UWB ICE Radar
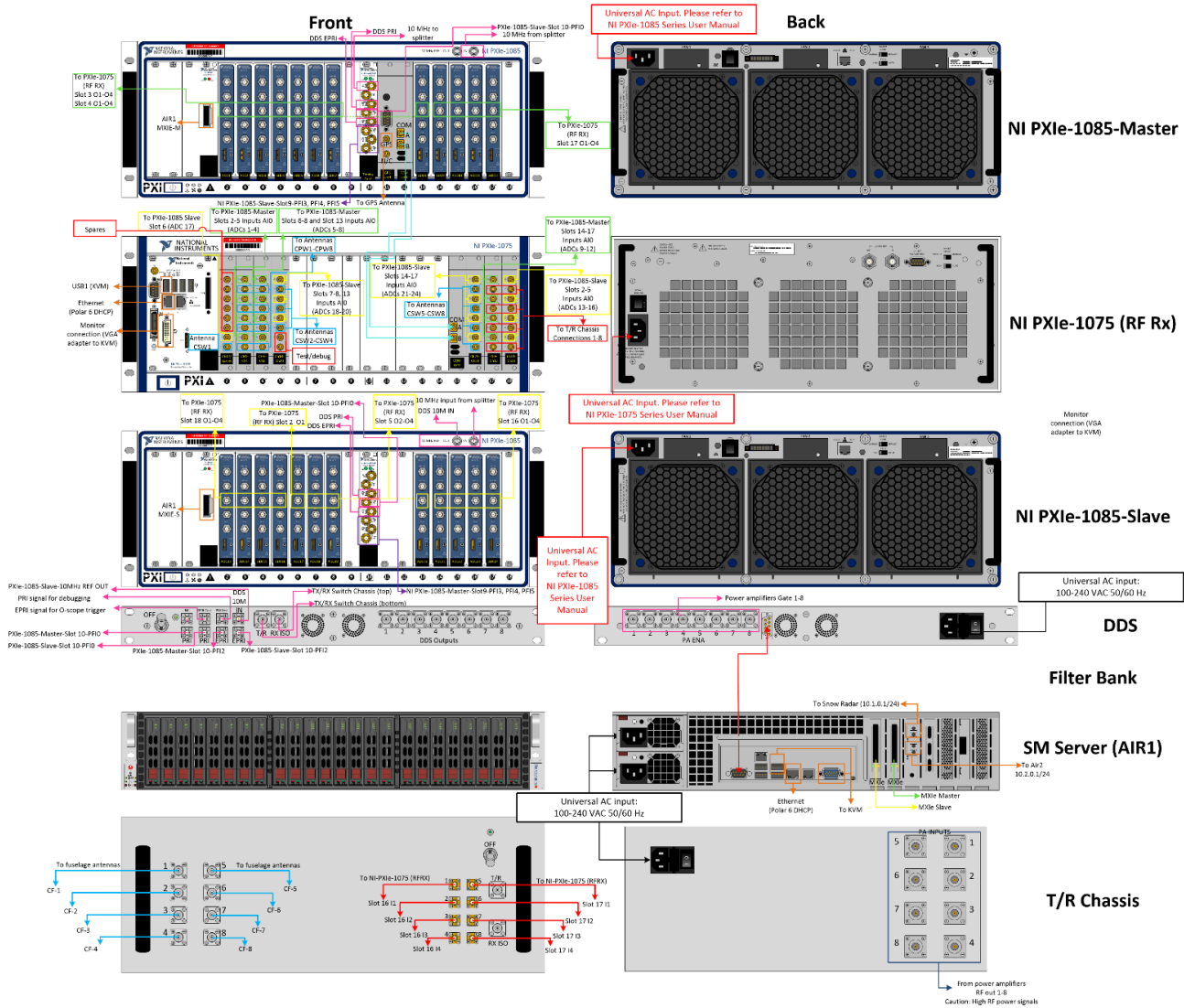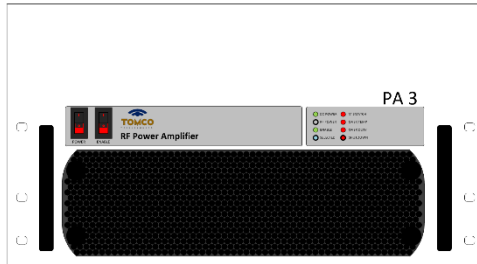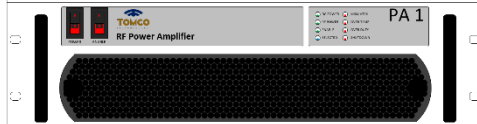
User Guide V 2.0

November, 2016

1. Configuration

Fig. 1: Main radar rack layout and connections. In the present configuration a 115 VAC UPS is used to power the two 1085 NI chassis and T/R switches while the server, waveform generator (formerly DDS) run on a 220 VAC UPS. When the Snow radar rack is installed, the 1075 NI chassis runs from the snow radar UPS (115 VAC). When the snow radar rack is not installed, the 1075 NI chassis runs off the 220 VAC UPS in the main power rack.
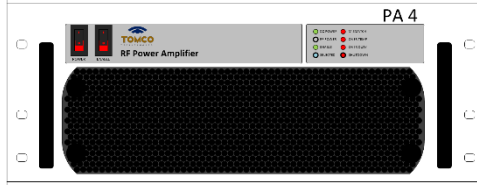
BT01000-Delta
SN: 11911

PA 3

TOMCO
RF Power Amplifier

From DDS chassis Gate 3
From DDS Out 3
To T/R chassis PA input #3

TOMCO

Chassis ground connection

Universal AC inputs (x2):
100-240 VAC 50/60 Hz

BT00500-Delta
SN: 11919

PA 1

TOMCO
RF Power Amplifier

From DDS Out 1
From DDS chassis Gate 1
To T/R chassis PA input #1

TOMCO
www.tomcoet.com

Universal AC inputs
100-240 VAC 50/60 Hz

Chassis ground connection

BT01000-Delta
SN: 11912

PA 4

TOMCO
RF Power Amplifier

From DDS chassis Gate 4
From DDS Out 4
To T/R chassis PA input #4

TOMCO

Chassis ground connection

Universal AC inputs (x2):
100-240 VAC 50/60 Hz

BT00500-Delta
SN: 11920

PA 2

TOMCO
RF Power Amplifier

From DDS Out 2
From DDS chassis Gate 2
To T/R chassis PA input #2

TOMCO
www.tomcoet.com

Universal AC inputs
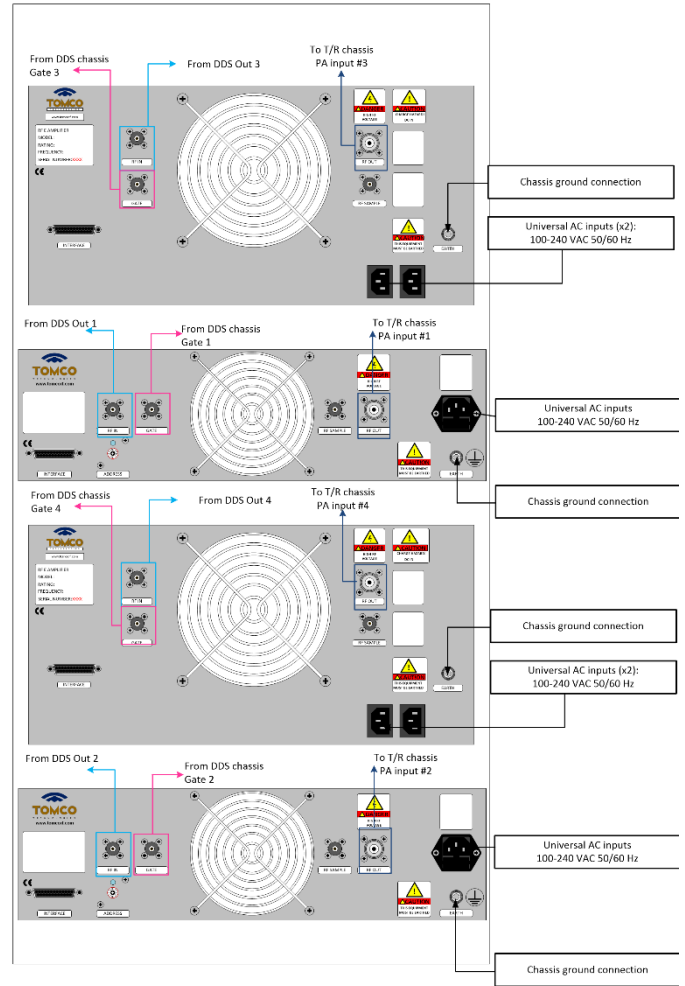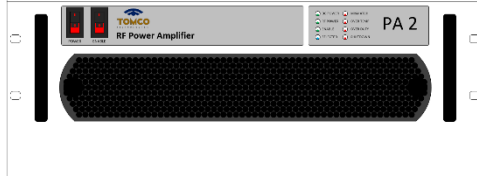100-240 VAC 50/60 Hz

