Digital Receiver Technology, Inc.

DRT4300B System Software Manual

For DRT4300B System Software R01.05.00 & greater

(DRT Part No. 434-00191)

Rev. 2.0, 29 July 2013

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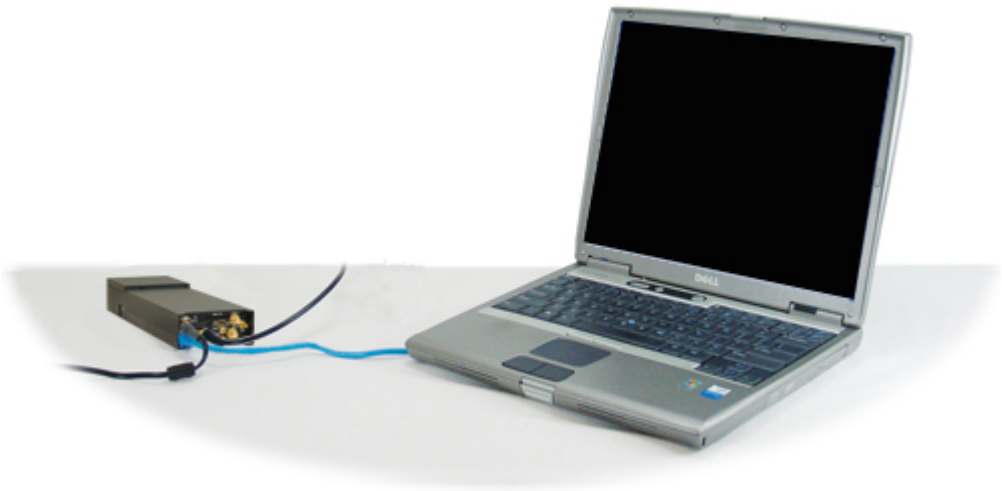
1 Introduction

These instructions describe *Galena* and the Android GUI that are used to control the DRT4311B Wideband Test Receiver. *Galena* runs on a PC while Android runs on a tablet or smart phone.



2 PC Requirements

The *Galena* GUI is loaded onto a PC meeting the following minimum requirements:

- 1.2 gigahertz (GHz) or faster 32-bit (x86) processor or 64-bit (x64) processor.
- *Windows XP* Professional or *Windows 7* (contact DRT for the latest versions of *Windows 7* that have been tested).
- 2 gigabytes (GB) RAM.
- 50 megabytes (MB) of available hard disk space.
- Super VGA (800 x 600) or higher resolution monitor.
- Keyboard and Mouse or compatible pointing device.
- CD-ROM or DVD drive required for local software updates.
- Sound requires audio output device and speaker/headset.
- To communicate with DRT system: Network adapter card supporting TCP required; 10/100 Ethernet LAN adapter recommended.

3 System Software - Connect, Install

3.1 Connecting to a Unit

Your unit is supplied with the current version of software installed and if a PC was also supplied, it should also be configured correctly for your unit. If software does need to be installed on the unit or the controller PC, refer to the ***Install Software: DRT4300B System Software CD*** section.

3.1.1 System Software CD

The *DRT4300B System Software* CD contains the files necessary to install:

- Embedded (system) files on the DRT4311B
- *Galena* GUI on the controller PC

3.1.2 Network Mode Selection

The DRT4311B is capable of operating using:

- Wired Ethernet

3.1.2.1 Unit Name and Default IP Address

3.1.2.1.1 DRT4311B

The unit's default network name is DRT4311BsnXXXX where XXXX represents the unit's serial number. For example, a unit with serial number 2302 would have the name DRT4311BSN2302.

The factory default IP addresses are:

- Wired Ethernet: 192.168.1.100

3.1.2.1.2 Controller PC

The default IP address for the controller PC, if supplied by DRT, is: 192.168.1.200.

3.1.3 Routers

If the DRT system is connected to a router, ensure the router is configured to forward UDP multicast traffic. To prevent "broadcasting to the internet," the DRT software will allow only one router transition.

NOTE:
When performing unit discovery, K*Galena* uses port 5602/UDP and *Yukon4k* uses port 5601 for DRT unit network configuration. These ports should not be blocked.
Unless the controller PC and the unit are on the same subnet, the PC will not find the unit during unit discovery, although the unit will respond if the correct unit name or IP address is used to connect with the unit.

3.1.4 DRT4311B System Power Control

The DRT4311B has two power modes, Standby and On. When power is applied to the unit (either by connecting a power cable to the DC IN connector on the front panel or by connecting an optional battery at the rear on the system) the system is On. To set the system to Standby, press and release the power control button.

To reboot the system, from an On state, return the system to Standby, remove power from the unit, reapply power to the unit, and turn ON the unit. From a Standby state, remove power from the unit, reapply power to the unit, and turn ON the unit.

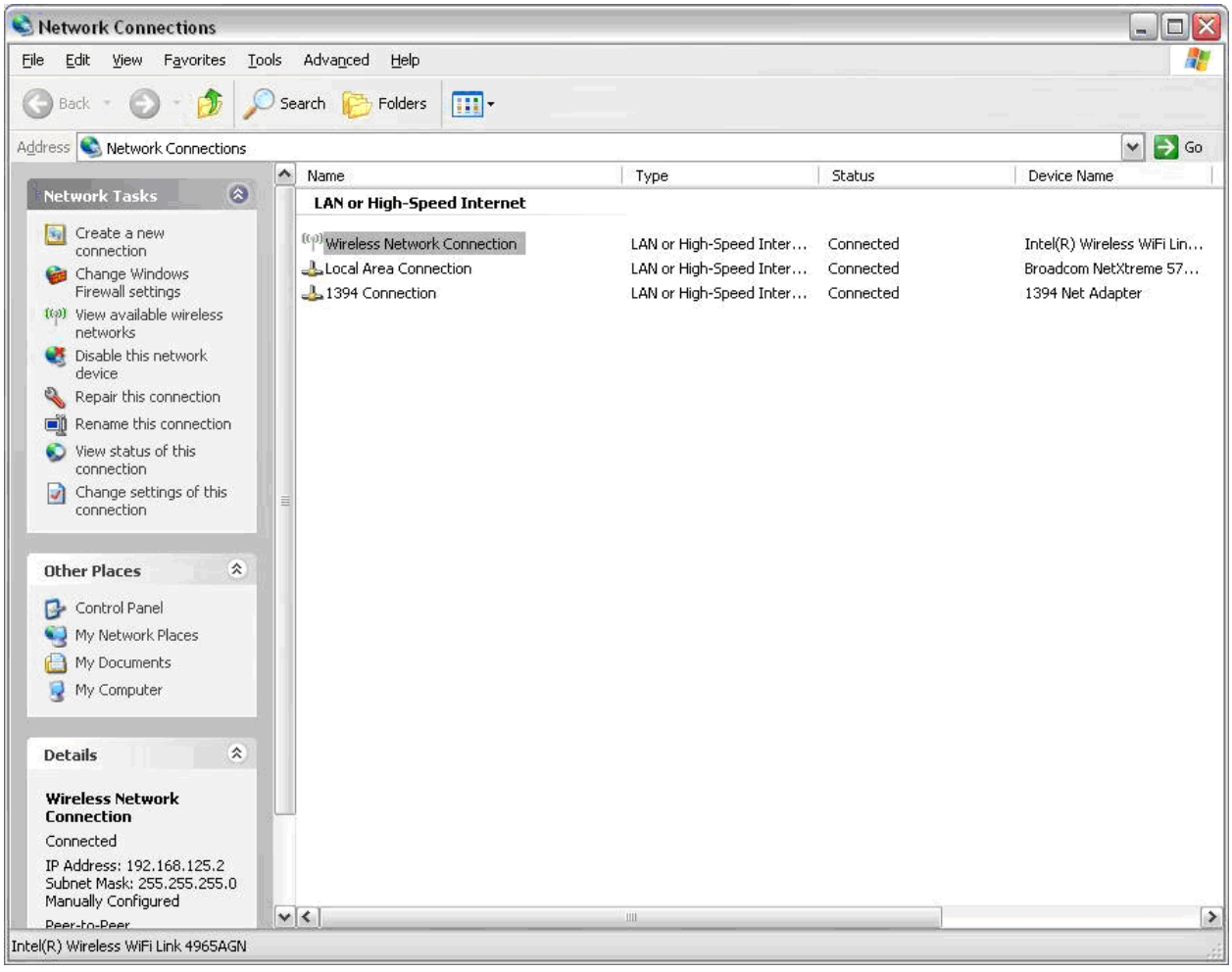
3.1.5 Configuring the Controller PC

Your controller PC may be operating *Windows XP* or *Windows 7* as the operating system (OS). Follow the instructions, below, for your PC's OS.

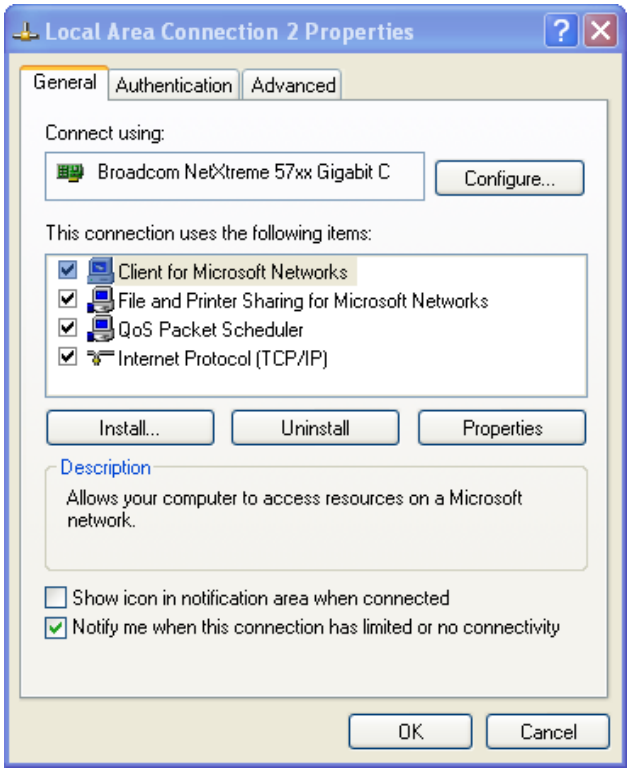
3.1.5.1 Controller PC - Windows XP

If not supplied, the Controller PC with Windows XP as the installed operating system must be configured before configuring the system. The system may be controlled over a network from a fixed location PC or from a direct connection to a PC. In any case, it is necessary to configure the Controller PC for communications with the unit. To configure the PC:

Click the **START** button on the *Windows* Desktop, then click the **Control Panel**. Double-click **Network Connections**. A window similar to that shown below will appear. The actual window will depend on the configuration of the PC being used.



