# Optimize repeater & sDAS interconnectivity

Revision: 0.2 Draft

TRANSYSTEM INC.

## Optimize repeater & sDAS interconnectivity

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### History

Revision	Change Note	Author	Date
0.1 Draft	Initial version	S.C. Yen	Dec. 2, 2016
0.2 Draft	Remove DAS GUI & wording For Java script: jdri_v1.3.0 (beginning version)	S.C. Yen	Dec. 21, 2016

Optimize repeater & sDAS interconnectivity |

#### **Overview:**

In the typical DAS application, HEU needs to be connected to mobile base station for better performance. However, it may be difficult to implement such architecture. In general, the DAS system is built by the neutral host owner, the mobile base station RF signal may need to be collected over the air, the specific architecture has been developed by added repeater. However, it needs to optimize for better system performance. This document described the criteria to build the system, and how to optimize the system.

#### **Preparation:**

To evaluate if **DAS** system can be built by receiving the over the air mobile radio signal is the preparation task, the system integrator shall measure the radio signal performance if good enough. When measure the radio signal performance, it needs to confirm that the signal quality is good enough, not only signal strength.

It had better to collect the operators' mobile network operation frequency spectrum for further performance adjustment/setting purpose for the region, this information will be set into repeater for better system performance.

- The following shows the classified for signal strength & signal quality:
  - 3G UMTS mobile network: the system integrator shall confirm the signal quality (Ec/Io) shall be more than -10.

RSSI	Signal Strength
>-70 dBm	Excellent
-70 to -85 dBm	Good
-86 to -100 dBm	Fair
<-100dBm	Poor

Ec/Io	Signal Quality
0 to -6	Excellent
-7 to -10	Good
<b>-11</b> to <b>-20</b>	Fair to Poor

Note:

- 1. RSSI: Received Signal Strength Indicator
- 2. Ec/Io: Energy to Interference Ratio
- 4G LTE mobile network: the system integrator shall confirm the signal quality (SINR) shall be more than 0.

RSRP	Signal Strength
>-90 dBm	Excellent
-90 to -105 dBm	Good
-106 to -120	Fair
$\mathrm{d}\mathbf{B}\mathrm{m}$	Fall
<b>&lt;-</b> 120d <b>B</b> m	Poor

SINR	Signal Quality	l
> 10	Excellent	∕it√
6 to 10	Good	cti
0 to 5	Fair	
< 0	Poor	har

Note:

1. RSRP: Reference Signal Received Power

2. SINR: Signal to Interference-plus-Noise Ratio

The radio signal performance can be measured by specific mobile phone. The following information was captured based on Samsung Galaxy A710Y mobile phone in engineering mode (by dialing "\* # 0 0 1 1 #", click "STACK 1", then "service mode"). The engineering mode for the other mobile phone model may need to have different engineering mode entering code, and the supported

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information may not be sufficient. If the system integrator wants to use the other mobile phone model, the system integrator shall confirm if it can collect sufficient information for further usage.

■ When the mobile phone is set at 3G UMTS mode, Ec/Io information can be captured as below. The system integrator shall confirm the signal quality (Ec/Io) shall be more than -10.

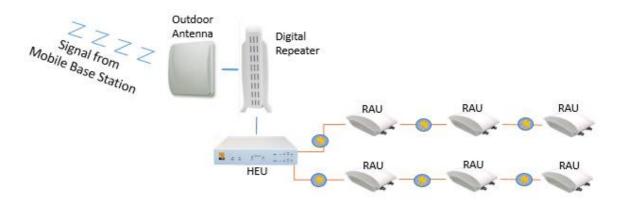
\$ ⊡ ≌ ¢	🔊 🖬 🎬 📶 71% 🖬 15:45
ServiceMode	查看更多
Serving Cell Info	
MCC: 466 MNC: 0	1
uarfcn:10588, <u>Ec/lo</u>	:-9
PSC : 18	_
CellId : 43463, LAC	: 9442
RSCP_CPICH: -65	
RAC:1	
URRC not in <ura_i< td=""><td>PCH&gt; state</td></ura_i<>	PCH> state
RRC: URA_PCH RSS	SI/TX:-56/0
WCDMA (2100)	
SIB19:0	
RB(DL/UL):0/0	
Max RB(DL/UL):0/0	
IMEI Status : OK	

When the mobile phone is set at 4G LTE mode: SINR information can be captured as below. The system integrator shall confirm the signal quality (SINR) shall be more than 0.