Chassis ground connection

Fig. 2: Power amplifier rack 1 layout and connections. AC power is provided directly from the DC-AC inverters (without UPS). Each inverter powers a set of BT-01000-Delta (1,000 W) and BT00500-Delta (500-W) amplifiers. The BT01000 amplifiers should drive the center elements in the antenna array.
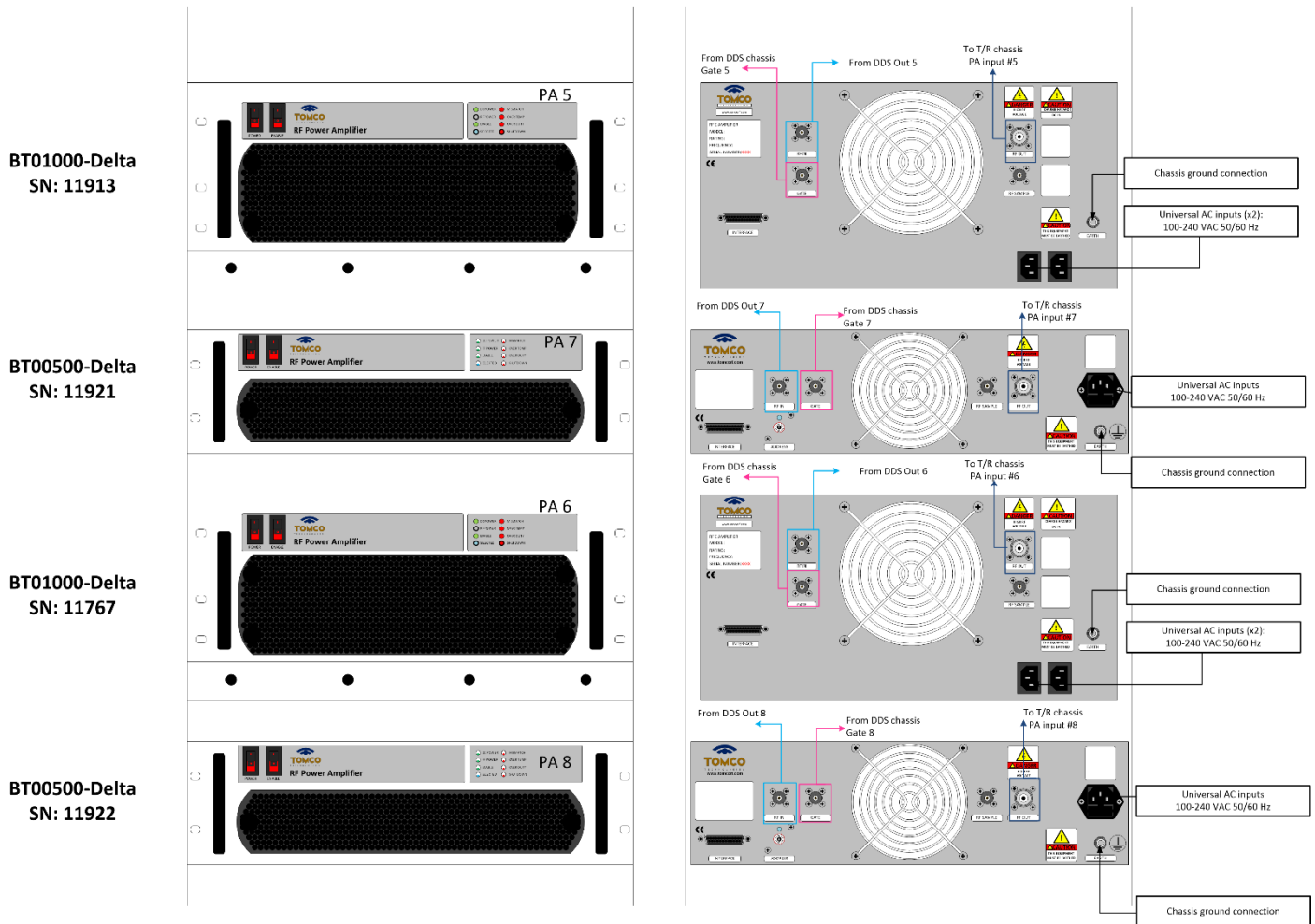
Fig. 3: Power amplifier rack 2 layout and connections. AC power is provided directly from the DC-AC inverters (without UPS). Each inverter powers a set of BT-01000-Delta (1,000 W) and BT00500-Delta (500-W) amplifiers. The BT01000 amplifiers should drive the center elements in the antenna array.
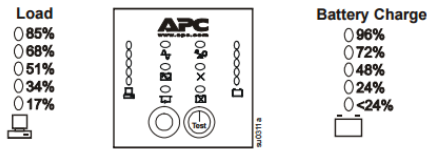
2. Operation
2.1 Preparations and power up sequence

In preparation for a flight or ground testing where data will be recorded, all the data collection solid state drives (SSDs) should be installed on the server. The user should verify that all the connections are properly made and that the equipment is OFF before applying AC power. **The temperature of the radar equipment (including UPS units) should be brought up to at least 0 °C before turning it on**. **After a long period of inactivity or storage, it is also recommended to supply AC power to the UPS units for some time before connecting a load to them for the first time. This is done so the batteries can be charged.** Once science power is available the system should be brought up in the following order:

- Turn on DC-AC inverters by pressing the 50 A breakers in the power rack. Wait 10 seconds before enabling the 10 A breakers. This will supply the power amplifier and the UPS with AC power.

- Press battery breaker and switch on the 110V UPS located in the power rack and turn it on by pressing the ⊕ button. Wait until UPS internal self-test is complete. Lights will be solid green indicating AC input present, battery charge, and load (Fig. 4).

Display Panel

Load		Battery Charge
○85%	APC	○96%
○68%	www.apc.com	○72%
○51%		○48%
○34%		○24%
○17%		○<24%

Display Panel Indicators

Indicator LED	Indicator Title	Description
⌁	On Line	The PS is supplying utility power to the connected equipment.
⌁	On Battery	The UPS is supplying battery power to the connected equipment.
⊓⌐	Bypass	The Bypass LED illuminates indicating that the UPS is in bypass mode. Utility power is sent directly to connected equipment during bypass mode operation. Bypass mode operation is the result of an internal UPS fault, an overload condition, or a user initiated command through an accessory. Battery operation is not available while the UPS is in bypass mode.
✕	Fault	The UPS detects an internal fault.
⚡	Overload	The connected equipment is drawing more than the UPS power rating allows.
⌧	Replace Battery/ Battery Disconnected	The battery is disconnected or must be replaced.

Display Panel Functions

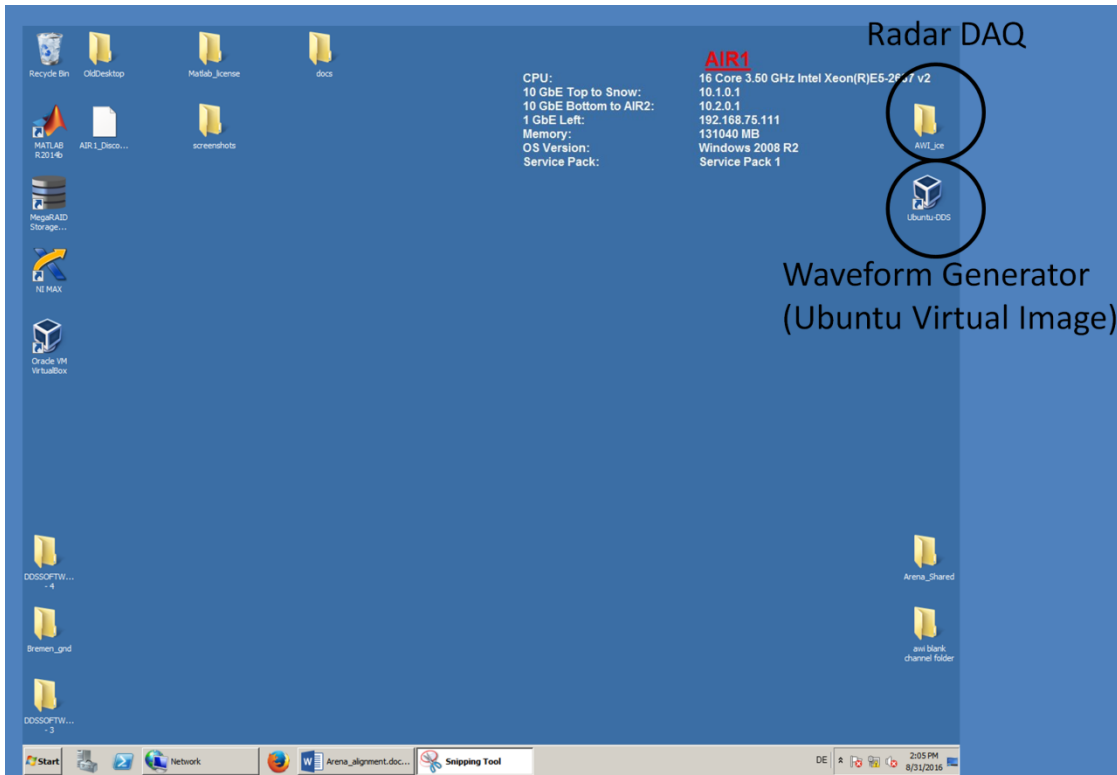| Feature Button	Feature Title	Function
	Power On/Test	Press this button to turn on the UPS. Continue reading for additional capabilities.
	Cold Start	When there is no utility power and the UPS is off, press and hold the **Test** button to power up the UPS and connected equipment. The UPS will emit two beeps. During the second beep, release the button.
(Test)	Self-Test	*Automatic:* The UPS performs a self-test automatically when tuned on, and every two weeks thereafter (by default). During the self-test, the UPS briefly operates the connected equipment On Battery. *Manual:* Press and hold the **Test** button for a few seconds to initiate the self-test.
○	Power Off	Press this button to turn off the UPS output. Note:The battery will continue to charge and the fans will continue to run while the UPS is connected to the utility.

Fig. 4: Display panel indicators and functions on the APC UPS (APC installation and operation manual).

- Wait for 230V Inverter online and 230V UPS in the power rack to be switched on and switch the Air1 server ON. Note that the server controls the two NI 1085 Chassis, which will be remotely turned ON (and OFF) as long as these chassis have AC power. ⚠ Turning on the server without the NI chassis may cause configuration errors with the data acquisition card numbering. If the server is turned ON without the NI 1085 chassis, please refer to the troubleshooting section for information on how to check the correct configuration.
- If the RAID controller displays new volume inserted message during the boot-up process, press "space bar" to continue. Once the boot-up process is complete (screen shows "Press CTRL+ALT+DEL"), log in as "Administrator" (password. Goosah^30 [type shift+6 for "^"]).
- The user should verify that the RAID is available (drive D:\ listed under "Computer" in Windows Explorer) and that the folders "awi" and "awi_snow" (when and if snow radar data is being recorded) are available on drive D:\. If not, then copy the folders from desktop to drive D:\
- Wait for "ACC" LED on 6674T timing module (Slot 10, Master chassis) to turn green. This ensures the 10 MHz clock reference is stable.
- Switch on the waveform generator (formerly DDS) and wait at least 60 seconds. The cooling fans inside the chassis (blowing in the back of the unit) and power on LED on the front panel should be on at this point.

- The NI-1075 chassis can be turned ON while the server boots up. This chassis gets power from the UPS located in the snow radar rack or from the 220VAC UPS located in the main power rack. To switch the UPS on press the 50 A breaker, wait 10 seconds and press the 10 A breaker. Press battery breaker, switch on UPS, and wait until UPS internal self-test is complete (green control light steady). Switch on NI Chassis 1075 (Switch located at lower left corner of the chassis). The user should verify that that the login screen came up (no login required but the password is Goosah^30 [type shift+6 for "^"]).