Right-click **Local Area Connection** to set up a wired connection. When you right-click your selection, a popup menu will appear. Click **Properties**. The **Local Area Connection Properties** dialog will appear:



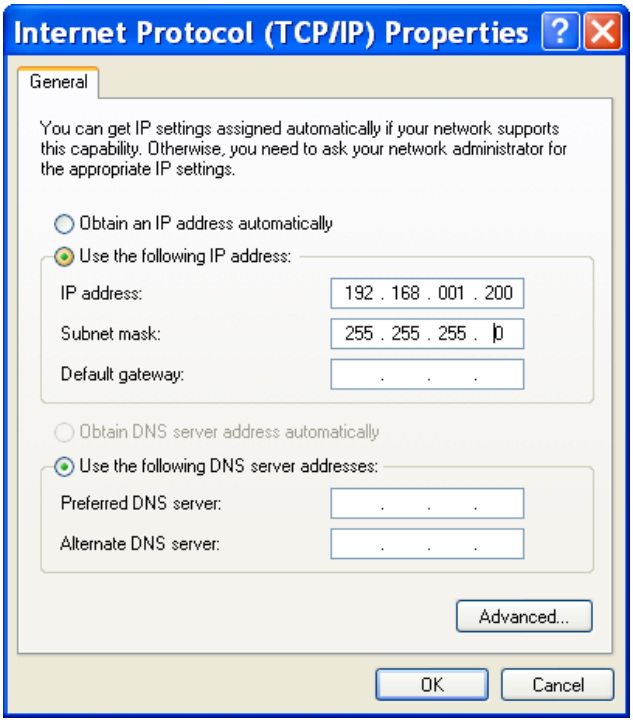
Select the entry **Internet Protocol (TCP/IP)** and then click the **Properties** button below and to the right of the list. This will bring up the **Internet Protocol (TCP/IP) Properties** dialog.

If the PC is to be configured for DHCP (wired Ethernet only), select **Obtain an IP address automatically** and exit the setup.

If the PC is to be configured for static IP, select **Use the following IP address:** then enter the desired IP address (for example **192.168.001.200)** in the **IP address** field. Next, press the TAB key to move the cursor to the **Subnet mask** field. If the IP address has been entered properly, the Subnet mask should automatically have the entry **255.255.255.0** entered in the field. If the IP address is correct and the subnet mask entry is incorrect, change the subnet mask to the correct entry.

Exit the setup by clicking **OK** to close the **Internet Protocol (TCP/IP) Properties** window, then click the **Close** button on the **Local Area Connection Properties** window. Finally, click the "X" box in the upper right corner of the **Network Connections** window to exit that window.

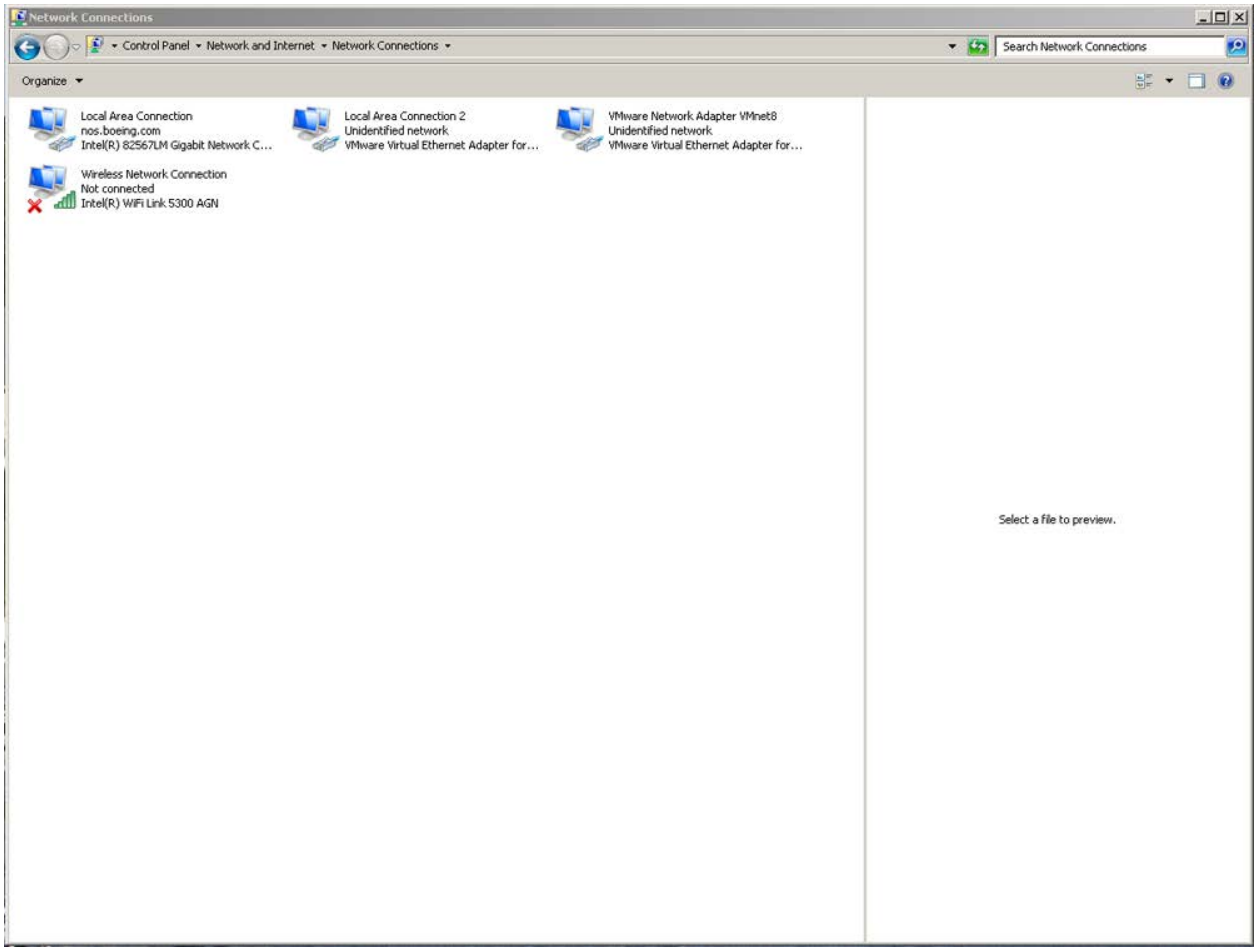
The PC is now configured for operation with the system.



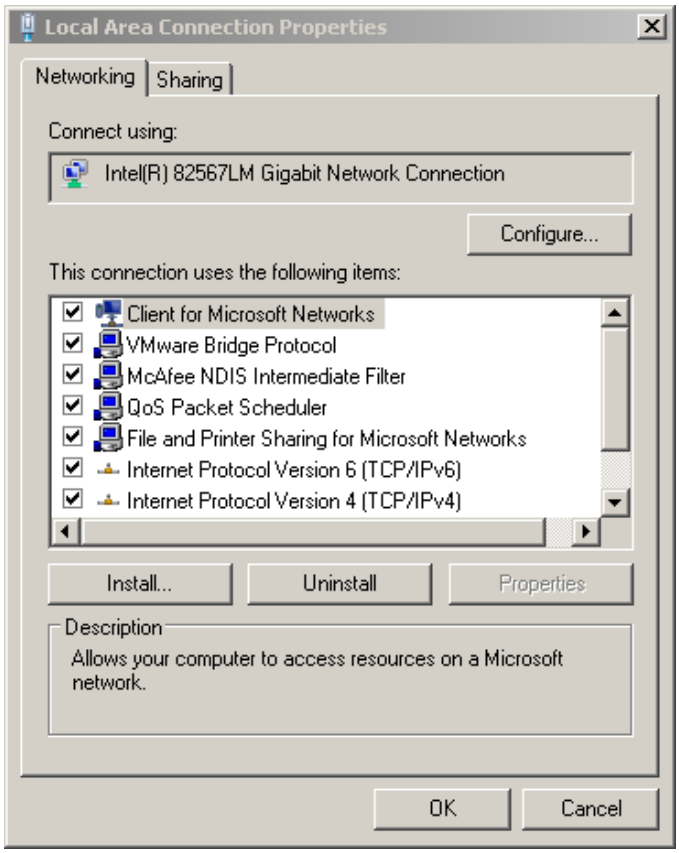
3.1.5.2 Controller PC - Windows 7

If not supplied, the Controller PC with Windows 7 as the installed operating system must be configured before configuring the system. The system may be controlled over a network from a fixed location PC or from a direct connection to a PC. In any case, it is necessary to configure the Controller PC for communications with the unit. To configure the PC:

Click the **START** button on the *Windows* Desktop, then click the **Control Panel**. Click **Network and Sharing Center** and then **click Change adapter settings**. A window similar to that shown below will appear. The actual window will depend on the configuration of the PC being used.



Right-click **Local Area Connection** to set up a wired connection. When you right-click your selection, a popup menu will appear. Click **Properties**. The **Local Area Connection Properties** dialog will appear:



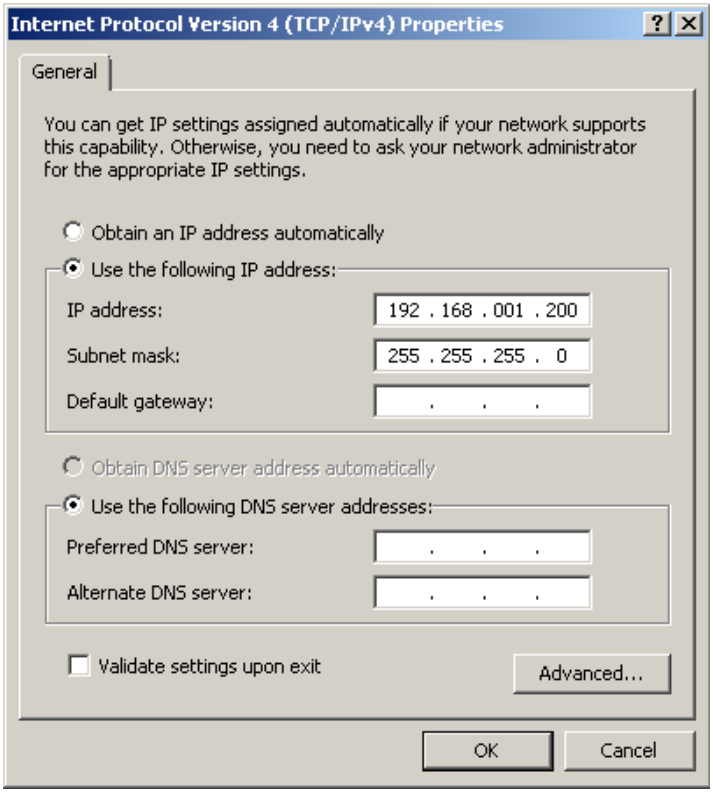
Select the entry **Internet Protocol Version 4 (TCP/IPv4)** and then click the **Properties** button below and to the right of the list. This will bring up the **Internet Protocol Version 4 (TCP/IPv4)** dialog.

