strong / 60M / 2	7M6 ×	-89.5	0.0	muted	17800
	19110 r	nuted	0.0	-88.0	2	× 0032strong / 60M / 227Mb	ACM	simp	e RX × 2	• -38.1	-35.9	muted	18100
	LOC	AL (pr	imary)		W	S:rem.sec_10	HSB/SD	loc.sec.	.12:S 🛞		REI	MOTES	
ADMIN permissions 🗗	Logout	in: 19	m 26 s										Write 🖗
> Status	Address	ses	SNM	P	Adva	nced							
Config System	STATIC P	OUTE	S - INF	AVTU	LUES								1
Access	Routed II	P/MAS	к										
IP	Gateway	IP									Add	d Dele	ete
Radio	NAT - IN	PUTW	ALUES										1
Alarms	Local_Po	ort Des	LIP.Po	rt						Add	Delet	e Del	All
Maintenance	Default N	AT to	remote	e		WEB)	SSH					1	Set
b Tools	RADIUS	- INPU	TVAL	JES		\sim							(1)
	IP.destpo	ort Sec	String	timeou	ıt					Add	Delet	e Del	All
- Section and the	SETTING	S				REQUIRED			CON	FIGURE	D		(1)
Date: Fn, 08.02.2019 Time: 13:19:59	Route							default via	92.168.20	i.1			
Uptime: 0 00:53:50 Refresh status	NAT							Default WEI (https://192 ,https://192 Default SSE	NAT: on 168.205.1 168.205.1	3:1443:14 3:1443:24	143/ 143/)		
Modem Serial Number 355260100009	Radius S	erver			-			Denduit Gor	CHARLENIT.				
License Number 3010403010100228												S	ave

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 '<u>Config->Ports->EthVLAN</u>' section

Sec. State	TxF	TxP	MSE	RxL	W	P.rem.prim	_11	Split 2+2		loc.prim	13:P	RxL	MSE	TxP	TxF
"A"	18810	muted	-38.8	-41.6	i • 🚺	× 0032strong	/ 60M / 2271	16 ACM	0032strone	g / 60M / 2	227Mb + 🕕 +	-56.0	-34.6	13	17800
SPAP	19110	muted	-38.4	-41.8	B + 2	× 0032strong	/ 60M / 2271	ib ACM	0032stron	g / 60M / 2	27Mb + 🔁 •	-56.0	-34.3	13	18100
	18810	6	-38.2	-46.4	-0	+ 0032strong	/ 60M / 227	Ib ACM	0032strone	g / 60M / 2	27Mb × 🚺 -	-61.1	-30.2	muted	17800
	19110	6	-37.7	-46.9	2	+ 0032strong	/ 60M / 2271	нь АСМ	0032stron	g / 60M / 2	227Mb × 2 -	-60.7	-29.4	muted	18100
	LC	CAL (pr	imary)			Strem.sec_	10	HSB/SD		loc.see	_12:S	-	RE	MOTES	
ADMIN permissions 🗗	Logou	t in: 19	m 43 s	5											Write 📽
> Status	MUX	Eth	/LAN	E	thqos	EMM									
▲ Config System	VLANI	IODE		LAN	1	LAN	2	LAN 3	M	1G	WAN	A		WAN B	(i)
Access	Port Me	ode	ba	sic		basic	•	basic 🔻	basic		basic	•	bas	sic	•
IP	Port Gr	oup	gr	oup-1		group-2	2 •	group-3 🔻	group	-3 •	group-1	*	gr	oup-2	*
Radio	Default	VLAN		1		1		1	1		1			1	
Alarms						67.5		115342		[TANK]	-				
Maintenance								GEswitch		LINES					
> Tools						WAJ	ta	WANG		MNG CPU	1				

Figure 5.84 Example of Side B Primary IDU port grouping

g) In web GUI '<u>Config->Ports->MUX</u>' 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'

 Config System 	-									0
Access	PO	TAFLOW CONFIGUE	SEPT	SFP2		SFP3	SFP4	LANT	LANZ	LANS
Radio		Status			0	Gbit FD	SFP module	LAN Gbit	LAN No LINK	LAN No LINK
Ports	9	Hot Standby		-)	stand	lby	active	active	
Alarms	ONF	Mode	force2G5	force2G5	• for	ce1GX 🔻	auto1GX •	auto 🔻	auto 🔻	auto 🔻
Maintenance Tools	TC	MDIX	-		/	-		auto 🔻	auto 🔻	auto 🔻
0 10015	POR	Flow Control	force	force		force	force	off	off	off
		1588	off *	off 🔻		off *	off *	off 🔻	off 🔻	off 🔻
Date: Fri, 08.02.2019 Time: 13:21:51 Uptime: 0.00:55:42 Befresh status	ЛТСН							LANI	LAN2 GE switch	LANS
	MS							WANa	WANE	MING CPU
Modem Serial Number 355260100009 License Number	ETH									CPU
3010403010100228	4	Channel Select	protection	protection		MM1 ·	none 🔻	ETH1a •	none 🔻	REI1 REI2
permanent / ok License Expiration	SWI	Connected Port	off	sfp3	wana	none	off	none	none	none
Firmware Version	M	Traffic Channel	PTP1	EMM1	ETHIa	ETH1b	PTP2	EMM2	ETH2a	ETH2b
0402_01 Bunging Design	PBF	Speed Limit (j)	auto	0	1000	0	auto	0	0	0
511		Avail Aggr Speed	-		\sim	227.	B Mbps ETH			
					-					
		Modem Speed		227.81 Mbps	s eth-dis	abled		227.81 Mb	ps active	
									Undo	Apply

Figure 5.85 Example of Side B Primary IDU port configuration

h) In web GUI '<u>Config->Ports->EMM</u>' 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'

State and State	TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:P 🛞	RxL	MSE	TxP	TxF
"A "	18810	muted	-36.2	-31.0	0.	simple RX	ACM	0032strong / 60M / 227Mb +	-88.8	0.0	24	17800
SPAF	19110	24	0.0	-86.8	2	0032strong / 60M / 227M	b ACM	simple RX ×	-32.6	-20.8	muted	18100
	18810	muted	-36.2	-34.6		simple RX	ACM	0032strong / 60M / 227Mb *	-89.5	0.0	muted	17800
	19110	muted	0.0	-88.1	2	0032strong / 60M / 227M	b ACM	simple RX ×	• -38.1	-36.2	muted	18100
	LC	CAL (p	rimary)		W	S:rem.sec_10	HSB/SD	loc.sec_12:S		REM	IOTES	
ADMIN permissions 🕞	Logou	t in: 16	m 58 s									Vrite 🏾 🥙
> Status	MUX	Eth	VLAN	Eth	qos	EMM						
▲ Config Sustom	EMM					EMM#1	EMM#2	EMM#3		EMIN	1#4	1
Access	EMM T	ype				4ASI	none	none		nor	1e	
IP	EMM E	nable				1		13				
Radio	EMM P	rotectio	n Failo	ver								
Ports	EMM A	dd/Droj	DID			auto 🔻						
Alarms	EMM A	dd/Droj	Range	e		14						
 Maintenance Tools 	EMM N	lode										
0 10013	EMM C	ARD #1				ASIT	ASI 2	ASI 3		ASI	4	(i)
	Enable					2						
	Link St	atus				noSync	loss	loss		los	s	
Date: Fri, 08.02.2019	PCR Lo	ck				noLock	4	-		-		
Time: 13:22:27 Untime: 0.00:56:18	Mode					Tx 🔻	Rx ▼	Bx 🔻		Rx	•	
Refresh status	Data So	ource				Remote Ch1 🔻						
Modem Serial Number	Speed	Limit (R	x) [Mbj	ps]		214	214	214		21	4	
355260100009 License Number										Und	о Ар	ply

Figure 5.86 Example of Side B Primary IDU EMM configuration

 In web GUI '<u>Config->Alarms->Minor</u>' 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

 Status Config 	Major Minor											
System		LC	CAL (prima	ary)	LOCAL	REMOTE			LO	CAL	1	1
Access	WARNINGS	Pri/Sec switch	CH1	CH 2	Peer (FO)	Direct RF	Т	HRES	HOLDS		DETAILS	
Radio	Modem											
Ports	Modem Aggr/Prot	no										
Alarms	Modem Data Sync	no		0								
Maintenance	Modem MSE Level	no					-25	(i)	-25	i	[dB]	
> Tools	Modem FER	no					10	i	10	i	[error_frm/10s]	
	Radio											
	Radio RX Level	no					-75	(i)	-75	(i)	[dBm]	
Date: Fri. 08.02.2019	Radio TX Mute	no	8.0									
Time: 13:23:13	Ports			-								
Uptime: 0 00:57:04 Refresh status	Modem LAN1 Link	yes	0									
Then worth of the two	Modem LAN2 Link	yes										
Modem Serial Number	Modem LAN3 Link	no	C	0								
355260100009 License Number	Modem SFP1 Link	no				•						
3010403010100228	Modem SFP2 Link	по		1 💿 🌖								
License Type / Status	Modem SFP3 Link	yes		-		•						
permanent / ok	Modem SFP4 Link	yes		0								
unlimited		1	OCAL (prim	nary)	REMOTE	LOCAL			1.0	CAL		i
Firmware Version 0402_01 Bunning Decign	EMM#1 -4ASI	Pri/Se switch		CH 1	Peer (FO)	Direct RF	THE	RESHO	LDS		DETAILS	
511	EMM HW+SW	no	6								none	
	SFP2 Link	yes	1	10								
	P1 Link	yes	C		•	•						
	P1 Sync	yes										
	P1 Idle	yes	6									

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

Figure 5.87 Example of Side B Primary IDU alarm configuration

- j) Save new settings by pressing write button.
- 4) IDU B (secondary):
 - a) In web GUI '<u>Config->System->Mode</u>' 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

the second second	TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2		loc.prim_13:P	W	RxL	MSE	TxP	TxF
ŠĂË	18810	muted	-36.1	-31.0	.0	× simple RX	ACM	0032strong	/ 60M / 227Mb	9	-88.8	0.0	24	17800
	19110	24	0.0	-86.7	2	 0032strong / 60M / 227Mb 	ACM		simple RX	<u>u</u>	-32.7	-20.8	muted	18100
	18810	muted	-36.2	-34.8	·	 simple RX 	ACM	0032strong	/ 60M / 227Mb	9	-89.5	0.0	muted	17800
	19110	muted	0.0	-88.1	2	 0032strong / 60M / 227Mb 	ACM		simple RX		-38.3	-36.3	muted	18100
and the second s	LOC	CAL (sec	condary	()	0	S:rem.sec_10	HSB/SD		loc.sec_12:S	0		REN	IOTE(s)	
DMIN permissions 🕞	Logou	it in: 19	m 35 s											vrite
Status	Mode	De	scriptio	n	Date	Time Advanced								
Config	DESIG	CONFI	GURAT	TION			LOCAL (s	econdary)				ACT	ION	G
Access	Design	Туре					Design	511 🔻				Ap	oly	
IP	DESIG	MODE	s				LOCAL (S	econdary)				ACT	ION	(1
Ports	Functio	onal Mod	de				Split 2	2+2 🔻				Ар	biy	
Alarms	Link Pr	otection	Divers	sity		1	HSB/SD - Ho	t standby 🔻				Ар	oly	
Maintenance	Link Ag	gregati	on Dive	ersity			FD	*			FO pe	er con	nected -	it's
Tools	Hot-Sw	ap Star	tup De	vice Ro	le		Fixed sec	ondary 🔻			a	utoma	tically.	
	RADIO	MODES				CHANNEL	T.	G	HANNEL 2			ACT	ION	E
Date: 5-1 88 02 2010						Rx Only	Ŧ	Tx (only 🔻					
Time: 15:26:03 Uptime: 0.00:59:20 Refresh status	Duplex	Mode				Caution: manually neighbour Radio Simple Tx n	set the RF Mode to node	Caution: m neighbor Sim	anually set th ur Radio Mode ple Rx mode	e RF to		Ар	oly	
Modem Serial Number	Refre	sh											Un	do

Figure 5.88 Example of Side B Secondary IDU system configuration

 b) In web GUI '<u>Config->Radio->Parameters</u>' 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 '<u>Config->System->Mode</u>' page

	TxF	TxP	MSE	RxL	W	P.rem.pri	m_11		Split 2+	2	lo	oc.prim_13:	w)	RxL	MSE	TxP	TxF
" A "	18810	muted	-36.1	-30.9		simple R	x		ACM	00	32strong /	50M / 227M	+	-88.8	0.0	24	17800
SPAF	19110	24	0.0	-86.8	2	+ 0032stro	ng / 60M	/ 227Mb	ACM			simple R)	×	-32.8	-20.7	muted	18100
	18810	muted	-36.2	-34.7		× simple R	x		ACM	00	32strong /	50M / 227M	× .	-89.4	0.0	muted	17800
	19110	muted	0.0	-88.2	2	× 0032stro	ng / 60M	/ 227Mb	ACM			simple R)	s × E	-38.2	-36.2	muted	18100
	LOG	CAL (sec	condary	1)	W	S:rem.se	ec_10		HSB/SE	D	1	loc.sec_12:	5 🛞		REN	AOTE(s)	
ADMIN permissions 🕞	Logo	ut in: 19	m 24 s													1	Write 🧐
Status	Paran	neters	ACI	N I	Advar	nced											
▲ Config							LOC	:6(BET	IOTE			(i)
System	MODE	N			Cł	ANNEL		C	HANNEL	2		HANNEL	1		CHAN	NEL 2	Ĩ
IP	Bandw	idth			60	000_02 •		60	0000_02	•		60000_02			6000	0_02	
Radio	Max R	ACM P	ofile		003	2/strong	•	003	2/strong	•	00	32/strong	τ	Ó	032/st	rong v	
Ports	ACM S	etting				» 🛱		1	* 43-			-			-		
Alarms	Advand	ed Sett	ing			default			default			-					
> Tools							100	AL					RE	AOTE			0
	RADIO				CHAI	INELT	(j)	CHA	NNEL 2	(I)		HANNEL	1		CHAN	NEL 2	
	T/R Sp	acing			fixed	•	<u>(</u>)	fixe	d v	1	F.	fixed			fix	ed	
	TX Free	quency	[MHz]		18	810	(i)	19	110	(1)	k.	17800			181	00	
Time: 15:27:11	RX Fre	quency	[MHz]		17	800	1	18	100	(i)	P.	18810			191	10	
Uptime: 0.01:00:28 Befresh status	TX Pov	ver Limit	[dBm]			20	1		13	(1)	1	20			1	3	
Thereal status	TX Mut	te Confi	9		auto	•		aut	• •		Ĩ	auto •	1		auto	•	_
Modem Serial Number	ATPC	unction			1				D			Ð	-	-	E	1	
License Number	ATPC	RX Level	[dBm]		-	55	(i)	1	55	(i)		-55		1	-5	5	_
3010403010100230 License Type / Status	Refre	sh												Und	do A	pply ic	cal

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 '<u>Config->Radio-</u> <u>>ACM</u>' in the web GUI and set ACM function to "man p1" on both Channels. This setting disables the ACM

Same	TxF	TxP	MSE	RxL	W	P.rem.prim_11	Split 2+2	loc.prim_13:P	W	RxL	MSE	TxP	TxF
"A "	18810	muted	-28.5	-41.7	- 🚺	× simple RX	ACM	0032strong / 60M / 227Mb	•	-89.5	0.0	13	17800
SPAP	19110	13	0.0	-87.0	2	• 0032strong / 60M / 227Mb	ACM	simple RX	× 🔁 •	-44.1	-39.2	muted	18100
	18810	muted	-38.1	-46.0		× simple RX	ACM	0032strong / 60M / 227Mb		-89.7	0.0	muted	17800
	19110	muted	0.0	-88.5	2	× 0032strong / 60M / 227Mb	ACM	simple RX	× 🔁 -	-48.9	-36.9	muted	18100
	LOO	CAL (sec	ondar	y)	W	S:rem.sec_10	HSB/SD	loc.sec_12:S	W		REM	IOTE(s)	
ADMIN permissions $m{B}$	Logo	ıt în: 19	m 30 s	5								1	Vrite 🗰
▷ Status	Paran	neters	ACI	VI I	Advar	nced							
▲ Config System	ACM S	ETTING	S.)	CHANNEL 1	CH	NNEL 2 Us	ual val	ue	1	Vote	(i)
Access	ACM fu	inction			C	man p1	ma	in p1	auto				
IP	ACM O	ffset				0.0		0.0	0		-3.0	+3.0	

Figure 5.90 Example of Side B Secondary IDU ACM configuration

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

The second s	TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2	loc.prim_13:F	W	RxL	MSE	TxP	TxF
275	18810	muted	-36.1	-30.9	-	simple BX	ACM	0032strong / 60M / 227Mb	- 0	-88.8	0.0	24	17800
5/11	19110	24	0.0	-86.8	2	0032strong / 60M / 227Mb	ACM	simple RX	10	-32.8	-20.7	muted	18100
	18810	muted	-36.2	-34.7		simple BX	ACM	0032strong / 60M / 227Mb		-89.4	0.0	muted	17800
	19110	muted	0.0	-88.2	2	0032strong / 60M / 227Mb	ACM	simple RX	10	• -38.2	-36.2	muted	18100
	LOC	CAL (sec	condar	y)	W	S:rem.sec_10	HSB/SD	loc.sec_12:S	W		REM	AOTE(s)	
ADMIN permissions 🕞	Logou	rt in: 19	m 24 s	5								1	Write
Status	Addre	sses	SNN	IP	Advar	nced							
 Config 	MAIN	ODRES	S SET	TINGS			REQUIRED		C	ONFIGU	RED		(i)
Access	Device	IP / Ma	sk			192.16	8.205.10	/ 24	192	.168.20	5.10/24		
IP	Default	Gatewa	ay IP			192	.168.205.1		1	92.168.2	205.1		
Radio	OPTION	AL ADI	DRESS	SETTI	IGS	1	REQUIRED		C	ONFIGU	IRED		(î
Alarms	USB IP	/Mask				 10.10. 192.16 	11.10/24 58.11.10/24	in l	1	0.10.11.1	10/24		
P Tools	Fallbac	k IP/Ma	sk			10.10.	10.10/24		1	0.10.10.1	0/24		

Figure 5.91 Example of Side B Secondary IDU IP configuration

e) In web GUI '<u>Config->IP->Advanced</u>' 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: <u>https://192.168.205.13:3443</u>

and the second second	TxF	TxP	MSE	RxL	W	Prem.prim_11	Split 2+2		loc.prim_13:F	W	RxL	MSE	TxP	TxF
"A #	18810	muted	-36.1	-30.9	0	simple RX	AGM	0032strong	/ 60M / 227Mb		-88.8	0.0	24	17800
SPAF	19110	24	0.0	-86.8	2	• 0032strong / 60M / 227Mb	ACM		simple RX	×	-32.8	-20.7	muted	18100
	18810	muted	-36.2	-34.7		simple RX	ACM	0032strong	/ 60M / 227Mb	-	-89.4	0.0	muted	17800
	19110	muted	0.0	-88.2	2	× 0032strong / 60M / 227Mb	ACM		simple RX	× 🖸 •	-38.2	-36.2	muted	18100
	LOC	CAL (sec	ondary	y)	W	S:rem.sec_10	HSB/SD		loc.sec_12:9	w)		REN	IOTE(s)	
ADMIN permissions 🕞	Logou	ut in: 19	m 24 s	5									1	Write 🕅
> Status	Addre	sses	SNM	P	Advar	nced								
▲ Config	STATIC	ROUTE	S-INF	UT VAL	UES									1
Access	Routed	IP/MA	SK											
IP	Gatewa	av IP				-		1				Ade	i Deli	ate
Radio	outern	.y										Enter .		
Ports	NAT-J	NPUTV	ALUES									-		(j)
Alarms	Local_I	Port Des	t_IP.Pc	ort							Add	Delet	e Del	All
 Maintenance 	Default	NAT to	remot	e		WEB	SSH						1	Set
P TOOIS	RADIU	S- INPL	T VAL	UES										(i)
	IP.dest	port Sec	String	timeou	t						Add	Delet	e Del	All
	SETTIN	IGS				REQUIRED				CON	IGURE	D)		(1)
Date: Fri. 08.02.2019	Route							det	fault via 192.1	68.205	1			
Uptime: 0.01:00:28 Refresh status	NAT							De (ht ,htt De	fault WEB NA tps://192.168 tps://192.168 fault SSH NA	T: on 205.13 205.13 1: off	3443:14 3443:24	143/ 43/)		
355260100011	Radius	Server												
License Number 3010403010100230													S	ave