2.2 GUI Operation

The radar graphical user interface is composed of two separate elements: the waveform generator (formerly DDS) and the radar DAQ software. These two components are executed from two different shortcuts located on the desktop (Fig. 5).
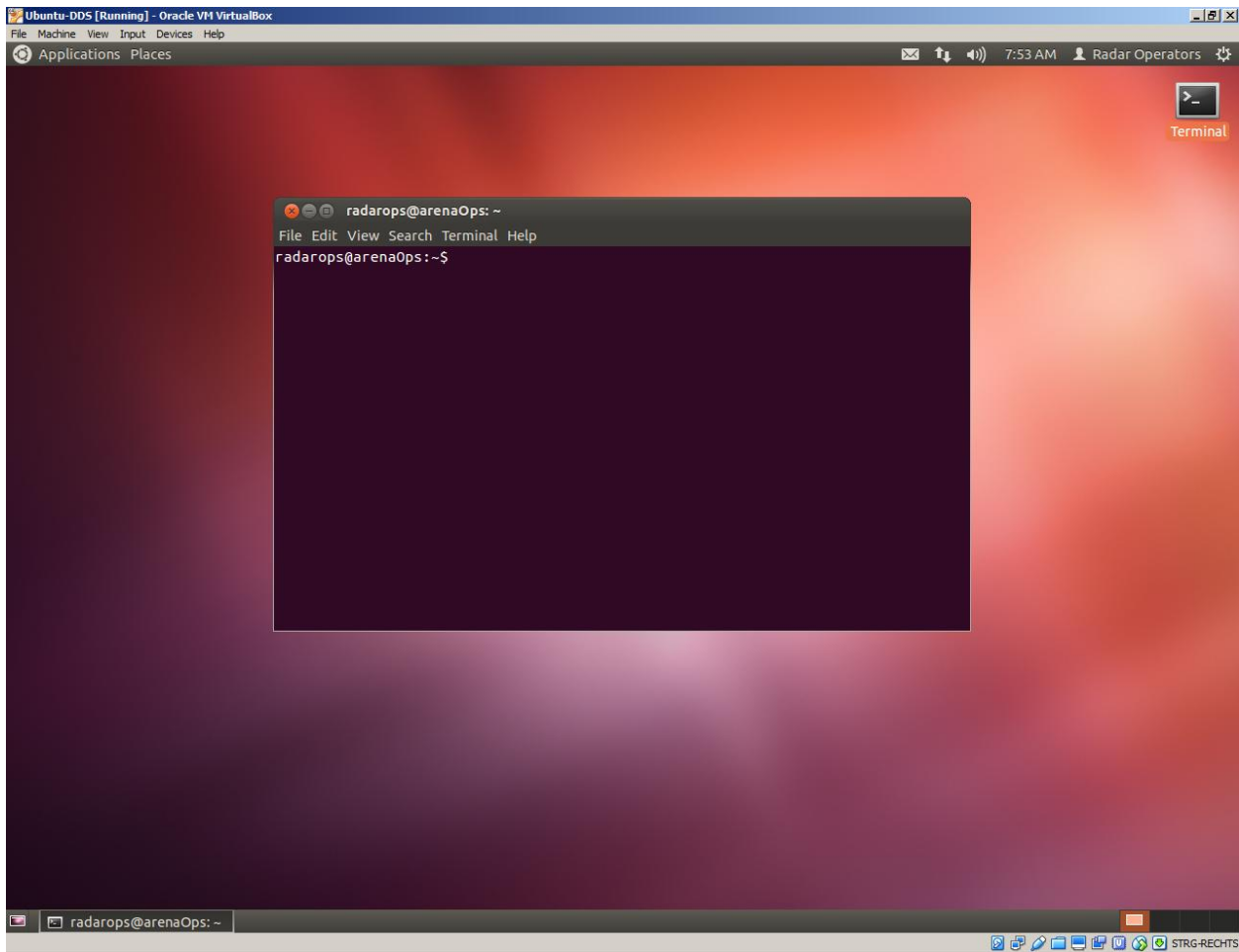

Fig. 5: Desktop shortcuts on the UWB-Ice radar server Air1.

2.2.1 Waveform Generator

The server's network card that is connected to the waveform generator is set to 10.0.0.X. The server communicates with the AWG system using the following IP addresses.
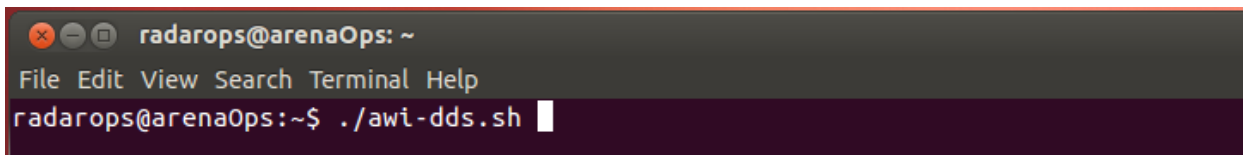
Unit	IP address	Function
CTU	10.0.0.50	Central timing unit
WG0	10.0.0.51	Channels 1 & 2
WG1	10.0.0.52	Channels 3 & 4
WG2	10.0.0.53	Channels 5 & 6
WG3	10.0.0.54	Channels 7 & 8

The waveform generator runs on an Oracle VM VirtualBox with Ubuntu. Double click in the Ubuntu-DDS shortcut located on the desktop. After initialization, the Ubuntu OS will run as a virtual machine (Fig. 6).
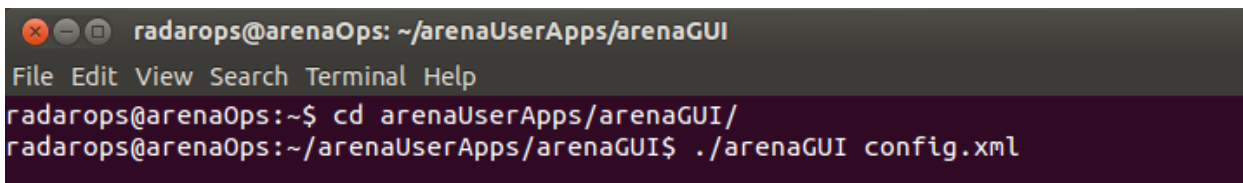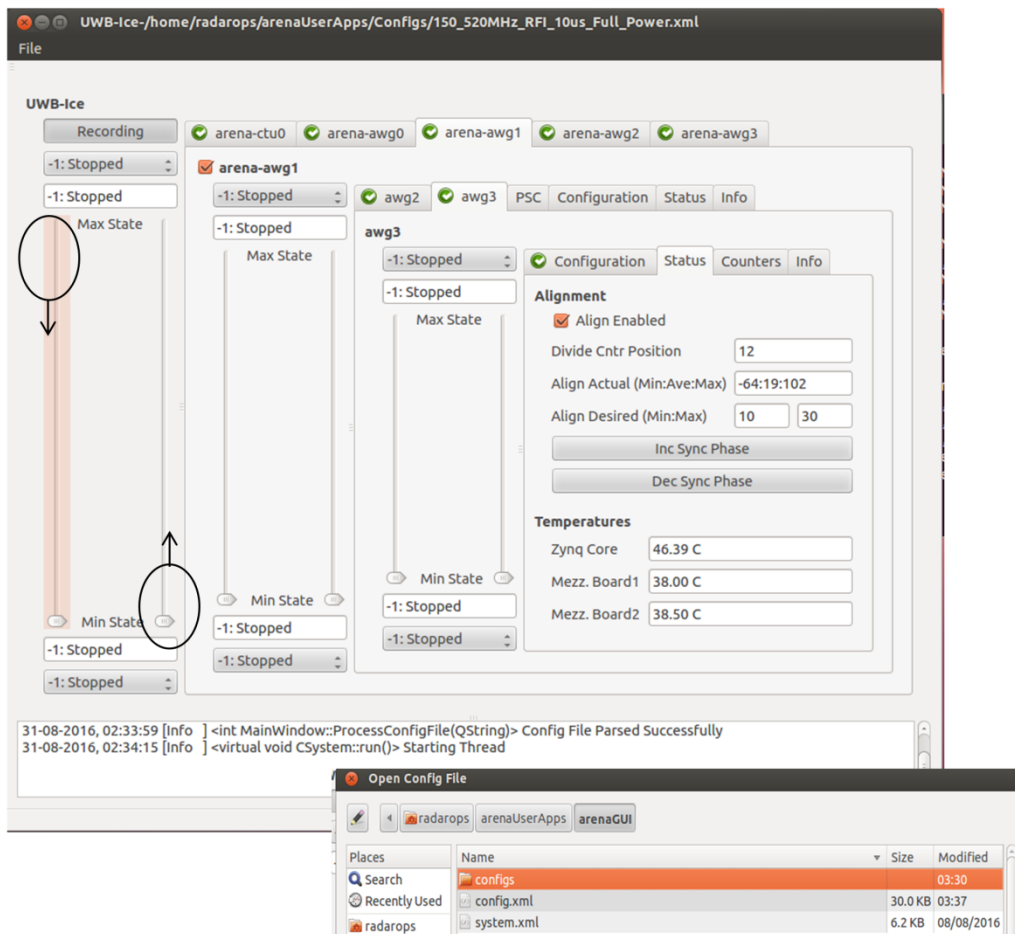
Fig. 6: Virtual machine running Ubuntu.

Open a shell terminal and execute the bash script `awi-dds` located in the home directory by typing ./awi-dds.sh

Alternatively, the user can type the complete path and then run the software from the command line as follows

The waveform generator GUI (arenaGUI) will appear in the default state (-1: Stopped). All the tabs should be

marked as , indicating that the application is ready to run. With the system in the default state, click file->Open Configuration in the main (File) menu. Open the desired configuration xml file (Fig. 7).

Fig. 7: Waveform Generator GUI (arena GUI). The waveform generator state is controlled through the sliders marked on the left side of the control console.

To operate the waveform generator, use the two sliding controls located on the left side of the screen (marked with arrows in Fig. 7). The right-side slider is used to switch from low to high state (e.g from -1: Stopped to 2: Align). The left-side slider is used to change the state from high to low (e.g. from 5:Run to -1: Stopped). Note that the system will go through the required intermediate states before reaching the final desired state. For example, if the slider is changed from -1: Stopped to 5:Align, it will automatically go through the sequence of intermediate states: Closed->Open-> Align. Furthermore, the waveform generator features automatic calibration and alignment, which will be done sequentially whenever the system transitions from -1: Stopped to 5:Run.

⚠️ Note that when the system is brought to the 5:Run state the waveform generator will produce output waveforms and will start transmitting. **Do not set the state to 5:Run unless it is safe to do so.** Verify that all the other steps outlined below are followed.