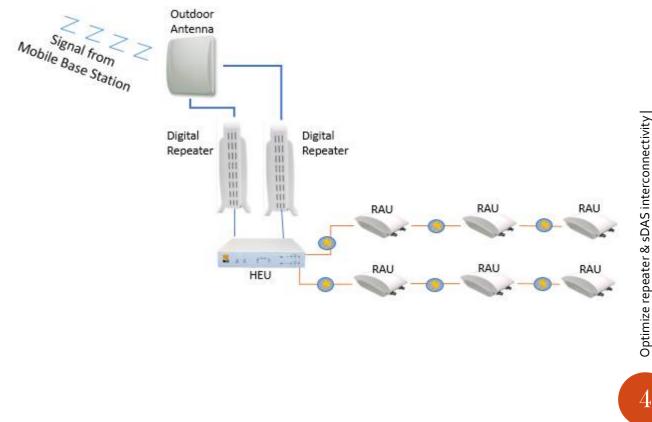
× 0 ø	N 🖪 😤 📶 90% 🖹 09:23
ServiceMode	查看更多
LTE-BASIC Info	
Band:3 BW: 15MH	Z
DL & UL Frequency	y: 1725 / 19725
MIMO Mode/MIM	O RI: TBD / 1
Serving Cell ID:33	(PCI:52)
Registered PLMN:	466 92
RSRP:-71 RSRQ:-1	0 RSSI:-65
TAC:13700 SINR: 1	1
RRC: IDLE	
Tx Pwr:	
Ant RSRP Diff:-10(	Avg:-11)
CA:NONE, SC_NUM	VI:0
IMEI Status : OK	
RB(DL/UL):0/0	
Max RB(DL/UL):0/	0

#### System Architecture

- The repeater is going to receive the mobile base station signal, and amplify the signal. HEU/RAU is going to distribute the mobile signal over optical fiber. There are 2 system architectures have been developed. The system integrator shall determine which architecture to be implemented. For 4G LTE mobile network, both architectures are possible to be implemented because of cost optimization, but the system performance will be degraded at least 50% or more.
- When apply the system architecture for multi-carrier services, TSI's digital repeater is able to select which carrier's signal will be carried or not, and equalized each carrier's signal before sending to DAS system. This feature can optimize the system performance compared with other analog repeater.
  - SISO (Single Input Single Output): It is generally applied to 3G UMTS mobile network architecture, but also is possible to be implemented in 4G LTE mobile network architecture for cost optimized. Only one repeater is required to implement.



MIMO (Multi Input Multi Output): It is generally applied to 4G LTE mobile network architecture. 2 repeaters are required to implement.



#### System Setup procedure

To optimize the system performance, the optimization process shall be performed. TSI has developed the software to setup the system parameters according to the exactly environment, it includes digital repeater, HEU, and RAU parameters setting.

The following shows step by step setup procedure for optimized repeater and sDAS interconnectivity:

#### 1. System Setup Preparation

It is possible to have multiple digital repeaters & HEU in the system, to minimize the setup effort, it is recommended to setup the system as the architecture shown as below figure.

- The setup of digital repeater shall be performed via USB interface, USB Hub shall be prepared to be connected among digital repeaters and notebook PC.
- The setup of HEU/RAU shall be performed via Ethernet interface, it is suggested PoE switch Hub to be prepared to be connected among HEU and notebook PC.
- The frequency spectrum information shall be collected, it is required to be setup in digital repeater in the beginning. the information also can be retrieved through mobile phone in engineering mode.

	Band 3 (1800MHz)	Band 7 (FDD) (2600MHz)	Band 8 (900MHz)	Band 28 (700MHz)	Band 38 (TDD) (2600MHz)
ChungHwa	25MHz (C2,	30MHz (D2,	10MHz		
Telecom	C5)	D4)	<b>(B</b> 2)		
Taiwan Mobile	15MHz (C1)			15MHz (A4)	
FarEasTone	20MHz (C3, C4)	20 <b>MH</b> z (D3)		10 <b>MH</b> z (A2)	25Mhz (D5)
APTG			10Mhz	20MHz (A1,	25Mhz (D6)
			<b>(B</b> 3)	A3)	231viiiz (D0)
Taiwan Star		20Mhz (D1)	10Mhz		
		2010112 (D1)	(B1)		