If the PC is to be configured for DHCP (wired Ethernet only), select **Obtain an IP address automatically** and exit the setup.

If the PC is to be configured for static IP, select **Use the following IP address:** then enter the desired IP address (for example **192.168.001.200)** in the **IP address** field. Next, press the TAB key to move the cursor to the **Subnet mask** field. If the IP address has been entered properly, the Subnet mask should automatically have the entry **255.255.255.0** entered in the field. If the IP address is correct and the subnet mask entry is incorrect, change the subnet mask to the correct entry.

Exit the setup by clicking **OK** to close the **Internet Protocol (TCP/IP) Properties** window, then click the **OK** button on the **Local Area Connection Properties** window. Finally, click the "X" box in the upper right corner of the **Network Connections** window to exit that window.

The PC is now configured for operation with the system.



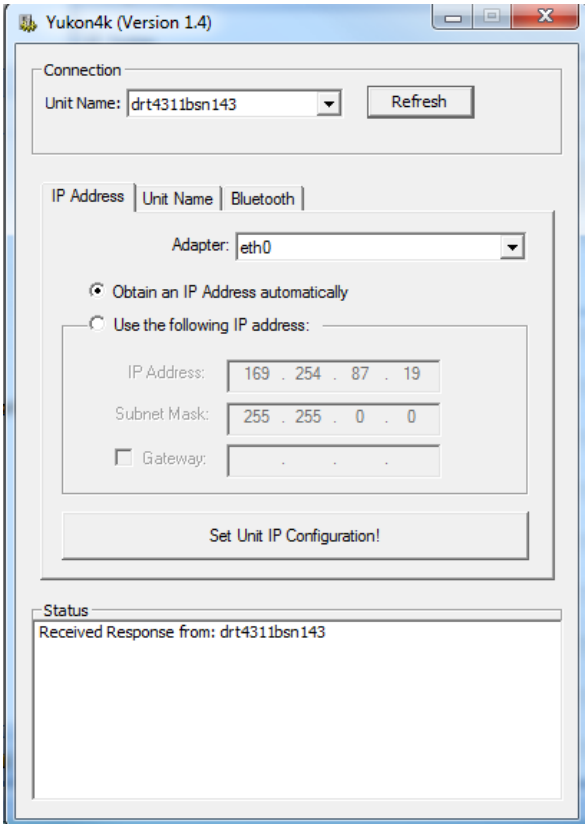
3.1.6 Network Configuration Using Yukon4K

3.1.6.1 DRT4300 System Configuration

The Controller PC must be configured before configuring the DRT43XX System.

Configuration of the unit's IP address is managed through *Yukon4k*. On the controlling PC, start *Yukon4k*. When *Yukon4k* starts, the window should list a system in the **Unit Name** field in the **Connection** box. If the PC and multiple DRT43XX Systems are on the network, multiple units may be in the drop down list. Use the arrow key to display the list of available units.

If the desired unit is not listed, click **Refresh** to re-query the network for the availability of the unit.



3.1.6.2 Wired Ethernet Configuration

If you are using a wired Ethernet connection, you will only need to set the fields on the **IP Address** page.

- Set the **Adapter** field to **eth0**. If you wish to use DHCP to obtain an IP address from the network, click the **Obtain an IP Address automatically** option then click the **Set Unit IP Configuration!** button.
- The **Status** area will acknowledge that the setting of the IP Address is in process and then will indicate that the setting was successful. The automatic configuration is complete. Close the *Yukon4k* software and reboot the unit.

If you wish to manually enter the IP address information:

- Click the **Use the following IP Address** option and set the **IP Address** field to an approved IP Address.
- Typically, the **Subnet Mask** field is set to 255.255.255.0, but change that address as necessary.
- If your network configuration requires a Gateway address, click the **Gateway** box and enter an approved Gateway Address in the **Gateway** field.

- Click the **Set Unit IP Configuration!** button.
- The **Status** area will acknowledge that the setting of the IP Address is in process and will indicate when the setting was successful. An error is indicated with a popup message box. The manual configuration is complete. Close the *Yukon4k* software and reboot the unit.

3.1.7 Determine the Static IP Address of a Unit

The situation may occur when the static IP address of a unit is not known. The following steps will allow you to determine the static IP address:

1. Connect the controller PC to the System using an Ethernet LAN crossover cable.
2. Configure the PC for static IP. Refer to the ***Configuring the Controller PC*** section, above.
3. Run *Yukon4K*. Refer to Network Configuration, above. *Yukon4K* will report the DRT System's static IP address.

3.1.8 Locate a Unit on a Network

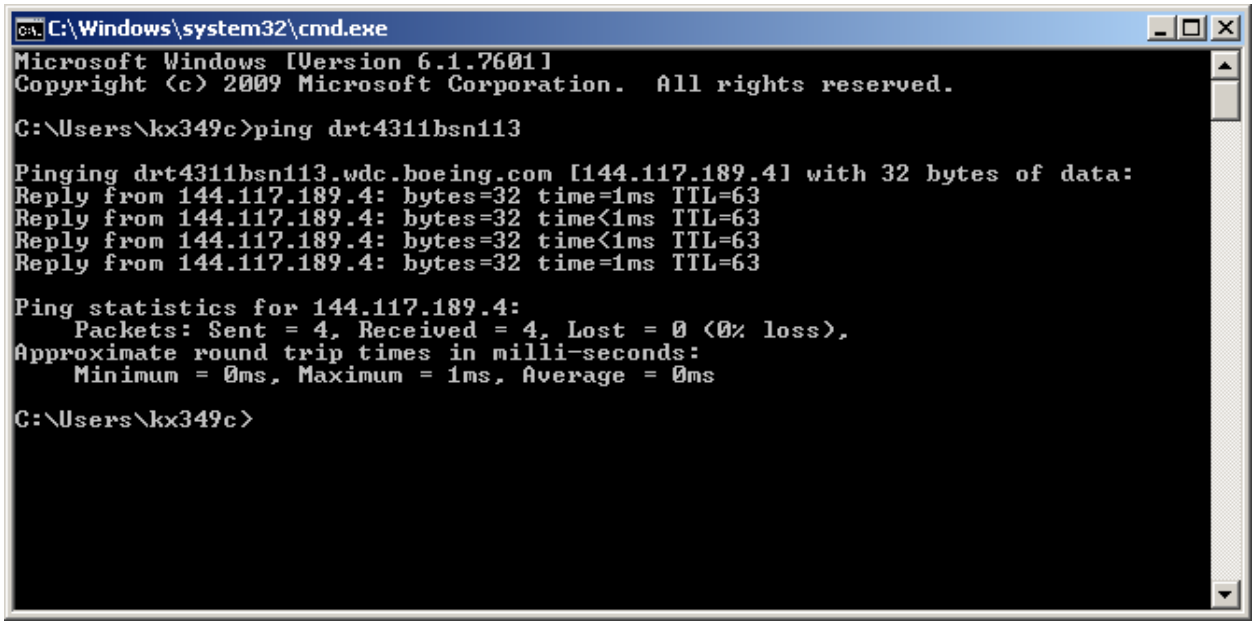
3.1.8.1 Win XP PC

If the unit is connected to a network when you install/update the embedded software or start the GUI, you must be able to "see the unit" on the network to continue. However, it is possible that the unit is on the network, but the software cannot locate it. This can be for a reason as simple as having a router between your PC and the unit. To locate the unit:

- Click the **Start** button and then click **Run**.
- The **Run** dialog will appear. Enter *cmd* and click **OK**. A command prompt box like the one below will appear with the last line indicating a drive letter followed by a colon, a backslash, and a ">." Enter the word *ping* followed by a space and then the model number and serial number of the unit as follows:

  ping drt4311bsn132

- Press ENTER on the keyboard. The software will interrogate the network in an attempt to locate the unit.
- When it is found, the IP address will be returned four times.



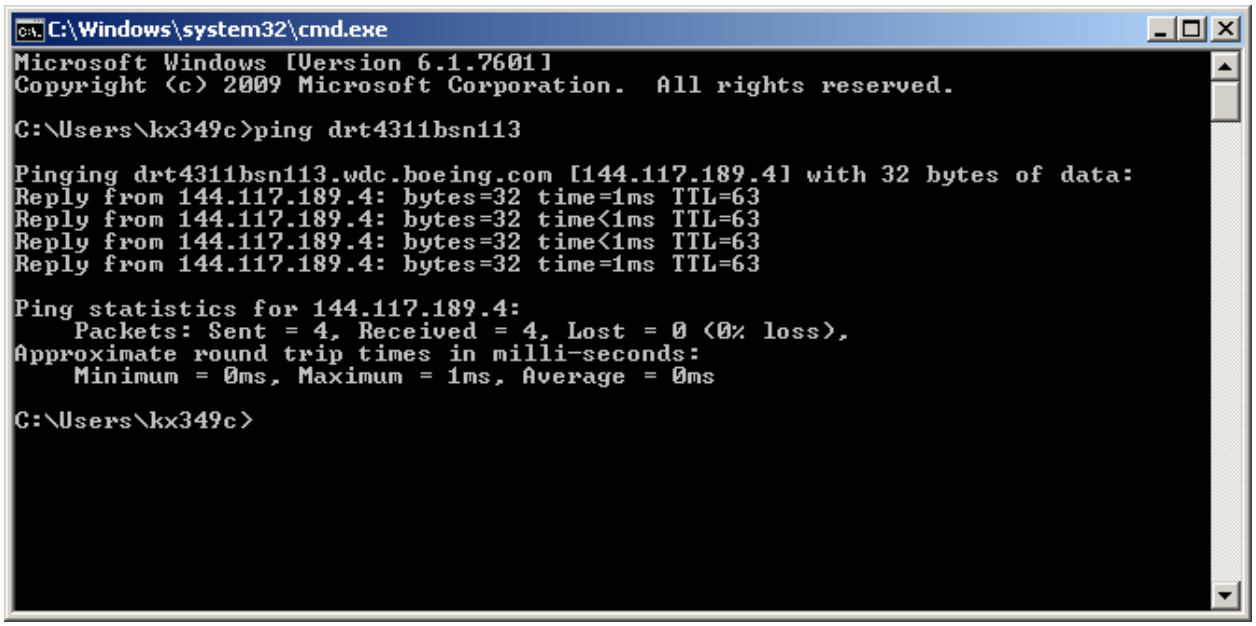
3.1.8.2 Win 7 PC

If the unit is connected to a network when you install/update the embedded software or start the GUI, you must be able to "see the unit" on the network to continue. However, it is possible that the unit is on the network, but the software cannot locate it. This can be for a reason as simple as having a router between your PC and the unit. To locate the unit:

- Click the **Start** button.
- In the lower left corner there is a field labeled **Search programs and files**. In this field, enter *cmd* and press ENTER on the keyboard or click the  icon. A command prompt box like the one below will appear with the last line indicating a drive letter followed by a colon, a backslash, and a ">." Enter the word *ping* followed by a space and then the model number and serial number of the unit as follows:

  ping drt4311bsn132

- Press ENTER on the keyboard. The software will interrogate the network in an attempt to locate the unit.
- When it is found, the IP address will be returned four times.