2.2.2 Radar DAQ

The Radar DAQ software is located under the desktop\AWi_ice directory. Use AWI_ice_2016_24chV2.1a.exe under the folder AWI_ice_2016_24chV2.1a as default software (Fig. 8). Version AWI_ice_2016_24chV2.1b.exe is only needed if the numbering in the RIO cards for the master/slave chassis is reversed (please refer to the troubleshooting section at the end of this document for details). A screenshot of

the main Radar DAQ GUI is shown in Fig. 9. ⚠️Please note that the old DDS controls are no longer used with the new waveform generator and can be disregarded.

Load the desired configuration file by clicking "Load waveform", which should match the settings created for the waveform generator. ⚠️Note that the configuration file for the Radar DAQ is also an XML file but it is different from the configuration file used for the waveform generator.
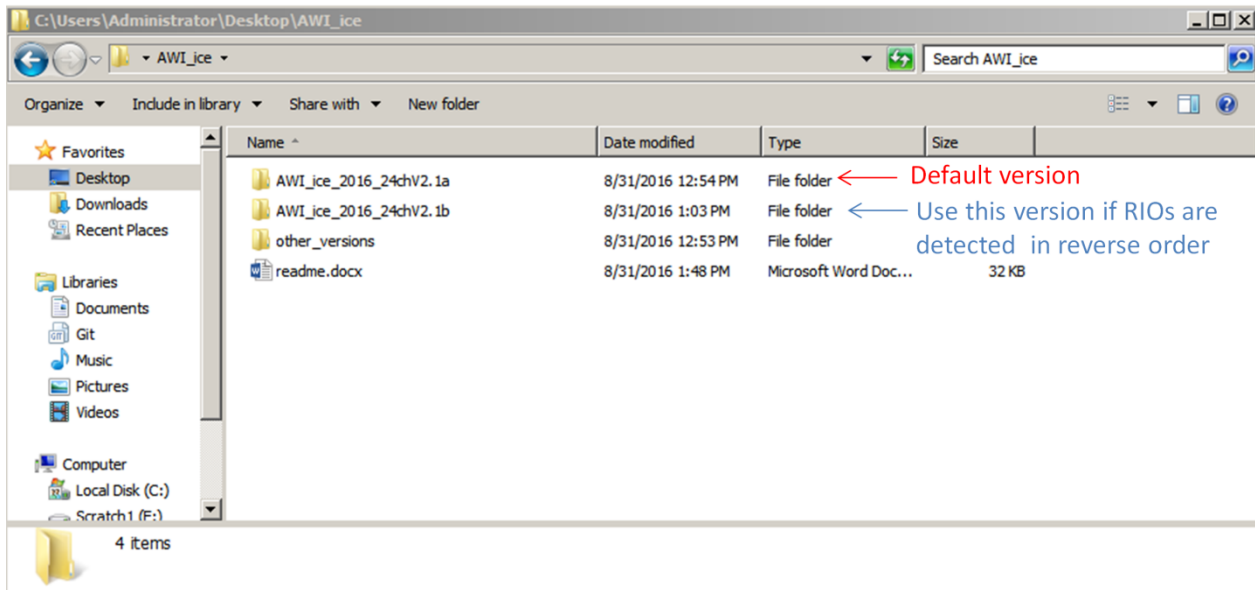

Fig. 8: Shortcuts to the different versions of the Radar DAQ software. Use AWI_ice_2016_24chV2.1a.exe under the folder AWI_ice_2016_24chV2.1a as the default software.
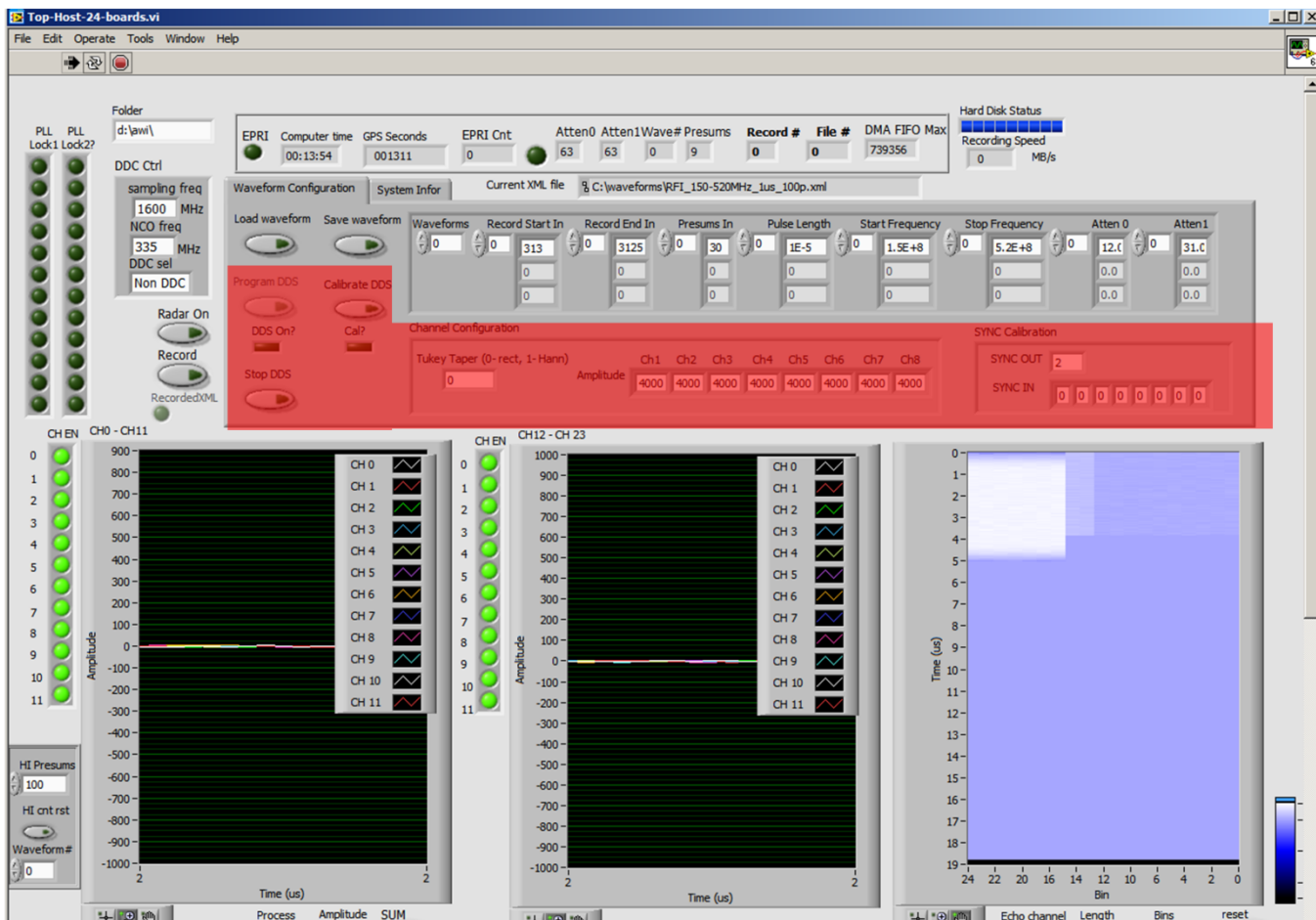

Fig. 9: Main Radar DAQ GUI. The red shadowed areas are not used with the new waveform generator.

2.2.2   Radar operation

Once both the waveform generator GUI (arenaGUI) and radar DAQ are running follow the ensuing steps for routine operation.

To start the radar:

- Once the AWI_ice_2016_24chV2.1 program is running, wait for all 24 "PLL Lock1" and "PLL Lock2" lights on left side of the Radar DAQ screen to turn green and verify that "GPS seconds" in the upper part of screen is running and updating (Fig. 10).
- Verify that the arenaGUI is in the -1: Stopped state.
- Load the desired configuration files on both the Radar DAQ (Load waveform) and on the arenaGUI (File->Open configuration). In the ArenaGUI the path of the configuration file that is currently loaded will appear on window title.
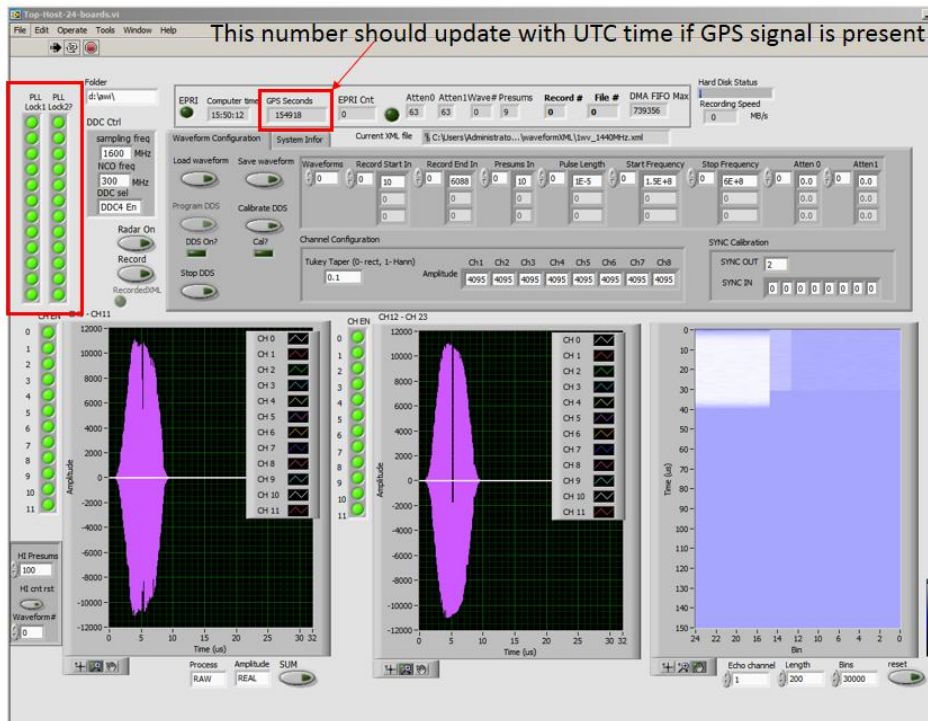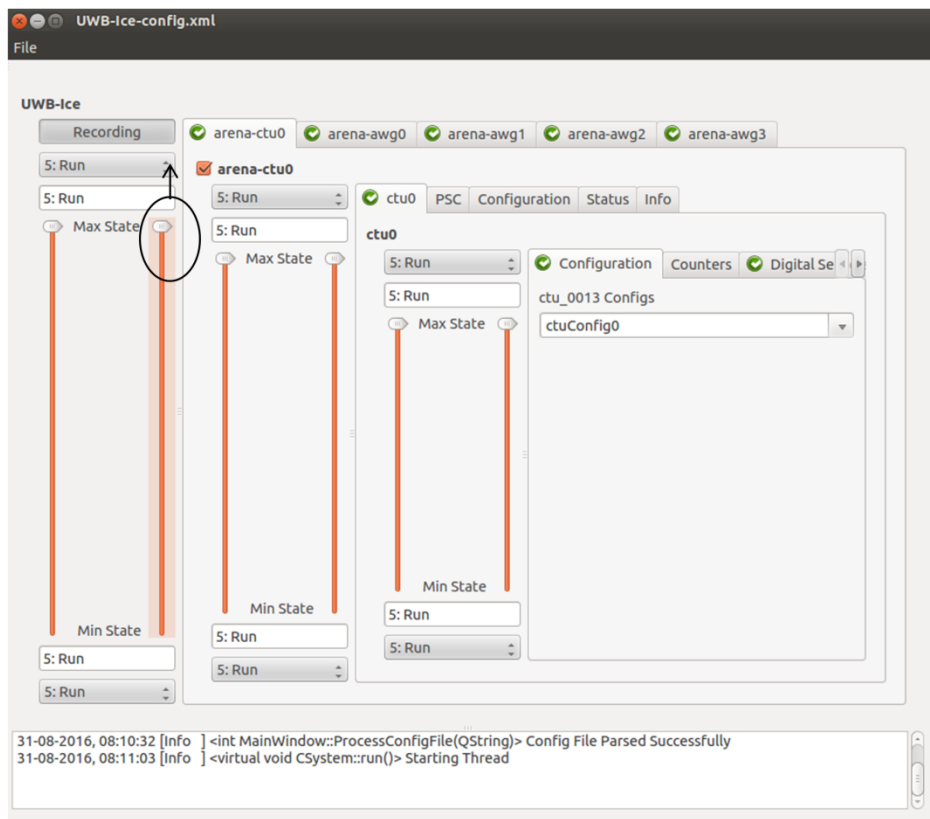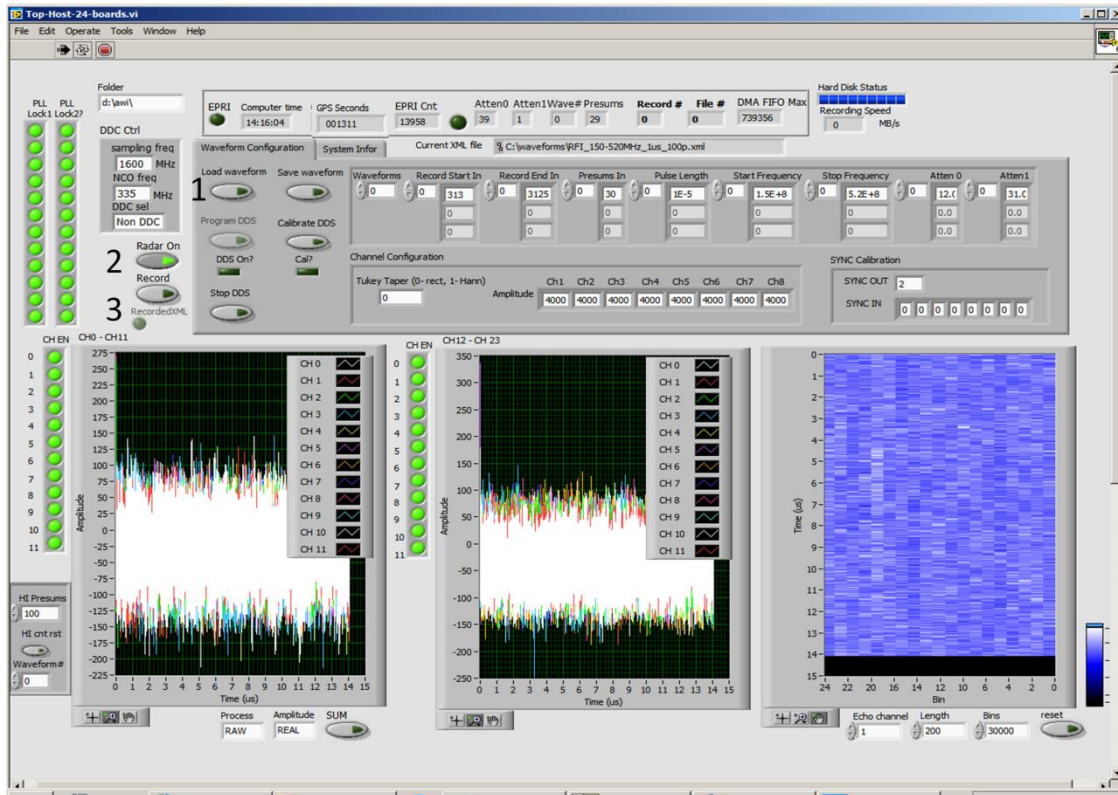

Fig. 10: Graphical user interface showing the PLL Lock1 and PLL Lock2 indicators on as well as GPS time.

- Switch on T/R Chassis using the switch located at upper right corner of the chassis. The LED in the front panel should be ON. ⚠ **Caution: Always make sure the T/R switch chassis is ON before enabling the power amplifiers.**

- Verify that the "Enable" switches on the power amplifiers are off, then turn on "Power" switches sequentially. Pause after each until "DC Power" LED on the amplifiers lights up.

- Verify that the arenaGUI (waveform generator) is in the -1: Stopped before enabling power amplifiers. If necessary, use the slider to bring it back to the stopped state. **Turn on the "Enable" switches on the power amplifiers <u>when is safe to transmit.</u>**

- Slide the right slider from the two left-most controls (marked in Fig. 7) to the "5:Run" position. Note that the two left-most sliders marked in Fig. 7 control the other sub-sliders, which will change automatically.

Fig. 11: ArenaGUI with the waveform generator in 5:Run State. Only the left-most sliders are to be used. To increase the state number, use the right slider all the other sub-sliders will change automatically.
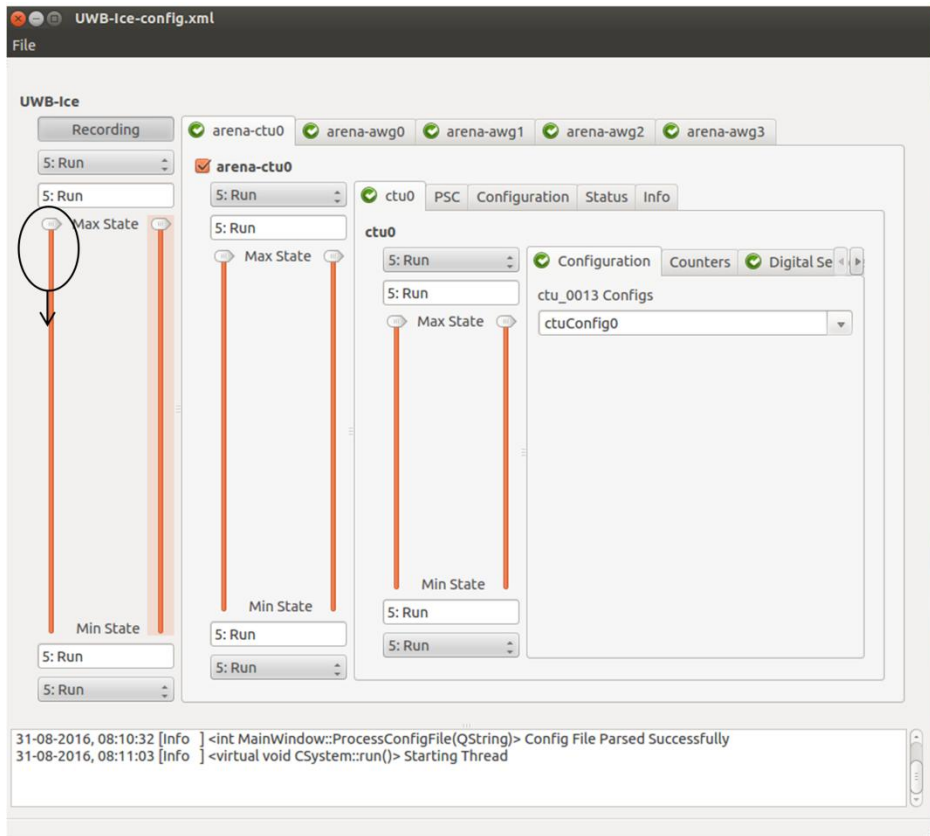
- At this point all the RF on LEDS on the power amplifiers should be green, indicating that the radar is transmitting.

- Click on "Radar On" on the Radar DAQ GUI. Check if graphic displays start updating.

- Click on "Record", check subfolders of d:\awi for new files being written. Request Event "UWB start", if desired.

Fig. 12: Graphical user interface showing the sequence to operate the Radar DAQ GUI and record data once the radar is transmitting via the ArenaGUI in state 5: Run. The sequence is: Load waveform->Radar on->Record

To stop the radar
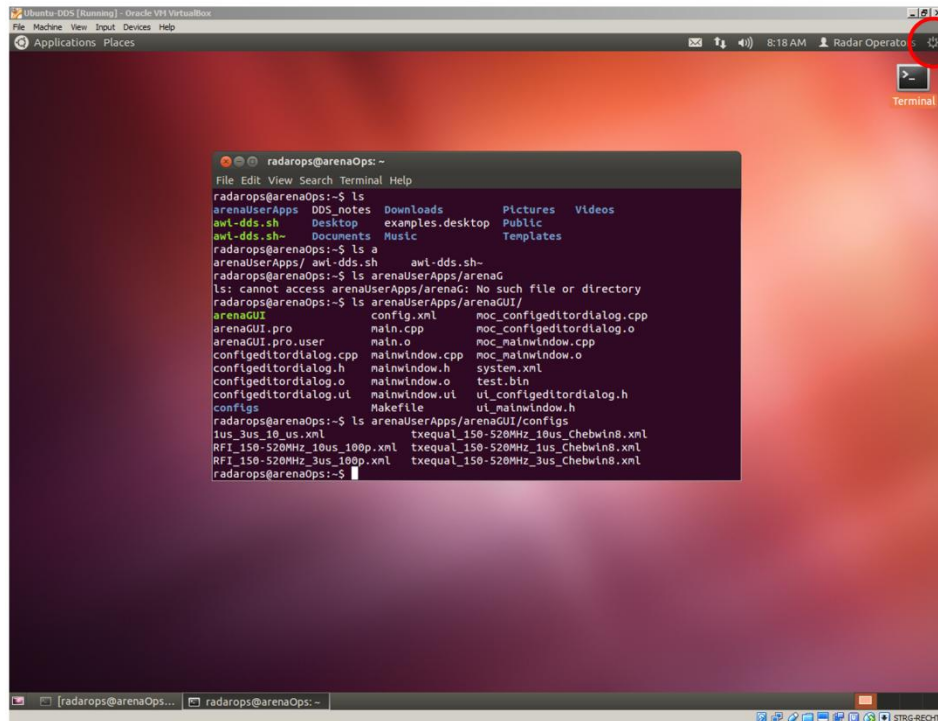
- Stop recording by disabling the "Record" button in the Radar DAQ GUI. Note that if the "Record" button is highlighted, click on "Record" to stop, request Event "UWB Stop", and wait for red indicator at top of screen to turn dark prior to next step.
- Disable the radar DAQ by clicking on "Radar On" to turn it dark green.
- Change the right slider in the ArenaGUI to the -1:Stopped position.