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 '<u>Config->Ports->EthVLAN</u>' section

	TxF	TxP M	MSE	RxL	W	P.rem.prim_11		Split 2+2	loc.prim	_13:P	RxL	MSE	TxP	TxF
"A #	18810 m	nuted -	38.8	-41.6	0	0032strong / 60M / 2	227Mb	ACM	0032strong / 60M / 2	27МБ • 🚺 •	-55.9	-34.6	13	17800
SAP	19110 m	nuted -:	38.4	-41.8	2	0032strong / 60M / 2	227Mb	ACM	0032strong / 60M / 2	27МБ + 🔼 +	-56.1	-34.3	13	18100
	18810	6 -:	38.2	-46.5	0	0032strong / 60M / 3	227Mb	ACM	0032strong / 60M / 2	27мь × 🚺-	-61.2	-30.2	muted	17800
	19110	6 -:	37.6	-46.9	2	0032strong / 60M / 2	227Mb	ACM	0032strong / 60M / 2	27Mb × 🔁 -	-60.6	-29.4	muted	18100
	LOCAL	(seco	ndary)		S:rem.sec_10		HSB/SD	loc.sec	_12:S		REN	IOTE(s)	
ADMIN permissions 🕒	Logout in	n: 19 m	1 45 s										1	Write
> Status	MUX	EthVL	AN	Eth	qos	EMM								
▲ Config System	VLAN MO	DE	1	LAN 1		LAN 2	L	AN 3	MNG	WAN	A	1	VAN B	(i
Access	Port Mode	e	bas	sic	•	basic 🔻	basi	ic 🔹	basic 🔻	basic		bas	sic	•
IP	Port Group	р	gr	oup-1		group-2 *	gro	up-3 🔻	group-3 🔻	group-1		gr	oup-2 🔻	
Radio	Default VL	LAN		T		1		1	1	1			1	
Ports	1					(TERMINE)		(Second)	1000000					
Maintenance						124941		CE switch	LANS					
> Tools						WAR		SE SWITCH	LANC COLL	-				

Figure 5.93 Example of Side B Secondary IDU port grouping

g) In web GUI '<u>Config->Ports->MUX</u>' 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'

System	DA	TAFLOW CONFIGUR	ATION	-	_					0
Access	PO	RT	SEP1	SFP2		SEP3	SEP4	LANT	LAN2	LANS
Radio		Status				Gbit FD	SFP module not present	Gbit FULL	LAN No LINK	LAN No LINK
Ports	0	Hot Standby		-)	stan	dby	sta	ndby	-
Alarms	ONF	Mode	force2G5 🔻	force2G5	./	force1GX 🔻	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
Maintenance Tools	TC	MDIX	-	-		-		auto 🔻	auto 🔻	auto 🔻
10013	POR	Flow Control	force	force		force	force	off	off	off
		1588	off 🔻	off 🔻		off *	off 🔻	off 🔻	off 🔻	off 🔻
Date: Fn, 08.02.2019 Time: 15.29:11 Uptime: 0.01:02:27 Refresh status	WITCH							LANT	GE switch	LAN3
Modem Serial Number 355260100011 License Number	ETH S									CPU
3010403010100230 License Type / Status	AP	Channel Select	protection *	protection	. (EMM1 ·	none •	ETH1a V	none 🔻	REI1 REI2
permanent / ok License Expiration	SW	Connected Port	off	sfp3	wana	none	off	none	none	none
Firmware Version	W	Traffic Channel	PTP1	EMM1	ETHI	a ETH1b	PTP2	EMM2	ETH2a	ETH2b
0402_01 Bunning Design	PBF	Speed Limit (j)	auto	0	1000	0	auto	0	0	0
511		Avail Aggr Speed			-	227.	8 Mbps ETH			
	-	Modem Speed		227.81 Mbps	eth-	lisabled		227.81 Mb	ps active	
									Undo	Apply

Figure 5.94 Example of Side B Secondary IDU port configuration

h) In web GUI '<u>Config->Ports->EMM</u>' 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'

▲ Config	EMM	EMOM#T	EMM#2	EMM#3	EMM##	(i)
Access	ЕММ Туре	4ASI	none	none	none	
IP	EMM Enable	2			D	
Radio	EMM Protection Failover		0	6		
Ports	EMM Add/Drop ID	auto 🔻				
Alarms	EMM Add/Drop Range	14				
Maintenance Tools	EMM Mode					
10013	EMM CARD #1	ASI 1	ASI 2	ASI 3	ASI 4	(i)
	Enable			B		
	Link Status	noSync	loss	loss	loss	
Date: Fri, 08.02.2019	PCR Lock	noLock	7	1	-	
Time: 15:29:38	Mode	Tx ▼	Rx 🔻	Rx ▼	Rx 🔻	
Refresh status	Data Source	Remote Ch1 🔻				
Modem Seriel Number	Speed Limit (Rx) [Mbps]	214	214	214	214	
355260100011 License Number					Undo App	ly

Figure 5.95 Example of Side B Secondary IDU EMM configuration

 In web GUI '<u>Config->Alarms->Minor</u>' 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	Major Minor													
System		Loc	ALISEC	ondary)		LOC	AL	REN	TOTE			LO	CAL	
Access	WARNINGS	Pri/Sec switch	CH 1	CI	12	Per (FC	er))	Dir	rect. IF	т	HRESI	HOLDS		DETAILS
Radio	Modem													
Ports	Modem Aggr/Prot	no						(1
Alarms	Modem Data Sync	no						0						
Maintenance	Modem MSE Level	no			0					-25	1	-25	1	[dB]
Tools	Modem FER	no								10	1	10	(i)	[error_frm/10s]
	Radio													
	Radio RX Level	no			0					-75	(i)	-75	1	[dBm]
Date: Fri. 08.02.2019	Radio TX Mute	no							•					
Time: 15:30:10	Ports													
Uptime: 0.01:03:26 Refresh status	Modem LAN1 Link	yes	C											
non blacab	Modem LAN2 Link	yes												
Modem Serial Number	Modem LAN3 Link	no				1	1							
355260100011 License Number	Modem SFP1 Link	no	1				1							
3010403010100230	Modem SFP2 Link	no	(Ø)									
License Type / Status	Modem SFP3 Link	yes	-	20										
permanent / ok License Expiration	Modem SFP4 Link	yes					Ĺ.,							
unlimited		LC	CAL (se	condary)		REMO	TE	LOC	AL			LO	CAL	
Firmware Version 0402_01 Running Design	EMM#1 - 4ASI	Pri/Se switch	0	CHI		Peer (FO)		Dire	CL	THP	ESHO	LDS		DETAILS
511	EMM HW+SW	no							1					none
	SFP2 Link	yes		0.0										
	P1 Link	yes	C	20	>									
	P1 Sync	yes						0						
	P1 Idle	yes												

Figure 5.96 Example of Side B Secondary IDU alarm configuration

- j) Save new settings by pressing Write button.
- 5) Reboot all 4 IDUs after successful reconfiguration
- 6) In web GUI '<u>Config->System->Mode</u>' set Hot-Swap Startup device Role to 'Auto primary' in both Primary IDUs in order to enable protection mode

and the second	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17800	24	0.0	-89.0	0	+ 0032strong / 60M / 227M	6 ACM	simple RX × 🚺	-31.1	-36.2	muted	18810
SPIL	18100	muted	-38.3	-49.0	• 🗉	× simple RX	ACM	0032strong / 60M / 227Mb × 2	-87.0	0.0	muted	19110
	17800	muted	0.0	-89.5		× 0032strong / 60M / 227M	b ACM	simple BX 🗴 🚺	-34.6	-36.3	muted	18810
	18100	muted	-34.6	-54.4	- 🖸	× simple RX	ACM	0032strong / 60M / 227Mb • 🔼	-88.1	0.0	0	19110
	LC	OCAL (p	rimary)		W	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕞	Logou	it în: 3 h	39 m	55 s							1	Write 🗌
> Status	Mode	De	scripti	on	Date	&Time Advanced						
▲ Config	DESIG	CONFI	GURA	NON			LOCAL ()	orimary)		ACT	ION	1
Access	Design	Туре					Design	511 🔻		Ар	ply	
IP	DESIG	MODE	s				LOCAL (erimary)		ACT	ION	1
Ports	Functio	onal Mo	de				Split 2	2+2 ▼		Ар	ply	
Alarms	Link Pr	otection	Diver	sity			HSB/SD - Ho	t standby 🔻		Ар	ply	
> Maintenance	Link Ag	gregati	on Dive	ersity			FD	•	FO pe	er con	nected -	it's
1 00IS	Hot-Sw	ap Star	tup De	vice R	ole	<	Auto (prim	ary)	a	automa	tically.	
	Runnin	g Role S	Swappi	ng		swap	device role (p	rimary/secondary)		Ар	ply	

Figure 5.97 Example of Primary IDUs system configuration in Auto mode

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

The second	TxF	TxP	MSE	RxL	100	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
242	17800	24	0.0	-88.8		• 0032strong / 60M / 227Mb	ACM	simple RX × 🚺	-31.2	-36.2	muted	18810
SPAF	18100	muted	-38.3	-48.9	•	× simple BX	ACM	0032strong / 60M / 227Mb × 2	-87.1	0.0	muted	19110
	17800	muted	0.0	-89.5		* 0032strong / 60M / 227Mb	ACM	simple RX × 🚺	-34.7	-36.2	muted	18810
	18100	muted	-34.7	-54.4	- 8	* simple RX	ACM	0032strong / 60M / 227Mb + 2	-88.2	0.0	13	19110
	LOG	CAL (see	ondary	y)	W	S:loc.sec_12	HSB/SD	rem.sec_10:S		REN	IOTE(s)	
ADMIN permissions 🕒	Logo	nt in: 18	m 56 s									Write 🙆
Status	Mode	De	scripti	on	Date	&Time Advanced						
▲ Config	DESIG	CONF	GURAT	TION			LOCAL (se	condary)		ACT	ION	(j)
Access	Design	Туре					Design	511 🔻		Ар	ply	
IP	DESIG	MODE	ş				LOCAL (SE	condary)	1	ACT	ION	(1)
Radio	Functio	onal Mo	de				Split 2	+2 •		Ар	ply	
Alarms	Link Pr	otection	Diver	sity		1	HSB/SD - Ho	t standby 🔻		Ар	ply	
Maintenance	Link Ag	gregati	on Dive	ersity			FD		FO pe	er con	nected	iťs
> Tools	Hot-Sv	ap Star	tup De	vice R	ole	(Auto (seco	ondary) 🔹 刘	a	utoma	tically.	
	Bunnin	a Role S	wappi	na		swap d	evice role (p	rimary/secondary)		AD	ply	

Figure 5.98 Example of Secondary IDUs system configuration in Auto mode

8) 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 5.99 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 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 HSB/SD protection are following:

 In web GUI '<u>Config->System->Mode</u>' 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.

and the state of	TxF	TxP	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17800	muted	-34.7	-55.9 •	×	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb × 1	+ -54.2	-36.2	muted	18810
SPAP	18100	muted	-39.3	-44.1 +	2 8	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb • 2	+ -53.8	-34.0	13	19110
	17800	6	-30.1	-61.0		0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb • 1	-58.2	-32.4	6	18810
	18100	6	-36.9	-49.7 -	2.4	0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb × 2	-59.0	-30.9	muted	19110
	LO	CAL (pr	imary)			S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🗗	Logout	t in: 15	m 52 s	5								-
D Status	Mode	De	scripti	on Da	ate&	Time Advanced						
▲ Config	DESIGN	CONFI	GURA	non			LOCAL (P	rimary)		ACT	ION	i
Access	Design T	Туре					Design	511 •		Ар	ply	
IP	DESIGN	MODE	8				LOCAL (p	rimary)		ACT	ION	i
Ports	Function	nal Mod	le				Split 2	+2 🔻		Ар	ply	
Alarms	Link Pro	otection	Diver	sity			HSB/SD - Ho	t standby 🔻		Ар	ply	
> Maintenance	Link Age	gregatio	on Dive	ersity			FD		FO pe	er con	nected -	it's
D TOOIS	Hot-Swa	ap Star	tup De	vice Role			Fixed prim	ary 🔻	a	utoma	tically.	
	RADIO	NODES				CHANNER	LT	CHANNEL 2		ACT	ION	1
Date: The 14 00 0010	Duplex I	Mode				Bidirection	al 🔻	Bidirectional *		Ap	piy	
Time: 14:30:25 Uptime: 0.03:21:53	Refres	sh									Ur	ndo

Figure 5.101 Example of System configuration

 In web GUI '<u>Config->Radio->Parameters</u>' configure basic radio and modem parameters in all Phoenix G2 IDUs. Choose different frequency channels for Channel 1 and Channel 2

the second	TxF	TxP	MSE Rx) Plo	c.prim_	13		Split 24	+2	n	em.prim	11:P	RxL	MSE	TxP	TxF
" A "	17800	13	-34.6 -55	.9 +	+ 003	2strong	/ 60M /	227M	ACM	1	0032strong	60M / 2	27Mb x 🚺	-41.8	-38.7	muted	18810
SPLF	18100	13	-39.2 -44	1 +	+ 003	2strong	/ 60M /	227M	ACM		0032strong /	60M / 2	27Mb + 2	• -41.7	-38.3	13	19110
	17800	muted	-30.1 -61	1	× 003	2strong	/ 60M /	/ 227M	ACM		0032strong	60M / 2	27Mb • 🚺	-46.6	-38.0	6	18810
	18100	muted	-36.9 -49	7	* 003	2strong	/ 60M /	227M	ACM		0032strong /	60M / 2	27Mb × 2	-47.0	-37.7	muted	19110
	LO	CAL (p	rimary)	(V) S:lo	c.sec_1	12		HSB/S	D		rem.sec	_10:S		RE	MOTES	
ADMIN permissions 🕞	Logou	t in: 17	m 22 s														Write 🖉
▷ Status	Param	eters	ACM	Adv	anced												
Config Suctom							LOC	AL					BI	MOTE			(i)
Access	MODEM	·			CHANN	VEL 7			CHANNEL	2		CHAN	IEL 7		CHAN	NEL 2	
IP	Bandwid	dth			50000_	02 🔻		- [60000_02	•		60000	_02		6000	0_02	
Radio	Max Rx	ACM P	rofile	00	032/str	ong 🔻		0	032/stron	g 🔻	0	032/st	* pno	0	032/st	rong 🔻	
Ports	ACM Se	tting			» 1	k			* 🅸			-			-		
Maintenance	Advance	ed Sett	ing		defa	ult			default			÷			-		
> Tools	DADIO						LDC	AL					RI	MOTE			(1)
	HADIO			CH	ANNEL	1	(i)	CH	ANNEL 2	0	D	CHANI	IEL 1		CHAN	NEL 2	
	T/R Spa	ncing		fix	ed 🕨	•	í	fi	ted 🔹	(D	fixe	d		fix	ed	
Dete: The 14 00 2010	TX Freq	uency	[MHz]		17800		(i)		18100	0	D	188	10		191	10	
Time: 14:35:11	RX Freq	uency	[MHz]		18810	1	(i)		19110	(D	178	00		181	00	
Uptime: 0 03:26:40 Refresh status	TX Powe	er Limi	t [dBm]		13		1		13	0	D	13	E		1	3	
	TX Mute	e Confi	g	a	.to 🔻			a	uto 🔻			auto	•		auto	•	
Modem Serial Number 355260100010	ATPC F	unction	1									Ē					
License Number	ATPC R	X Leve	[dBm]		-55		(i)	E	-55	0	D	-5	5		-5	5	
3010403010100229 License Type / Status	Refres	sh												Un	do A	pply ic	cal

Figure 5.102 Example of Radio configuration

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

and the second se	TxF	TxP	MSE	RxL	W	P.loc.prim_1	3	Split 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17800	13	-34.6	-56.0	-0	• 0032strong /	60M / 227Mb	ACM	0032strong	/ 60M / 227Mb × 1	+ -41.8	-38.7	muted	18810
SPAF	18100	13	-39.2	-44.1	- 2	• 0032strong /	60M / 227Mb	ACM	0032strong	/ 60M / 227Mb + 2	+ -41.8	-38.4	13	19110
	17800	muted	-30.2	-60.9	-	× 0032strong /	60M / 227Mb	ACM	0032strong	/ 60M / 227Mb +	-46.6	-38.0	6	18810
	18100	muted	-36.9	-49.7	42	* 0032strong /	60M / 227Mb	ACM	0032strong	/ 60M / 227Mb × 2	-47.0	-37.6	muted	19110
	LO	CAL (pr	rimary)	C	W	S:loc.sec_12	2	HSB/SD		rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕞	Logou	t in: 19	m 49 s	5									1	Write 🔮
> Status	Addres	sses	SNM	IP	Adva	inced								
System	MAIN A	DORES	S SET	TINGS				REQUIRED			CONFIGU	URED		(i)
Access	Device I	P / Mas	sk				192.1	68.205.13	/ 24	19	2.168.20	5.13/24	ļ.	
IP	Default	Gatewa	ay IP				19	92.168.205.1			192.168.3	205.1		
Ports	OPTION	AL ADE	DRESS	SETTI	NGS			REQUIRED			CONFIGU	IRED		1
Alarms	USB IP/	Mask					 10.10 192.1 	0.11.10/24 168.11.10/24	í.		10.10.11.	10/24		
Tools	Fallback	k IP/Ma	isk				10.10	0.10.10/24			10.10.10.	10/24		

Figure 5.103 Example of IP configuration

 In web GUI '<u>Config->IP->Advanced</u>' 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

and the second se	TxF	TxP	MSE	RxL	W	P.loc.pr	im_13		Split 2+2		rem.prim	_11:P	RxL	MSE	TxP	TxF
"A#	17800	13	-34.6	-56.0		+ 0032str	ong / 60M / 22	27Mb	ACM	0032stron	g / 60M / 2	27Mb × 🚺	+ -41.8	-38.7	muted	18810
SPAP	18100	13	-39.2	-44.1	•	• 0032str	rong / 60M / 22	27Mb	ACM	0032stron	ng / 60M / 2	27Mb + 🔼	• -41.8	-38.4	13	19110
	17800	muted	-30.2	-60.9	-9	* 0032str	rong / 60M / 22	27Mb	ACM	0032stron	ng / 60M / 2	27Mb + 🚺	-46.6	-38.0	6	18810
	18100	muted	-36.9	-49.7		* 0032str	rong / 60M / 22	27Mb	ACM	0032stron	ng / 60M / 2	27Mb × 2	-47.0	-37.6	muted	19110
	LC	ICAL (p	rimary		W	Stloc.se	ec_12		HSB/SD		rem.sec	_10:S		RE	MOTES	-
ADMIN permissions	Logou	it in: 19	m 49 :	\$											-	Write 🦉
> Status	Addre	sses	SNM	P	Adva	nced										
4 Config	STATIC	ROUTI	es - INI	PUT VA	LUES											1
Access	Routed	IP/MA	SK				1									
IP	Gatewa	y IP												Ad	d Del	ete
Radio	NAT - I	NPLITY	ALUES													(i)
Alarms	Local_F	Port Des	st_IP.Po	ort						1			Add	Delet	e De	All
Maintenance	Default	NAT to	remot	e			(WW	VEB	SSH				And the second s		E	Set
> 100IS	RADIUS	- INPA	IT VAL	JES												1
	IP.dest	oort Se	String	timeo	ut								Add	Delet	e De	All
Party in the second second	SETTIN	GS					REQUIRE	Ð				CON	FIGURE	D		í
Date: Thu, 14.02.2019	Route									C	efault via	192.168.205	a.			
Uptime: 0.03:24:13 Refresh status	NAT									1 [(443 192.1 Default WE https://192	58.205.11.4 B NAT: on 2.168.205.13	43 3:1443/			
Modem Serial Number										,! [https://192 Jefault SSH	168,205.13 NAT: off	3:2443/)			
License Number	Radius	Server														
3010403010100229 License Type / Status															S	ave