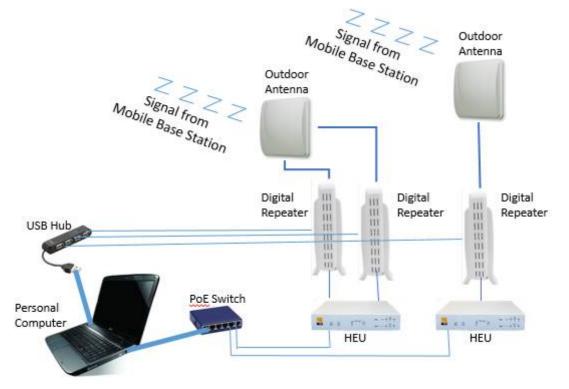
For example, Taiwan LTE operators' spectrum shows below,

Frequency	Uplink (MHz)	Downlink (MHz)	<b>3GPP Planned</b>
Al	703 ~ 713	758 ~ 768	Band 28
A2	713 ~ 723	768 ~ 778	
<b>A</b> 3	723 ~ 733	778 ~ 788	
A4	733 ~ 748	<b>788</b> ~ <b>8</b> 03	
B1	885 ~ 895	930 ~ 940	Band 8
<b>B</b> 2	895    905	940 ~ 950	
<b>B</b> 3	905 ~ 915	950 ~ 960	
C1	1710 ~ 1725	1805 ~ 1820	Band 3
C2	1725 ~ 1735	1820 ~ 1830	
C3	1735 ~ 1745	1830 ~ 1840	
C4	1745 ~ 1755	1840 ~ 1850	
C5	1755 ~ 1770	1850 ~ 1865	
D1	$2500 \approx 2520$	$2620 \approx 2640$	Band 7
D2	$2520 \ \tilde{\ } \ 2540$	$2640 \ \tilde{\ } 2660$	
D3	$2540 \approx 2560$	$2660 \approx 2680$	
D4	$2560 \approx 2570$	$2680 \approx 2690$	

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D5	2570 ~ 2595	Band 38
	(guard band: 2570 $\sim$ 2575 included)	
D6	$2595 \approx 2620$	Band 41
	(guard band: $2615 \  2620$ included)	

- Java runtime environment shall be setup in the notebook PC. The Java version shall be Version 8 update 111 or later version.
  - Required java script shows below, if you have no such script, please contact the technical support.
    - ✓ Jdri\_x32.jar: for 32-bit Windows OS environment
    - ✓ Jdri\_x64.jar: for 64-bit Windows OS environment



2. Run Java script

By command "java -jar jdri\_x64.jar" or "java -jar jdri\_x32.jar" to run Java script.

🚯 Git CMD - java -jar jdri_x64.jar	J
D:\WorkJava\JDRI\export 的目錄 2016/11/15 下午 05:30	
2 個目錄 333,012,799,488 位元組可用 D:\WorkJava\JDRI\export> D:\WorkJava\JDRI\export> D:\WorkJava\JDRI\export> D:\WorkJava\JDRI\export> D:\WorkJava\JDRI\export> D:\WorkJava\JDRI\export>	
D:\Worklava\JDRI\export>java -jar jdri_x64.jar OS Architecture: amd64 OS Name: Windows 7 Version 6.1 Sun Data Model: 64 Real Arch:64 Extract DLL for: x64	
DLL file (D:\WorkJava\JDRI\export\rxtxSerial.dll) extracted! ListAvailablePorts: Serial - Prolific USB-to-Serial Comm Port (COM15) JDRI Windows opened!	-

#### 3. Connect/disconnect sDAS and repeater

The Java GUI will be presented as below when "java -jar jdri\_x64.jar" or "java -jar jdri\_x32.jar" is successful running.