Fig. 13: ArenaGUI with the waveform generator in 5:Run State. Only the left-most sliders are to be used. To decrease the state number, use the left slider all the other sub-sliders will change automatically.

- Close the ArenaGUI window and shutdown the virtual machine by using the shutdown button on the upper right corner (Fig 14).

Fig 14: Shutting down the virtual machine after closing the ArenaGUI window.

Apendix I.

NI 1075 Trigger configuration

The gain of all the analog receivers in the 1075 chassis is controlled by means of two variable attenuators (Hittite HMC624LP4E). Each attenuator can be set to value between 0 and 31.5 dB. The attenuation values are controlled from the Master chassis (NI 1085) via the COM cards and transmitted through the back-plane of the 1075 chassis. Fig. A-1 shows the mapping of the trigger signals. If the receiver gain is not being adjusted, verify that these are mapped correctly by using the NI Measurement & Automation Explorer (NI MAX).
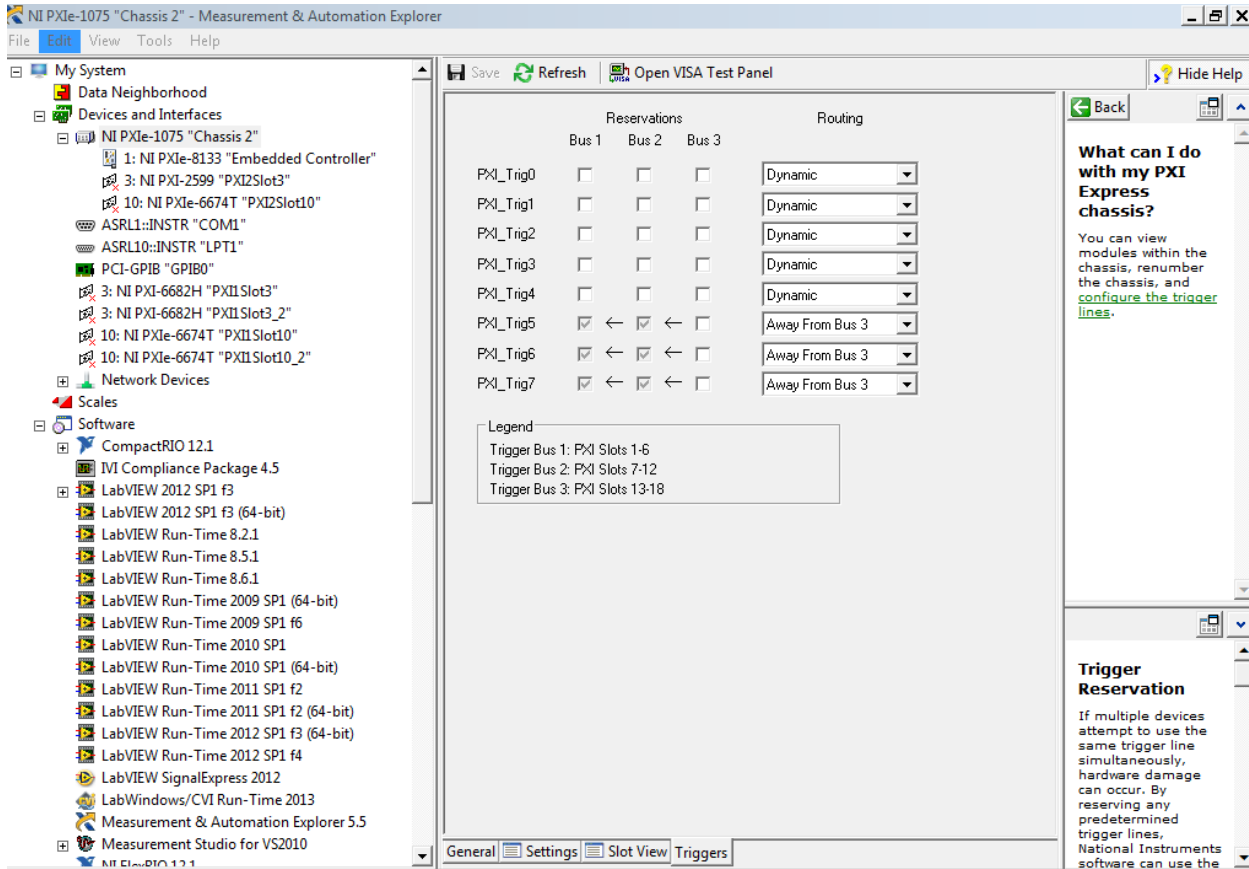

Fig A-1: NI 1075 trigger signal mapping on NI MAX (RF Rx).

Troubleshooting

1) Issue: GPS seconds does not update when the radar is turned ON or files are not recorded

Cause: This may indicate that the device numbering of the FlexRIO devices and timing cards in the master and slave chassis has changed.

Solution: Try running the AWI_ice_2016_24chV2.1b.exe file, which was compiled with the other possible device numbering.

If the problem persists verify the order of slot to RIO mapping. This needs to be updated in the top host vi so that it matches the order in NI max. The listing of RIOS in the vi is, from top down, channel 1 to channel 24. Channel 7 is the master. The timing cards ("Dev 1" and "Dev 2") should also be matched to whatever shows up in the NI max. Save the VI and recompile the program. Then power down server. Then start it up again.

Top-Host-24-boards.vi Block Diagram on UWB_24channel.lvproj/My Computer

File Edit View Project Operate Tools Window Help

13pt Application Font

5
RIO17
RIO19
RIO18
RIO22
RIO23
RIO20
Master
RIO21
9
RIO15
RIO12
RIO13
RIO14
RIO16

24

N
UWB
PXIe-7975R
i

File #
0 Record #

N

True

User Status
PLL Locked
Master
Global Rec
6

i

i

Dev2
RIO5
RIO7
RIO6
RIO10
RIO11
RIO8
RIO9
RIO3
RIO0
RIO1

UWB_24channel.lvproj/My Computer

Navigation

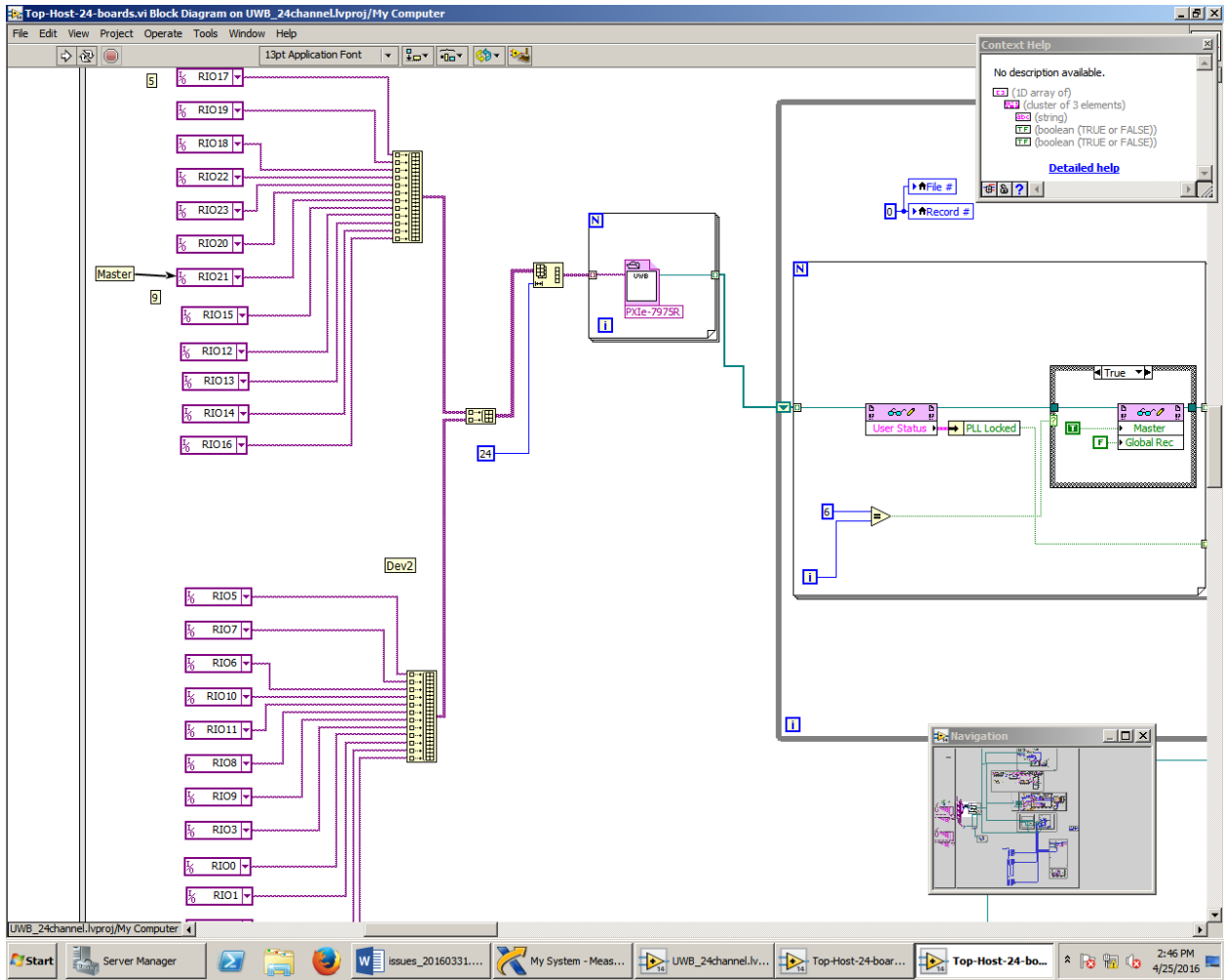Start   Server Manager   issues_20160331....   My System - Meas...   UWB_24channel.lv...   Top-Host-24-boar...   Top-Host-24-bo...   2:46 PM 4/25/2016