3.2 System Software Upgrades

Initially, the DRT unit will have all software installed and no further actions are necessary. Later, you may wish to load the GUI or tools on another PC or upgrade the system software.

If your PC was supplied by DRT, it too will be fully configured with , the controlling GUI software. If your PC was not supplied by DRT, follow the instructions below to load the GUI software on it.

CAUTION

Do not attempt to load any software on the DRT system other than the *DRT4300B System Software* provided by DRT. Loading any other software (including virus protection software unless pre-approved by DRT) may render the DRT system unusable. Contact DRT for more information.

Do not attempt to load software on a DRT4311B with the LED disabled. The LED provides important information about the status of the software load that will not be available with the LED disabled. To enable the LED, refer to View System Configuration > Hardware > ***Status_LED***. The LED is enabled by default.

See the ***Network Configuration using Yukon4k*** for information on networking.

You must have administrator privileges to install on the controller PC. No special privileges are required to load / update system software on the unit. The *DRT4300B System Software* CD contains *Galena* GUI software, DRT4300B system software, and supporting tools.

3.3 Install Software: DRT4300B System Software CD

The *DRT4300B System Software* CD can install / update the GUI on a controller PC and the embedded (system) software on aDRT4311B unit.

NOTICE

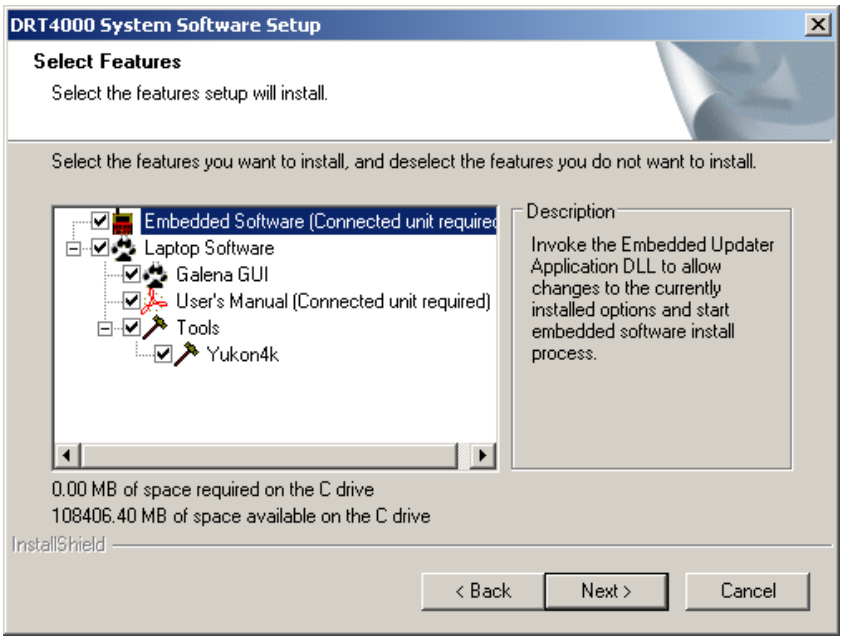
The controller PC must be connected to the DRT System when GUI software is installed/updated. During installation, the software checks the connected system to obtain information about the options available on that system. The software then installs support for those options within on the controller PC so that the PC can properly control the unit. Options do not transfer between units.

As an example, if unit 1 is configured for options 1, 2, & 3, those options will be installed on the controller PC. The PC can then control the unit in those areas. If the PC was later moved to a different unit that is configured for options 1 & 2, the software could control the unit in the areas of options 1 & 2 and the software for option 3 would be available on the PC, but the new unit would not have this feature.

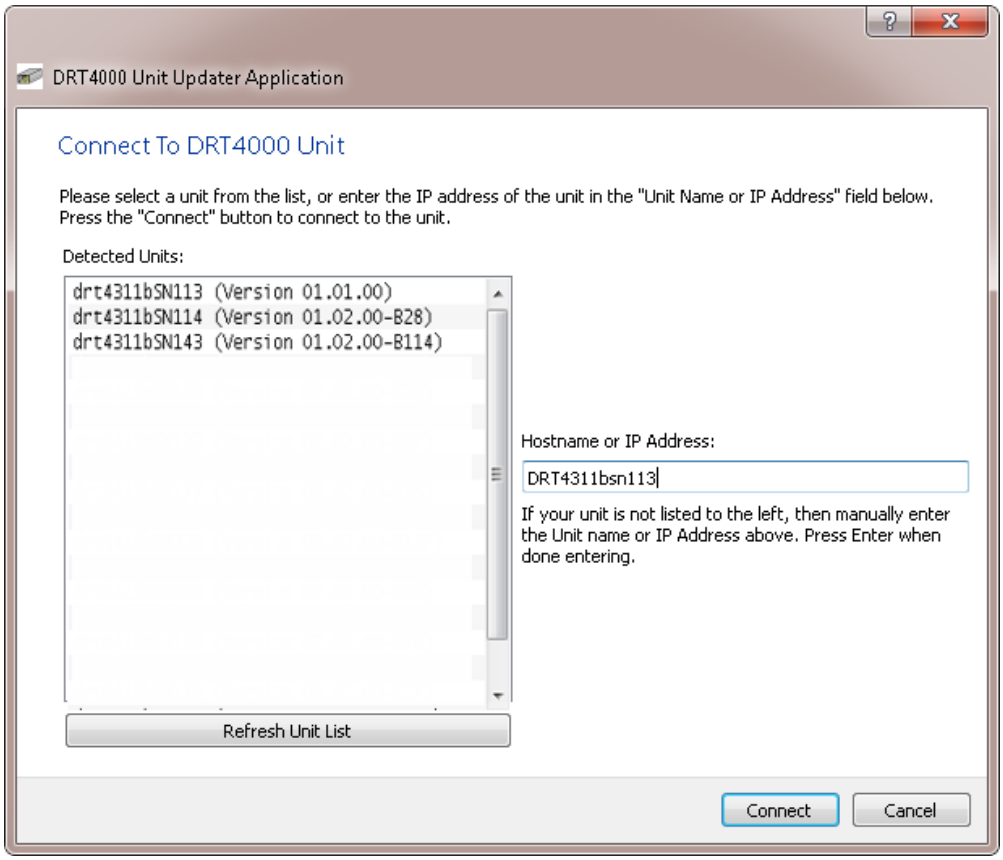
As a second example, if the controller PC, configured for a unit with options 1, 2, & 3, was connected to a unit configured for options 1, 2, 3, & 4, the PC could control the unit for options 1, 2, & 3, but option 4 would not be available.

The screenshots shown below were taken using a particular version of the Windows Operating System (OS) on a PC. If your PC has a different OS (for example, Windows XP vs. Windows 7), the screenshots may look different and have selections such as "Back" displayed in different locations; however, there should be NO difference in the available selections.

- Connect the controller PC to the unit to be used for the installation. Apply power to the PC and then to the unit.
- Insert the CD into the disk drive and the installation wizard will load automatically if autoplay is enabled. If autoplay is not available, navigate to the CD and run *Setup.exe*. The first window is a welcome window. Click **Next.** The second window is the DRT Licensing Agreement. Read carefully then select **I accept the terms of the license agreement** and click **Next**.
- On the next window, select to **Install DRT4000 System Software** (you may also select to uninstall software from this window).
- On the next window select any or all of the following:
    - **Embedded Software** – This selection will update the existing system software on a DRT4311B with the version contained on the *DRT4300B System Software* CD.
    - **Laptop Software** – This selection will install / update the GUI-related items to the controller PC with the following options:
        - **GUI** – This selection will install the version of GUI on the *DRT4300B System Software* CD.
        - **User's Manual** – This selection will install a user manual on the PC. The manual installed will reflect the options of the unit connected to the PC at the time.
    - **Tools** – This selection will install / update the system tools to the controller PC with the following options:
        - **Yukon4k** – This selection will install *Yukon4k.exe*, a software utility for managing the unit's IP address
- Click **Next**.



- The **Connect to DRT4000 Unit** window will display a field with a list of the units detected by the controller PC. This list may not contain all of the available units if a unit was in the process of booting up or if you are connected to a network where some units are masked by a router or other hardware.
    - If the desired unit is displayed, select that unit to automatically place the unit information in the **Hostname or IP Address** field.
    - If the unit is not displayed, click the **Refresh Unit List** button to check for any additional units that might have just come online or, if the unit's serial number or IP address is known, enter that information in the **Hostname or IP Address** field. The format is either the standard IP address format of XXX.XXX.XXX.XXX or the unit name such as drt4311bsnxxxx where xxxx is the unit serial number. Click **Connect**.



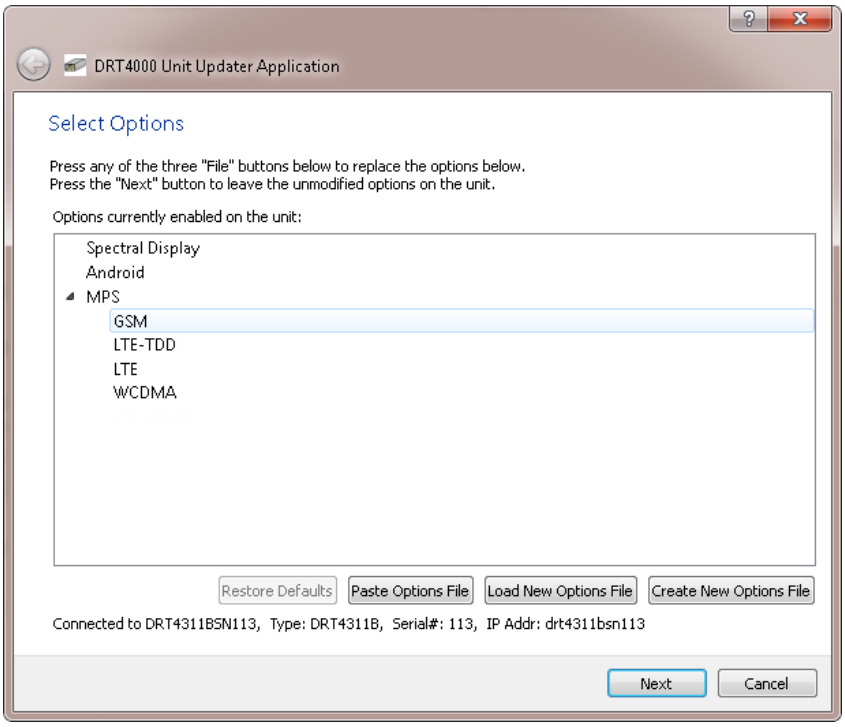
- **Unit Options**: The *setup* software will connect to the unit and obtain information about which options are enabled on that unit. (If you have elected not to load the embedded software, you will go directly to the step where the GUI is installed.) The unit's options are maintained in an Options File stored on the unit and the window displays the options currently available on the unit. At this time, you can either accept the configuration of the options currently installed or select to update the Options File on the unit.
    - To use the current options, click **Next**.
    - To change the options, contact DRT for a new Options File. More details are provided in ***Updating the Unit's Option File***, below. When the Options File is available, click **Paste Options File** if the update information was forwarded as text in an email or click **Load New Options File** if the information was forwarded as a .KEY file.

