IParalel WIRELESS

DRRU-R428 User Manual



Content

1.	Radio Setup
1.1.	Radio Interface
1.2.	Typical Connection
2.	Radio Login
2.1.	Enable GUI with back door
2.2.	OMT Login
2.3.	Console login
3.	Upgrade
3.1.	Firmware Version Check
3.2.	Upgrade with a new load9
3.3.	Load Configuration (If Needed)10
4.	Carrier Configuration11
4.1.	Power Conversion Factor
4.2.	eAxC Configuration
4.3.	Bandwidth & Center Frequency
4.4.	Carrier Enable
4.5.	DU MAC Address
4.6.	CUS-Plane VLAN ID
4.7.	Register Access
4.8.	Dual Carrier considerations
5.	Status Monitor
5.1.	PTP Status monitor
5.2.	Power monitor
5.3.	Counters
6.	Maintenance Tools
6.1.	Manual reset equipment
6.2.	MPLANE Timeout Reset



12

1. Radio Setup

1.1. Radio Interface

Please find Table 3-1 for interface definitions shown in the figure below:



-

CROSSFIRE



Table 1-1 Interface definition

Index Number	Port Name	Description	Remarks
1	CH1	Duplex DL/UL RF Port 1	
2	CH2	Duplex DL/UL RF Port 2	
3	СН3	Duplex DL/UL RF Port 3	Connect to antenna
4	CH4	Duplex DL/UL RF Port 4	
5	ALARM	External Alarm Port	
6	POWER	Power Socket Interface	
7	RET	Reserved	
8	GND	Grounding	
9	DEBUG	Maintenance Interface	GUI: https://10.7.3.200 default
10	OPS	OP Port for Previous Uint	Connect to DU/PTP Switch
11	OPM	OP Port reserved for Cascade	
12	LED	LED Indicator of OP & System	

* Please use 10G port & SFP+ module

See Indicator Status and indication in the table below:

Table 1-2 **OPS/OPM** OPTICAL INDICATOR

Optical Indicator	Description
Green	Normal
Red	The optical link is not synchronized.
N/A	Optical module is not plugged in

Table 1-3 SYSTEM RUN INDICATOR

Status Indicator	Description
Flash Green	Element is working without an alarm
Solid Green	Software is crashed, but it will reboot automatically in 3 mins
Flash Red	Element is working but with alarm
Solid Red	Software is crashed (with alarm), but it will reboot automatically in 3 mins
Flash Orange	Software is upgrading
Solid Orange	Element is booting



1.2. Typical Connection

The Picture below shows the typical connection of X2RU in an ORAN application.



Note: Please use 10G port & SFP+ module for DU and X2RU.

SFP+ Recommendation:

Туре	Status
FTLX8573D3BTL	Validated



2. Radio Login

Currently X2RU uses local debug Ethernet port for radio O&M. It's using a fixed IP address of 10.7.3.200. To login the radio,

please confirm the PC IP address is accessible for the radio. Picture below shows an example.

General											
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.											
Obtain an IP address automatically											
• Use the following IP address:											
IP address:	10 . 7 . 3 . 20										
Subnet mask:	255.255.0.0										
Default gateway:											
Obtain DNS server address autom	atically										
• Use the following DNS server addr	resses:										
Preferred DNS server:											
Alternate DNS server:											
Validate settings upon exit	Advanced										
	OK Cancel										

2.1. Enable GUI with back door

For the latest version, GUI will be disabled for safety considerations, all configurations will be pushed from M-Plane. In this case, it's very inconvenient for radio IOT and debug. A back door can be used to enable the GUI, please follow the steps below for this function:

Step #1 - Open windows command console and use command:

ssh dasUser@10.7.3.200

Step #2 - Enter password:

<mark>CF!DasUser@sw1</mark>

Step #3 - Use the blow command in the console:

touch /tmp/boa.txt

Step #4 - Wait for 3 minutes for obtaining GUI authority



2.2. OMT Login

Please enter <u>https://10.7.3.200</u> in an internet browser to visit the web GUI.