> Select sDAS IP for further setting

Select repeater USB COM port for future setting 

jDRI		the second se		
Connect DAS Repeater Interaction	Help	-		
O DAS Default IP (192.168.100.20)				
<ul> <li>DAS Default IP (192.168.100.20)</li> <li>DAS User IP</li> </ul>				
DISCONNECT DAS				
Repeater 1: Prolific USB-to-Serial Com	m Port (COM15) Ctrl-1	D		
Disconnect Repeater 1	Ctrl-5			
Quit				
Host OS: Windows 7 (AMD64) (JRE64)			[DAS]:   [Rptr#1]:   [Rptr2]:	[Rptr3]:   [Rptr4]:

#### Disconnect sDAS or repeater USB COM port can be executed by the menu below.

DAS Default IP (192.168.100.20)     DAS User IP     Disconnect DAS     Repeater 1 Critical Comm Port (COM15) Critical     Disconnect Repeater 1 Critical     Quit	DAS Default IP (192.168.100.20)      DAS User IP      Disconnect DAS      Repeater 1: Prolific USB-to-Serial Comm Port (COM15) Ctrl-1      Disconnect Repeater 1 Ctrl-5	JDRI Connect DAS Repeater Interaction Help	
O Disconnect DAS     Image: Common Port (COM15) Ctrl-1       O Disconnect Repeater 1     Ctrl-5	Disconnect DAS   P Repeater 1: Prolific USB-Io-Serial Comm Port (COM15) Curt:   Disconnect Repeater 1   Curt		
Repeater 1: Prolific USB-to-Serial Comm Port (COM15) Ctrl-1  Disconnect Repeater 1  Ctrl-5	Repeater 1: Prolific USB-to-Serial Comm Port (COM15) Ctrl-1   Disconnect Repeater 1   Cuit	O DAS User IP	
O Disconnect Repeater 1 Ctrl-5	C Disconnect Repeater 1 Cti-5 Quit	○ Disco <u>n</u> nect DAS	
	Quit	Repeater 1: Prolific USB-to-Serial Comm Port (COM15) Ctrl-	
Quit		C Disconnect Repeater 1 Ctrl-	
	Host OS: Windows 7 (AMD64) (JRE64)   [DAS]:192.168.100.20]/FDS18S21S   [Rptr#1]:COM15[FD2100]0814A0216110   [Rptr2]:   [Rptr3]:   [Rptr4]:	Quit	
	Host OS: Windows 7 (AMD64) (JRE64)   [DAS]:192.168.100.20  FDS18S21S   [Rptr#1]:COM15 FD2100 0814A0Z16110   [Rptr2]:   [Rptr3]:   [Rptr4]:		

#### 4. sDAS parameter Setup

■ sDAS parameters shall be setup via web based GUI. However, through this interface, the parameters can be retrieved via this menu.

RI ect j	<u>D</u> AS <u>R</u> epeater	Interaction	Help			
	Configure					
	DAS RF	Power Level			<b>5 X</b>	
		Downlink RF1 (dBm)	RF2 (dBm)	Uplink RF1 (dBm)	DE2 (dDm)	
	HEU (Input)	-12.15	-11.84		RF2 (dBm)	
	RAU#11	-18.7	-18.0	-94.86	-94.86	
	RAU#12	-120.0	-120.0	-120.0	-120.0	
	RAU#13	-120.0	-120.0	-120.0	-120.0	
	RAU#21	-20.1	-14.2	-104.88	-104.42	
	RAU#22	-120.0	-120.0	-120.0	-120.0	
	RAU#23	-120.0	-120.0	-120.0	-120.0	
OS: W	/indows 7 (AMD64	) (JRE64)				[DAS]:192.168.100.20] FDS18   [Rptr#1]:COM15 FD1800]071453326044   [Rptr2]:   [Rptr3]:   [Rf

#### 5. Repeater parameter setup:

- Repeater parameters setup can be performed via the following menu.
- Setup "Sub Channel Setting", the operator's channel frequency allocation info. if it has been well understood, or by mobile phone when running in engineering mode to collect the information.

Connect DAS Repeater Interaction Help					
1: Prolific USB-to-Serial Comm	Port (COM15) > 🔗 Sub Channel Alt-A				
	Shutdown Threshold Alt-B				
	Module Operation Alt-C				
	RF Power Status Alt-D				
	Operation Status Alt-E				
Host OS: Windows 7 (AMD64) (JRE64)	[DAS]:192.168.100.20  FDS18S21S	[Rptr#1]:COM15 FD2100 0814A0Z16110	[Rptr2]:	[Rptr3]:	[Rptr

Sub Channel Setting": the information for the setting can be retrieved per operator's channel frequency allocation, or by mobile phone when running in engineering mode.