NOTE: You must elect to load the embedded software if you are updating the Options File.

If you do not have access to email, you will need to contact DRT Customer Support and they will talk you through the update process. While on the phone with DRT Customer Support, advance to the point where you select the method of loading the update and click **Create New Options File**.

- *Option Dependencies*: If an option is not present on the unit it will not be listed.

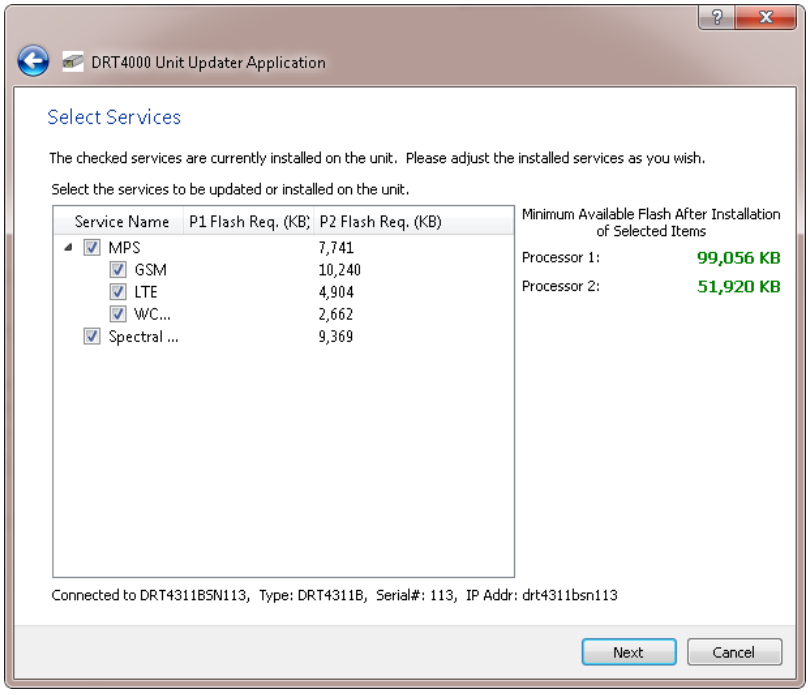
  Android Option Note: If the Android option is not listed, the **Android App Publication** page discussed below will not be shown.



Click **Next** and the selected options will appear again for confirmation, this time the text for enabled options is bolded. Click **Next** again to accept these selections.

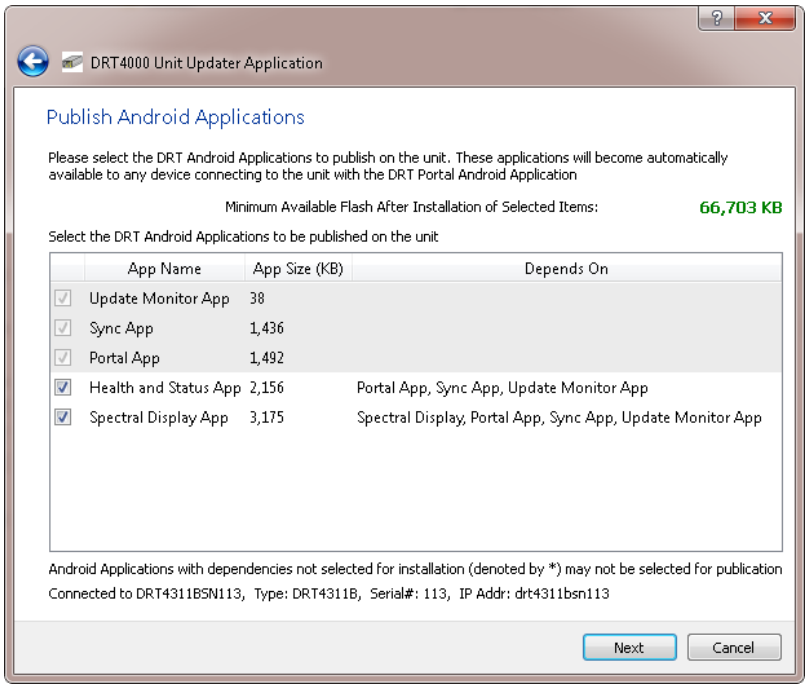
- **Select Services, Android Apps & Summary Page**:

  Select Services: The next window is **Select Services**. Here you may select from the services available for your unit. Check the desired service(s) and click **Next**.



Publish Android Applications: If the Android option is enabled on this unit, an additional page called **Publish Android Applications** will appear after the **Select Services** page. Which Android applications may be installed is dependent on the other options enabled and selected on previous pages.

- At this time, these are the Android applications which may be "published": *Update Monitor*, *Sync*, *Portal*, and *SDU.* Note that the SDU Android application requires that all of the other Android applications be selected, so selecting **SDU App** will automatically select all of them.
- Some Android applications require that a particular service be installed on the unit. For example, for the *SDU* Android application to be available, the *SDU* service must also have been selected on the **Select Services** page above. So if *SDU* was not selected, the **SDU App** option will not be available. The **Depends On** column will indicate which items an Android App requires. If a required service was not selected for installation, there will be an asterisk ***** in the **Depends On** column next to the service name.
- Applications that you may not select or deselect will have a **gray background.**
- **Click Next.**



Summary page: A summary of the options you selected above is presented. If you did not select something under a main group heading, that heading will not be shown either. For example, if no Android applications were selected, then the title line *Android Apps* will not be listed.

Click **Install** to begin the installation process. If selected, the installation of files on the unit and the controller PC will begin.

NOTE: A complete install of embedded software and can take as long as fifteen minutes, depending on what files need to be updated and the connection speed.

Once the installation process has begun, do NOT turn off or disconnect the unit from the PC. However, should power be lost to the unit or the PC or should you lose the USB / Ethernet connection from the PC to the unit, you will need to repeat the installation from the beginning. If the options had been updated, they should be OK unless the loss of power / connection occurred while the options were being updated. Verify that the unit's options are correct and update if necessary.

- During the software installation process, various windows will appear to let you know what the installation process is doing.

- Following installation of the embedded files, the **Complete Software Update** dialog will give you the option of viewing and/or saving a log file of the install. You may view it now and then continue on by clicking **Cancel**, otherwise, click **Next** and then click **Finish** to continue with the installation process.
- If you selected to install the GUI, and the selected documentation will now be installed on the controller PC. You will be prompted to select a **Program Folder**: Accept the default destination folder or browse to a new location then click **Next**.
- will be installed / updated and the selected documentation will be added / updated. When the installation is complete, click **Finish**.

3.3.1 Updating the Unit's Option File

An "Options File" defines what options this particular DRT system has. Each unit has a unique Options File identified by the unit serial number and Options File Version Number. This Options File resides on the DRT system. The unit's baseline Options File was installed prior to shipment from DRT. However, requirements can change and it may be necessary to add or remove options on a unit. If a change in the options is required, contact DRT to obtain an updated file. The file can be forwarded to you as a .KEY attachment to an email (if allowed), the file can be forwarded to you as text in an email, or you can obtain updating information during a phone call to DRT Customer Support.

If, during the ***Install Software: DRT4300 System Software CD***, you find that you need to change the unit's options, contact DRT Customer Support and indicate the changes in the unit's options file that you require. DRT can email you back the file or file information or Customer Support can pass the information via a phone call and you can continue with the update.

The options file includes: the Install Context version number, the unit model number, the unit serial number, and the codes to designate the available options. (To view these items, open the .KEY file using *Notepad* or view the contents of the email with the options file included.)

NOTE: The options file can NOT be installed:

On a unit with a later Install Context number. (Options file with Install Context number 3 will not load on a unit that has Install Context version 4 or greater installed on it.)

On a unit with a different serial number. (An options file for DRT4311B, serial number 10, will not install on DRT4311B, serial number 11.)

If the contents of the options file has been changed. (An options file will not load if any of the contents within the file have been changed.)

3.3.1.1 Installing the Options File Update

To change or upgrade the options of a unit:

1. a. If the updated Options File was sent as a .KEY attachment to an email, save that file on a local drive. It will be installed later.
   or
   b. If the file was sent as text as part of an email, highlight the options file portion of the text of that email and copy it to the clipboard. It will be retrieved later. A sample options file text portion of an email message is shown below.

Sample Options File

```
<?xml version="1.0" encoding="UTF-8"?>
<OptionsFile xmlns:xs="http://www.w3.org/2001/XMLSchema-instance">
  <SignedData>
    <OptionFileVersion>2</OptionFileVersion>
    <UnitInfo>
      <Model>DRT4311B</Model>
      <SerialNumber>8</SerialNumber>
      <InstallContext>1</InstallContext>
    </UnitInfo>
    <Options>
      <Category id="Software Options">
        <ThirdPartySigning>1</ThirdPartySigning>
        <Features>
          <EnabledFeature Id="17766BCF-D432-4EAB-ADEF-F831C78C3A3F">
            <SubFeature/>
          </EnabledFeature>
          <EnabledFeature Id="33113112-DB89-4F2A-A3A4-7BBD0202D459">
            <SubFeature>
              <EnabledFeature Id="142970C7-4894-48F4-B2E3-0DE6B01C14CE">
                <SubFeature/>
              </EnabledFeature>
              <EnabledFeature Id="BE041665-35D7-419E-A5F6-2B4465ADFBB5">
                <SubFeature/>
              </EnabledFeature>
            </SubFeature>
          </EnabledFeature>
          <EnabledFeature Id="47BD203B-32BE-4BA1-A161-43B05A0D2FF9">
            <SubFeature>
              <EnabledFeature Id="443BBAF2-416C-4334-BD49-72E44B01092F">
                <SubFeature/>
              </EnabledFeature>
              <EnabledFeature Id="CA3575F9-BBC4-44F2-84F7-041D19F637CA">
                <SubFeature/>
              </EnabledFeature>
            </SubFeature>
          </EnabledFeature>
        </Features>
      </Category>
    </Options>
  </SignedData>
  <Signature>AFJ47IED5DGH66C6UUTRDNB6O3SVFPW5</Signature>
  <ThirdPartyOptions>
    <Features>
      <EnabledFeature Id="33113112-DB89-4F2A-A3A4-7BBD0202D459">
        <SubFeature>
          <EnabledFeature Id="BE041665-35D7-419E-A5F6-2B4465ADFBB5">
            <SubFeature/>
          </EnabledFeature>
        </SubFeature>
      </EnabledFeature>
      <EnabledFeature Id="47BD203B-32BE-4BA1-A161-43B05A0D2FF9">
        <SubFeature>
          <EnabledFeature Id="CA3575F9-BBC4-44F2-84F7-041D19F637CA">
            <SubFeature/>
          </EnabledFeature>
        </SubFeature>
      </EnabledFeature>
    </Features>
  </ThirdPartyOptions>
  <ThirdPartySignature>CCHOW57X64URCIR7OJ6OG3CPWZIDFLFH</ThirdPartySignature>
</OptionsFile>
```