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

and and	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim	11:P	RxL	MSE	TxP	TxF
"A #	17800	13	-34.6	-55.9	•	• 0032strong / 60M / 3	227МЬ АСМ	0032strong / 60M / 22	27Mb × 🚺 •	-41.8	-38.7	muted	18810
SAL	18100	13	-39.2	-44.0	•0	• 0032strong / 60M / 3	227Mb ACM	0032strong / 60M / 23	27Mb + 🔁 +	-41.7	-38.3	13	19110
	17800	muted	-30.2	-61.0	0	0032strong / 60M / 2	227мь АСМ	0032strong / 60M / 22	27мь • 🕕-	-46.6	-38.0	6	18810
	18100	muted	-36.9	-49.8	-8	0032strong / 60M / 3	227МЬ АСМ	0032strong / 60M / 22	27Mb × 🔁 -	-46.9	-37.7	muted	19110
	LC	CAL (p	rimary)	e -	W	S:loc.sec_12	HSB/SD	rem.sec	10:S	-	REM	NOTES	
ADMIN permissions 🕞	Logou	rt in: 15	mOs									1	Vrite 😤
Status	MUX	Eth	VLAN	Eth	QOS	EMM							
Config Sustom	VLANA	NODE		LAN T		LAN'S	LAN 3	MNG	WAN	A:	3	VAN B	1
Access	Port Me	ode	bas	sic	•	basic 🔻	basic 🔹	basic 🔻	basic		bas	ic	•
IP	Port Gr	oup	gr	oup-1	•	group-2 🔻	group-3 🔻	group-3 🔻	group-1		gr	oup-2 🔻	
Radio	Default	VLAN		1		1	1	1	1			1	
Alarms						(COLUMN)	(Carrowa)	10000					
Maintenance						LANI	LAN2	LANS					
> Tools						(777777)	GE switch	Freezewarth	-				
0.2.6.2						WANA	WANE	MINGCHU					

Figure 5.105 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

										(1)
System	DA	TAFLOW CONFIGUR	ATION	-						
ACCESS	PO	RT	SFP1	SFP2		SFP3	SFP4	LAN1	LAN2	LANS
Radio		Status		Gbit FL		Gbit FD	SFP module not present	LAN Gbit FULL	LAN No LINK	Gbit FULL
Ports	9	Hot Standby		2		stand	dby	active	active	-
Alarms	ONF	Mode	force2G5 *	force2G5	• for	ce1GX *	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
 Maintenance Tools 	TC	MDIX	-	-		-		auto 🔻	auto 🔻	auto 🔻
1000	POR	Flow Control	force	force		force	force	off	off	off
		1588	off *	off *		off *	off *	off 🔻	off 🔻	off 🔻
Date: Thu, 14.02.2019 Time: 14:36:41 Uptime: 0.03:28:10 Refresh status	SWITCH							LAN1 WAND	GE switch	LAN3
Modem Serial Number 355260100010 License Number	ETH									CPU
3010403010100229 License Type / Status	AP	Channel Select	protection *	protection	* (E	MM1 ·	none •	ETH1a V	none 🔻	RFI1 RFI2
permanent / ok License Expiration unlimited	MS	Connected Port	off	sfp3	wana	none	off	none	none	none
Firmware Version	W	Traffic Channel	PTP1	EMM1	ETH1a	ETHID	PTP2	EMM2	ETH2a	ETH2b
0402_01 Bunning Design	PBF	Speed Limit (1)	auto	0	1000	0	auto	0	0	0
511		Avail Aggr Speed			-	455.	6 Mbps ETH			
		Modem Speed		227.81 Mb	ops activ	re		227.81 Mb	os active	
									Undo	Appiy

Figure 5.106 Example of port configuration

- Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI '<u>Config->Alarms->Minor</u>' 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

> Status	Major Minor										
System		LC	OCAL (primary)		LOCAL	REMOTE			LO	CAL	
Access	WARNINGS	Pri/Sec switch	CHT	GH 2	Peer (FO)	Direct RF	T	IRES	HOLDS		DETAILS
Radio	Modem										
Ports	Modem Aggr/Prot	no									
Alarms	Modem Data Sync	no									
Maintenance	Modem MSE Level	no					-25	(i)	-25	(1)	[dB]
Tools	Modem FER	no					10	(i)	10	(i)	[error_frm/10s]
	Radio										
	Radio RX Level	no					-75	(i)	-75	(i)	[dBm]
Date: Fri 08.02.2019	Radio TX Mute	no		e e		0 0			-		
Time: 15:03:20	Ports										
Jptime: 0 00:37:46 Refresh status	Modem LAN1 Link	yes		>		•					
include and a second seco	Modem LAN2 Link	yes									
Modem Serial Number	Modem LAN3 Link	no				0					
355260100010	Modem SFP1 Link	no									
3010403010100229	Modem SFP2 Link	no	20								
License Type / Status	Modem SFP3 Link	yes		/	٠	•					
License Expiration	Modem SFP4 Link	yes									
unlimited		1	OCAL (primary)	(F	REMOTE	LOCAL			LO	CAL	
Firmware Version 0402_01 Rupping Design	EMM#1-4ASI	Pri/Se switch	с сна		Peer (FO)	Direct RF	THR	ESHO	LDS		DETAILS
511	EMM HW+SW	no									none
	SFP2 Link	yes	- Ele								
	P1 Link	yes		>	•	•					
	P1 Sync	yes									
	P1 Idle	yes	0.0							_	
	P1 Lock	yes									
	and a second secon										

Figure 5.107 Example of alarm configuration

- 9) Save new settings by pressing write button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '<u>Config->System->Mode</u>' 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

Contraction of Contraction	TxF Tx	P MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A#	17800 13	-34.7	-56.0	•	+ 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb ×	41.9	-38.6	muted	18810
SPAP	18100 13	-39.2	-44.1	0	• 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb + 2	+ -41.7	-38.1	13	19110
	17800 mut	ed -30.2	-61.0	-0	× 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb +	-46.7	-37.9	6	18810
	18100 mut	ed -36.9	-49.7	0	× 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb × 2	-47.0	-37.4	muted	19110
	LOCAL	(primary	K.	W	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	NOTES	
ADMIN permissions 🕞	Logout in:	19 m 53	5							1	Vrite 👹
▷ Status	Mode	Descripti	on	Date	&Time Advanced						
▲ Config	DESIGN CON	FIGURA	TION			LOGAL (P	mmary)		ACTI	ON	1
Access	Design Type					Design	511 🔻		App	oly	
IP	DESIGN MO	DES				LOCAL (P	rimary)	1	ACT	ON	(1)
Radio	Functional M	Aode				Split 2	+2 🔻		Арр	oly	
Alarms	Link Protect	ion Diver	sity		H	SB/SD - Ho	t standby 🔻		Арр	oly	
Maintenance	Link Aggreg	ation Div	ersity			FD	-	FO pe	er con	nected -	it's
> Tools	Hot-Swap S	tartup De	vice Ro	le	(Auto (prim	ary)	a	utoma	tically.	
	Running Rol	e Swapp	ng		swap de	vice role (pi	rimary/secondary)		Арр	oly	
Parter The Avenue	RADIO MOD	ES			CHANNEL		CHANNEL 2		ACT	ON	(i)
Time: 14:31:27	Duplex Mod	e			Bidirectional	7	Bidirectional 🔻		Ар	oly	
Refresh status	Refresh									Ur	do

Figure 5.108 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	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
284	17800	13	-34.6	-55.9	-	+ 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb × 🚺 •	-41.8	-38.7	muted	18810
SMP	18100	13	-39.2	-44.0	0	• 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb + 2 +	-41.7	-38.3	13	19110
	17800	muted	-30.2	-61.0	-0	× 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb +	-46.6	-38.0	6	18810
	18100	muted	-36.9	-49.8	- 🖸	× 0032strong / 60M / 227Mb	ACM	0032strong / 60M / 227Mb × 2	-46.9	-37.7	muted	19110
	LO	CAL (p	rimary)	1	W	S:loc.sec_12	HSB/SD	rem.sec_10:S		REI	MOTES	

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:

 In web GUI '<u>Config->System->Mode</u>' 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

The second s	TxF	TxP	MSE	RxL	Ploc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17790	15	-38.7	-41.4	• 1024strong / 60M / 455M	h ACM	1024strong / 60M / 455Mb •	+ -39.9	-38.7	15	18800
SPAP	17890	15	-39.1	-41.4	• 2 • 1024strong / 60M / 455M	ь асм	1024strong / 60M / 455Mb +	+ -40.0	-38.4	15	18900
	17990	18	-38.5	-48.9	- 1024strong / 60M / 455M	b ACM	1024strong / 60M / 455Mb +	-47.2	-38.6	18	19000
	18190	18	-36.5	-50.3	• 2 • 1024strong / 60M / 455M	ь асм	1024strong / 60M / 455Mb +	-47.3	-36.7	18	19200
	LO	CAL (p	rimary	1	S:loc.sec_12	FD	rem.sec_10:S		REN	IOTES	it .
ADMIN permissions 🕞	Logou	t in: 17	m 11	s							
Status	Mode	De	escripti	on	Date&Time Advanced						
	DESIGN	CONF	IGURA	TION		LOCAL (p	rimary)		ACTI	ON	(i)
Access	Design	Туре				Design	511 🔻		Арр	ly	
IP	DESIGN	MODE	S			LOCAL (p	rimary)		ACTI	ON	(i)
Radio	Functio	nal Mo	de			Split 2	+2 🔻		Арр	ly	
Alarms	Link Pre	otectio	n Diver	sity		FD - Freq. div	ersity 🔻		Арр	ły	
Maintenance	Link Ag	gregat	ion Div	ersity		FD	•	FO pe	er conn	ected	- it's
Tools	Hot-Sw	ap Sta	rtup De	vice R	ole	Fixed prim	ary 🔻	a	utomat	ically.	
	RADIO	MODES	5.		CHANN	EL T	CHANNEL 2		ACTI	ON	(i)
Dete: Tur 10 02 0010	Duplex	Mode			Bidirectio	nal 🔻	Bidirectional 🔻		Арр	iy	
Time: 14:53:18 Uptime: 0 00:27:07	Refre	sh								U	ndo

Figure 5.111 Example of System configuration

2) In web GUI '<u>Config->Radio->Parameters</u>' 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

Contraction of the local division of the loc	TxF	TxP	MSE	RxL		P.loc.p	rim_13		Split 2+	-2	r	em.prim_11:P	RxL	MSE	TxP	TxF
"A "	17790	15	-38.7	-41.4	. 1.	1024st	rong / 60M /	455Mb	ACM	U	024strong	/ 60M / 455Mb +	• -39.7	-38.8	15	18800
SPAP	17890	15	-39.0	-41.4	•2•	1024st	rong / 60M /	455Mb	ACM	1	024strong	/ 60M / 455Mb +	+ -40.1	-38.5	15	18900
	17990	18	-38.5	-48.8		1024st	rong / 60M /	455Mb	ACM	1	024strong	/ 60M / 455Mb +	-47.2	-38.4	18	19000
	18190	18	-36.5	-50.4	. 2.	1024st	rong / 60M /	455Mb	ACM	1	024strong	/ 60M / 455Mb +	-47.3	-36.8	18	19200
	LO	CAL (p	rimary)		S:loc.s	ec_12		FD			rem.sec_10:S		REN	NOTES	it.
DMIN permissions 🕞	Logour	in: 18	3 m 57	5												
Status	Param	eters	AC	M	Advan	nced										
Config							LOC	CAL				RI	MOTE			(i)
Access	MODEM				CH	ANNE	11	C	RANNEL	2		CHANNEL 1		CHANN	IEL 2	
IP	Bandwidth Max BxACM Brofile				60	000_02	•	60	000_02	•		60000_02		60000	_02	
Radio	Max RxACM Profile				102	4/stron	ig 🔻	102	4/strong	•	1	024/strong 🔻	10	024/str	ong 🔻	
Ports	Max RxACM Profile ACM Setting					×¢			» 🅸			-		-		
Maintenance	Advance	ed Sett	ting			default			default					-		
Tools							LOC	CAL				RI	EMOTE			1
	RADIO				CHAN	INEL T	(j)	CHA	NNEL 2	1		CHANNEL 1		CHANN	IEL 2	
	T/R Spa	cing			fixed	•	(j)	fixe	d 🔻	1		fixed		fixe	d	
	TX Freq	uency	[MHz]		17	790	(1)	17	890	(j)).	18800		1890	00	
Time: 14:56:59	RX Freq	uency	[MHz]		18	800	(j)	18	900	(1)	1	17790		1789	90	
Uptime: 0 00:30:49 Befrech status	TX Pow	er Limi	it [dBm	1	1	15	(1)		15	(1))	15		15		
incircon status	TX Mute	Confi	ig		auto	•		aut	• •			auto 🔻		auto	•	
Modem Serial Number	ATPC F	Inction	n		(-	D		
License Number	ATPC R	X Leve	dBm	1	-	55	(i)		55	(1)	r.	-55		-55	5	
3010403010100229 License Type / Status	Refres	sh										Undo	pply to	local	& rem	ote

Figure 5.112 Example of Primary IDU Radio configuration

The second second	TxF	TxP	MSE	RxL	P.loc.pri	m_13	Sp	lit 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
2 A 2	17790	15	-38.8	-41.4	• 1. • 1024stro	ing / 60M /	455Mb	ACM	1024str	ong / 60M / 455Mb + 🚺	+ -39.8	-38.8	15	18800
SPAF	17890	15	-39.0	-41.5	• 2 • 1024stro	ng / 60M /	455Mb	ACM	1024str	ong / 60M / 455Mb + 2	+ -40.1	-38.5	15	18900
	17990	18	-38.4	-48.8	1024stro	ng / 60M /	455Mb	MOA	1024str	ong / 60M / 455Mb + 🚺	-47.3	-38.4	18	19000
	18190	18	-36.5	-50.3	2 + 1024stro	ng / 60M /	455Mb	ACM	1024str	rong / 60M / 455Mb + 2	-47.3	-36.8	18	19200
	LOC	AL (se	condar	y)	S:loc.se	c_12		FD		rem.sec_10:S	-	REM	OTE(s	1
ADMIN permissions 🕞	Logou	t in: 1:	3 m 18	5										8
Status	Param	eters	AC	M	Advanced									
▲ Config	lune in					LOC	AL			RE	MOTE			(i)
System	MODEN	4			CHANNEL	1	CHAN	NEL 2		CHANNEL 1		CHANN	EL 2	
IP	Bandwi	dth			60000_02		60000	0_02 •		60000_02		60000	_02	
Radio	Max Rx	ACM F	Profile		1024/strong	•	1024/s	trong •	1	1024/strong *	10	024/str	ong 🔻	
Ports	ACM Se	etting			» 🅸		20	ŭ:		-		-	-	
Alarms	Advanc	ed Set	ting		default		def	ault				÷		
> Tools						LOC	AL			RE	NOTE			(j)
	RADIO				CHANNEL 7	1	CHANNE	1.2	(i)	CHANNEL T		CHANN	IEL 2	
	T/R Spa	acing			fixed •	(1)	fixed	•	(i)	fixed		fixe	d	
Contraction and and	TX Freq	uency	[MHz]		17990	(i)	18190	X	(i)	19000		1920	00	
Date: Tue, 19.02.2019 Time: 14:57:04	RX Free	uency	[MHz]	1	19000	(i)	19200)	1	17990		1819	00	
Uptime: 0 00:31:15 Befreeb status	TX Pow	er Lim	it [dBm	1	18	(i)	18		(i)	18		18		
nencon otatuo	TX Mut	e Conf	iq		auto 🔻		auto	•		auto 🔻		auto		_
Modem Serial Number	ATPC F	unctio	n		0		E			0				
License Number	ATPC R	X Leve	l [dBm]	1	-55	(j)	-55		1	-55		-55		
3010403010100227 License Type / Status	Refre	sh					h			Undo A	opiy to	local	& rem	ote

Figure 5.113 Example of Secondary IDU Radio configuration

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

TxF	TxP	MSE	RxL	W	Ploc.prir	m_13	Split 2+2	f	em.prim_11:P	RxL	MSE	TxP	TxF
17790	15	-38.8	-41.4	•	+ 1024stro	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb + 🚺	+ -39.8	-38.8	15	18800
17890	15	-39.0	-41.3	• 2	• 1024stro	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb + 🔁	+ -40.1	-38.5	15	18900
17990	18	-38.4	-48.8	-	+ 1024stro	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb + 🚺	-47.2	-38.4	18	19000
18190	18	-36.4	-50.3	- 2	• 1024stro	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb + 🛂	-47.2	-36.8	18	19200
LO	CAL (p	rimary))	W	S:loc.sec	2_12	FD		rem.sec_10:S		REN	IOTES	
Logou	t in: 19	m 49	5									1	Write 🦚
Addres	sses	SNA	ИP	Adv	anced								
MAINA	DDRES	SS SET	TINGS	1			REQUIRED		C	ONFIGU	RED		i
Device	IP / Ma	sk				192.10	58.205.13 /	24	192	168.205	13/24		
Default	Gatew	ay IP				192	2.168.205.1		1	92.168.2	05.1		
OPTION	AL AD	DRESS	SET	INGS			REQUIRED		0	ONFIGU	RED		i
USB IP/	/Mask					 10.10 192.1 	.11.10/24 58.11.10/24		10	0.10.11.1	0/24		
Fallbac	k IP/M	ask				10.10	10.10/24		10	0.10.10.1	0/24		
	17790 17790 17890 17990 18190 LO Logou Addre: MAIN A Device Default USB IP, Fallbac	IXF IXP 17790 15 17890 15 17990 18 18190 18 LOCAL (p Logout in: 19 Addresses MAIN ADDRES Device IP / Ma Default Gatew OPTIONAL AD USB IP/Mask Fallback IP/M	IXP IXP MSE 17790 15 -38.8 17890 15 -39.0 17990 18 -38.4 1890 18 -36.4 LOCAL (primary, Logout in: 19 m 49 Addresses SNM MAIN ADDRESS SET Device IP / Mask Default Gateway IP OPTIONAL ADDRESS USB IP/Mask Fallback IP/Mask	Ixr Ixr Mse HxL 17790 15 -38.8 -41.4 17890 15 -39.0 -41.3 17990 18 -38.4 -48.8 18190 18 -36.4 -50.3 LOCAL (primary) Logout in: 19 m 49 s Addresses SNMP MAIN ADDRESS SETTINGS Device IP / Mask Default Gateway IP OPTIONAL ADDRESS SETT USB IP/Mask Fallback IP/Mask	IXP IXP MSE KL 17790 15 -38.8 -41.4 1 17890 15 -39.0 -41.3 -2 17990 18 -38.4 -48.8 1 1890 18 -36.4 -50.3 2 LOCAL (primary) W Logout in: 19 m 49 s Addresses SNMP Adv MAIN ADDRESS SETTINGS Device IP / Mask Default Gateway IP 0PTIONAL ADDRESS SETTINGS USB IP/Mask Fallback IP/Mask Fallback IP/Mask Fallback IP/Mask Fallback IP/Mask	IXP IXP MSE RL IV P.00, Pill 17790 15 -38.8 -41.4 1 + 1024stro 17890 15 -39.0 -41.3 2 + 1024stro 17990 18 -38.4 -48.8 1 + 1024stro 18 -36.4 -50.3 2 + 1024stro LOCAL (primary) W Sloc.sec Logout in: 19 m 49 s Addresses SNMP Advanced MAIN ADDRESS SETTINGS Derice IP / Mask Default Gateway IP OPTIONAL ADDRESS SETTINGS USB IP/Mask Fallback IP/Mask	IXP IXP MSE IXL IVP PIOL-Immedia 17790 15 -38.8 -41.4 • • 1024strong / 60M / 455Mb 17890 15 -39.0 -41.3 • 1024strong / 60M / 455Mb 17990 18 -38.4 -48.8 1 • 1024strong / 60M / 455Mb 18190 18 -36.4 -50.3 2 • 1024strong / 60M / 455Mb LOCAL (primary) W Siloc.sec_12 Logout in: 19 m 49 s Addresses SNMP Advanced MAIN ADDRESS SETTINGS Derice IP / Mask 192.16 192.16 192.17 USB IP/Mask 10.10.0 192.17 192.17 192.17 192.17	IXP III IXP IIII IXP IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	IXP IIIP IIIIP IIIP IIIP II	IXP IXP MSE Rtt. Proc.pmint (3 spint (242 reinip init (11) 17790 15 -38.8 -41.4 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 17890 15 -39.0 -41.3 • 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb • 2 17990 18 -38.4 -48.8 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb • 3 18190 18 -36.4 -50.3 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb • 3 LOCAL (primary) W Sloc.sec_12 FD rem.sec_10.S Logout in: 19 m 49 s Addresses SNMP Advanced MAIN ADDRESS SETTINGS REQUIRED C Default Gateway IP 192.168.205.13 / 24 192 192.168.205.1 1 USB IP/Mask © 10.10.11.10/24 © 10.10.11.10/24 10 10 10	IXP IXP MSE RXL PROC_PINIC IS Spint 2*2 TempInit II T Fill pinit II T 17790 15 -38.8 -41.4 1 1024strong / 60M / 455Mb ACIM 1024strong / 60M / 455Mb 10 17990 15 -39.0 -41.3 2 1024strong / 60M / 455Mb ACIM 1024strong / 60M / 455Mb -40.1 17990 18 -38.4 -48.8 1 1024strong / 60M / 455Mb ACIM 1024strong / 60M / 455Mb -47.2 18190 18 -36.4 -50.3 2 +1024strong / 60M / 455Mb ACIM 1024strong / 60M / 455Mb -47.2 LOCAL (primary) W Stoc sec_12 FD remsec_10:S -47.2 Logout in: 19 m 49 s Addresses SNMP Advanced -47.2 -47.2 MAIN ADDRESS SETTINGS REQUIRED CONFIGU Default Gateway IP 192.168.205.13 / 24 192.168.205 Default Gateway IP 192.168.205.13 / 24 192.168.205.1 192.168.205 USB IP/Mask	IXP INPUTUTE IXE INSE 17790 15 -38.8 -41.4 • • 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb • • -39.8 -38.8 -	KP KP MSE Rtt. PROC_PRINT (S Spin (2*2 Tech print (S) Tech print (S)