- Frequency: the center frequency of the channel can be set; Downlink/Uplink center frequency will be automatically set.
- Bandwidth (BW): the bandwidth of the center frequency of the channel can be set.
- On/Off: the downlink/uplink channel can be turn on or off.
- ◆ Gain (dB): the gain of the downlink/uplink channel can be set. It is suggested to set at system default, +40.0dB, in the beginning. However, it may be optimized by the Java script after interaction command.
- OP (dBm): the maximum RF output power of the downlink/uplink channel can be set. It is suggested to set at system default, +11.0dBm, in the beginning. However, it may be optimized by the Java script.
- "Submit": after the setting, click "Submit" button to perform.
- "Clear": the exactly system setting will be retrieved and displayed.
- "Shutdown Threshold Setting":
  - Over Pwr. (Over power): when the repeater detected the RF input power of Downlink/Uplink over the setting threshold, the RF output power of Downlink/Uplink will be shutdown. The user can set the threshold as needed. However, it is suggested to leave at the system default setting.
  - Under Pwr. (Under power): when the repeater detected the RF input power of Downlink/Uplink lower than the setting threshold, the RF output power of Downlink/Uplink will be shutdown. The user can set the threshold as needed. However, it is suggested to leave at the system default setting.
  - "Submit": after the setting, click "Submit" button to perform.
  - "Clear": the exactly system setting will be retrieved and displayed.
- Module Operation Setting":

Please leave all parameters are in the system default.

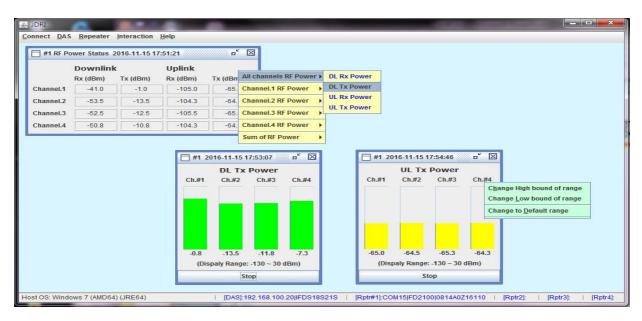
			MALALALACCOCCCC	101010101	09090909090909			201010101010101	2010101	010101010101	51.51.51.51					0101010:	
	Downlink	Company and the second						Uplin								Clear	
Channel.1	Freq.(MHz)	BW(MHz)	On/Off ON	- -	40.0		(dBm) 4.0	Freq.(M		On/Off ON	<b>T-</b>	Gain(dB) 40.0	•	OP(dBr 14.0	n)	Submit	
Channel.2	2132.5 👻	15 🔻		<b>↓</b>   [			4.0 -	1942.5		ON	-	40.0	• •	14.0		Submit	
Channel.3	2147.5 👻	15 🔻					4.0 -	1957.5		ON	-	40.0	-	14.0		Submit	
Channel.4	2162.5 👻	15 🔻		-			4.0 🔻	1972.5		ON	-	40.0		14.0	-	Submit	
#1 Shu		hold Setting	UnEnte		d Dave \		<b>•</b> ×	1	-	#1 Modu tenna Ga		eration S 3i)	ettin	9		r 🛛	-
#1 Shu	tdown Thres Downlin		Uplink	(1	dBm)		o <sup>r</sup> 🗵		-	tenna Ga		Bi)		9	Subi		-
	Downlin Over-Pwr	k(dBm) Under-Pwr	Over-Pwr	ır Uı	nder-Pw		Clear		-		in (dB		0	) 	Subr	nit	-
Channel.1	Downlin Over-Pwr -10.0	k(dBm) Under-Pwr -125.0	Over-Pwr -10.0	r Ui	nder-Pw -130.0		Clear ubmit		Ant	tenna Ga Donor Service	in (dB	3i) 0. 0.	0	) 		nit	-
Channel.1 Channel.2	Downlin Over-Pwr -10.0 -10.0	k (dBm) Under-Pwr -125.0 -125.0	Over-Pwr -10.0	r Ui	-130.0 -130.0	s	Clear ubmit ubmit		- Ani	tenna Ga Donor	in (dB	3i) 0. 0.	0			nit /	-
Channel.1	Downlin Over-Pwr -10.0	k(dBm) Under-Pwr -125.0	Over-Pwr -10.0	r Ui	nder-Pw -130.0	s	Clear ubmit		-Ant	tenna Ga Donor Service /DL Gain	in (dB Intera de	3i) 0. 0. active	0 0 Ie		Quer	nit /	-
Channel.1 Channel.2	Downlin Over-Pwr -10.0 -10.0	k (dBm) Under-Pwr -125.0 -125.0	Over-Pwr -10.0		-130.0 -130.0	s s	Clear ubmit ubmit		- Ani - ULJ S	tenna Ga Donor Service /DL Gain Gelect Mo Gain Valu	in (dB Intera de ie	Bi) 0. 0. Active Disab	0 0 Ie		Quer	nit /	-
Channel.1 Channel.2 Channel.3	Downlin Over-Pwr -10.0 -10.0	k(dBm) Under-Pwr -125.0 -125.0 -125.0	Over-Pwr -10.0 -10.0 -10.0		Inder-Pw -130.0 -130.0 -130.0	s s	Clear ubmit ubmit ubmit		- Ani - ULJ S (	tenna Ga Donor Service /DL Gain Select Mo Gain Valu mperatur	in (dB Intera de ie re (Ce	Bi) 0. 0. active Disab 0. elsius)	0 0 le   0		Quer	nit /	-
Channel.1 Channel.2 Channel.3	Downlin Over-Pwr -10.0 -10.0	k(dBm) Under-Pwr -125.0 -125.0 -125.0	Over-Pwr -10.0 -10.0 -10.0		Inder-Pw -130.0 -130.0 -130.0	s s	Clear ubmit ubmit ubmit		- Ani - UL) S ( - Ter Cu	tenna Ga Donor Service /DL Gain Gelect Mo Gain Valu	in (dB Intera de ie re (Ce mp.	Bi) 0. 0. Active Disab	0 0 <b>le</b> 0		Quer	nit /	-