My System - Measurement & Automation Explorer

File Edit View Tools Help

Save Refresh Hide Help

- My System
  - Data Neighborhood
  - Devices and Interfaces
    - NI PXIe-1085 "Chassis 1"
      - 1: NI PXIe-8381
      - 2: NI PXIe-7975R "RIO17"
      - 3: NI PXIe-7975R "RIO19"
      - 4: NI PXIe-7975R "RIO18"
      - 5: NI PXIe-7975R "RIO22"
      - 6: NI PXIe-7975R "RIO23"
      - 7: NI PXIe-7975R "RIO20"
      - 8: NI PXIe-7975R "RIO21"
      - 10: NI PXIe-6674T "Dev2"
      - 13: NI PXIe-7975R "RIO15"
      - 14: NI PXIe-7975R "RIO12"
      - 15: NI PXIe-7975R "RIO13"
      - 16: NI PXIe-7975R "RIO14"
      - 17: NI PXIe-7975R "RIO16"
    - NI PXIe-1085 "Chassis 2"
      - 1: NI PXIe-8381
      - 2: NI PXIe-7975R "RIO5"
      - 3: NI PXIe-7975R "RIO7"
      - 4: NI PXIe-7975R "RIO6"
      - 5: NI PXIe-7975R "RIO10"
      - 6: NI PXIe-7975R "RIO11"
      - 7: NI PXIe-7975R "RIO8"
      - 8: NI PXIe-7975R "RIO9"
      - 10: NI PXIe-6674T "Dev1"
      - 13: NI PXIe-7975R "RIO3"
      - 14: NI PXIe-7975R "RIO0"
      - 15: NI PXIe-7975R "RIO1"
      - 16: NI PXIe-7975R "RIO2"
      - 17: NI PXIe-7975R "RIO4"
    - ASRL1::INSTR "COM1"
    - NI PCIe-8381
    - NI PCIe-8381

Back

System Settings

Hostname	AIR1
DNS Name	AIR1
Vendor	Silicon Mechanics
Model	Storform iServ R516.v4
Serial Number	SM87874
Firmware Revision	3.0b
Operating System	Microsoft Windows Server 2008 R2 En
System Start Time	4/25/2016 2:41:02 PM
Description	Primary In-Flight Data Collection
System Configuration Web Access	Local Only

System Resources

Total Physical Memory	128 GB				
Free Physical Memory	121 GB				
Total Virtual Memory	256 GB				
Free Virtual Memory	249 GB				
Primary Disk Capacity	931 GB				
Primary Disk Free Space	451 GB				
CPU Total Load	37%	0%	0%	0%	25%
CPU Interrupt Load	37%	0%	0%	0%	24%

Settings

National Instruments Measurement & Automation Explorer

Measurement & Automation Explorer (MAX) provides access to your National Instruments products.

What do you want to do?

Manage my devices and interfaces

Manage my installed National Instruments software

Manage virtual channels or tasks for my devices

Create scales for my virtual instruments

Configure my IVI instrument drivers

Import/export my device configuration file.

Note Some categories are device specific. For example, the IVI category appears only if you have IVI installed.

For more information about using MAX, select available help categories from the **Help** menu. If you need further assistance or want to know more about your device, visit the National Instruments Technical Support website.

For more information about this version of MAX, launch the readme or visit ni.com/info and enter the following Info Codes:

- SysCfgFixList—Improvements and bug fixes
- SysCfg140KnownIssues—Known issues

Test Panels : NI PXIe-6674T: "Dev2"

| Routing | Clock | Measure | Advanced |

Frequency Measurement

Terminal

PFI0

Duration

5 ▲▼ s ▼

Measured Frequency: 0 MHz

Actual Duration: 0 us

[Measure]

Line State

PFI: 0 1 2 3 4 5

PFI_LVDS: 0 1 2

PXI_Trig: 0 1 2 3 4 5 6 7

PXIe_DStarB: P

PXI_Star: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

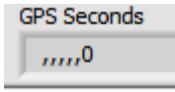PXIe_DStarC: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

[Update Line State] Peripheral lines are denoted with a 'P'.

Clock Status

● PXI_Clock10 Present

[Close] [Help]

2) Issue: GPS seconds is not a number, instead the user sees ",,,,,0" in this field ( )

Cause: GPS receiver in the NI chassis is working but there is no GPS signal from the GPS receiver or splitter.
Solution: Check the GPS antenna connections to the aircraft, splitter, and radar rack.

3) Issue: Cannot communicate with the Waveform generator. ArenaGUI is irresponsive when moving sliders.

Cause: This may indicate a problem with the IP communication between server and Arena devices inside the waveform generator.

Solution: Make sure the following addresses can be pinged from the server from a terminal in the Virtual box.

Unit	IP address	Function
CTU	10.0.0.50	Central timing unit
WG0	10.0.0.51	Channels 1 & 2
WG1	10.0.0.52	Channels 3 & 4
WG2	10.0.0.53	Channels 5 & 6
WG3	10.0.0.54	Channels 7 & 8

4) Issue: When the waveform generator is in 5:Run state the LEDs in the power amplifiers do not turn on indicating that there is no RF signal at their input.

   Cause: This may indicate that the waveform generator is not transmitting (not programmed or operating properly).

   Solution: Check that the correct waveform generator file has been loaded. Verify that the waveform generator is being properly configured. The window terminal from which the ArenaGUI is being operated should show the following messages and no errors. Note that the number of sequences may be different but it should be a stable screen with several messages indicating GOING UP: Arm, Run.

To further check the alignment and proper operation, bring the slider from state -1: Stop to 2: Align. Next, click on the tab labeled arena-awg0. This provides information on Channels 1 (awg0) and 2 (awg1). Click on the awg0 sub-tab to check alignment of Channel1 by clicking in the status sub-sub-tab. Verify that the Align Actual (Min:Ave:Max) values are updating and that the Ave value is within the Align Desired (Min:Max) range. Ideally it should be in the middle of the range. Verify that all the temperature values on the lower right corner of the status sub-sub tab are also updating. The same can be done for the awg1 sub tab within the arena-awg0 tab and under the arena-awg1 (awg2, awg3), arena-awg2 (awg4, awg5), and arena-aw3(awg6, awg7) tabs. Note that the Min:Max ranges may be different for different channels. What is important is that the Ave value is within the desired Min:Max as explained above. Actual temperature values may also be different than those in the screenshots below.

Screenshot 1 (awg0):

UWB-Ice-/home/radarops/arenaUserApps/Configs/150_520MHz_RFI_10us_Full_Power.xml

File

UWB-Ice

Recording

2: Align
2: Align
Max State

Bring slider up to
State 2: Align

Min State
2: Align
2: Align

arena-ctu0   arena-awg0   arena-awg1   arena-awg2   arena-awg3

arena-awg0

2: Open
2: Open
Max State

Min State
2: Open
2: Open

awg0   awg1   PSC   Configuration   Status   Info

awg0

2: Align
2: Align
Max State

Min State
2: Align
2: Align

Configuration   Status   Counters   Info

Alignment

Align Enabled

Divide Cntr Position   12
Align Actual (Min:Ave:Max)   -74:10:94
Align Desired (Min:Max)   0   20

Inc Sync Phase

Dec Sync Phase

Temperatures

Zynq Core   39.87 C
Mezz. Board1   30.00 C
Mezz. Board2   29.50 C

Check that these
numbers update
And that the
average (e.g. 10) is
in the middle of the
min:max range (e.g.
0:20)

Check that these
internal
temperature values
are updating

31-08-2016, 02:33:59 [Info] <int MainWindow::ProcessConfigFile(QString)> Config File Parsed Successfully
31-08-2016, 02:34:15 [Info] <virtual void CSystem::run()> Starting Thread

Screenshot 2 (awg1):

UWB-Ice-/home/radarops/arenaUserApps/Configs/150_520MHz_RFI_10us_Full_Power.xml

File

UWB-Ice

Recording

2: Align
2: Align
Max State

Bring slider up to
State 2: Align

Min State
2: Align
2: Align

arena-ctu0   arena-awg0   arena-awg1   arena-awg2   arena-awg3

arena-awg0

2: Open
2: Open
Max State

Min State
2: Open
2: Open

awg0   awg1   PSC   Configuration   Status   Info

awg1

2: Align
2: Align
Max State

Min State
2: Align
2: Align

Configuration   Status   Counters   Info

Alignment

Align Enabled

Divide Cntr Position   12
Align Actual (Min:Ave:Max)   -67:17:101
Align Desired (Min:Max)   10   30

Inc Sync Phase

Dec Sync Phase

Temperatures

Zynq Core   40.48 C
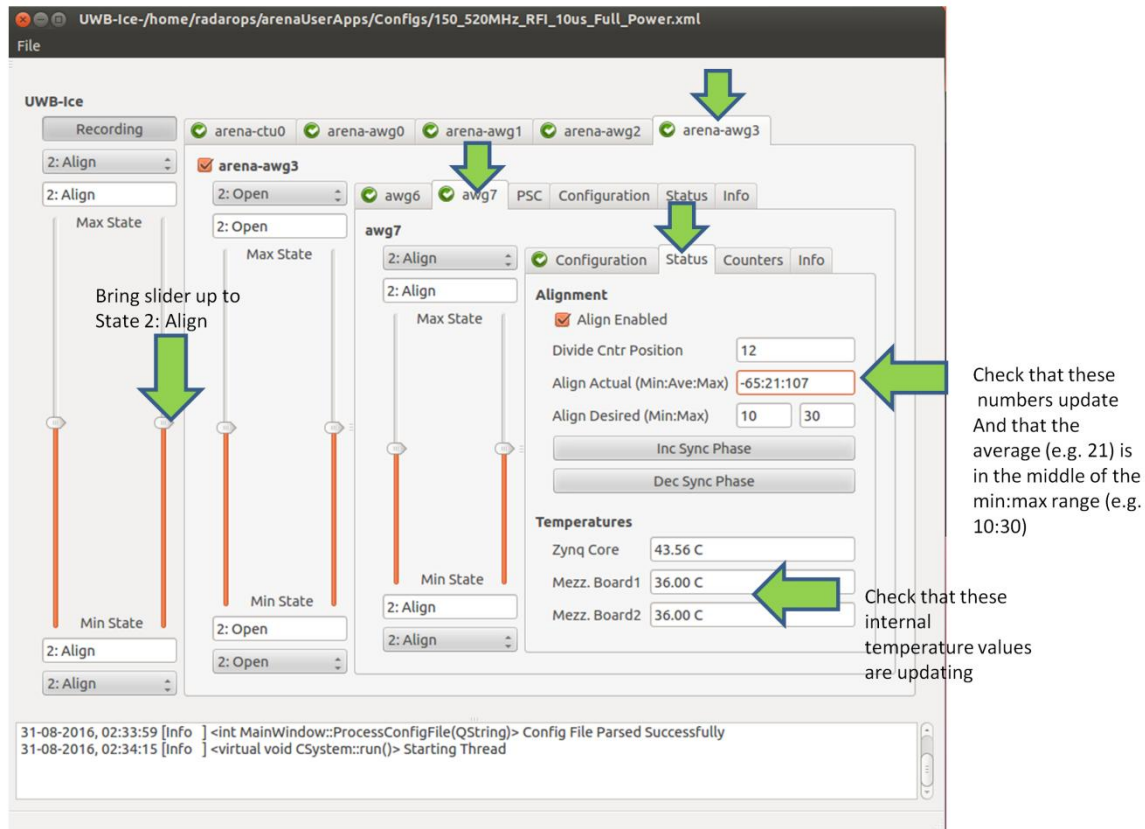Mezz. Board1   32.00 C
Mezz. Board2   31.50 C