Figure 5.114 Example of IP configuration

 In web GUI '<u>Config->IP->Advanced</u>' 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

and the second se	TxF	TxP	MSE	RxL		P.loc.prim_1	3	Split 2+2		rem.pr	im_11:P	RxL	MSE	TxP	TxF	
"A #	17790	15	-38.7	-41.4	0	1024strong /	60M / 455Mb	ACM	1024stro	ng / 60M	455Mb +	-39.8	-38.8	15	18800	x
SPAP	17890	15	-39.1	-41.4 •	2	1024strong /	60M / 455Mb	ACM	1024stro	ng / 60M	455Mb +	-40.1	-38.5	15	18900	1
	17990	18	-38.5	-48.8	0	1024strong /	60M / 455Mb	ACM	1024stro	ng / 60M	455Mb +	-47.2	-38.5	18	19000	K
	18190	18	-36.4	-50.4	2	1024strong /	60M / 455Mb	ACM	1024stro	ng / 60M	455Mb +	-47.3	-36.8	18	19200	1
	LO	CAL (p	rimary)			S:loc.sec_12	2	FD		rem.s	ec_10:S		REN	IOTES	1	
ADMIN permissions 🕒	Logou	t in: 19	9 m 53 s													8
Status	Addres	ses	SNM	P	Adva	nced										
⊿ Config	STATIC	ROUT	ES - INF	UT VA	LUES										a)
Access	Routed	IP/MA	SK						1							
IP	Gatewa	y IP											Add	Del	ete	
Radio	NAT - IN	NPUT I	ALUES												(i)
Alarms	Local_P	ort De	st_IP.Pc	rt			-					Add	Delete	De	IAII	
• Maintenance	Default	NAT to	o remot	e			WEB	SSH							Set	
> 100IS	RADIUS	- INP	UT VAL	JES			~								(i	5
	IP.destp	ort Se	cString	timeou	rt							Add	Delete	De	IAII	
	SETTIN	GS				IA	EQUIRED				co	NFIGURE	0		(i)
Date: Tue, 19.02.2019 Time: 14.56:03	Route								1	lefault vi	192.168.2	05.1				
Uptime: 0 00:29:52 Refresh status	NAT								1	443 192 Default W https://1	168.205.11 EB NAT on 92.168.205.	443 13:1443/				
Modem Serial Number									i	https://1 Default S	92.168.205. SH NAT: off	13:2443/)				
License Number	Radius	Server														
3010403010100229 License Type / Status														5	ave	

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

Sec. 10	TxF	TxP	MSE	RxL		P.loc.prim_13	Split	2+2	rem.prim	_11:P	RxL	MSE	TxP	TxF
"A "	17790	15	-38.7	-41.4	•	• 1024strong / 60M / 4	55Mb ACI	M	1024strong / 60M / 4	55Mb + 🚺	39.7	-38.7	15	18800
SPAP	17890	15	-39.1	-41.4	• 2	• 1024strong / 60M / 4	55Mb ACI	M	1024strong / 60M / 4	55Mb + 🔁	• -40.1	-38.4	15	18900
	17990	18	-38.5	-48.8		• 1024strong / 60M / 4	55Mb ACI	M	1024strong / 60M / 4	55Mb • 🚺	-47.3	-38.4	18	19000
	18190	18	-36.4	-50.3	12	• 1024strong / 60M / 4	55МЬ АСІ	M	1024strong / 60M / 4	55Mb + 🔁	-47.3	-36.9	18	19200
	LO	CAL (p	rimary)	6		S:loc.sec_12	FC)	rem.sec	_10:S		REN	IOTES	
ADMIN permissions 🕞	Logou	t in: 17	m 54 s	5										
Status	MUX	Eth	VLAN	Eth	1005	EMM								
	VLAN N	ODE		LANT		LAN 2	LAN 3		MNG	WAN	A	V	VAN B	(i)
Access	Port Mo	de	ba	sic	•	basic 🔹	basic	•	basic 🔻	basic	•	basi	ic	•
IP	Port Gro	oup	gi	roup-1	•	group-2 *	group-3	*	group-3 🔻	group-1		gro	oup-2	•
Radio	Default	VLAN		1		1	1		1	1			1	
Alarms						(Tree)	in the second se	1	(1000-1	-				
Maintenance						LANT	OE out	itch	LANS					
> Tools						WANA	GESW		MNC CELL					

Figure 5.116 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

⊿ Config	i.	CHITERUY	Lungoo	-itititi						Œ
System	DA	TAFLOW CONFIGU	RATION							
TP	PO	AT	SEPT	SFP2		SFP3	SEP4	LANI	LAN2	LANS
Radio		Status			0 2	Gbit FD	SFP module not present	LAN Gbit FULL	LAN 100Mbit FULL	LAN Gbit FULL
Ports	9	Hot Standby		-	1	stand	dby	active	active	-
Alarms	ONF	Mode	force2G5	force2G5	• for	rce1GX *	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
 Maintenance Tools 	TC	MDIX	-			+		auto 🔻	auto 🔻	auto 🔻
1003	POR	Flow Control	force	force		force	force	off	off	off
		1588	off *	off *		off *	off 🔻	off 🔻	off 🔻	off 🔻
Date: Tue: 19.02.2019 Time: 14:58:42 Uptime: 0.00:32:32 Refresh status	WITCH							LANT	LAN2 GE switch	LAN3
Modem Serial Number 355260100010 License Number	ETHS									CPU
3010403010100229 License Type / Status	AP	Channel Select	protection	protection	Y CE	MM1 T	none 🔻	ETH1a 🔻	none •	REI1 REI2
permanent / ok	SW	Connected Port	off	sfp3	wana	none	off	none	none	none
unlimited										
Firmware Version	Md	Traffic Channel	PTP1	EMM1	ETH1a	ETH1b	PTP2	EMM2	ETH2a	ETH2b
Running Design	PB	Speed Limit (j)	auto	0	1000	0	auto	0	0	0
511		Avail Aggr Speed				911.3	2 Mbps ETH			
			-		-					
		Modem Speed		455.62 M	bps acti	ve		455.62 Mb	ps active	
									Undo	Apply

Figure 5.117 Example of port configuration

- Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI '<u>Config->Alarms->Minor</u>' 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

Status	Major Minor										
System		LC	CAL (primary)		LOCAL	REMOTE			LO	CAL	
Access	WARNINGS	Pri/Sec switch	CH1 G	H 2	Peer (FO)	Direct	T	RES	HOLDS		DETAILS
Radio	Modem										
Ports	Modem Aggr/Prot	no									
Alarms	Modem Data Sync	no									
Maintenance	Modem MSE Level	по					-25	1	-25	(i)	[dB]
Tools	Modem FER	no					10	(i)	10	(i)	[error_frm/10s]
	Radio										
	Radio RX Level	no					-75	i	-75	i	[dBm]
Date: Fri 08 02 2019	Radio TX Mute	no		0							
Time: 15:03:20	Ports										
Uptime: 0 00:37:46 Refresh status	Modem LAN1 Link	yes		>		•					
The states	Modem LAN2 Link	yes									
Modem Serial Number	Modem LAN3 Link	no				6					
355260100010	Modem SFP1 Link	no	20								
3010403010100229	Modem SFP2 Link	no	20			•					
License Type / Status	Modem SFP3 Link	yes		/		•					
permanent / ok	Modem SFP4 Link	yes									
unlimited		1	OCAL (primary)		REMOTE	LOCAL			LO	CAL	
Firmware Version 0402_01	EMM#3-4ASI	Pri/Se switch	ссна		Peer (FO)	Direct RF	THR	ESHO	LDS		DETAILS
511	EMM HW+SW	no									none
	SFP2 Link	yes	000								
	P1 Link	yes	C ≥ •	>	•						
	P1 Sync	yes									
	P1 Idle	yes									
	P1 Lock	yes									
	Dottink		(D) (D)		-	-					

Figure 5.118 Example of alarm configuration

- 9) Save new settings by pressing write button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '<u>Config->System->Mode</u>' 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 second	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
275	17790	15	-38.7	-41.4	.0	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	39.9	-38.8	15	18800
SPAP	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	.0	• 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
	LO	CAL (p	rimary)		W	S:loc.sec_12	FD	rem.sec_10:S		REN	NOTES	
ADMIN permissions 🕞	Logou	t in: 1	9 m 53 s	5								Write
b Status	Mode	D	escripti	on	Date	&Time Advanced						
▲ Config Sustam	DESIGN	CONF	IGURA	TION			LOCAL (F	rimary)		ACTI	ON	Ē
Access	Design	Туре					Design	511 🔻		Арр	ly	
IP	DESIGN	MOD	ES				LOCAL	orimary)	1	ACTI	ON	(1)
Ports	Functio	nal Mo	ode				Split 2	+2 🔻		Арр	ly	
Alarms	Link Pro	otectio	n Diver	sity		F	D - Freq. div	ersity 🔻		Арр	ly	
 Maintenance 	Link Ag	gregat	ion Div	ersity			ED	-	FO pe	er conn	nected	- iťs
> Tools	Hot-Sw	ap Sta	rtup De	vice Re	ole	(Auto (prim	ary) 🔹	a	utomat	be set tically.	
	Bunning	g Role	Swappi	ng		swap d	evice role (p	nmary/secondary)		Арр	ly	
Sala Constants	RADIO	MODE	s			CHANNEL	ĩ	CHANNEL 2		ACTI	DN	(1)
Time: 14:54:01	Duplex	Mode				Bidirectiona	•	Bidirectional 🔻		Арр	ly	
Optime: 0 00:27:50 Refresh status	Refres	sh									U	ndo

Figure 5.119 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):

and the second se	TxF	TxP	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17790	15	-38.7	-41.4	0	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	-39.9	-38.7	15	18800
SAF	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
	LO	CAL (p	rimary)		S:loc.sec_12	FD	rem.sec_10:S		REN	OTES	ai .

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 (Hotstandby/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:

 In web GUI <u>'Config->System->Mode</u>' 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

The second second	TxF	TxP	MSE	RxL	P.loc.pr	im_13	Split 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17990	muted	-39.4	-43.0 +	1024str	ong / 60M / 455Mb	ACM	1024stro	ong / 60M / 455Mb × 🚺	-42.2	-39.1	muted	19000
SPAP	17990	muted	-39.4	-40.3 +	2 × 1024str	ong / 60M / 455Mb	ACM	1024stro	ong / 60M / 455Mb + 🔽	-41.4	-36.4	15	19000
	17990	18	-38.4	-48.5	1024str	ong / 60M / 455Mb	ACM	1024stro	ong / 60M / 455Mb + 🚺	-47.1	-38.4	18	19000
	17990	18	-37.8	-45.5	2 + 1024str	ong / 60M / 455Mb	ACM	1024stro	ong / 60M / 455Mb × 💈	+ -46.5	-36.6	muted	19000
	LO	CAL (pr	imary)		S:loc.se	ec_12	XPIC HSB		rem.sec_10:S		REI	NOTES	
ADMIN permissions 🕞	Logou	t in: 1 h	59 m	22 s									
> Status	Mode	De	scriptio	on (Date&Time	Advanced							
▲ Config	DESIGN	CONFI	GURAD	TION			LOCAL ((wimary)			ACT	ION	G
Access	Design	Туре					Design	511 •			Ap	oly	
IP	DESIGN	MODE	S				LOCAL (primary)			ACT	ION	G
Radio	Functio	nal Mod	le				Split 2	2+2 ▼			Ар	oly	
Alarms	Link Pro	otection	Diver	sity		1	HSB/SD - Ho	t standby	. •		Ар	oly	
Maintenance	Link Ag	gregatio	on Dive	ersity			XPIC	C •		F0 pe	er con	nected	it's
> Tools	Hot-Sw	ap Star	tup De	vice Rol	e		Fixed prim	nary •		r a	utoma	tically.	
	RADIO	MODES				CHANNEL	1		CHANNEL 2		ACT	ION	G
Detet Word 20 07 2010	Duplex	Mode				Bidirection	al 🔻	E	idirectional 🔻		Ар	oly	
Time: 11:02:48	Refre	sh										Ur	ndo

Figure 5.122 Example of System configuration

 In web GUI '<u>Config->Radio->Parameters</u>' 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.

The second of	TxF	TxP	MSE	RxL	P.loc.p	rim_13		Split 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17990	15	-39.4	-42.9	1024st	trong / 60M	/ 455Mb	ACM	1024	strong / 60M / 455Mb × 🚺	+ -40.0	-38.5	muted	19000
SPAF	17990	15	-39.4	-40.4	2 + 1024st	trong / 60M	/ 455Mb	ACM	1024	strong / 60M / 455Mb + 2	+ -39.4	-38.1	15	19000
	17990	muted	-38.5	-48.5	1024st	trong / 60M	/ 455Mb	ACM	1024	strong / 60M / 455Mb + 1	-43.9	-38.3	18	19000
	17990	muted	-37.7	-45.4	2 × 1024st	trong / 60M	/ 455Mb	ACM	1024	strong / 60M / 455Mb × 2	-44.1	-38.0	muted	19000
	LC	CAL (p	rimary)		S:loc.s	sec_12	.1	(PIC HSB		rem.sec_10:S		RE	MOTES	
ADMIN permissions \mathbb{G}	Logou	nt în: 1 h	1 58 m	38 s										
Status	Param	neters	ACI	N A	dvanced									
Config Suctor						LOC	AL			RI	MOTE			(1)
Access	MODEN	~			CHANNEL	1	CH/	NINEL 2		CHANNEL 1		CHAN	NEL 2	
IP	Bandwi	idth			60000_02	. •	600	00_02 •		60000_02	_	6000	0_02	
Radio	Max Rx	ACM P	rofile		1024/stron	ig 🔻	1024	/strong	•	1024/strong *	1	024/st	rong 🔻	
Ports	ACM Se	etting			» 🎄			* 🕸		*		÷		
 Maintenance 	Advanc	ed Sett	ing		default		d	efault						
> Tools	DADIO					LOC	CAL			RI	MOTE			(1)
	HADIO			-	CHANNEL T	(j)	CHAN	IEL 2	(j)	CHANNEL 1		CHAN	NEL 2	
	T/R Spa	acing			fixed 🔻	1	fixed	•	í	fixed		fixe	ed	
Deter lived on on onto	TX Free	uency	[MHz]		17990	1	179	90	(i)	19000		190	00	
Time: 11:06:15	RX Free	quency	[MHz]		19000	(i)	190	00	í	17990		179	90	
Uptime: 0 00:53:30 Refresh status	TX Pow	er Limi	t [dBm]	l.	15	(i)	15		(i)	15		1	5	
	TX Mut	e Confi	g		auto 🔻		auto	•		auto 🔻		auto	•	
Modem Serial Number 355260100010	ATPC F	unction	ı				E		-				L	
License Number	ATPC P	X Level	[dBm]	5	-55	i	-55	5	(i)	-55		-5	5	
3010403010100229 License Type / Status	Refre	sh									Un	do A	pply lo	cal

Figure 5.123 Example of Radio configuration

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

Concernant of	TxF	TxP	MSE	RxL	P.loc.	orim_13		Split 2+2		rem.p	prim_11:F		RxL	MSE	TxP	TxF
"A "	17990	15	-39.5	-43.1	• 1024	trong / 60N	1 / 455Mb	ACM	102	4strong / 60M	4 / 455Mb	× 🚺 •	-40.1	-38.5	muted	19000
SAF	17990	15	-39.4	-40.4	• 2 • 1024	trong / 60M	1/455Mb	ACM	1.02	4strong / 60N	4 / 455Mb	•2•	-39.5	-38.0	15	19000
_	17990	muted	-38.5	-48.5	1024	trong / 60N	1/455Mb	ACM	102	4strong / 60M	4 / 455Mb	-0-	-44.0	-38.2	18	19000
	17990	muted	-37.7	-45.5	2 × 1024	trong / 60N	1/455Mb	ACM	1.02	4strong / 60N	A / 455Mb	2	-44.0	-38.0	muted	19000
	LO	CAL (pr	rimary)		S:loc	sec_12		XPIC HSB		rem	sec_10:5	5		REI	MOTES	
ADMIN permissions 🕒	Logou	rt in: 7 h	59 m	52 s												
Status	Addre	sses	SNN	1P	Advanced											
System	MAIN A	DORES	S SET	TINGS				RECUTRED				CC	NFIGL	RED		(i)
Access	Device	IP / Ma	sk				192.16	58.205.13	/ 24			192	168.205	5.13/24		
IP	Default	Gatewa	ay IP				192	2.168.205.1				19	2:168.2	05.1		
Ports	OPTION	IAL ADI	RESS	SETTI	NGS			REQUIRED				CC	NFIGL	RED		í
Alarms	USB IP	/Mask					 10.10 192.1 	.11.10/24 68.11.10/24	1			10	10.11.1	0/24		
Tools	Fallbac	k IP/Ma	isk				 10.10 192.1 	.10.10/24	4			10	10.10.1	0/24		