- "RF power status": after "Sub Channel Setting", the received/transmitted RF power of the repeater can be retrieved.
- "Operation Status": after "Sub Channel Setting", "Shutdown Threshold Setting", & "Module Operation Setting", the received/transmitted **RF** power of the repeater can be retrieved.

	Downlinl Rx (dBm)	Tx (dBm)	Uplink Rx (dBm)	Tx (dBm)								
Channel.1	-41.5	-1.5	-105.0	-65.0	1							
Channel.2	-56.3	-16.3	-104.3	-64.3	-							
Channel.3	-52.5	-12.5	-105.5	-65.5								
Channel.4	-47.0	-7.0	-104.3	-64.3	-							
10	eration Status	2016-11-15 17 ISO Alar		DL Shutdown	U	Sleep	Temp.	Alarm	Hardwa	re Status		
AGC	eration Status	ISO Alan		DL Shutdown		Sleep ink Power Ala	-	Alarm	Hardwa	0000000		
AGC AGC	eration Status Alarm	ISO Alan	m	DL Shutdown Isolation			rm	Alarm Pwr Output	Hardwa	0000000		
AGC AGC	eration Status Alarm ownlink Power Pwr Input	ISO Alar Alarm	m line	Isolation		ink Power Ala Pwr Input	rm		Hardwa	re Status		
AGC . Channel Do	eration Status Alarm ownlink Power Pwr Input Over-Thd	ISO Alan Alarm Pwr O nder-Thd	m line	Isolation	Channel Up	ink Power Ala Pwr Input Over-Thd	rm I	Pwr Output		re Status Isolation		
AGC . - Channel Do Channel.1	eration Status Alarm ownlink Power Pwr Input Over-Thd Ur Over-Thd Ur	ISO Alan Alarm Pwr O nder-Thd	m Dutput r-Thd Under-Th Under-Th	Isolation ISO ISO	Channel Up Channel 1	ink Power Ala Pwr Input Over-Thd Over-Thd	rm F Under-Thd	Pwr Output	Under-Thd	Isolation		