1	Username	
	Passanist	
	(Linguese)	

At login page, use the credentials shown below:

User	admin
Password	admin

2.3. Console login

At the current integration stage, sometimes it would require console access to debug or monitor the radio. Please use any SSH tools to login the radio console via <u>dasUser@10.7.3.200</u>.

Password: CF!DasUser@sw1

The login might be denied for the first time, please try with the credential again.



3. Upgrade

3.1. Firmware Version Check

Firmware version info is in the page Maintenance -> Engineering and Settings >LAN Connectivity, you may follow the red indicator shown in the pictures below.

1) Take the following firmware program as an example, the version number is shown in the following image:



2) Decompress the package of the firmware program to see the version numbers and CRC of other programs, such as ARM, PA, and SETUP_NETCONF.



3) The version number and CRC $(1)^{-6}$ in the above firmware program can correspond to the display in OMT one by one, as shown in the following figures:

🔡 DAS Topo	E		Loga Upgrade	Configuration	Screenshot		
🛞 Settings 🗠 🗠		Query O Query All & Set	⊙ Clear	⊖ Show ID ⊝ S	how Range		
Carrier Info		General					
Stream Info		Vendor	summer				
TDD Continuation		Product Model	0	0			
100 composition		Serial Number	123				
Band Configuration		Software Version	1.0-R420X-PW	0			
Radio Signal Information		Netconf Deployment Version	v1.0	2			
		Filesystem Version	Linux v3.6	3			
DAN Connectivity		FPGA Version	¥1.0	(4)			



EXTRA POWER

62.06dBm Output Power

DAS Topo						Logs U	ipgrade Configur	ation Screenshot	4
Settings			Q Query	O Query All	₿, Set	O Clear	ar © Show ID	© Show Range	
Alams			Engineering Info						
Maintenance	laintenance ^		Data Update Time			2105-12-	20 17:01:64		
			ARM CRC Check			B211	3		
Optical Info			M-Plane App CRC Chec	k		6243	6		
			Configuration CRC Chec	×		0000			

Then click on the Button "Query all" shown in the picture with blue mark. The CRC information for the firmware currently in use will appear in the box marked with red. Note (1) to (6) in the following figure show the firmware information of the current device. You can compare the firmware information with the software package to check whether the firmware is up to date or confirm the upgrade result.

3.2. Upgrade with a new load

Click on the Upgrade button shown in the main page below.

II DAS Topo	10 10					Logs Upgrad	1	Screenshot	4
() Svilings -		O Query	O Query All	2. Set	© Clear	@ Show ID	© Show Range		
Carrier Info	General								

After enter the upgrade page, click on the "Upload" button shown below; a file will be asked, select the package to upgrade the radio. After the package has been selected and uploaded, Select the firmware to be upgraded according to Step ③, and click "forced upgrade" to upgrade the firmware.

The Second		The Size	Deta		0
CAS_DIRAL_RAIN_VI CARD_DAM_DISTORATE		R. A. arman.	2014/01/10	8	
					۲
Upt.ord (C select	2 ANN 1 1 14	etado di specia	of the Resident	E facilitagente

A warning will show up as shown below, click the OK button.

	10.7.3.200 says Force upgrade will not confirm if the type file matches, please be careful.Continue Force upgrade?	N
A password then will be asked for "F	force Upgrade", enter " <mark>iDas</mark> " and confirm.	N N
	10.7.3.200 says please input force update code	
	iDas	
	OK Cancel	2





When you see the message shown below, upgrade has been completed and the radio is going for a reboot. Please wait until the radio boot up running with the new firmware.

Names Connet Software CEC chart Ressons will Back to Solar in	of the limited in Visa
Sering CRC check recover!	