Figure 5.124 Example of IP configuration

 In web GUI '<u>Config->IP->Advanced</u>' 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

and an other	TxF	TxP	MSE	RxL	P.loc.prin	1_13	Split 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
242	17990	15	-39.5	-43.1 +	+ 1024stron	g / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb ×	-40.1	-38.5	muted	19000
3/11	17990	15	-39.4	-40.4 + 2	 1024stron 	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb +	-39.5	-38.0	15	19000
	17990 n	nuted	-38.5	-48.5	× 1024stron	g / 60M / 455Mb	ACM	1024strong	/ 50M / 455Mb +	-44.0	-38.2	18	19000
	17990 n	nuted	-37.7	-45.5	× 1024stron	ng / 60M / 455Mb	ACM	1024strong	/ 60M / 455Mb ×	-44.0	-38.0	muted	19000
	LOC	AL (pr	imary)	(e	S:loc.sec	_12	XPIC HSB		rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕞	Logout	in: 1 h	59 m	52 s									
Status	Address	es	SNM	P Adv	anced								
▲ Config	STATIC P	OUTE	S-INF	UT VALUE	s								(1)
Access	Routed I	P/MAS	к										
IP	Gateway	IP						1			Ade	d Dele	ete
Radio	NAT - INF	PUTV	ALUES										(1)
Alarms	Local_Po	rt Des	LIP.Po	ort		~				Add	Delet	e Del	All
> Maintenance	Default N	AT to	remot	e	1	WEB	SSH			-			Set
I OOIS	RADIUS	INPU	TVAL	JES		\sim							i
	IP:destpo	rt Sec	String	timeout						Add	Delet	e Del	All
	SETTING	s				REQUIRED			CC	NEIGURE	D		(1)
Date: Wed, 20.02.2019 Time: 11:05:02	Route							de	fault via 192.168.2	05.1			
Uptime: 0.00:52:16 Refresh status	NAT							14 De (ht	43 192 168 205 11 fault WEB NAT: on tps://192 168 205	:443 .13:1443/			
Modem Serial Number								,hti De	tps://192.168.205. fault SSH NAT: off	13:2443/)			
License Number	Radius S	erver											
3010403010100229 License Type / Status												S	ave

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

TxF	TxP	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prim	L11:P	RxL	MSE	TxP	TxF
17990	15	-39.5	-43.0	•	• 1024strong / 60M / 4	абынь АСМ	1024strong / 60M / 4	155Mb × 🔃	-40.1	-38.5	muted	19000
17990	15	-39.2	-40.2	• 2	 1024strong / 60M / 4 	абла АСМ	1024strong / 60M / 4	155Mb • 🔁	-39.5	-38.2	15	19000
17990	muted	-38.5	-48.5	-0	× 1024strong / 60M / 4	абынь АСМ	1024strong / 60M / 4	155Mb • 🚺	-43.9	-38.2	18	19000
17990	muted	-37.8	-45.4	- 2	× 1024strong / 60M / 4	аблы АСМ	1024strong / 60M / 4	155Mb × 🔁	-44.1	-38.0	muted	19000
LOC	CAL (pr	imary)			S:loc.sec_12	XPIC HSB	rem.sec	_10:S		REI	MOTES	
Logout	in: 1 h	57 m	54 s									
MUX	Eth	LAN	Et	hqos	EMIM							
VLAN M	ODE		LAN T		LAN 2	LAN 3	MNG	WAN	A	1	WAN B	1
Port Mod	de	ba	sic	•	basic •	basic 🔻	basic 🔻	basic	•	bas	sic	•
Port Gro	up	gr	oup-1	•	group-2 🔻	group-3 🔻	group-3 *	group-	1 •	gr	oup-2	
Default \	/LAN		1		1	1	1	1			1	
					(Trease)		10000					
						GE switch	(LAKE)					
						OL SHITCH						
	TxF 17990 17990 17990 17990 LOC Logout MUX VLAN M Port Mod Port Gro Default V	TxF TxP 17990 15 17990 15 17990 nuted 17990 muted LOCAL (pr Logout in: 1 h MUX Ethy VLAN MODE Port Mode Port Group Default VLAN	TxF TxP MSE 17990 15 -39.5 17990 15 -39.2 17990 nuted -38.5 17990 muted -37.8 LOCAL (primary) LocaL (primary) Logout in: 1 h 57 m MUX EthVLAN VLAN MODE Port Mode ba Port Group gu Default VLAN	TxF TxP MSE RxL 17990 15 -39.5 -43.0 17990 15 -39.2 -40.2 17990 muted -38.5 -48.5 17990 muted -37.8 -45.4 LOCAL (primary) Logout in: 1 h 57 m 54 s MUX EthVLAN Eth VLAN MODE LAN 1 Port Mode basic Port Group group-1 Default VLAN 1 1 1 1	TxF TxP MSE RxL 17990 15 -39.5 -43.0 •1 17990 15 -39.2 -40.2 •2 17990 15 -39.2 -40.2 •2 17990 muted -38.5 -48.5 1 17990 muted -37.8 -45.4 2 LOCAL (primary) Logout in: 1 h 57 m 54 s MUX EthVLAN EthQOS VLAN MODE LAN 1 Port Mode basic ▼ Port Group group-1 ▼ Default VLAN 1	TxF TxP MSE RxL Ploc.prim_13 17990 15 -39.5 -43.0 1 + 1024strong / 60M / 4 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 4 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 4 17990 muted -38.5 -48.5 1 * 1024strong / 60M / 4 17990 muted -37.8 -45.4 2 * 1024strong / 60M / 4 LOCAL (primary) S:loc.sec_12 2 Logout in: 1 h 57 m 54 s MUX EthVLAN EthQOS EMM VLAN MODE LAN 1 LAN 2 Port Mode basic * basic * Port Group group-1 group-2 * Default VLAN 1 1 1	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 17990 15 -39.5 -43.0 1 1024strong / 60M / 455Mb ACM 17990 15 -39.2 -40.2 2 1024strong / 60M / 455Mb ACM 17990 15 -39.2 -40.2 2 1024strong / 60M / 455Mb ACM 17990 muted -38.5 -48.5 1 1024strong / 60M / 455Mb ACM 17990 muted -37.8 -45.4 2 1024strong / 60M / 455Mb ACM LOCAL (primary) s.16c.sec_12 XPIC HSB Logout in: 1 h 57 m 54 s MUX EthVLAN EthQOS EMM VLAN MODE LAN 1 LAN 2 LAN 3 Port Mode basic v basic v Port Group group-1 v group-2 v group-3 v Default VLAN 1 1 1 1	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim 17990 15 -39.5 +43.0 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 17990 15 -39.2 +40.2 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb<	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P 17990 15 -39.5 -43.0 •1 •1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •1 17990 15 -39.2 -40.2 •2 •1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •2 17990 muted -38.5 -48.5 •1 •1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •2 17990 muted -38.5 -48.5 •1 •1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •2 17990 muted -37.8 -45.4 •2 •1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •2 LOCAL (primary) Siloc.sec_12 XPIC HSB rem.sec_10:S •2 Logout in: 1 h 57 m 54 s MUX EthVLAN EthQOS EMM VLAN MODE LAN 1 LAN 2 LAN 3 MNG WAN Port Mode basic basic basic	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P RxL 17990 15 -39.5 -43.0 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 1 + 40.1 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 2 + -39.5 17990 muted -38.5 -48.5 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 1 + 43.9 17990 muted -37.8 -45.4 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 2 - 44.1 LOCAL (primary) S10c.sec_12 XPIC HSB rem.sec_10.3 - 44.1 LOCAL (primary) S10c.sec_12 XPIC HSB rem.sec_10.3 - 44.1 LOCAL (primary) S10c.sec_12 XPIC HSB rem.sec_10.3 - 44.1 VLAN MODE LAN 1 LAN 2 LAN 3 MNG WAN A Port Mode	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P RxL MSE 17990 15 -39.5 -43.0 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 + 40.1 -38.5 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 2 + 39.5 -38.2 17990 muted -38.5 -48.5 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 43.9 -38.2 17990 muted -37.8 -45.4 -2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 43.9 -38.2 17990 muted -37.8 -45.4 -2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 43.9 -38.2 LOCAL (primary) Siloc.sec_12 XPIC HSB rem.sec_10:S RE Logout in: 1 h 57 m 54 s MNG MAN A - - - - -	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P RxL MSE TxP 17990 15 -39.5 -43.0 1 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 + 40.1 -38.5 muted 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 + 40.1 -38.5 muted 17990 15 -39.2 -40.2 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 2 - 39.5 -38.2 15 17990 muted -38.5 -43.4 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 - 43.9 -38.2 18 17990 muted -37.8 -45.4 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 2 - 44.1 -38.0 muted LOCAL (primary) Siloc.sec_12 XPIC HSB rem.sec_10:S <

Figure 5.126 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

 Status Config 	N	IUX EthVLAN	EthQOS	EMM						
System	DA	TAFLOW CONFIGU	RATION							(U
Access	PO	RT	SEPT	SEP2		SEP3	SFP4	LANT	LAN2	LANS
Radio		Status	Gbit FD	Gbit FI		Gbit FD	SFP module not present	Gbit FULL	LAN No LINK	Gbit FULL
Ports	9	Hot Standby		-)	stand	iby	active	active	-
Alarms	ONF	Mode	force2G5 *	force2G5	• for	rce1GX *	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
 Maintenance Tools 	TC	MDIX	-	-		-	+0	auto 🔻	auto 🔻	auto 🔻
0 10015	POR	Flow Control	force	force		force	force	off	off	off
		1588	off 🔻	off 🔻		off 🔻	off 🔻	off 🔻	off 🔻	off 🔻
Date: Wed, 20.02.2019 Time: 11:07:36 Uptime: 0.00:54:50	ITCH							LANI	GE switch	LANS
nenesii siaius	SW							W/ANa	WAND	MNG CPU
Modem Serial Number 355260100010 License Number	ETH							-		CPU
3010403010100229	db	Channel Select	protection 1	protection	• (MM1 ·	none 🔻	ETH1a V	none 🔻	REI1 BEI2
permanent / ok License Expiration	SW	Connected Port	off	sfp3	wana	none	off	norte	none	none
Firmware Version	E	Traffic Channel	PTP1	EMM1	ETHIa	ETH1b	PTP2	EMM2	ETH2a	ETH2b
0402_01 Runping Design	PBP	Speed Limit (j)	auto	0	1000	0	auto	0	0	0
511	-	Avail Aggr Speed	- Inclusion -		-	911.3	2 Mbps ETH	استقبيا		
					-		-			
		Modem Speed		455.62 Mb	ops acti	ve		455.62 Mb	ps active	
									Undo	Apply

Figure 5.127 Example of port configuration

- Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI '<u>Config->Alarms->Minor</u>' 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

Status	Major Minor									
Sustem		L	OCAL (primary)		LOCAL	REMOTE			LOCAL	
Access	WARNINGS	Pri/Sec switch	CH1	GH 2	Peer (FO)	Direct RF	TH	RESHOL	os	DETAILS
Radio	Modem									
Ports	Modem Aggr/Prot	no	0.0			0				
Alarms	Modem Data Sync	no								
Maintenance	Modem MSE Level	no	00 0				-25	.2	5 (i)	[dB]
Tools	Modem FER	no					10	1	0 1	[error_frm/10s]
	Radio									
	Radio RX Level	no					-75	 -7 	5 (i)	[dBm]
ate' Eri 08.02.2019	Radio TX Mute	no		0 6						-
fime: 15:03:20	Ports									
Jptime: 0 00:37:46	Modem LAN1 Link	yes	0	>						
nencon status	Modem LAN2 Link	yes								
Modem Serial Number	Modem LAN3 Link	no	5.0			0				
355260100010	Modem SFP1 Link	no	20							
3010403010100229	Modem SFP2 Link	no	20							
Līcense Type / Status	Modem SFP3 Link	yes		1						
permanent / ok	Modem SFP4 Link	yes								
unlimited		1	LOCAL (primary)		REMOTE	LOCAL		l	OCAL	
Firmware Version 0402_01 Running Decise	EMM#1-4ASI	Pri/Se switch	с. СН 1		Peer (FO)	Direct RF	THRE	SHOLDS		DETAILS
511	EMM HW+SW	no	80							none
	SFP2 Link	yes	E.C.	-						
	P1 Link	yes)	•					
	P1 Sync	yes								
	P1 Idle	yes								
	P1 Lock	yes								
	DOLLink	Voo				-				

Figure 5.128 Example of alarm configuration

- 9) Save new settings by pressing write button.
- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '<u>Config->System->Mode</u>' 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 second second	TxF	TxP	MSE	RxL	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17990	15	-39.4	-43.0 +	1024strong / 60M / 455M	b ACM	1024strong / 60M / 455Mb × 1	+ -40.1	-38.5	muted	19000
SPAP	17990	15	-39.4	-40.4 +	2 • 1024strong / 60M / 455M	ь асм	1024strong / 60M / 455Mb + 2	+ -39.5	-38.1	15	19000
	17990	muted	-38.4	-48.4	🔃 × 1024strong / 60M / 455M	b ACM	1024strong / 60M / 455Mb + 🚺	-44.0	-38.2	18	19000
	17990	muted	-37.8	-45.5	2 × 1024strong / 60M / 455M	6 ACM	1024strong / 60M / 455Mb × 2	-44.1	-38.0	muted	19000
	LC	CAL (pi	imary))	S:loc.sec_12	XPIC HSB	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕞	Logou	rt în: 1 h	59 m	53 s							0
🛛 Status	Mode	De	scripti	on D	ate&Time Advanced						
Config System	DESIGN	CONF	GURA	TION		LOCAL (N	nimary)		ACT	ION	(i)
Access	Design	Туре				Design	511 🔻		Ар	oly	
IP	DESIGN	MODE	s			LOCAL (nimary)		ACT	ION	(i)
Radio	Functio	nal Mo	de			Split 2	+2 •		Ар	oly	
Alarms	Link Pr	otection	Diver	sity		HSB/SD - Ho	t standby 🔻		Ap	bly	
Maintenance	Link Ag	gregati	on Dive	ersity		XPIC		FO pe	er con	nected -	it's
Tools	Hot-Sw	ap Star	tup De	vice Role		Auto (prim	ary)	- n a	ole will iutoma	be set tically.	
	Runnin	g Role S	Swappi	ing	swap	device role (p	rimary/secondary)		Ар	oly	
	BADIO	MODES			CHANNE	LT .	GHANNEL 2		ACT	ION	(1)
Date: Wed; 20.02.2019 Time: 11:04:04	Duplex	Mode			Bidirection	nal 🔻	Bidirectional 🔻		Ap	oly	
Uptime: 0 00:51:19 Refresh status	Refre	sh								Ur	ndo

Figure 5.129 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):

and the second	TxF	TxP	MSE	RxL		P.loc.prim_13	Split 2+2	rem.prim_11:P		RxL	MSE	TxP	TxF
"A	17990	15	-39.5	-43.0	•	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb × 1	•	-40.1	-38.5	muted	19000
5/AF	17990	15	-39.2	-40.2	.2	+ 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 2	•	-39.5	-38.2	15	19000
	17990	muted	-38.5	-48.5		× 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb • 1	-	-43.9	-38.2	18	19000
	17990	muted	-37.8	-45.4	- 2	× 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb × 2		-44.1	-38.0	muted	19000
	LC	CAL (p	rimary)		S:loc.sec_12	XPIC HSB	rem.sec_10:S		-	RE	NOTES	

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 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 FD protection are following:

 In web GUI '<u>Config->System->Mode</u>' 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

the second second	TxF	TxP	MSE	RxL	F	Ploc.prim_13	Split	2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17990	15	-38.7	-40.8 •	1.	1024strong / 60M / 455M	6 AC	M 102	4strong / 60M / 455Mb +	+ -40.0	-38.5	15	19000
SPIP	17990	15	-39.3	-40.3 •	2.	1024strong / 60M / 455M	ь АС	M 102	4strong / 60M / 455Mb 🔸	• -39.6	-38.1	15	19000
	18100	18	-37.7	-49.8		1024strong / 60M / 455M	ь АС	M 102	4strong / 60M / 455Mb •	-46.8	-38.3	18	19110
	18100	18	-36.5	-48.9	2-1	1024strong / 60M / 455M	ь АС	M 102	4strong / 60M / 455Mb +	-46.6	-36.8	18	19110
	LO	CAL (p	rimary)		S:loc.sec_12	XF	IC	rem.sec_10:S		REN	IOTES	le .
ADMIN permissions 🕞	Logou	t in: 19	9 m 31	S									8
Status	Mode	De	escript	ion	Date&1	Time Advanced							
⊿ Config	DESIGN	CONF	IGURA	TION			LDC	AL (primar	y)		ACTI	ON	(i)
Access	Design	Туре					De	sign 511			Арр	ly	
IP	DESIGN	MODE	ES				LOC	AL (primar	W)		ACTI	ON	(1)
Ports	Functio	nal Mo	ode				S	plit 2+2 🔻			Арр	iy	
Alarms	Link Pro	otectio	n Dive	rsity			FD - Fre	q. diversity	•		Арр	ly	
Maintenance	Link Ag	gregat	ion Div	ersity				XPIC •		F0 pe	er conr	nected	- iťs
> Iools	Hot-Sw	ap Sta	rtup De	evice Ro	le		Fixed	primary	•	a	utomat	tically.	
	RADIO	MODES	S-			CHANNE	11		CHANNEL 2		ACTI	ON	(i)
Deter us Los es este	Duplex	Mode				Bidirection	nal 🔻		Bidirectional 🔻		Арр	ily	
Time: 11:21:08 Uptime: 0 01:08:23	Refres	sh										U	ndo

Figure 5.132 Example of System configuration

2) In web GUI '<u>Config->Radio->Parameters</u>' 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

and the second second	TxF	TxP	MSE	RxL		P.loc.prim	_13		Split 2+	-2		rem.pr	im_11	P	RxL	MSE	TxP	TxF
242	17990	15	-38.6	-40.8		1024stron	g / 60M /	455Mb	ACM		1024strong	/ 60M	455N	b • 🚺	+ -40.1	-38.4	15	19000
SPAP	17990	15	-39.3	-40.3	2.	1024stron	g / 60M /	455Mb	ACM		1024strong	/ 60M	455N	b • 🔁	+ -39.5	-38.0	15	19000
	18100	18	-37.8	-49.8	0.	1024stron	g / 60M /	455Mb	ACM		1024strong	/ 60M	455N	b • 🚺	-46.8	-38.2	18	19110
	18100	18	-36.5	-48.9	2.	1024stron	g / 60M /	455Mb	ACM		1024strong	/ 60M	455N	b • 🖸	-46.4	-36.9	18	19110
	LO	CAL (pr	imary)			S:loc.sec_	.12		XPIC			rem.s	ec_10	S		REN	IOTES	
ADMIN permissions \mathbb{G}	Logou	t in: 18	m 36 s															
> Status	Param	eters	ACM	A . 1	Advan	iced												
▲ Config Sustan							LOC	AL						RE	MOTE			(i)
Access	MODEN	andwidth				IANNEL 1		C	HANNEL	2		CHAI	INEL	1		CHANN	IEL 2	
IP	Bandwi	andwidth				000_02 ▼		6	0000_02	•		600	00_02			60000	_02	
Radio	Max Rx.	andwidth Iax RxACM Profile				4/strong	•	10	24/strong	g 🔻	1	024/s	trong	T	10	024/str	ong 🔻	
Ports	ACM Se	etting				» 🅸			» 楼				-			+		
 Maintenance 	Advanc	ed Sett	ing			default			default				в.			÷		
> Tools							LOC	AL						RE	NOTE			(1)
	HADIO				CHAN	INEL 7	(i)	CHA	NNEL 2	(D	CHAP	INEL.	T		CHANN	IEL 2	
	T/R Spa	acing			fixed	•	(i)	fixe	d 🔻	0	D	fi	ked			fixe	d	
Batal Nul 20 00 0000	TX Freq	uency	[MHz]		17	990	(i)	1	7990	0	D	19	000			1900	00	
Time: 11:24:00	RX Freq	uency	[MHz]		19	000	(i)	1	9000	0	D	17	990			1799	90	
Uptime: 0.01:11:14 Refresh status	TX Pow	er Limi	[dBm]		1	15	(i)		15	(D	1	15			15		
	TX Mut	e Confi	9		auto	•		aut	• •			auto	•			auto		
Modem Serial Number 355260100010	ATPC F	unction	Ú.		Ĩ	3			E			1						
License Number	ATPC R	X Level	[dBm]		-5	55	í		-55	0	D	4	55			-55	5	
3010403010100229 License Type / Status	Refres	sh											Un	do A	oply to	local	& ren	ote