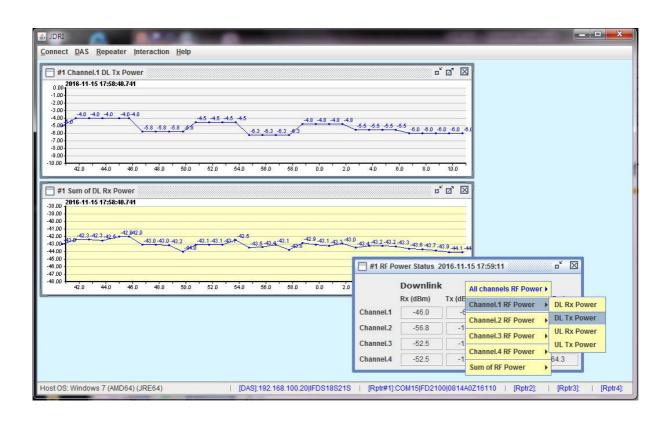
#### 6. Outdoor Antenna Alignment

For better system performance, the outdoor antenna shall have the best alignment with the mobile base station. It is suggested that the installation person can adjust the outdoor antenna alignment and monitor "DL RX power" or "DL TX power" until all the channel in the highest power.



Besides, the other DL/UL TX/RX power can be monitored through the following operation:

- "DL RX power" windows can click "RF power status" windows, and select "All channels RF Power", then "DL RX power" for all channels status. The individual channel also can be retrieved accordingly.
- "DL TX power" windows can click "RF power status" windows, and select "All channels RF Power", then "DL TX power" for all channels status. The individual channel also can be retrieved accordingly.
- "UL RX power" windows can click "RF power status" windows, and select "All channels RF Power", then "UL RX power" for all channels status. The individual channel also can be retrieved accordingly.
- "UL TX power" windows can click "RF power status" windows, and select "All channels RF Power", then "UL TX power" for all channels status. The individual channel also can be retrieved accordingly.



#### 7. Interaction Gain Tuning Setup:

Once repeater and sDAS parameter has been corrected setup, the installation person can setup the interaction target by "Interaction"  $\rightarrow$  "Setup".

ect <u>D</u> AS <u>R</u> e	A	action Help Setu <u>p</u> Gain Tuning						
Interaction Repeater	Setup		DAS/RAU	<b>⊳</b> "⊠				
No.	Input HEU Po	ort Sub Ch. Total						
Repeater 1	None	▼ 4	12.0	Submit				
Repeater 2	None	0	0.0	Clear				
Repeater 3	RF1 RF2	0	0.0					
Repeater 4	RF3	0	0.0					
	RF4	(4)						

- Input HEU Port: select RF port of HEU to be setup. This option is going to setup the RF port of HEU which connected w/ the repeater. Only one HEU supported in the version, jdri\_v1.3.0.
- "Sub Ch. Total": setup the total number of sub channel
- "Target Power": setup the target RF output power of RAU.
- "Submit": after the setting, click "Submit" button to perform.
- "Clear": the exactly system setting will be retrieved and displayed.

#### 8. Interaction Gain Tuning

Once Interaction gain tuning parameter has been corrected setup, the installation person can enable the interaction gain tuning by "Interaction"  $\rightarrow$  "gain tuning". Then, the Java script will show the current setup and target parameters as below.

Departer						DAC/DAL		•	
Repeater No.	Sub Ch. No.	DI Freq (MHz)	UL Freq.(MHz)	DI Gain(dB)	UI Gain(dB)	DAS/RAU Tgt Pwr(dBm)			
Repeater 1	Channel 1	2117.5	1927.5	40.0	40.0	[RF1] 12.0	-20.5	Start	
Repeater 1	Channel 2	2132.5	1942.5	40.0	40.0	[RF1] 12.0	-20.5	Start	
Repeater 1	Channel 3	2147.5	1957.5	40.0	40.0	[RF1] 12.0	-20.5	Start	
Repeater 1	Channel 4	2162.5	1972.5	40.0	40.0	[RF1] 12.0	-20.5	Start	
									_

- Click "Start" button per each sub channel, the Java script automatically setup both repeater/sDAS parameters for better system performance. The GUI of this Java script will show the output power and setting relationship as below figure.
- Once exactly TX power of RAU is stable, click "Stop" button.
- All the sub channel shall be setup individually.