Unit Model Number

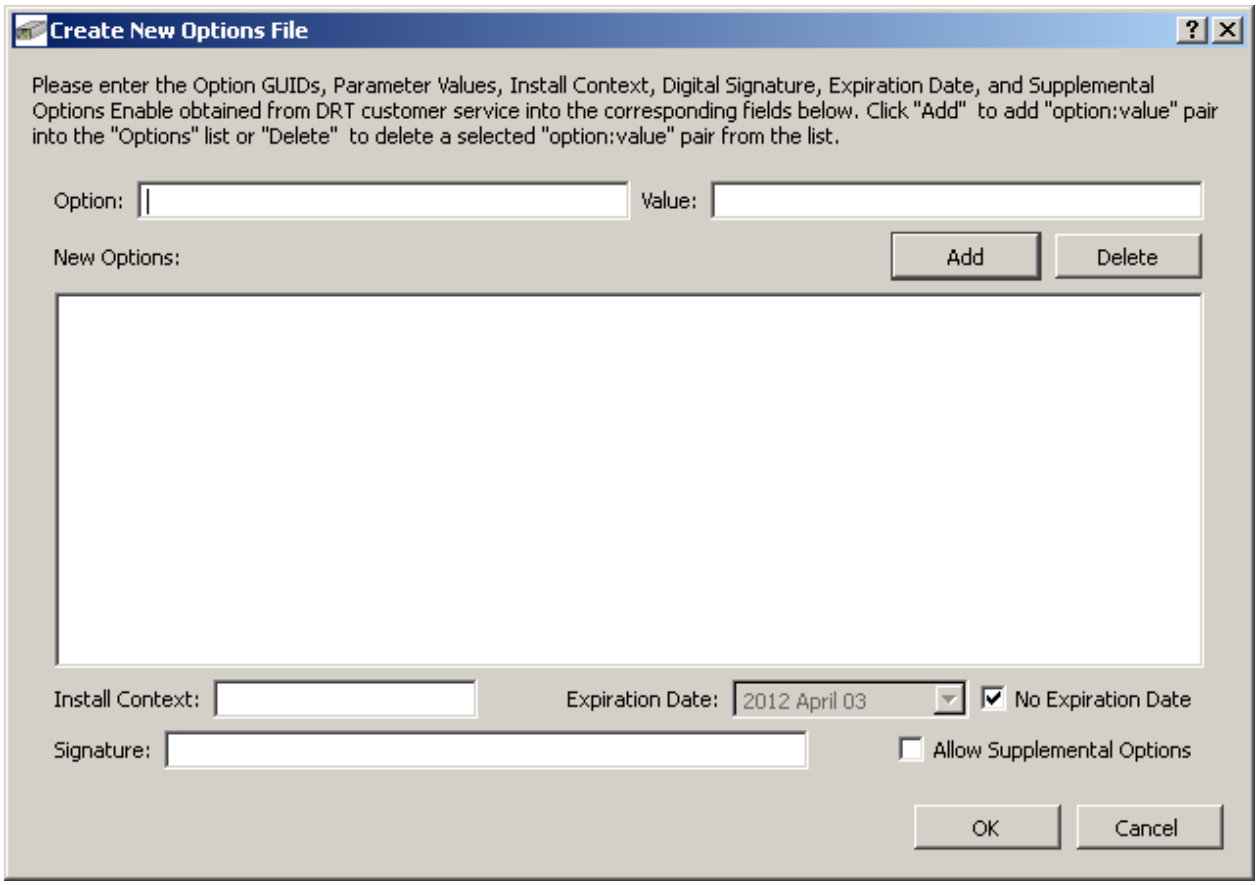
Unit Serial Number

Install Context Version Number

Or

c. If an updated options file is not available, contact DRT Customer Support at DRThelp@drti.com;Toll Free 855-205-6027 (or 301-916-5554 ext. 567) to obtain the alphanumeric codes.

2. Follow Steps 1 through 5 of ***Install Software: DRT4300 System Software CD***, as shown above.
3. At **Select Options**:
   If you received a file contained in a text email, click **Paste Options File** and proceed to Step 4 or
   If you received a .KEY file, click **Load New Options File** and proceed to Step 6 or
   If you are obtaining the options information via phone call, click **Create New Options File** and proceed to step 8.
4. If you selected **Paste Options File**, the next window will be **Paste New Options**. At this time, you should have pasted the options portion from the text message to the clipboard. Click **Paste from Clipboard** at the bottom of the screen. The options file portion of the email that you copied to the clipboard is now displayed in the **Paste New Options** window.
5. Click **OK**. The software will validate the file for use with the attached unit and will update the unit's options file.
6. If you selected **Load New Options File**, the next window will be **Open New Options File**. Navigate to the location where you stored the options .KEY file. Highlight the new options file and click **Open**.
7. The software will validate the file for use with the attached unit and will update the unit's options file.
8. The **Create New Options File** dialog will appear. DRT Customer Support will help you fill in the fields until all fields have been filled out and you click **OK**.



3.4 Remote Server Configuration

If you intend to save files to a remote server, you may need to configure that server.

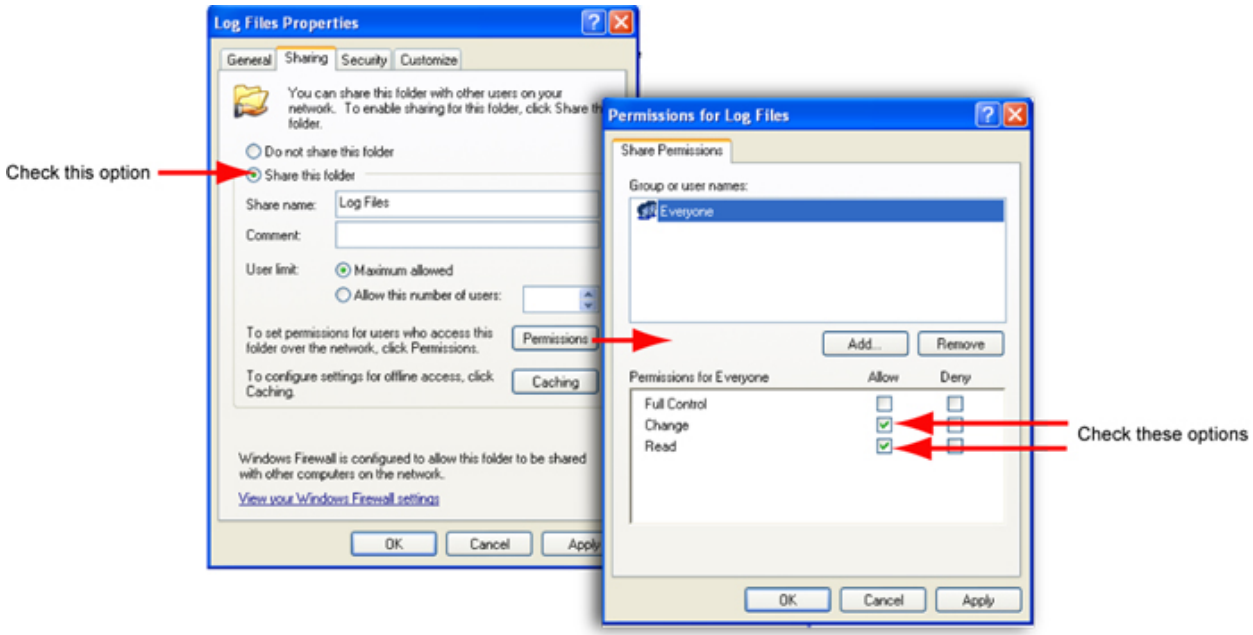
3.4.1 Set up a Windows XP Remote Server

Windows XP SP2 added security to protect a computer from unauthorized access. This security prevents the DRT unit from saving audio and log files to that computer. The solution is to configure the *WINXP* computer so that it will allow the DRT unit to save to one of its directories. The steps are outlined below.

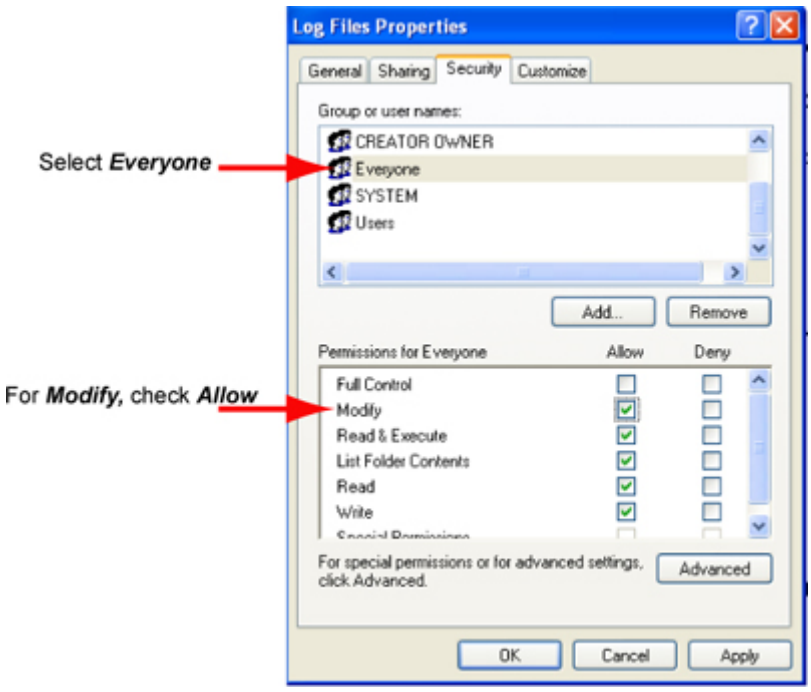
Note that these steps do not apply to a network server. To save to a network server, consult with your network administrator.