3.3. Load Configuration (If Needed)

Click on the button Configuration --> Load Configuration shown in the main page below;

II DAS Topo	10 10			Logs	Upgrade	Configuration	D Screenshot	4
💮 Settings 🗠	Settings / Carrier Info	O Query	£ 54	O Save Sele	nction	± Export Configuration	 Load Config. 	enation.
A Harman V								

Click upload button to upload the configuration file;

100 D	-	WE - INCOMPOSITION OF T	210,000,000	04. #	100	0
-	811 98110		10 -			
	State of	The second state have seen but mining from	ACCURATE ON AN			
	2 1/14	(i)				
	1					
	-					
	- 4 TR			- 1		
	1 8 81					
	1.5.00					
	A DE MAR					
			-			
	2217		(ing.)	84		
				COLLEGE ST		

If it is loaded ssssssssuccessfully, there will be a prompt window.

III. 040 Tele-	8	· · · · · · · · ·	(apade)	Contraction	Second at	A	۵
O temp	Testante -						



4. Carrier Configuration

4.1. Power Conversion Factor

Expected DL Digital IQ Input Power to RU in dBFS for Max Rated TX Output Power at the antenna port.

RE ave Power(dBFS): -13.7

4.2. eAxC Configuration

eAxC configuration is pre-defined as shown below:









While there are still some parameters currently needs to be configured though the web OMT.





4.3. Bandwidth & Center Frequency

Carrier Configuration can be found in page "Settings -> Carrier Info".

🚦 DAS Topo			Logs Upgr	ade Configuratio	n Screenshot 🐣
💮 Settings 🗠		C Query O Query All & Set	© Clear	@ Show ID	© Show Range
Carrier Info		Carrier © Configuration			
Stream Info		UL ARFON	508000	0	
TDD Configuration	0	DL ARFON	508000	0	
Band Configuration		Bandwidth Select	20M	3	
Darks Strend Information	0	Carrier 0 Technology Sel	NR		
Hadio orginal Information		Carrier0 SCS Select	KHZ_15		
LAN Connectivity	0	DL Gain	58	4	đĐ
Alarma ~		UL Gain Correction	٥	6	Bb
Holatosono Y		Carrier UL enable	INACTIVE		
an Mariananaa		Carrier DL enable	INACTIVE		

You may find same carrier settings pattern for C0, C1, C2 and C3, here we take C0 as an example.

Frequency

Please use the ARFCN of the carrier instead of the center frequency for the GUI. After the ARFCN is set, frequency info can be confirmed in the Carrier information section as shown in the boxes numbered (1) and (2) the picture above.

Bandwidth

Bandwidth for the corresponding carrier, Bandwidth is selectable among 5M/10M/15M/20M.

DL Gain

The device can tune the device downlink output power by configuring the DL Gain parameter.

If the carrier is not used, please set this value to -50.

Calculation algorithm:

Antenna Output Power = DL_Max_Power(C0) + DL_Max_Power(C1)

+ DL_Max_Power(C2) + DL_Max_Power(C3);

 $DL_Max_Power(Cn) = 46 dBm + (DL Gain(Cn) - 58 dB)$, (n = 0~1);

Rated Antenna Output Power = 46 dBm;

Rated DL Gain = 58 dB;



EXTRA POWER

62.06dBm Output Power

CC Num	CC 0 DL Gain/dB	CC 1 DL Gain/dB	CC 2 DL Gain/dB	CC 3 DL Gain/dB	Antenna Output Power /dBm
1	58	-50	-50	-50	46
1	55	-50	-50	-50	43
2	55	55	-50	-50	46
2	52	52	-50	-50	43
3	53	53	53	-50	46
3	50	50	50	-50	43
4	52	52	52	52	46
4	49	49	49	49	43

UL Gain Correction

Please set it to 0 for this version. Not used currently.

Please confirm the checkbox status for the parameters before 'Set' is clicked, otherwise it will not be applied. After the carrier information is set, update button needs to be click to apply the modification, it's located at the bottom of the GUI. Update button shall turn green after the click, if the button turns red, indicates error is detected in the carrier settings.

8	General	
8	Band Configuration Update	Lipida

4.4. Carrier Enable

III. Day Constant		
Carriel 10, insultan	ACTIVE	1.0
Carriell, endite	ACTIVE	19
Same HARC D		

Carriers can be enabled and locked by enter ACTIVE or INACTIVE in the field shown above. If the carrier is not used, please Set it to INACTIVE. Update needs to be clicked to apply after these parameters are changed.