Figure 5.133 Example of Primary IDU Radio configuration

and the second	TxF	TxP	MSE	RxL	F	Ploc.prim	13		Split	2+2		re	m.prim_	11:P	RxL	MSE	TxP	TxF
"A "	17990	15	-38.7	40.8	•	1024stron	g / 60M /	455Mb	AC	M	1024	strong /	60M / 45	5Mb + 🚺	+ -40.0	-38.5	15	19000
SAF	17990	15	-39.3	40.2	•2•	1024stron	g / 60M /	455Mb	AC	M	1024	strong /	60M / 45	5Mb + 2	+ -39.5	-38.0	15	19000
	18100	18	-37.7	49.8	-0-	1024stron	g / 60M /	455Mb	AC	M	102	strong /	60M / 45	5Mb + 🚺	-46.7	-38.3	18	19110
	18100	18	-36.4	48.9	-2-	1024stron	g / 60M /	455Mb	AC	M	1024	strong /	60M / 45	5Mb + 2	-46.5	-36.8	18	19110
	LOC	AL (see	condary)		S:loc.sec_	12		XP	IC		I	em.sec_	10:S		REM	IOTE(s)	1
ADMIN permissions 🕒	Logou	t in: 16	m 19 s															00
IN Status	Param	eters	ACM	A	Advanc	ed												
							HOC	AL.						RE	MOTE			0
System	MODEN	•			CHA	ANNEL I		C	HANN	EL 2		ſ	HANNE	11	100112	CHANN	EL 2	
IP	Bandwi	dth			600	00_02 •		6	0000_0	2 •		-	60000_	02		60000	_02	
Radio	Max Rx	Bandwidth Max RxACM Profile				/strona	•	10	24/stro	ona 🔻		10	24/stro	na 🔻	10	024/str	ona 🔻	
Ports	ACM Se	etting				» Ö	_		» di				-	-		-		
Alarms	Advanc	ed Sett	ting		d	efault			defau	lt	3		-					
 Maintenance Tools 							100	101						BE	MOTE			0
	RADIO				CHANI	NEL 1	(j)	CHA	NNEL	ź	Ð	(HANNE	11	1	CHANN	IEL 2	
	T/R Spa	ncing			fixed	•	(i)	fixe	d 🔻	1	(i)		fixed			fixe	d	
	TX Freq	uency	[MHz]		181	00	(i)	1	3100		(i)		19110)		191	10	-
Date: Wed, 20.02:2019 Time: 11:24:05	RX Free	uency	[MHz]		191	10	(i)	13	9110	-	(i)	-	18100	1		1810	00	
Uptime: 0 01:11:42	TX Pow	er Limi	t [dBm]		18	3	(i)		18		(i)		18	1		18		
nerresiristatus	TX Mut	e Confi	a		auto	•	-	aut	• •	1	-	-	auto		Ĩ	auto		_
Modem Serial Number	ATPC F	unction	1		1	1					-	-	Π		1	1		-
License Number	ATPC R	X Leve	[dBm]		-5	5	(i)		-55		(i)		-55			-55	5	
3010403010100227 License Type / Status	Refre	sh		1							-		U	ndo A	pply to	local	& rem	ote

Figure 5.134 Example of Secondary IDU Radio configuration

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

TxF	TxP	MSE	RxL	P.loc.prim_13	Split	2+2	rem.prim_11:	P R	L MS	E TxP	TxF
17990	15	-38.6	-40.7	1024strong / 60M	/ 455Mb AC	M	1024strong / 60M / 455M	b • 🚺 • -40	.1 -38	5 15	19000
17990	15	-39.2	-40.3	• 2 + 1024strong / 60M	/ 455Mb AC	N.	1024strong / 60M / 455M	b • 🔁 • -39	.5 -38	0 15	19000
18100	18	-37.7	-49.7	1024strong / 60M	/ 455Mb AC	M	1024strong / 60M / 455M	b • 🚺 · -46	.9 -38	3 18	19110
18100	18	-36.6	-49.0	2 + 1024strong / 60M	/ 455Mb AC	Ŵ.	1024strong / 60M / 455M	b + 240	.6 -36	9 18	19110
LO	CAL (p	rimary)	1	S:loc.sec_12	XP	С	rem.sec_10	S	R	EMOTE	S
Logou	t in: 1	9 m 36 :	S.								
Addres	sses	SNN	1P	Advanced							
MAIN A	DDRE	SS SET	TINGS		REQUI	ED		CONFI	URED		1
Device	IP / Ma	ask			192.168.205.	13 / 2	24	192.168.	05.13/3	4	
Default	Gatew	ay IP			192.168.2	05.1		192.16	3.205.1		
OPTION	AL AC	DRESS	SETTI	VGS	REQUI	RED		CONFI	JURED		(i)
USB IP	/Mask				 10.10.11.10/ 192.168.11.1 	24 0/24		10.10.1	1.10/24		
Fallbac	k IP/M	ask			10.10.10.10/ 192.168.10.1	24 0/24		10.10.1	0.10/24		
	TxF 17990 17990 18100 18100 LOGOU Addre MAIN A Device Default OPTIO? USB IP, Fallbac	TxF TxP 17990 15 17990 15 18100 18 18100 18 LOCAL (p Logout in: 11 Addresses MAIN ADDRE Device IP / M: Default Gatew OPTIONAL AD USB IP/Mask Fallback IP/M	TxF TxP MSE 17990 15 -38.6 17990 15 -39.2 18100 18 -37.7 18100 18 -36.6 LOCAL (primary) Logout in: 19 m 36 Addresses SNM MAIN ADDRESS SET Device IP / Mask Default Gateway IP OPTIONAL ADDRESS USB IP/Mask Fallback IP/Mask	TxF TxP MSE RxL 17990 15 -38.6 -40.7 17990 15 -39.2 -40.3 18100 18 -37.7 -49.7 18100 18 -36.6 -49.0 LOCAL (primary) Logout in: 19 m 36 s	TxF TxP MSE RxL Ploc.prim_13 17990 15 -38.6 -40.7 1 1024strong / 60M 17990 15 -39.2 -40.3 2 1024strong / 60M 18100 18 -37.7 -49.7 1 10.4 1024strong / 60M 18100 18 -36.6 -49.0 2 1024strong / 60M LOCAL (primary) Sloc.sec_12 1024strong / 60M 2 1024strong / 60M Logout in: 19 m 36 s Addresses SNMP Advanced MAIN ADDRESS SETTINGS Device IP / Mask Default Gateway IP 0 0 0 0 VISB IP/Mask Fallback IP/Mask 10 10 10 10	TxF TxP MSE RxL Ploc.prim_13 Split 1 17990 15 -38.6 -40.7 •	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 17990 15 -38.6 -40.7 + + 1024strong / 60M / 455Mb ACM 17990 15 -39.2 -40.3 + 2 + 1024strong / 60M / 455Mb ACM 18100 18 -37.7 -49.7 1 + 1024strong / 60M / 455Mb ACM 18100 18 -37.7 -49.7 1 + 1024strong / 60M / 455Mb ACM LOCAL (primary) Siloc.sec_12 XPIC Logout in: 19 m 36 s Addresses SNMP Advanced MAIN ADDRESS SETTINGS REQUIRED Device IP / Mask 192.168.205.13 / 2 Default Gateway IP 192.168.205.13 / 2 10.0.11.10/24 3 3 3 2 10.10.11.10/24 3 3 3 2 102.168.10.10/24 3 3 4 3 3 4 3 3 4 3 3 4 3 3	TxF TxP MSE BxL Ploc.prim_13 Split 2+2 rem.prim_11: 17990 15 -38.6 -40.7 •1 •1224trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb 17990 15 -39.2 -40.3 •2 •1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb 18100 18 -37.7 -49.7 •1 •1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb 18100 18 -37.7 -49.7 •1 •1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb 18100 18 -36.6 -49.0 •2 •1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb LOCAL (primary) Siloc.sec_12 XPIC rem.sec_10 Logout in: 19 m 36 s - - - - - Addresses SNMP Advanced - - - - Derice IP / Mask 192.168.205.13 / 24 - - - USB IP/Mask •10.10.11	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P Rx 17990 15 -38.6 -40.7 + + 1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb + 40 17990 15 -39.2 -40.3 + 2 + 1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb + 40 17990 15 -39.2 -40.3 + 2 + 1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb + 2 - -39 18100 18 -37.7 -49.7 + + 1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb + 4 - -46 18100 18 -36.6 -49.0 -2 + 1024trong / 60M / 455Mb ACM 1024trong / 60M / 455Mb 2 -46 LOCAL (primary) Siloc.sec_12 XPIC rem.sec_10:8 2 -46 Dedoutin: 19 m 36 s Addresses SIMMP	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P RxL MSE 17990 15 -38.6 -40.7 •1 +1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •1 +40.1 -38.6 17990 15 -39.2 -40.3 •2 +1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •1 +40.1 -38.6 18100 18 -37.7 -49.7 •1 +1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •1 +46.9 -38.6 18100 18 -36.6 -49.0 •2 +1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb •1 +46.9 -38.6 LOCAL (primary) Siloc.sec_12 XPIC rem.sec_10.5 R Logout in: 19 m 36 s Addresses SIMP Advanced 46.6 36.5 Derice IP / Mask 192.168.205.13 / 24 192.168.205.1 192.168.205.1 192.168.205.1 192.168.205.1 OPTIONAL ADD	TxF TxP MSE RxL Ploc.prim_13 Split 2+2 rem.prim_11:P RxL MSE TxP 17990 15 -38.6 -40.7 + + + + 40.1 - 88.5 15 17990 15 -39.2 -40.3 + 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb + 40.1 - 88.5 15 18100 18 -37.7 -49.7 + + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 - - 46.9 - 38.3 18 18100 18 -36.6 -49.0 2 + 1024strong / 60M / 455Mb ACM 1024strong / 60M / 455Mb 1 - - 46.9 38.3 18 LOCAL (primary) Sloc.sec_12 XPIC rem.sec_10:8 REMOTES Logout in: 19 m 36 s - - - 46.9 38.3 18 Derice IP / Mask <

Figure 5.135 Example of IP configuration

4) In web GUI '<u>Config->IP->Advanced</u>' 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

and and a second	TxF	TxP	MSE	RxL		P.loc.prim_	13	Split 2+2		rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17990	15	-38.6	-40.7		1024strong	/ 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb +	1 + -40.1	-38.5	15	19000
SAF	17990	15	-39.2	-40.3	• 2 •	1024strong	/ 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb +	2 • -39.5	-38.0	15	19000
	18100	18	-37.7	-49.7		1024strong	/ 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb •	-46.9	-38.3	18	19110
	18100	18	-36.6	-49.0	- 2	1024strong	/ 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb +	-46.6	-36.9	18	19110
	LO	CAL (p	rimary)			S:loc.sec_1	2	XPIC		rem.sec_10:S		RE	NOTES	3
ADMIN permissions 🕞	Logou	t in: 19	9 m 36 s											0
Status	Addres	sses	SNM	P	Adva	nced								
Config	STATIC	ROUT	ES - INF	UTV	LUES									C
Access	Routed	IP/MA	SK											
IP	Gatewa	y IP				Ī			1			Add	Del	ete
Radio	NAT-H	NPUT	VALUES											(1)
Alarms	Local_P	Port De	st_IP.Po	ort		[Add	Delet	e De	IAII
Maintenance	Default	NATt	o remot	e.			WEB	SSH			and the second second			Set
Tools	RADIUS	- INP	UT VAL	JES.			~							(î
	IP.destp	oort Se	cString	timeo	ut						Add	Delet	e De	IAII
	SETTIN	65				1	REQUIRED			C	ONFIGURE	D		(i
Date: Wed, 20.02.2019	Route								de	fault via 192.168.	205.1			
Uptime: 0.01:10:13 Refresh status	NAT								14 De (ht	43 192 168 205 1 fault WEB NAT: o ttps://192 168 20	1:443 n 5.13:1443/			
Modem Serial Number									,ht De	tps://192.168.20 fault SSH NAT: of	5.13:2443/) f			
License Number	Radius	Server												
3010403010100229													13	lave

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

and the second	TxF	TxP	MSE	RxL		Ploc.prim_13	Split 2+2	rem.prin	L11:P	RxL	MSE	TxP	TxF
"A	17990	15	-38.7	-40.8	•	+ 1024strong / 60M / 4	55МЬ АСМ	1024strong / 60M / 4	455Mb • 🚺 •	-40.1	-38.5	15	19000
SAF	17990	15 -	-39.4	-40.4	.2	+ 1024strong / 60M / 4	55мь АСМ	1024strong / 60M / 4	455Mb • 🔁 •	-39.6	-38.0	15	19000
_	18100	18	-37.7	-49.7		+ 1024strong / 60M / 4	55МЬ АСМ	1024strong / 60M / 4	455Mb • 🚺 •	-46.9	-38.3	18	19110
	18100	18	-36.6	-48.8	-2	+ 1024strong / 60M / 4	55МЬ АСМ	1024strong / 60M / 4	455Mb • 2 -	-46.6	-36.8	18	1911
	LOC	AL (pri	imary)			S:loc.sec_12	XPIC	rem.sec	c_10:S		REN	IOTES	
ADMIN permissions 🕒	Logout	in: 17	m 5 s										
Status	MUX	Ethy	/LAN	Et	QOS	EMM							
Config	VLAN MO	DDE		LAN T		LAN 2	LAN 3	MNG	WAN	L.	¥	AN B	0
Access	Port Mod	le	ba	sic	•	basic 🔻	basic 🔻	basic 🔻	basic	•	bas	ic	•
IP	Port Grou	ıp	gi	roup-1	•	group-2 🔻	group-3 🔻	group-3 🔻	group-1		gro	up-2	
Radio	Default V	LAN		1		1	1	1	1			1	
Alarms						(and a	ERETER						
Maintenance						LAU	OF out tob	(Exit)					
Tools						(7707773)	GE SWIICH	(Conversion)	-				

Figure 5.137 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

System	DA.	TAFLOW CONFIGUR	BATION							Q
Access	PO	RT	SEPI	SFP2	×	SFP3	SFP4	LANT	LAN2	LANS
Radio		Status				Gbit FD	SFP module not present	LAN Gbit FULL	LAN No LINK	LAN Gbit
Ports	9	Hot Standby		-		stand	iby	active	active	-
Alarms	ONF	Mode	force2G5 🔻	force2G5	• for	ce1GX 🔻	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
Maintenance	TC	MDIX	1	-		+	+	auto 🔻	auto 🔻	auto 🔻
1000	POR	Flow Control	force	force		force	force	off	off	off
		1588	off 🔻	off 🔻		off 🔻	off 🔻	off 🔻	off 🔻	off 🔻
Date: Wed, 20.02.2019 Time: 11:25:02 Uptime: 0.01:12:17 Refresh status Modem Serial Number 355260100010	ETH SWITCH							LAN1	LANZ GE switch WANE	LAN3
License Number 3010403010100229	d.	Channel Select	protection *	protection		MM1 ·	none 🔻	ETH1a V	none •	REI1 BEI2
permanent / ok	SWP	Connected Port	off	sfp3	wana	none	off	none	поле	none
License Expiration					1			1	1	
Firmware Version	W	Traffic Channel	PTP1	EMM1	ETH1a	ETH1b	PTP2	EMM2	ETH2a	ETH2b
0402_01 Running Design	PBF	Speed Limit (i)	auto	0	1000	0	auto	0	0	0
511	-	Avail Aggr Speed			-	911.3	2 Mbps ETH			
					-		-			
		Modem Speed		455.62 M	Ibps activ	re		455.62 Mb	ps active	

Figure 5.138 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI <u>'Config->Alarms->Minor</u>' 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

Config		LO	CAL (prin	nary)		LOC	CAL	REN	OTE			LC	CAL	
Access	WARNINGS	Pri/Sec switch	CHI		GH 2	Pe (F	ner O)	Dir	eat	т	HRES	HOLDS		DETAILS
Radio	Modem													
Ports	Modem Aggr/Prot	no		0				1	0					
Alarms	Modem Data Sync	no							0					
Maintenance	Modem MSE Level	no	0.0							-25	1	-25	(1)	[dB]
Tools	Modem FER	no								10	(i)	10	(1)	[error_frm/10s]
	Radio		-											
	Radio RX Level	no								-75	í	-75	(i)	[dBm]
Date: Fri 08 02 2019	Radio TX Mute	no			00			0	0			-		
Time: 15:03:20	Ports													
ptime: 0 00:37:46 efresh status	Modem LAN1 Link	yes	C	-										
nemeon otana	Modem LAN2 Link	yes					5							
Modem Serial Number	Modem LAN3 Link	no		8.0				1	5					
355260100010	Modem SFP1 Link	no	-	2 0										
3010403010100229	Modem SFP2 Link	no	(
License Type / Status	Modem SFP3 Link	yes		2	1									
permanent / ok	Modem SFP4 Link	yes		0.0	1			1						
unlimited		L	OCAL (pri	imary	0	REMO	TE	LOC	AL			LO	CAL	
Firmware Version 0402_01 Rupping Design	EMM#1-4ASI	Pri/Sec switch		CH	1	Pee (FO	er I)	Dire	et.	THE	RESHO	LDS		DETAILS
511	EMM HW+SW	no			8									none
	SFP2 Link	yes	-	10	2				-					
	P1 Link	yes	C											
	P1 Sync	yes		1				6						
	P1 Idle	yes						- 6						
	P1 Lock	yes												

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 <u>'Config->System->Mode</u>' 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

and the second se	TxF	TxP N	ASE F	L PI	oc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17990	15 -	38.6 -4	.8 • 10 • 10	124strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb • 🕕	+ -40.1	-38.5	15	19000
SPAF	17990	15 -	39.4 -4	.4 + 2 + 10	24strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb • 2	• -39.5	-38.0	15	19000
	18100	18 -	37.7 -4	.8 10 - 10	124strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 🚺	-46.8	-38.3	18	19110
	18100	18 -	36.5 -4	.9 - 2 - 10	24strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb • 2	- 46.5	-36.8	18	19110
	LO	CAL (prin	mary)	S:	loc.sec_12	XPIC	rem.sec_10:S		REN	AOTES	
ADMIN permissions 🕞	Logou	t in: 19 n	n 56 s								4
b Status	Mode	Des	cription	Date&Ti	me Advanced						
⊿ Config	DESIGN	CONFIG	URATIO	N.		LOCAL (p	rimary)		ACTI	ON	Ē
Access	Design	Туре				Design	511 🔻		Арр	ly	
IP	DESIGN	MODES				LOCAL (P	rimary)	1	ACTI	ON	(1)
Ports	Functio	nal Mode	e			Split 2	+2 •		Арр	ly	
Alarms	Link Pro	otection	Diversit		F	FD - Freq. div	ersity 🔻		Арр	ly	
Maintenance	Link Ag	gregation	n Divers	ty		XPIC		FO pe	er conn	nected	- iťs
> Tools	Hot-Sw	ap Starti	up Devie	Role	<	Auto (prim	ary)	a	utomat	be set tically.	
	Bunning	Role Sv	vapping		swap d	evice role (pr	imary/secondary)		Арр	ly	
Determined permanent	RADIO	MODES			CHANNEL	1	CHANNEL 2		ACTH	DN	(
Time: 11:21:57	Duplex	Mode			Bidirectiona	il 🔻	Bidirectional 💌		Арр	ly	
Refresh status	Refres	sh								U	ndo

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):

and the second second	TxF	TxP	MSE	RxL	_	P.loc.prim_13	Split 2+2	rem.prim_11:P	RxL	MSE	TxP	TxF
HA H	17990	15	-38.7	-40.8		1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 11+	-40.1	-38.5	15	1900
SPAF	17990	15	-39.4	-40.4	• 2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 2 +	-39.6	-38.0	15	1900
	18100	18	-37.7	-49.7	-0	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	-46.9	-38.3	18	1911
	18100	18	-36.6	-48.8	- 2	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 2	-46.6	-36.8	18	1911
	LO	CAL (p	rimary)	-	S:loc.sec_12	XPIC	rem.sec_10:S	-	REN	IOTES	1

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 Stnadby/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 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 HSB/SD full protection are following:

 In web GUI '<u>Config->System->Mode</u>' 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