Create a Shared Directory:

1. Open *Windows Explorer* and create the target directory on the local computer.
2. Right-click the directory icon and select **Properties** from the popup menu.
3. Click the **Sharing** tab.
4. Check the **Share this folder** box.
5. Click the **Permissions** button.
6. Under **Group or user names**, select **Everyone**. (If the **Everyone** user is not present then click the **Add** button. In the **Enter the object names to select** box, type **Everyone** and click **OK**.)
7. With **Everyone** selected, in the **Permissions for Everyone** box, set **Change** and **Read** so that **Allow** is checked. Click **OK**.

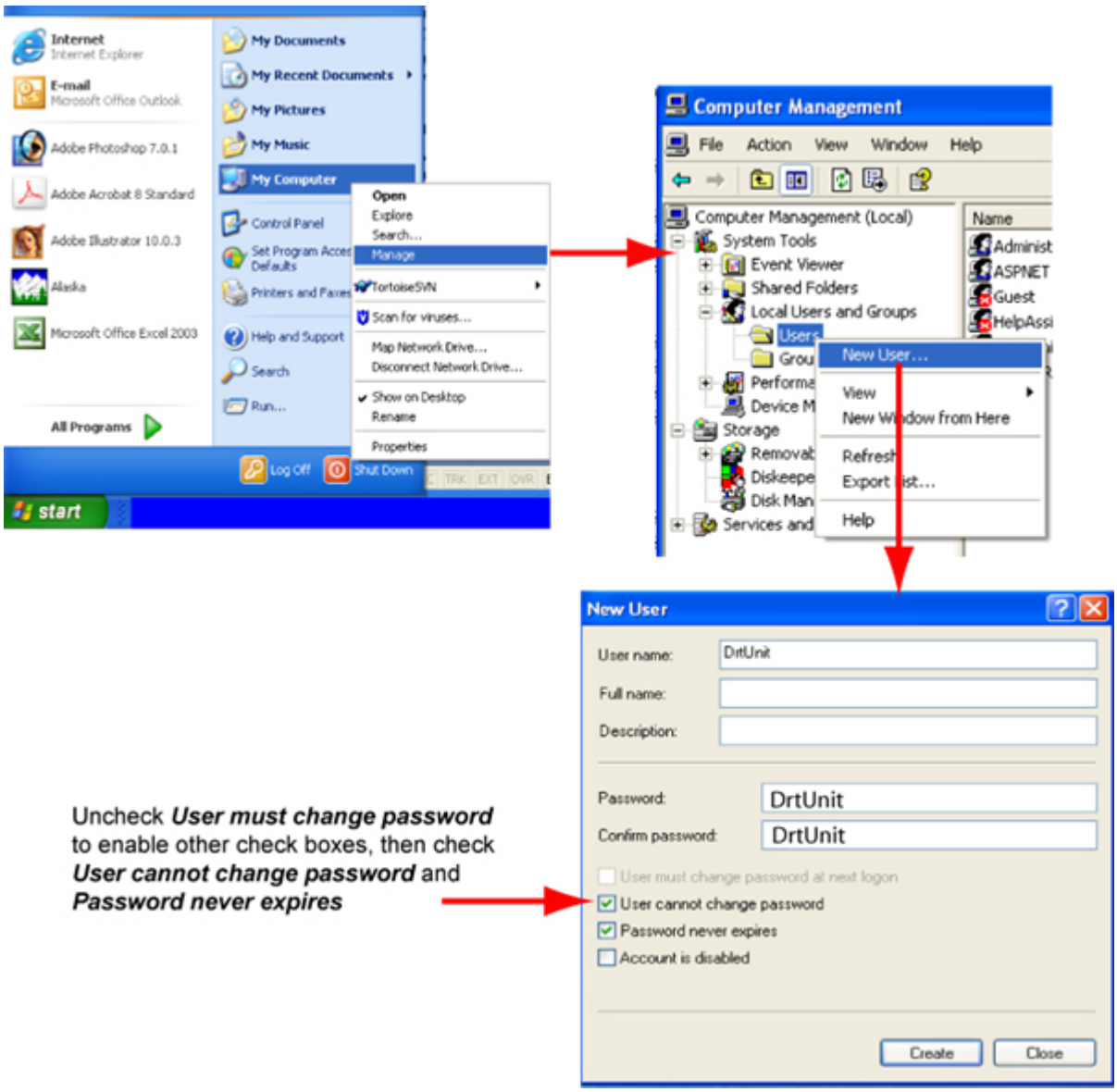


8. Click the **Security** tab and then select **Everyone**. If **Everyone** is not present, click **Add** and add **Everyone** using the same procedure as above.
9. With **Everyone** selected, in the **Permissions for Everyone** box, check **Allow** for the **Modify** box and click **OK**.



Add the DRT Unit as a user:

10. From the *Windows* **Start** menu or on the *Windows* desktop: right-click **My Computer** and select **Manage** from the popup menu.
11. Expand **System Tools** by clicking the **+** symbol.
12. Expand **Local Users and Groups** by clicking the **+** symbol.
13. Right-click the **Users** folder and select **New User...** from the popup menu.
14. Enter *drtunit* in the **User Name** field.
15. Enter D*rtUnit* in the **Password** and **Confirm Password** fields.
16. Uncheck the **User must change password at next logon** box.
17. Check the **User cannot change password** and **Password never expires** boxes.



18. Click the **Create** button.
19. Click the **Close** button.
20. Close the **Computer Management** dialog.

3.4.2 Set up a Windows 7 Remote Server

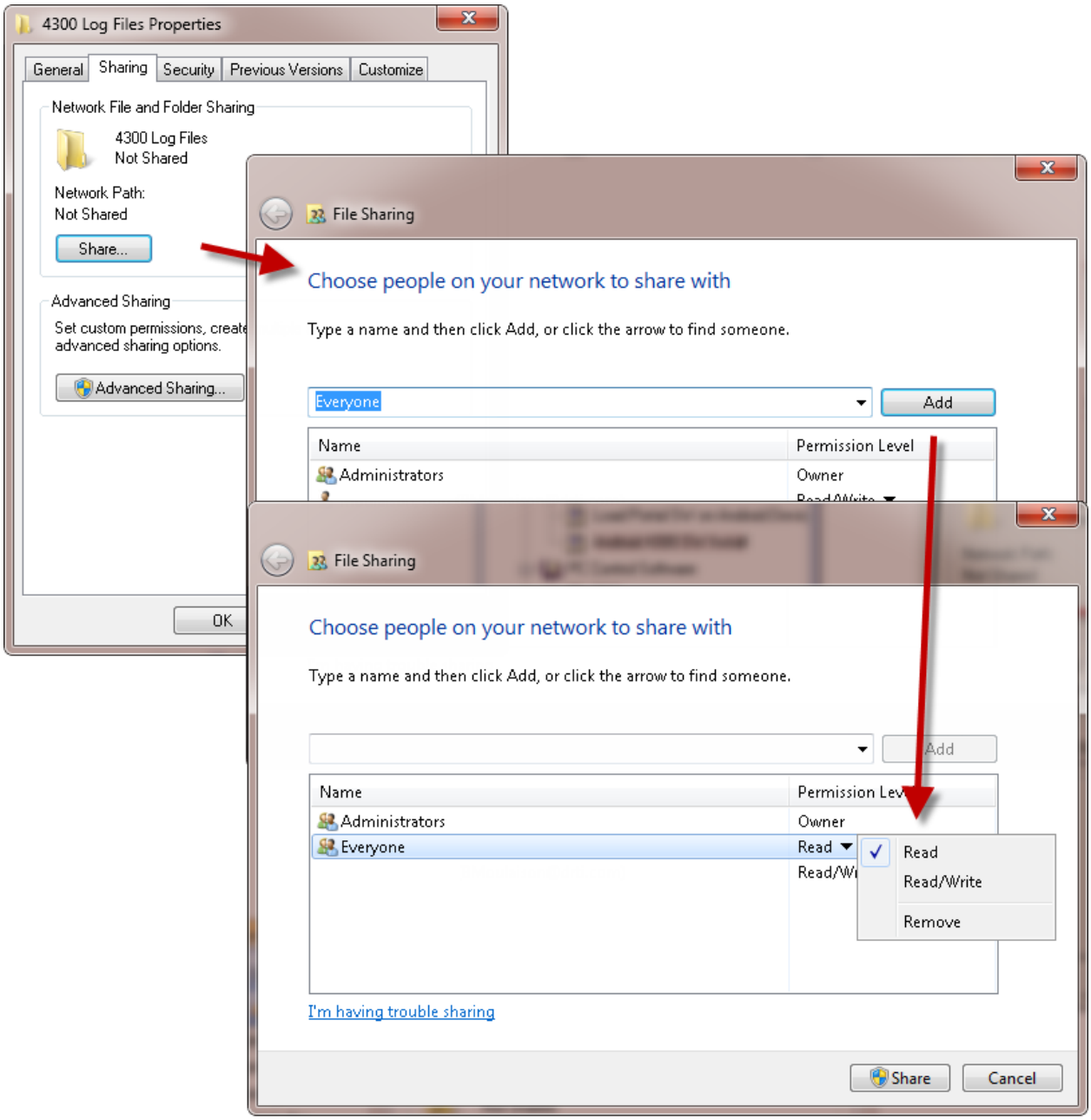
Windows 7 has security to protect a computer from unauthorized access. This security prevents the DRT unit from saving audio and log files to that computer. The solution is to configure the *WIN7* computer so that it will allow the DRT unit to save to one of its directories. The steps are outlined below.

Note that these steps do not apply to a network server. To save to a network server, consult with your network administrator.