General		
Band Configuration Update	Update	

4.5. DU MAC Address

DU MAC address can be set at GUI page Setting ->LAN Connectivity.

Radio Signal Information	0	Carrier0 DU MAC Address	00:11:22:53:44:09
	0	Carrier1 DJ MAC Address	00:11:22:53:44:09
	0	Carrier2 DJ MAG Address	00:11:22:33:44:89
Maintenance ·	0	Carrier's DJ MAG Address	00:11:22:53:44:09
	0	DRIVU MAC Address	68:14:54:58:58:58:57
Module DL Test ~	0	CUS-Plane VLAV ID	1366



4.6. CUS-Plane VLAN ID

CUS-Plane VLAN ID can be set at GUI page Setting ->LAN Connectivity.

Bollings ^		C Query C Query All	& Set	© Show ID © Show Range
Carrier Info	Carrier0 DU MAC Ac	direce .	00:11:22:33:4	439
Stream Info	Centert DU MAC As	lóreas	00:11:22:33:4	438
T00 0-0-00-00	Carried: DU MAC As	dress.	00/11/22:83:6	439
TDD Configuration	Carried DU MAC As	diwaa	00/11/22/88:4	439
Band Configuration	DRRU MAC Address		65-14-64-54-54	467
Radio Signal Information	CUS-Plane VLAV ID		1266	
LAN Connectivity	MPLANE timeout res	4		
	OP Transcetver the	ial Number		
U Auri	OP-slave Transcelve		UW9627T	
🐺 Maintonanco 🔍	OP-master Transcel	er (NA	

4.7. Register Access

11 DAS Tepo	E Logs Upgrade Configuration Servenshot
() Bellings "	○ Query ○ Query All & Set
Aams	Chip Select FPGA U
🗮 Maintenance 🔍	REGAD(16 scale) 128
Module DL Test	Length(10 scale) 4
③ Digital Modulo ^	Content(16 scale) 66 60 66
Address Interface	CrOwry & Set
Debug Parametere	
Digital IF	
MCU Parameter	

Step #1 - Enter factory mode (please refer to <u>section 4.6</u>).

Step #2 – Enter page "Digital Module -> Address Interface".

Step #3 – Select 'FPGA' for "Chip Select" field.

Step #4 – Enter Register Address, length (always set to 4).

Step #5 – Click 'Query' for current value shown in Content field and 'Set' to apply the new value after the modification.



4.8. Dual Carrier considerations

Some extra considerations are needed when 2 carriers are used:

1) Frequency

When 2 carriers are used, frequency settings on the GUI are independent for the two carriers.

But special care must be taken to be avoid of carrier overlapping.

Frequency(ARFCN1) - Frequency(ARFCN0) >= (Bw0 + Bw1) /2



For frequency settings, please find the parameters shown in the snap shot below:

🐵 Betings 💦 ^			C Query	O Query All	£ Set	© Clear	@ Show ID	Show Range
Carrier Info		Carrier © Configuration						
Stream Into		UL ARFON				43790		
TDD Configuration		DL ARFON				43790		
Read Racks and an		Bandwidth Select				2014		
🗇 Sutings 🔷 ^			O. Query	O Query All	£ Set	⊗ Clear	© Show ID	© Show Range
Carrier Info		Carrier 1 Configuration						
Camer Info	8	Carrier 1 Configuration				43990		
Carrier Info Stream Info TDD Configuration	8	Carrier 1 Configuration UL, ARECN DL, ARECN				43990		
Carrier Info Stream Info TDD Configuration		Carrier 1 Configuration UL ARECN DL ARECN Bandwidth Select				43990 43990 20M		



2) Gain settings

The device can define the device downlink output power by configuring the DL Gain parameter on the OMT. Take CO carrier as an example, the corresponding relationship between downlink output power and DL Gain is shown as follows:
 46 dBm + (DL Gain(CO) – 58 dB) = DL Max Power(CO)

Note: 58dB is the rated gain of the equipment, and 46dBm is the rated downstream output power of the equipment.