Statement of	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
WA H	17800	15	-38.8	-41.2		·	4014		39.7	-38.8	15	18810
SAF	17800	muted	-38.2	-46.8	- 🗊	1024strong / 60M / 455M6	ACIVI	1024strong / dum / 400Mb	-43.6	-38.4	muted	18810
	LC	OCAL (p	rimary)	W	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions $m{B}$	Logou	it in: 19	m 51 :	5							1	Write 🚳
Status	Mode	De	scripti	on	Date	Time Advanced						
▲ Config Sustom	DESIGN	CONF	IGURA	TION			LOCAL (P	nimary)		ACT	ION	(1)
Access	Design	Туре					Design	511 •		Ар	ply	
IP	DESIGN	MODE	s				LOCAL (P	rimaryi		ACT	ION	(1)
Radio Ports	Functio	onal Mo	de				Split 1	+1 🔻		Ар	ply	
Alarms	Link Pr	otectio	n Diver	sity		H	SB/SD - Ho	t standby 🔻	F0 pe	Ap er con	ply nected	it's
D Tools	Hot-Sw	ap Sta	rtup De	vice Re	ole		Fixed prim	ary 🔻	re	ole wil utoma	l be set tically.	
	RADIO	MODES	š				CHAN	NEL 1		ACT	ION	(i)
Date: The 01 00 2010	Duplex	Mode					Bidirecti	onal 🔻		Ар	ply	
Time: 13:55:35 Uptime: 0.03:11:26	Refre	sh									Ur	ndo

Figure 5.143 Example of System configuration

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

August and	TxF	TxP	MSE	RxL	P.loc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
"A#	17800	15	-38.8	-41.2 +		1011	• 1	-39.6	-38.7	15	18810
SPAF	17800	muted	-38.2	-46.7	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-43.6	-38.3	muted	18810
	LC	OCAL (p	rimary)	S:loc.sec_12	HSB/SD	rem.sec_10:S	-	REI	MOTES	
DMIN permissions 🕞	Logou	ut in: 17	m 51 :	5							16
Status	Paran	neters	AC	M Adv	anced						
Config					LOCAL			MOTE			G
System	MODE	M			CHANNEL 1		CHA	NNEL 1			
IP	Bandw	idth			60000_02 ▼		60	000_02			
Radio	Max Ro	ACM P	rofile		1024/strong		1024	strong			
Ports	s ACM Setting			×÷			-			_	
Alarms Maintenance	Advand	ced Sett	ing		default			-			
Tools	ns Advanced Setting				LOCAL		RE	MOTE			(i
	RADIO				CHANNEL 1		(i) CHA	NNEL 1			
	T/R Sp	acing			fixed 🔻		(i) f	ixed			
	TX Free	quency	[MHz]		17800		1	8810			
Time: 14:01:20	RX Fre	quency	[MHz]		18810		1	7800			_
Uptime: 0.03:17:11 Refresh status	TX Pow	ver Limi	t [dBm	1	15		0	15			
	TX Mut	te Confi	g		auto 🔻		aut	• •			_
Modem Serial Number 355260100010	ATPC F	Function	1		E			0			
License Number	ATPC F	RX Leve	[dBm]		-55		(i)	-55			
3010403010100229 License Type / Status	Refre	sh					Undo 🛛	pply to	local	& rem	ote

Figure 5.144 Example of Radio configuration

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

and the second second	TxF	TxP	MSE	RxL	P.	loc.prim_13	Split 1+1	rem.prim_11:P	1	RxL	MSE	TxP	TxF
242	17800	15	-38.8	-41.2 •	🖸 • 🛛		1011		· 🚺 ·	-39.7	-38.7	15	18810
SPAP	17800	muted	-38.3	-46.7	0.1	024strong / 60M / 455Mb	AGM	1024strong / 60M / 455Mb	· 🚺 ·	-43.5	-38.4	muted	18810
	LO	CAL (p	rimary)	01	S	loc.sec_12	HSB/SD	rem.sec_10:S			REI	MOTES	
ADMIN permissions 🗗	Logou	t in: 19	m 40 s	5									0
Status	Addres	sses	SNM	IP A	dvance	ed							
▲ Config Custom	MAINA	DDRES	S SET	TINGS			REQUIRED		CO	NFIGU	RED		(j
Access	Device	IP / Ma	sk			192.16	58.205.13	/ 24	192.1	68.20	5.13/24		
IP	Default	Gatewa	ay IP			192	2.168.205.1		19	2.168.2	205.1		
Radio	OPTION	AL AD	DRESS	SETTIN	GS		REQUIRED		CO	NFIGL	RED		(
Alarms	USB IP/	/Mask				 10.10 192.10 	.11.10/24 68.11.10/24	4	10.	10,11.	0/24		
> Tools	Fallbac	k IP/Ma	ask			10.10	.10.10/24	4	10.	10.10.1	0/24		

Figure 5.145 Example of IP configuration

4) In web GUI '<u>Config->IP->Advanced</u>' 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

Contraction (Section of the section	TxF	TxP	MSE	RxL	P.loc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17800	15	-38.8	-41.2 +		1.001	• 1	-39.7	-38.7	15	18810
SPAF	17800	muted	-38.3	-46.7	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb	-43.5	-38.4	muted	18810
	LC	DCAL (p	rimary))	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕒	Logot	ut in: 19	m 40 s	5							(#
Status	Addre	sses	SNM	P Ad	vanced						
	STATIC	ROUTE	S - INI	PUTVALU	ES						(i)
System	Routed	IP/MA	SK								
IP	Gatewa	av IP							Ad	d Del	ete
Radio		history	0.000						California de		
Ports	NAT-1	MPUTV	ALUES				1			De	
Alarms	Local_I	Port Des	st_IP.Pc	ort				Add	Delei	elue	All
 Maintenance Tools 	Default	t NAT to	remot	e	₩EB	SSH				k	Set
	RADIU	S - INPL	IT VAL	UES							1
	IP.dest	port Sec	String	timeout				Add	Delet	e De	All
	SETTIN	IGS			REQUIRED		CON	FIGURE	D		(i)
Date: Thu: 21.02.2019	Route						default via 192.168.205	1			
Uptime: 0.03:15:21 Refresh status	NAT						1443 192 168 205 11 4 Default WEB NAT on (https://192.168.205.13	13 1:1443/			
Modem Serial Number							,https://192.168,205.13 Default SSH NAT: off	:2443/)			
License Number	Radius	Server									
3010403010100229										S	ave

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

and the second	TxF TxP	MSE	RxL	P.loc.prim_13	Split 1+1	rem.prin	L11:P	RxL	MSE TxP	TxF
242	17800 15	-38.8	-41.2 .				• 🖸 •	-39.7	-38.7 15	18810
SAF	17800 mute	d -38.3	-46.7	* 1024strong / 60M / 45	SMD AGM	1024strong / 60M / 4	*00 × 00 -	-43.6	-38.4 muted	18810
	LOCAL (orimary)	S:loc.sec_12	HSB/SD	rem.sec	:_10:S		REMOTES	
ADMIN permissions 🕞	Logout in: 1	7 m 10	s							0
Status	MUX Et	hVLAN	EthQO	s						
Config System	VLAN MODE		LAN 1	LAN 2	LAN 3	MNG	WAN	Ą.	WAN B	(Î
Access	Port Mode	ba	isic 🔻	basic 🔻	basic 🔻	basic 🔻	basic	•	basic	•
Access IP	Port Group	g	roup-1 🔻	group-2 🔻	group-3 🔻	group-3 🔻	group-1	T	group-2	
Radio	Default VLAN		1	1	1	1	1		1	
Alarms				LANT	LAN2	LANS				
Maintenance					GE switch					
⊳ Tools				WANa	WAN5	MNG CPU				
	VTU SETTING	S								(
	ACTION V	LĂN N.	FID	QOS PRI LAN	1 LAN 2	LAN 3	MNG	WAN	A WAN	B
Date: Thu 21.02.2019	add 🔻			off Deny	• Deny	Deny 🔹 🛙	Deny 🔻	Deny	• Deny	

Figure 5.147 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

Sustem	DAT	TAFLOW CONFIGURA	TION						
Access	PO	RT	SFP1	SFP2	SFP3	SFP4	LAN1	LAN2	LANS
IP		Status	Gbit FD	SFP module not present	Gbit FD	SFP module not present	Gbit FULL	LAN No LINK	Gbit FULL
Radio	FIG	Hot Standby		-	sta	ndby	active	active	-
Alarms	CON	Mode	force2G5 V	force2G5 🔻	force1GX *	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔹
Maintenance	RT	MDIX		-	-	-	auto 🔻	auto 🔻	auto 🔻
Tools	P	Flow Control 🐇	force	force	force	force	off	off	off
		1588	off *	off 🔻	off 🔻	off 🔻	off 🔻	off 🔻	off 🔻
Time: 14:04:45 Uptime: 0 03:20:36 Refresh status Modem Serial Number 355260100010	ETH SWITC						WANG	GE switch	MNG GPU CPU
3010403010100229	VAP	Channel Select	protection *	reserved *	EMM1 ·	none 🔻	ETH1a 🔻	none 🔹	BEII REI2
icense Type / Status iermanent / ok	SV	Connected Port	off		sfp3	wa	na	no	ne
unlimited	Wo	Traffic Channel	PTP1		EMM1	ET.	110	ETH	H1b
Firmware Version	PBI	Speed Limit (j)	auto		0	10	00	()
Running Design 511		Available Sneed				IEE 62 Million			

Figure 5.148 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI <u>'Config->Alarms->Minor</u>' 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

⊿ Config		LOCA	(orimerv)	LOCAL	REMOTE		LOCAL		
System Access	WARNINGS	Pri/Sec switch	CH 1	Peer (FO)	Direct RF	THRES	HOLDS	DETAILS	
Radio	Modem								
Ports	Modem Aggr/Prot	no							
Alarms	Modem Data Sync	no							
Maintenance	Modem MSE Level	no			•	-25	(1)	[dB]	
Tools	Modem FER	no	80			10	(1)	[error_frm/10s]	3]
	Badio								
	Radio RX Level	no		۲		-75	(1)	[dBm]	
Date: Thu. 21.02.2019	Radio TX Mute	no	00						
Time: 14:06:05 Uptime: 0 03:21:57 Refresh status	Ports		-						
	Modem LAN1 Link	yes		•					
	Modem LAN2 Link	yes							
Modem Serial Number	Modem LAN3 Link	no	0.0						
355260100010	Modem SFP1 Link	no			•				
3010403010100229	Modem SFP2 Link	no	10-00						
License Type / Status	Modem SFP3 Link	yes							
permanent / ok License Expiration	Modem SFP4 Link	yes	0.0						
unlimited		LOCA	L (primary)	REMOTE	LOCAL		LOCAL	27	
Firmware Version 0402_01 Bunning Design	EMM#1 = 4ASI	Pri/Sec switch	CHT	Péer (FO)	Direct RF	THRESH	IOLDS	DETAILS	
511	EMM HW+SW	no						nActivated	
	SFP2 Link	yes							
	P1 Link	yes							
	P1 Sync	yes	0		6				

Figure 5.149 Example of alarm configuration

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

 In web GUI <u>'Config->System->Mode</u>' 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

Second Second	TxF	TxP	MSE	BxL	W	Ploc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
"A"	17800	15	-38.7	-41.2	.0		1014		• -39.7	-38.7	15	18810
SAF	17800	muted	-38.2	-46.7	-0	1024strong / bUM / 455Mb	AGM	1024strong / b0M / 455Mb	-43.6	-38,4	muted	18810
	LC	CAL (p	rimary)		W	S:loc.sec_12	HSB/SD	rem.sec_10:S		RE	MOTES	
ADMIN permissions 🕞	Logou	it in: 19	m 50 s									Write
> Status	Mode	De	scripti	on	Dates	Time Advanced						
Config System	DESIGN	CONF	GURA	TION			LOCAL (orimary)		AGT	ION	(
Access	Design	Туре					Design	511 🔻		Ар	ply	
IP	DESIGN	MODE	S				LOCAL (orimany)		ACT	ION	(i)
Ports	Functio	nal Mo	de				Split 1	+1 🔻		Ap	ply	
Alarms Maintenance	Link Pr	otection	n Diver	sity		н	SB/SD - Ho	t standby 🔻	FO pe	Ap er con	ply nected	-it's
> Tools	Hot-Sw	ap Star	tup De	vice Ro	ole	<	Auto (prim	ary)	n a	ole wil utoma	l be set atically.	
	Runnin	g Role S	Swappi	ng		swap de	vice role (p	rimary/secondary)		Ар	ply	
Sectores contacts	RADIO	MODES					CHAN	NEL 1		ACT	ION	i
Date: Thu, 21.02.2019 Time: 13:56:39	Duplex	Mode					Bidirect	ional 🔻		Ар	ply	
Refresh status	Refre	sh									U	ndo

Figure 5.150 Example of system configuration in Auto mode

12) Save new settings by pressing



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:

 In web GUI '<u>Config->System->Mode</u>' 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

and the second	TxF TxP MSE	RxL (W)	P.loc.prim_13	Split 1+1	rem.prim_11:P (W)	RxL	MSE	TxP	TxF
WA H	17800 15 -38.8	-41.3 •	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	+ -39.6	-38.8	15	18810
SAF	18000 18 -38.3	-49.2	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 🕕	-47.3	-38.6	18	19010
	LOCAL (primary)	W	S:loc.sec_12	FD	rem.sec_10:S 🛞		REN	IOTES	
ADMIN permissions 🕒	Logout in: 19 m 10 s								Write 🔮
Status	Mode Descriptio	on Date	&Time Advanced						
▲ Config	DESIGN CONFIGURAT	ION		LOCAL (pri	mary)		ACTIO	NC	í
Access	Design Type			Design 5	11 🔻		Арр	ly	
IP	DESIGN MODES			LOCAL (pri	mary)		ACTI	DN	(i)
Ports	Functional Mode			Split 1+	1 🔻		Арр	iy	
Alarms Maintenance	Link Protection Divers	sity	FI	D - Freq. dive	rsity •	FO pe	App er conn	ly lected	- it's
> Tools	Hot-Swap Startup De	vice Role		Fixed prima	ry 🔻	ro	ele will l utomat	be set ically.	
	RADIO MODES			CHANNE	EL-1		ACTI	DN	(i)
Date: Thu 21 02 2010	Duplex Mode			Bidirectio	nal 🔻		Арр	ly	
Time: 14:13:15 Uptime: 0 03:29:07	Refresh							U	ndo

Figure 5.153 Example of System configuration

 In web GUI '<u>Config->Radio->Parameters</u>' 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

The second second	TxF	TxP	MSE	R	xL (W)	P.loc.prim	_13	1	Split 1+1		rem.pri	n_11:P		RxL	MSE	TxP	TxF
"A #	17800	15	-38.8	-4	1.3 •	1	+ 1024stron	g / 60M / 455Mb)	ACM	1024st	rong / 60M /	455Mb		-39.7	-38.8	15	18810
SPAF	18000	18	-38.3	-49	9.0	1	+ 1024stron	g / 60M / 455Mb		ACM	1024st	rong / 60M /	455Mb	- 🚺	-47.3	-38.5	18	19010
	LO	CAL (orimary)	(W	S:loc.sec_	.12		FD		rem.se	c_10:S			REN	IOTES	
ADMIN permissions 🕞	Logou	nt in: 1	8 m 42	s														Write 🔮
Status	Param	neters	AC	M	Ac	Ivar	nced											
▲ Config								LIBCAL						REM	OTE			0
System	MODEN	л						CHANNEL 1						CHAN	NELT			
IP	Bandwi	idth					-	60000 02 *						6000	0.02			
Radio	Max Bx	ACM	Profile				1	024/strong	•				11	024/s	rong			
Ports	ACM S	ettina	21112		1			» db	_		-		1.0					_
Alarms	Advanc	ed Set	ting					default										
> Maintenance								LOCAL						BEN	OTE			(1)
0.0202	RADIO						CH	IANNEL 1			Ð			CHAN	NELT			
	T/R Sp	acing					fi	xed 🔻			(i)			fix	ed			
	TX Free	uency	[MHz]					17800			0			188	310			
Date: Thu, 21.02.2019	BX Free	ulency	[MH7]				Ē	18810			0			179	200			
Uptime: 0 03:31:47	TV Dow	uor Lim	it [dDr	1	-		1	15			•			1	5	_		-
Refresh status	TY Mut	o Conf	in Jubi	4				uto •						auto	•			
Modem Serial Number	ATOC	e com	ig n				a	ulo •						auto				
355260100010	ATPOP	uncuo	ui Linea				F				~				-			
3010403010100229	AIPCH	IX Leve	ei Tanw	1			-	-55			0			-0	0			_
License Type / Status	Refre	sh											Undo	Ар	ply to	local	& геп	ote

Figure 5.154 Example of Primary Radio configuration

Suffrage Date	TxF	TxP	MSE	RxL	W	P.loc.prim_13	S	plit 1+1	ren	n.prim_11:P	RxL	MSE	TxP	TxF
UA H	17800	15	-38.8	-41.4		• 1024strong / 60M / 45	бМЬ	ACM	1024strong / 6	IOM / 455Mb + 🔃	-39.7	-38.7	15	18810
5/AF	18000	18	-38.3	-49.1	- 🖸	• 1024strong / 60M / 45	SMb	ACM	1024strong / 6	OM / 455Mb + 🚺	-47.3	-38.5	18	19010
	LOC	AL (se	condar	y)	W	S:loc.sec_12		FD	re	m.sec_10:S		REN	IOTES	
ADMIN permissions 🕞	Logou	it in: 1	5 m 9 s										1	Write 🚳
Status	Param	eters	AC	M	Adva	nced								
▲ Config						LIDEAL				REA	OTE			
System	MODEN	n				CHANNEL	11			CHAN	NEL-1			
Access	Bandwi	dth				60000_02	2 •		1	6000	0_02			
Radio	Max Bx	ACM F	rofile			1024/stron	na 🔻			1024/s	trona •			
Ports	ACM Se	etting	a cova			*ð	-			122000	-			
Alarms	Advanc	ed Set	ting			default	t							
o Tools	1					LOCAL				BEN	IOTE			(i)
	RADIO					CHANNEL T			1	CHAN	NELT			
	T/R Spa	acing				fixed 🔻			 (i) 	fix	ed			
	TX Free	uency	[MHz]			18000			(i)	19	010			
Date: Thu. 21.02.2019 Time: 14.16:04	RX Free	uency	[MHz]			19010			1	18	000			
Uptime: 0 03:32:20 Refresh status	TX Pow	er Lim	it [dBm	l		18			1	1	8			
The treat a tatua	TX Mut	e Conf	ig			auto 🔻				auto				
Modem Serial Number	ATPC F	unctio	n			0				0	1			_
License Number 3010403010100227	ATPC RX Level [dBm]					-55		- 10	1	-6	5			
License Type / Status	Refre	sh								Undo Ap	ply to	local	& rem	ote

Figure 5.155 Example of Secondary Radio configuration

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

Sec. 1	TxF	TxP	MSE	RxL	W	P.loc.prim	_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
"A #	17800	15	-38.7	-41.4	•	+ 1024strong	455Mb	ACM	1024strong / 60M / 455Mb + 1	+ -39.8	-38.7	15	18810
SPLF	18000	18	-38.3	-49.1	-0	+ 1024strong	/ 60M / 455Mb	ACM	1024strong / 60M / 455Mb • 1	-47.2	-38.5	18	19010
	LO	CAL (p	rimary)	W	S:loc.sec_	12	FD	rem.sec_10:S	-	REN	IOTES	Ê.
ADMIN permissions 🕞	Logou	t in: 19	9 m 53	5									Write
> Status	Addres	sses	SNI	MP	Adva	anced							
Config System	MAIN A	DDRE	SS SET	TINGS	;			REQUIRED	C	ONFIGU	RED		G
Access	Device	MAIN ADDRESS SETTINGS Device IP / Mask					192.16	8.205.13 /	24 192	.168.205	13/24		
IP	Default	Gatew	ay IP				192	.168.205.1	1	92.168.2	05.1		
Radio Ports	OPTION	AL AD	DRES	SETT	INGS			REQUIRED	c	ONFIGU	RED		G
Alarms Maintenance	Iarms USB IP/Mask						 10.10. 192.10 	11.10/24 58.11.10/24	1	0.10.11.1	0/24		
	E-III	L ID AL	ack				@ 10.10	10.10/24	1	0.10.10.1	0/24		