Check that these
numbers update
And that the
average (e.g. 17) is
in the middle of the
min:max range (e.g.
10:30)

Check that these
internal
temperature values
are updating

31-08-2016, 02:33:59 [Info] <int MainWindow::ProcessConfigFile(QString)> Config File Parsed Successfully
31-08-2016, 02:34:15 [Info] <virtual void CSystem::run()> Starting Thread

UWB-Ice -/home/radarops/arenaUserApps/Configs/150_520MHz_RFI_10us_Full_Power.xml

File

UWB-Ice

Recording

⊘ arena-ctu0   ⊘ arena-awg0   ⊘ arena-awg1   ⊘ arena-awg2   ⊘ arena-awg3

2: Align

2: Align   ☑ arena-awg3

Max State

2: Open   ⊘ awg6   ⊘ awg7   PSC   Configuration   Status   Info

2: Open   **awg7**

Max State

Bring slider up to State 2: Align

2: Align   ⊘ Configuration   Status   Counters   Info

2: Align   **Alignment**
☑ Align Enabled

Max State

Divide Cntr Position   12

Align Actual (Min:Ave:Max)   -65:21:107   ⟵ Check that these numbers update And that the average (e.g. 21) is in the middle of the min:max range (e.g. 10:30)

Align Desired (Min:Max)   10   30

Inc Sync Phase

Dec Sync Phase

Temperatures

Zynq Core   43.56 C

Min State   Mezz. Board1   36.00 C   ⟵ Check that these internal temperature values are updating

2: Align   Mezz. Board2   36.00 C

Min State   2: Align

2: Align   2: Open

2: Align   2: Open

31-08-2016, 02:33:59 [Info] <int MainWindow::ProcessConfigFile(QString)> Config File Parsed Successfully
31-08-2016, 02:34:15 [Info] <virtual void CSystem::run()> Starting Thread

5) Issue: Quicklook display in the Radar DAQ GUI does not update when the radar is supposed to be running.

Cause: This may indicate that the 1085 Chassis are not getting the desired trigger signals (EPRI, PRI).

Solution:
- Verify cable connections from the waveform generator chassis and the Master and Slave 1085 chassis.
- Verify that the correct configuration files have been loaded on both the Radar DAQ GUI and the ArenaGUI.
- Verify that the waveform generator is operating properly (see issue 3).
- Open NI MAX application and double click on the timing board icon for the master chassis (PXIe-6674T), run the test panels and use the Measure tab to verify the presence of the signals PFI0 (PRI trigger), PFI2 (EPRI). Set the measure period for 1 second. The PFI0 should measure several kHz for the PRF and the PFI2 should measure several hundred hertz for the effective PRF. Exact values depend on configuration settings. The same can be done for the timing card 6674T in the slave chassis.

6) Issue: Power amplifiers show a fault indicator.

Consult the manual for the power amplifier. Be aware that a high VSWR fault indicator may indicate a lose cable connection.

7) Issue: UPS does not start properly and produces clicking noises cycling between fault and OK state
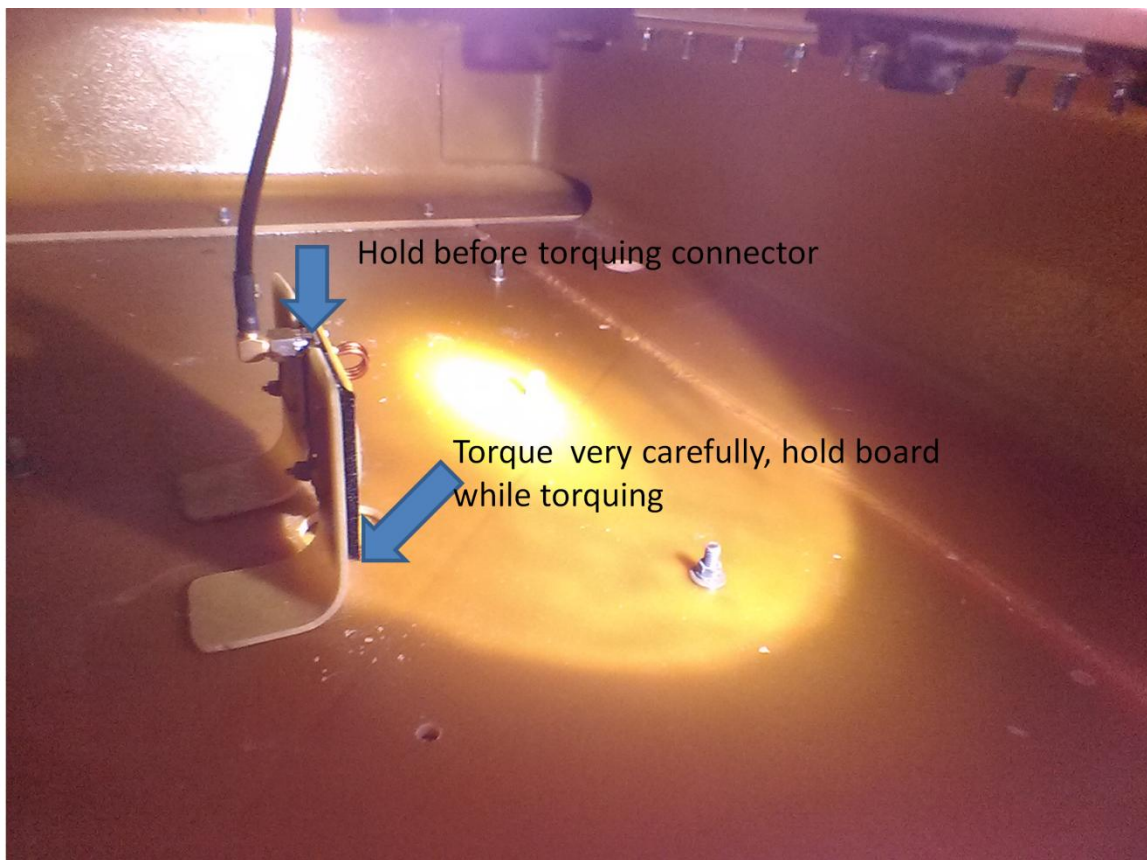
Cause: This could occur if the batteries are not fully charged or if there is an overload condition in the UPS.

Solution:

- Make sure the loads are properly balanced. Use the in-line AC current meters to verify that load is below ~10 A per UPS.
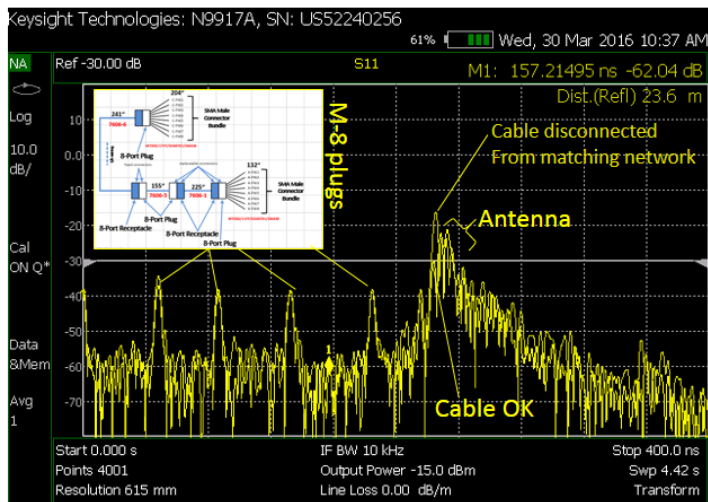- Warm up the UPS before starting.

Antenna cable setup and verification

- Verify that all the RF cable connections are tight. The M8 multi-connector shells should be secured tightly and stress relieved.
- For SMA cables, ensure that they are properly torqued (recommended torque is 7.5 in-lb). When torquing a non-flanged connector, make sure that both sides are secured (stress relieved) to prevent breakage. This is particularly important with the cables and impedance matching network cards inside the fairing. There are two connectors, one for the black cable on top, and one to the plate. Both should be tightened.

- If a network analyzer is available, the distant to fault should be measured for each cable from the inside of the cabin. This requires a set of 24 measurements. The plot below shows an example of a normal measurement vs. a disconnect measurement done on antenna L6 during the April 2016 campaign.

Superimposed traces of VNA response with the L6 antenna disconnected (orange, before fix) and connected (after fix, yellow).

NA settings:150-600 MHz, 4001 points after using "Quick-cal" feature, which only requires open and load. To get time domain response on VNA press Meas Setup->Transform->transform in and set start/stop limits (e.g. [0, 400 ns]).

Note that when the antenna is properly connected, all reflections are below 20 dB. A complete disconnect produces a ~15 dB change in the reflection at the matching network feed

- If a network analyzer is not available, verify each connection carefully and make sure it they are mechanically stable (not lose connectors) and use the radar data to verify operation and proper signal levels in all channels.

Other recommendations

- Verify that all the AC power connections are properly tight and stress relieved
- Make sure the grounding straps for the power amplifiers are properly attached to the ground
- In dry/cold environments users should be aware of static electricity. It is recommended that the user is grounded to the chassis (e.g. via a strap or simply touching the rack) when troubleshooting or handling the radar electronics (not necessary if the user is simply operating the system from the console).