Interaction Gain	n Tuning							o"	X
Repeater						DAS/RA	U #11		
No. Sub	Ch. No.	DL Freq.(MHz)	UL Freq.(MHz	) DL Gain(dB)	UL Gain(dB)	Tgt Pwr(dBm	) Tx Pwr(dBn	1)	
Repeater 1 Ch	annel 1	2117.5	1927.5	40.0	40.0	[RF1] 12.0	-20.3	Stop	
Repeater 1 Ch	annel 2	2132.5	1942.5	40.0	40.0	[RF1] 12.0	-20.3	Start	
Repeater 1 Ch	annel 3	2147.5	1957.5	40.0	40.0	[RF1] 12.0	-20.3	Start	
Repeater 1 Ch	annel 4	2162.5	1972.5	40.0	40.0	[RF1] 12.0	-20.3	Start	
-16.00 -26.00 -36.00									
-46.00 56.0 58	s.o <u>o</u> .o	2.0 4	.0 6.0	8.0 10.0	12.0 14.0	16.0 18.0	20.0 2	2.0 24.0	
46.00 <b>2016-11-15</b> 18	8:13:54.417		DAS RAU[11]:	DLA Power					
36.00									
26.00									
26.00 16.00 6.00 -4.00									

#### 9. sDAS Error Code

Click "Help" → "DAS fault Codes" for understanding the description of the error code.

🚣 JDRI	and the second se				100 A 100	
Connect DAS Repeater Interaction	Help					
	DAS Fault Codes					
	Repeater Status Codes					
	About					
	ſ	Fault Co	de			
		<b>i</b>	< RA	U Faul	t Code Description >	
			[No]	[Code]	[Description]	
			01		RAU both DL & UL LB done	
			02	1	RAU provisioned	
			03	-3	RAU no response or DL optic power too low	
			04	-4	RAU LD turn-off	
			05	-5	RAU unprovisioned	
			06	-8	RAU Fiber loss > 3dB	
			07	-17	RAU BiDi module failed (Tmcu > 85degC)	
				-18	RAU BiDi module failed (Tmcu > 25degC && PWM=10% w/ continous 600sec)	
				-20	RAU BiDi module failed (Id_off=0 && Id_st=0)	
				-32	Main PA failed	
				-64	Diversity PA failed	
				-128	Reference 40MHz unlock	
			13	-256	Main/diversity synthesizer unlock	
			14	-512	Loopback VCO synthesizer unlock	
					確定	
		<u></u>	_	_		
Host OS: Windows 7 (AMD64) (JRE64)				IDASI-	192.168.100.20  FDS18   [Rptr#1]:COM15 FD1800 071453326044   [Rptr2]:   [R	ptr3]:   [Rptr4]:
100100. Hindows / (Ambo4) (SI(E04)		-		[0/10].	The rest rest sector is presented biological sector and the rest in the rest of the rest o	prop.   [repu4].

#### 10. Repeater Error Code

Click "Help" → "Repeater Status Codes" for understanding the description of the error code.

IDRI Innect DAS Repeater Interaction Help		100	10000
			X
DAS Fault Codes	Status Code		
Repeater Status Codes	(i) < Resp	onsed Status Code Description >	
About			
	[No] [C	ode] [Description]	
		00 Successful.	
	02 0x	01 CRC error!	
	03 0x	02 Command code error!	
	04 0x		
	05 0x		
	06 0x		
	07 Ox	그 같은 것은 것 같아요. 같은 것은 것은 것은 것이 같아요. 것은 것은 것은 것이 같아요. 것은 것이 같아요. 것이 같아요. 같이 없는 것이 같아요. 같이 없는 것이 없 않는 것이 없는 것이 않는 것이 없는 것이 없는 것이 없는 것이 없는 것이 없는 것이 없는 것이 않는 것이 않는 것이 않는 것이 않는 것이 않는 것이 않는 것이 없는 것이 않는 것이 않이 않는 것이 않 않이 않는 것이 않는 않는 것이 않이	
	08 Ox		error!
	09 Ox		
	10 Ox		or!
		11 VCO unlock!	
		12 Operation failed: FPGA operating e	
		13 Operation failed: module RAM erro	
	14 0x	14 Operation failed: VCO unlock & fla 20 RESERVED	sn writting errors!
	15 0x 16 0x		
		22 Module gain setting error!	
	18 0x		a setting errort
	10 0x		ig setting error:
	20 0x		na settina error!
	20 0X	in a section of the s	<ul> <li>The second s second second seco</li></ul>
		80 Module maximum output power le	
st OS: Windows 7 (AMD64) (JRE64)   [DAS]:192.168.1		確定	