Figure 5.156 Example of IP configuration

4) In web GUI '<u>Config->IP->Advanced</u>' 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

and the second second	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 1+1		rem.prim_11:P	RxL	MSE	TxP	TxF	٦
"A "	17800	15	-38.7	-41.4 +		+ 1024strong / 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb + 🕕	+ -39.8	-38.7	15	18810	1
SPAF	18000	18	-38.3	-49.1	0	• 1024strong / 60M / 455Mb	ACM	1024strong	g / 60M / 455Mb + 🚺	-47.2	-38.5	18	19010	đ
	LO	CAL (rimary)		W	S:loc.sec_12	FD		rem.sec_10:S	-	REN	IOTES	È.	-
ADMIN permissions 🕞	Logou	t in: 1	9 m 53 :	S								1	Write	i,
▷ Status	Addres	ses	SNN	IP A	dva	nced								
▲ Config	STATIC	ROUT	ES - IN	PUT VAL	UES	1							G)
System	Routed	IP/MA	SK											
IP	Gatewa	V IP									Add	Del	ete	
Radio	ALAT. 10		UNI LITER					1			Bellevin	() Phone in a	6	
Ports	MAT-I	APUT	of IDD					1		Add	Dolate	De		ľ
Alarms	Local_P	on De	SUP.PO	ort		(- Ant			Auu	Delete	De		
> Tools	Default	NAIt	o remot	e		WEB WEB	SSH						Set	
	RADIUS	-INP	UT VAL	UES								-	(i)
	IP.destp	ort Se	cString	timeout	t					Add	Delete	e De	IAII	
	SETTIN	65				REQUIRED			CON	FIGURE	D.		C	5
Date: Thu, 21.02.2019	Route							de	fault via 192.168.205	1				
Uptime: 0.03:30:35 Refresh status	NAT							14 De (ht	43 192 168 205.11 4/ fault WEB NAT: ол tps://192 168 205.13	13 11443/				
Modem Serial Number								,ht De	tps://192.168.205.13 fault SSH NAT: off	:2443/)				
License Number	Radius	Serve												
3010403010100229 License Type / Status												S	ave	

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 '<u>Config->Ports->EthVLAN</u>' section and must be done in all Phoenix G2 IDUs

Section 201	TxF	TxP	MSE	RxL	W	P.loc.prim_1	13	Split 1+1	r	em.prin	L11:P	RxL	MSE	TxP	TxF
"A "	17800	15	-38.8	-41.3	•	+ 1024strong	/ 60M / 455Mb	ACM	1024strong	/ 60M / 4	155Mb • 🚺	-39.8	-38.7	15	18810
SAF	18000	18	-38.3	-49.2	-	• 1024strong	/ 60M / 455Mb	ACM	1024strong	/ 60M / 4	155Mb • 🕕	-47.2	-38.5	18	19010
-	LO	CAL (p	rimary)	W	S:loc.sec_1	2	FD		rem.see	:_10:S		REN	IOTES	
ADMIN permissions 🗗	Logou	t in: 17	7 m 34	s										1	Write 🦉
⊳ Status	MUX	Eth	VLAN	Et	hqos	EMM									
	VLAN N	IODE		LANT		LAN	2	LAN 3	MNG	3	WAN	A	V	VAN B	(i)
Access	Port Mo	de	ba	sic	۲	basic	• b	asic 🔻	basic	•	basic	•	bas	ic	•
IP	Port Gr	oup	g	roup-1	•	group-2	2 -	group-3 🔻	group-3	3 🔻	group-1	•	gro	up-2	
Radio	Default	VLAN		1		1		1	1	1	1			1	
Alarms	1					LAN	11	LAN2		LAN3					
Maintenance							8	GE switch							
> Tools						WAI	Va	WAND	M	NG CPU					

Figure 5.158 Example of port grouping

6) In web GUI '<u>Config->Ports->MUX</u>' 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'

System	PO	RT	SEPT	SFP2	SFP3	SFP4	LANT	LAN2	LAN3
Access IP		Status		SFP module not present		SFP module not present	Gbit FULL	LAN No LINK	Len Gbit FULL
Radio	FIG	Hot Standby		-	sta	ndby	active	active	-
Alarms	NOC	Mode	force2G5 🔻	force2G5 🔻	force1GX 🔻	auto1GX 🔻	auto 🔻	auto 🔻	auto 🔻
Maintenance	RT (MDIX	~	-	-	-	auto 🔻	auto 🔻	auto 🔻
Tools	Po	Flow Control	force	force	force	force	off	off	off
		1588	off 🔻	off 🔻	off *	off 🔻	off 🔻	off 🔻	off 🔻
Date: Thu, 21.02.2019 Time: 14:17.35 Uptime: 0.03:33:26 Befresh status Modem Serial Number 355250100010	ETH SWIT						WANZ	GE switch	CPU
License Number 3010403010100229	(AP	Channel Select	protection *	reserved *	EMM1 T	none 🔻	ETH1a 🔻	none 🔻	RFI1 RFI2
License Type / Status permanent / ok	SV	Connected Port	off		sfp3	wa	na	no	ne
License Expiration	W	Traffic Channel	PTP1		EMM1	ETH	la	ETH	41b
Firmware Version 0402_01	PBF	Speed Limit (j)	auto		0	10	00	()
Running Design						-1			

Figure 5.159 Example of port configuration

- 7) Configure EMM according to customer requirements and basing on EMM configuration description described in section '<u>Config->Ports->EMM</u>' in all Phoenix G2 IDUs.
- 8) In web GUI <u>'Config->Alarms->Minor</u>' 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

> Status	Major Minor							
4 Config		LOCA	L (primary)	LOCAL	REMOTE		LOCA	L.
Access	WARNINGS	Pri/Sec switch	CHT	Peer (FQ)	Direct RF	THREE	HOLDS	DETAILS
Radio	Modem							
Ports	Modem Aggr/Prot	no						
Alarms	Modem Data Sync	no						
Maintenance	Modem MSE Level	no			0	-25	(i)	[dB]
Tools	Modem FER	no				10	1	[error_frm/10s]
	Radio							
	Radio RX Level	no				-75	(i)	[dBm]
Date: Thu. 21.02.2019	Radio TX Mute	no						
Time: 14:18:11	Ports		-					
me: 14:18:11 ptime: 0 03:34:03 efresh status	Modem LAN1 Link	yes		•	•			
	Modem LAN2 Link	yes						
Modern Serial Number	Modem LAN3 Link	no	D.C.		0			
355260100010 License Number	Modem SFP1 Link	no			•			
3010403010100229	Modem SFP2 Link	no						
License Type / Status	Modem SFP3 Link	yes						
permanent / ok	Modem SFP4 Link	yes						
unlimited		LOCA	L (primary)	REMOTE	LOCAL		LOCA	E.
Firmware Version 0402_01 Bunning Design	EMM#1 - 4ASI	Pri/Sec switch	CH 1	Peer (FO)	Direct RF	THRESH	IOLDS	DETAILS
511	EMM HW+SW	no						nActivated
	SFP2 Link	yes			0			
	P1 Link	yes						
	P1 Sync	yes	0.0	0				

Figure 5.160 Example of alarm configuration

9) Save new settings by pressing



- 10) Reboot all 4 IDUs after successful reconfiguration
- 11) In web GUI '<u>Config->System->Mode</u>' 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 state	TxF	TxP	MSE	RxL	W	Ploc.prim_13	Split 1+1	rem.prim_11:P 🛞	RxL	MSE	TxP	TxF
"A"	17800	15	-38.8	-41.3	•	1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	+ -39.	7 -38.8	15	18810
SAF	18000	18	-38.3	-49.2	-0	• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	+ -47.3	3 -38.5	18	19010
	LOC	AL (p	rimary)	W	S:loc.sec_12	FD	rem.sec_10:S 🛞		REI	/IOTES	(
ADMIN permissions 🕞	Logout	in: 19	m 53	s							1	Write 👹
> Status	Mode	De	scripti	on	Date	&Time Advanced						
₄ Config	DESIGN	CONF	IGURA	TION			LOCAL (orimary)		ACT	ON	(1)
Access	Design T	уре					Design	511 •	Ì	Арр	ly	
IP	DESIGN	MODE	s				LOCAL (rimary)		ACTI	ON	(1)
Radio Ports	Function	al Mo	de				Split 1	+1 •		Арр	ly	
Alarms Maintenance	Link Prot	tectio	n Dive	sity		E	D - Freq. div	rersity 🔻	FOp	App eer conr	ly nected	-it's
> Tools	Hot-Swa	p Sta	rtup De	evice R	ole		Auto (prim	ary) 🔹	1	ole will automa	be set tically.	
	Running	Role	Swapp	ing		swap de	evice role (p	rimary/secondary)		Арр	oly	
(Weiter er e	RADIO M	IODES	ž				CHAN	NEL 7		ACTI	ON	(i)
Time: 14:13:55	Duplex N	lode					Bidirect	ional 🔻		Арр	iy	
Befresh status	Refres	h									U	ndo

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):

and and	TxF	TxP	MSE	RxL	W	P.loc.prim_13	Split 1+1	rem.prim_11:P	RxL	MSE	TxP	TxF
#A #	17800	15	-38.8	-41.3		• 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 🚺 +	-39.8	-38.7	15	18810
SAP	18000	18	-38.3	-49.2		+ 1024strong / 60M / 455Mb	ACM	1024strong / 60M / 455Mb + 1	-47.2	-38.5	18	19010
	LO	CAL (p	rimary)	W	S:loc.sec_12	FD	rem.sec_10:S	-	REN	IOTES	

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 <u>Config->System->EthVLAN</u> the 'Port Mode' for all ports must be set to "basic" option – this is transparent mode and VLAN mode is disabled:

	TxF	TxP	MSE	RxL (W	High	1+0 CH1		Lo	w	RxL.	MSE	TxP	TxF
"A #	6666	8	-41.0	43.2 +	1	• 1024strong / 40M / 3	DBMb ACM	1024strong / 40	M / 308N	њ 📭	• -42.9	-40.4	8	7006
SAF		LOCA	L									RE	MOTE	
ADMIN permissions 🕞	Logout	in: 18	m 12 s											Write
Status	MUX	Eth\	/LAN	EthQ	OS									
Config	VLAN MO	DE		LANT		LaM 2	1.041.2	DIANO		WAN	A	V	VAN B	(
Access	Port Mod	e <	bas	ic .	•	basic •	basic 🔻	basic	•	basic	•	bas	ic	
IP	Port Grou	ıp	gro	up-1 🔻		group-3 🔻	group-1 🔻	group-1		group-1	•	gro	up-3	•
Radio	Default V	LAN		1		1	1	1		1			1	
Alarms						LANT	LAN2	LA	13					
Maintenance							GE switch	1						
Tools						WANa	WAND	MING	CPU					
	VTU SET	TINGS												(
	ACTION	VL	AN N.	FID		QOS PRI LA	NI LANZ	LAN 3	M	NĠ	WAN	A	WAN	B
Date: Thu, 28.03.2019	add 🔻					off 🔻 Den	y 🔻 Deny	▼ Deny ▼	Deny	•	Deny	•	Deny	•

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 button:

A Property and	TxF	TxP	MSE R	IXL W	High		1+0 CH1			Low	RxL	MSE	TxP	TxF
2 A 2	6666	8	-40.9 -4	3.2 •	• 1024strong / 4	40M / 308N	Ib ACM	1024stro	ing / 40M /	308Mb + 1	42.9	-40.5	8	7006
SPAP		LOCA	L								-	RE	MOTE	
ADMIN permissions 🕞	Logou	nt in: 8 m	1 58 s											Write 🚳
> Status	MUX	Eth	/LAN	Ethoos										
Config	VLAN	ADDE	L	AN 1	LAN 2		LAN 3	N	ING	WAN	A	V	VAN B	(i)
Access	Port M	ode	basic		basic	•	basic 🔻	basic	•	basic	•	bas	ic	•
IP	Port Gr	oup	grou	p-1 🔻	group-3	•	group-1 🔻	grou	p-1 🔻	group-1		gro	up-3	
Radio	Default	VLAN		1	1		1		1	1			1	
Alarms							[CANE		LANS .					
Maintenance					Cana		GE switch	1	(Care)					
0 Tools					WAN		WANE		MNG CPL					
	VTU SE	TTINGS												(i)
	ACTION	V VL	AN N.	FID	OOS PRI	LANI	LAN 2	LA	13	MNG	WAN	A	WAN	в
Date: Thu. 28.03.2019	add	90	00	100	off 🔻	Тад	Deny	• Deny	•	Deny 🔹	Tag	$\mathbf{\overline{)}}$	Deny	•
Time: 14:37:38	LICTIN	-	THAT		150	-					-			
Uptime: 9 03:55:25 Refresh status	LISTIN	GOFAC	JUAL V	TU VALU	JES									
	PORTBA	S. LAI	1 LA	N2 LA	N3 MNG	WANA	WANB							
Modem Serial Number 357790100001	MODE	; bas	ic ba	sic ba	sic basic	basic	basic							
License Number	DEFAU	LT:	1	1	1 1	1	1							
3010403010100268	VTU TA	BLE	i li oli e	IMMERIAL										
permanent / ok	ok	TOT.	rirsira	(find fine)	NDIENT									
License Expiration													-	-
Unimited												Und	lo Ap	ply

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:

The second s	TxF	TxP I	MSE RxL	W	High	1+0 CH1			Low	RxL	MSE	TxP	TxF
"A	6666	8 -	40.9 -43.2	•	+ 1024strong / 40M / 3	воемь АСМ	1024strong /	40M / 30	овмь + 🕕 •	-42.9	-40.5	8	7006
5/11		LOCAL	-								RE	NOTE	
ADMIN permissions 🕞	Logout	in: 3 h	54 m 22 s										Write
Status	MUX	EthV	LAN	thoos									
Config	VLAN MODE L			1	LAN 2	LAN 3	MNG		WAN	X	N	ANB	(1)
Access	Port Mod	le	basic	•	basic •	basic •	basic	•	basic	•	basi	с	•
IP	Port Grou	up	group-1	•	group-3 🔻	group-1 🔻	group-1		group-1	•	grou	ip-3	•
Radio	Default V	LAN	1		1	1	200)	1			1	
Alarms					(1341)		-						
Maintenance					(Carrie	GE swite	h		-				
> Tools					WANa	WAND	MN	G CPU					
	VTU SET	TINGS											(1)
	ACTION	VLA	NN.	FID	OOS PRI LA	NT LANS	LANS		MNG	WAN	A	WAN	B
Terrarian terrariana	add •	20	00	200	off Tag	Denv	Deny	· Ur	ntag)	Tag	2	Denv	•
Time: 14:56:12	~							-					
Uptime: 9 04:13:59	LISTING	OF AC	TUAL VTU	J VALU	JES								
Refresh status	PORTRAS	I LAN		114	NB E MNG I WAN	A I WANE							
Modem Serial Number	GROUP	:	1	3	1 1	1 3							
357790100001	MODE	: bas	ic basi	c ba	sic basic bas	sic basic							
License Number	DEFAULT		1	1	1 200	1 1							
3010403010100268	VLAN F	ID L1	IL2IL3IM	NIWAD	WBIPRI								
permanent / ok	100 1	100 T	D D	D_T	D -								
License Expiration unlimited	200 2 ok	200 T	DD	UT	D								
Firmware Version 0403_01T01												-	-

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"

Annel

mode for I	MNG port	and pre	ss 🗳	чри	outton:						
The second second	TxF TxP	MSE RxL	W Hi	gh	1+0 CH1		Low RxL	MSE	TxP	TxF	
"A #	6666 8	-41.0 -43.3 •	1 + 10	024strong / 40M / 3	овмь АСМ	1024strong / 40M / 3	овмь • 🕕 • -42.	9 -40.4	8	7006	i
3/11	LOCA	AL.						RE	MOTE		
ADMIN permissions 🕞	Logout in: 3 h	50 m 29 s								Write	-
> Status	MUX Eth	VLAN Eth	QOS								
▲ Config System	VLAN MODE	LAN T		LAN 2	LAN 3	MNG	WANA	V	VAN B	0	D
Access	Port Mode	trunk		basic 🔻	basic 🔻	access 🕠	trunk 🔹	bas	ic	•	
IP	Port Group	group-1	•	group-3 🔻	group-1 🔻	group-1 🔻	group-1 •	gro	up-3		
Radio	Default VLAN	1		1	1	200	1		1		
Alarms				LAN1	LAN2	LANS					
Maintenance					GE switch						
> Tools				WAMa	WAND	MINIG CPU					

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 appripriate VLAN configuration (VLAN ID 200 for management access)
- 7) After successfull VLAN configuration save new settings by pressing Write button.

Appendix A: TECHNICAL SPECIFICATION

		PhoeniX G2									
General											
Concept / fo	orm factor	Split Mount									
Frequency	bands	2/2.3*GHz, 4GHz, U4GHz, L6GHz, U6GHz 7GHz, 8GHz, 11GHz, 13GHz, 18GHz, 23GHz, 38GHz									
.		Up to 900 Mbps in 2+0 configuration									
Capacity		452 Mbps at 60 MHz 1024QAM 1+0									
Max modu	lation	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 handwidth		ETSI: from 7 MHz, up to 56 MHz									
		FCC: from 10 MHz, up to 60 MHz									
Ports											
Ethernet	3x RJ-45	10/100/1000Base-T									
traffic 4x SFP		1000BaseSX/LX									
Ethorpot M	anagamant	2X SFP ports also work as Extension/Protection ports									
Access		1x 10/100/1000Base-T, RJ-45									
Serial port for configuration		USB B (alternative IP port)									
Flash mem	ory port	USB A									
ODU port		2x N-Type Female									
DC power p	oort	Single block 4 pole									
Ethernet											
Switch type	9	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 buf	fer	125KB, non-blocking store&forward									
Flow Contr	ol	802.3x									
VLAN supp	ort	802.1Q, up to 4096 VLANs									
QinQ (Dout	ble 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									
Manageme	ent features										
Protocols		VIA WEB GUI (HTTP/HTTPS), CLI (Telnet/SSH),									
Access		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 nower consumption	IDU only: <30W							
max. power consumption	IDU + 2xODU: <180W							
	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*

		2/2.3 GHz**	U4GHz	L6GHz	U6GHz	7GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps
Bandwidth, MHz	Modulation				(Guarante	ed RSL Th	reshold, d	dBm		
	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
7	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
	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
14	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
	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
20	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
	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
28	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
	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
10	64QAM StrongFEC	-71.5	-72,5	-72,5	-70	-71	-70	-69,5	-71	-69,5	183
40	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
	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
50	64QAM StrongFEC	-70	-71	-71	-68,5	-69	-68,5	-68	-69,5	-68,5	261
56	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*

		2GHz**	U4GHz	L6GHz	U6GHz	7GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps
Bandwidth, MHZ	Modulation	00.5	00.5	00.5	00.5	Juarante		ireshold, (aBm		15
	4QAM StrongFEC	-89.5	-90.5	-88.5	-88.5	-87	-88	-90	-88	-89	15
10	TOUAM StrongFEC	-83.5	-84.5	-82	-82.5	-81	-81.5	-83.5	-82.5	-82.5	30
10	32QAM StrongFEC	-80	-81	-79	-79.5	-78.5	-78.5	-80	-79	-79.5	38
	64QAM StrongFEC	-//.5	-78.5	-/6	-76.5	-/5.5	-75.5	-//	-76	-76.5	45
	128QAM StrongFEC	-/4.5	-75.5	-73.5	-73.5	-73	-72.5	-73.5	-72.5	-/4	53
	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
20	64QAM StrongFEC	-74.5	-75.5	-73	-74	-72.5	-73	-75	-72.5	-73	91
	128QAM StrongFEC	-/1	-72	-70	-/1	-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
	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
	T6QAM StrongFEC	-79.5	-80.5	-78	-79	-78	-78	-81	-78	-78	74
	32QAM StrongFEC	-/6.5	-//.5	-75	-75.5	-75	-75.5	-78	-75	-75	93
25	64QAM StrongFEC	-73.5	-74.5	-72	-73	-72	-72	-75	-/1.5	-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
	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
30	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
	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
40	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
	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
50	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
	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
60	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
1	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	ascading 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
	G.703-E1 balanced 120ohm for E1 mode
16xE1/T1	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
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- 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**



SAF Tehnika JSC 24a, Ganibu dambis, Riga, LV-1005, Latvia, EU sales@saftehnika.com www.saftehnika.com