When 2 carriers are used, for DL 2 carriers will share the rated output power of 46dBm.

The restriction is:

Max_Power(C0) + Max_Power(C1) <= 46 dbm

You may change the DL gain settings for carrier 0 and 1 to satisfy the equation shown above. To query the DL Max Power, please find below section in Carrier Configuration Page.

	Ð	Loga Upgrade Configuration &	reamhot 🔒
() Bellings ^		County C County All & Set C Clear ⊕ Show ID ⊕ Show Rampe	
	Carrier 8 Information		
Stream Info	UL Centre Prequency	5700.006	1012
	DL Centre Prequency	5700.006	1012
TDD Configuration	DL Max Power		-
🚦 DAS Topo	12	Logs Upgrade Configuration	Screenshot
11 DAS Topo	10	Logs Upgrade Configuration	Screenshot
DMS Topo Settings Currer Into	Carrier 1 Information	Legs Upgrade Configuration O Query O Query All & Set © Clear © Show 1D © Show Range	Screenahot
EMS Topo Settings Carrier Info Stream Info	Carrier 1 Information U.B. Centre Transmosy	Logs Upgrade Configuration O Query All & Set © Clear © Show 10 © Show Range 6649	Screenshot
DAS Topo Settings Carrier Info Stream Info	Carrier 1 Information U. Centre Frequency D. Centre Frequency	Legs Upgrade Configuration C. Querry All & Set © Clear © Show 10 © Show Range	Screenahot

With correct configurations, the module info will show valid in query after "Update" button is clicked.

=		<u>=</u>			Logs Upgrade Configuration	Screenshot 🔒
	Bettings ^		C Query C Query Al	£ Set ⊗ Clear	© Show ID © Show Range	
			Carle 7 BOOK			_
	Ginam Info		Carrier 3 Information			
			UL Centre Frequency	3760		MHz
	TDD Configuration	0	DL Centre Frequency	1760		MHz
	Band Configuration	0	DL Max Power	-40		illen.
	Radio Signal Information		Module Info			
			Radio Module 1 Into Check	Val		
	Livel Connectivity	0	Radio Module 2 Info Check	Valid		
•			Radio Module 3 Info Check	Value		
	Mantanarea ~	0	Radio Module 4 Info Check	Valid		



5. Status Monitor

5.1. PTP Status monitor

1) PTP status			
	General		
Band Configuration	Device Temperature	69	
Radio Signal Information	PTP Sync State	•	
LAN Connectivity	Extern Input1 State	•	

PTP status can be found in the page Settings -> Radio Signal Information, green light indicates good PTP status.

5.2. Power monitor

1) Antenna Power

Antenna input/output power can be found in page "Settings -> Radio Signal Information".

TDD Configuration							_
		UL Input-power	-		-	-	dDm
Band Configuration	0	DL Output-power	-			-	din
	0	VSWR	-	-	-	-	

2) Antenna Baseband Power

Antenna baseband power Transmitted/Received at antenna can be checked from GUI at page Settings -> Radio Signal Information. Baseband power is shown in dBm.

11 DAS Topo	10 10	Loga Upgrade Configuration Boreanshot 🐣
() Setings ^	O Query D Query All & Set	⊙ Clear
Carrier Info	Extern Output2 State	
Stream Info	Copen Load Detect Bakth	
TDD Configuration	Uplink Daseband Power	
Barrel Combo antino	Module1 UL Baseband Input power -4	M din
Carlo Consguration	Interduced UK, Raseband Input power 4	4.6 dBm
	Moduled UL Baseband Input power	n@b 0.0
LAN Connectivity	Modulet UL Baseband Input-power 4	Ma din
Alurea	Downlink Basebard Power	
	Introducti DL Baseband Output power 40	e den
🐺 Maintenance 🔍	Initialized DL Reselvand Output-power	a
Module Di, Test	Moduled DL Baseband Output power 40	e don
	Modulet DL Baseband Output-power	• **





3) Carrier Power

Carrier power can be found in page "Settings -> Stream Info".

🚦 DAS Topo	82	Logs Upgrade Configuration Bereenshot 🐣
() Settings ^	C Query D Query Al 2, Set	Orar O Show D O Show Range
Carner Into	Carrier 0 Stream Information	
Stream Into	Stream 0 UK. Exceland Power	44.1 din
TDD Configuration	Bream 0 DL Baseband Power	40
Eard Configuration	Steam 1 UL Baseband Power	417 din
	Bream 1 DL Beschard Power	40 00
Radio Signal Information	Bitram 2 Di, Baseland Poser	40
LAN Connectivity	Stream 5 UK. Baseband Power	44.3 din
Ø Alarra ~	Bream 3 DL Baseband Power	40
🖶 Mantenance 🔍	Carrier 1 Bitsans Information	
	5team 0 UL Eastand Power	-46.1 dbn
() Module DL Teat V	Steam 0 DL Resetand Power	41 das

Picture above shows the UL/DL baseband power of carrier0 in dBm.

5.3. Counters

1) eCPRI Counters

Number of U-plane packets and C-plane packets can be monitored at GUI page Maintenance -> Engineering.

	=			Logs Upgrade Configuration	Boreenshot 🔒
() Settings ~		C Query C Query All & Set	© Cea	r I Show ID I Show Range	
		Interface Info			
	<u> </u>	O-RAN Counter Reset		Reset	
I Maintenance *	0	RK_TOTAL Counter	۰		
Optical Info	0	U plane RX_ONTIME Counter	•		
		U-plane RDL_EARLY Counter			
	0	U plane R0_LATE Counter			
Factory Command	0	C-plane RX_ONTIME Counter	•		
Module DL Test ~	0	Ciplane RX_EARLY Counter	•		
		C-plane RX_LATE Counter	•		
	0	TX_TOTAL Counter			
	0	TX_T0TAL_0 Counter			



6. Maintenance Tools

6.1. Manual reset equipment

The device supports manual reset on the OMT, you can find the Hardware reset button at GUI page Maintenance ->

Engineering.

II DAS Topo	🖭 Logs Upgrade Configuration Berevenahot 🐣
O Settings	C Query C Query All & Set © Clear © Show ID © Show Range
Alarra "	ALC Inducation
Hantanance o	Introdulen UL ALC Monking Alarm
	📄 Module2 UI, ALC Mohing Alarm 😐
Uptos Ino	📄 Modulet UL ALC Molong Alarm 🛛 👻
	Module4 UL ALC Working Alarm
Factory Command	Advanced Command
④ Module DL Test ~	Hardeane Reset
	Alarm Initialization
	Alarm Mode Smin

6.2. MPLANE Timeout Reset

1) If the MPLANE Timeout Reset button is enabled

Within 24 hours after the device is started, if the CMS platform is not successfully connected, the device will actively Reset at an hour interval. If the CMS is successfully connected once and no reset operation is performed, the CMS stops detecting the connection and does not trigger the 24-hours automatic reset mechanism.

2) If the MPLANE Timeout Reset button is disabled

The device does not detect the connection to the CMS platform and does not Reset the device. Therefore, if the device is being debugged, you are advised to disable the switch.

	E Logs Upgrade Configuration Berner	whot 🚢
() Setings ^	○ Query ○ Query All 2: Set ⓒ Clear	
Carrier Info	Carried DU IMC Address 00:11:22:33:44:09	
Stream Info	Carter1 DU MAC Address 00:11:22:33:44:09	
TDD Configuration	Carned DU MAC Address 00:11(22:88:44.89	
Band Configuration	Carned DU IMAC Address 00.11122.03.44.89	
	DPRUMAC Address 98/1444.86/86/07	
Radio Signal Information	CUS-Plane VLAN ID 1266	
	MPLANE tracks reset	
	OP Transceiver Berial Number	
	OP-size Tweetver	
er Mainerahoe -	OP-master Transastver NA	



FCC Warning:

This device must be professionally installed.

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 358.5cm between the radiator & your body.

NOTE: Only authorized person can enter the area where the antenna is installed. And the person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program.