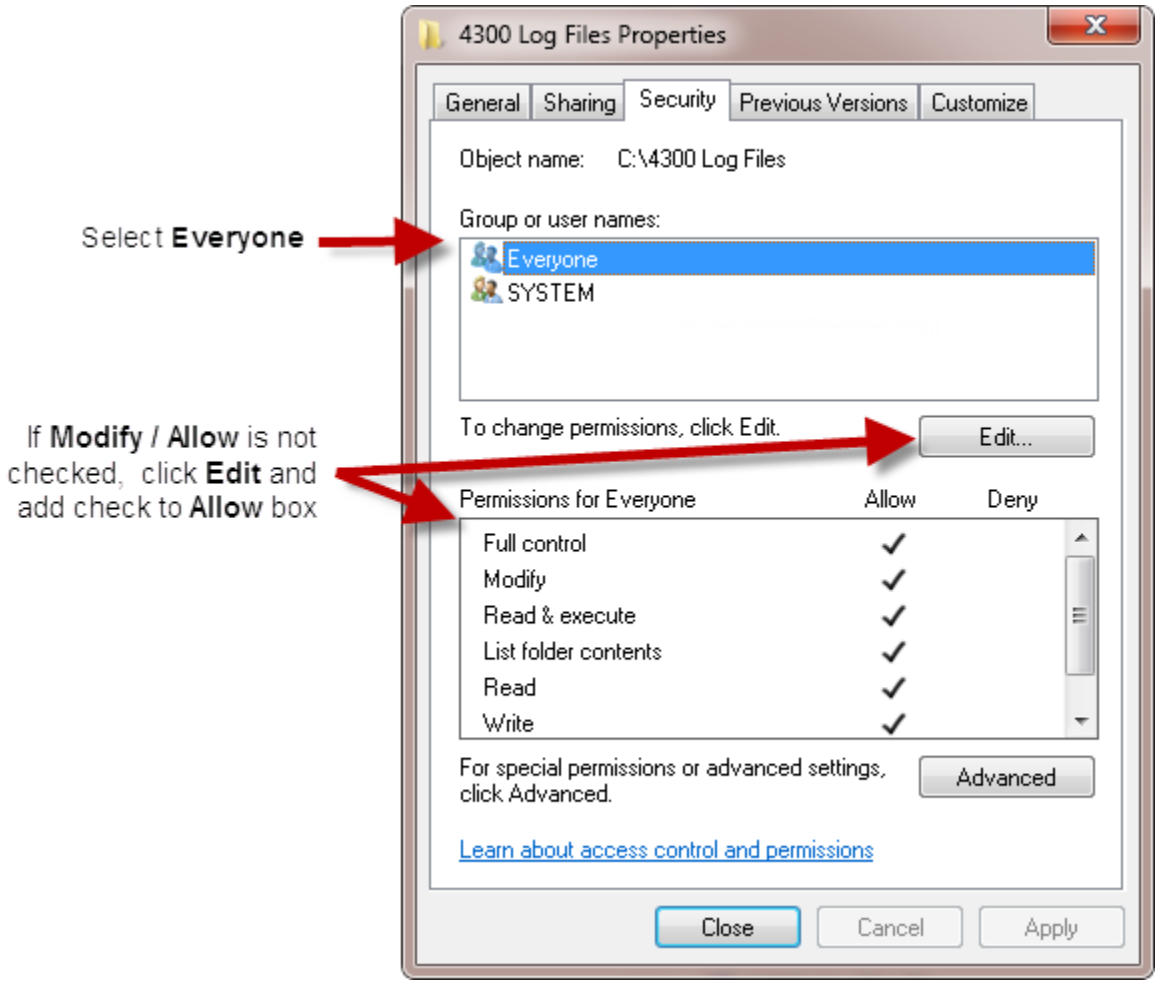
Create a Shared Directory:

1. Open *Windows Explorer* and create the target directory on the local computer.
2. Right-click the directory icon and select **Properties** from the popup menu.

3. Click the **Sharing** tab.
4. Click the **Share** button to open **File Sharing / Choose people on your network to share with.**
5. Using the pull-down arrow beside the **Add** button, open and select **Everyone**. **Everyone** will be added to the field below with a **Permission Level** of **Read**.
6. Click the **Permission Level** box and select **Read/Write**.
7. With **Everyone** selected and **Permission Level** set to **Read/Write**, click **Share**
8. The **Choose people** dialog will be replaced with **Your folder is shared**. Click **Done** to return to the **Properties** page.

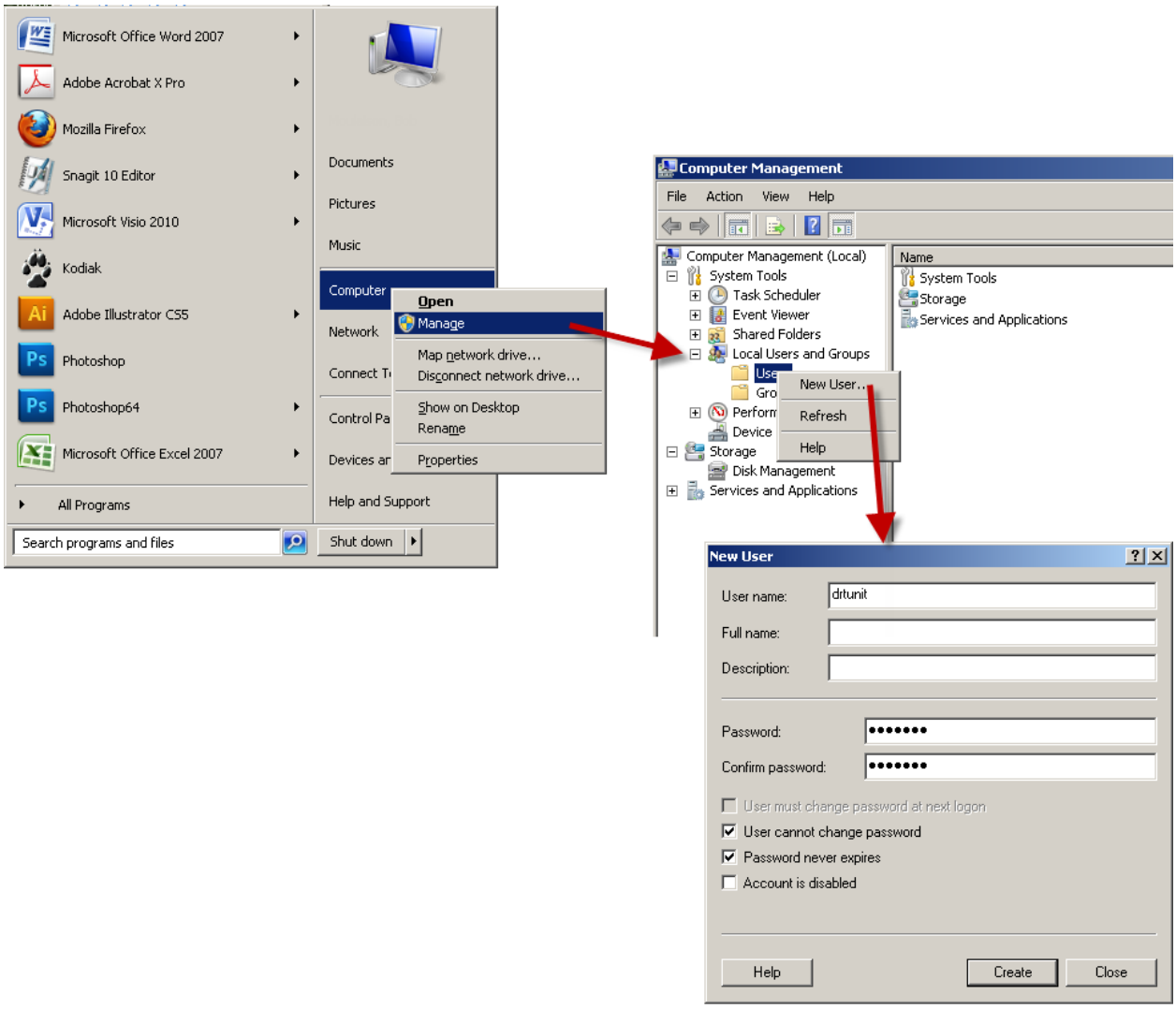


9. Click the **Security** tab and then select **Everyone**. If **Everyone** is not present, click **Add** and add **Everyone** using the same procedure as above.
10. With **Everyone** selected, in the **Permissions for Everyone** box, check **Allow** for the **Modify** box and click **OK**.



Add the DRT Unit as a user:

11. From the *Windows* **Start** menu: right-click **Computer** and select **Manage** from the popup menu.
12. Expand **System Tools** by clicking the **+** symbol.
13. Expand **Local Users and Groups** by clicking the **+** symbol.
14. Right-click the **Users** folder and select **New User...** from the popup menu.
15. Enter d*rtunit* in the **User Name** field.
16. Enter *DrtUnit* in the **Password** and **Confirm Password** fields.
17. Uncheck the **User must change password at next logon** box.
18. Check the **User cannot change password** and **Password never expires** boxes.



19. Click the **Create** button.
20. Click the **Close** button.
21. Close the **Computer Management** dialog.

3.5 PC Control Connection via USB

This procedure describes how to connect a controller PC to control a DRT4311B unit using USB. The *Windows* 7 procedure differs from the *Windows* XP procedure and each will be handled separately.

NOTE: Both the *Windows* 7 procedure and the *Windows* XP procedure configure only the controller PC's USB port to which the DRT unit is connected. If, at a later date, the DRT unit is connected to a different USB port on that PC, it will be necessary to reconfigure the PC's network connection for the new port.

Required cable: USB Type A to USB Mini-B.

NOTE: Although both a Mini-B and Mini-A cable could physically be used to connect to the DRT unit, we recommend that you use a Mini-B cable because the DRT unit is a client device in this configuration.

Windows 7 Configuration

1. Apply power to both the controller PC and the DRT unit.
2. Connect the controller PC to the DRT unit using a Type A (to controller PC) to Mini-B USB (to DRT unit) cable. Note which USB port on the PC is used for this connection.
3. After a short period, *Windows* will display that it is unable to install a driver for the device.
4. Click **Start**, right-click **Computer**, click **Manage**, and finally click **Device Manager**. The **Computer Management** window will be displayed.
5. One of the icons on the tree in the right panel has the label **Other Devices**. Under this icon will be a lower-level icon with a yellow triangle in the lower right with an exclamation mark in the center of the triangle. The icon's label will include **RNDIS/Ethernet Gadget.**
6. Right-click **RNDIS/Ethernet Gadget** and select **Update Driver Software**.
7. On the **Update Driver Software** window, select **Browse my computer for driver software**.
8. On the next window, click **Let me pick from a list of device drivers on my computer.**
9. The next window provides a field with a list of **Common hardware types**. Highlight **Network adapters** then click **Next**.
10. The next screen has two fields, **Manufacturer** (left field) and **Network Adapter** (right field).
    a. In the **Manufacturer** field, highlight **Microsoft Corporation**. (Note: this is not the same as the selection **Microsoft**.)
    b. In the **Network Adapter** field, highlight **Remote NDIS based Internet Sharing Device**.
    c. Click **Next**.
11. An **Update Driver Warning** will display a warning about installing a device driver that Windows cannot verify that it is compatible. Click **Yes**.
12. Click **Start**, click **Control Panel**, and finally click **Network and Internet** (if configured as **View by: Category**) and then **Network and Sharing Center** or **Network and Sharing Center** (if configured as **View by: Large** or **Small icons**).
13. On the upper left side of pane, click **Change adapter settings**.
14. A **Network Connections** window will be displayed. The label for one of the displayed icons will include **RNDIS/Ethernet Gadget.** Right-click that label and select **Properties**.
15. A **Local Area Connection** window will be displayed. Double-click **Internet Protocol Version 4 (TCP/IPv4)**.

    NOTE: The DRT unit was originally assigned the IP address **192.168.2.100**. The PC's IP address can be between **192.168.2.1** and **192.168.2.255** with the exception that the PC's IP address can NOT be set to the DRT unit's IP address. In the next step, the IP address 192.168.2.101 is just an example.

16. Select **Use the following IP** address and, in the **IP address** field, enter **192.168.2.101**.
17. Press the TAB key to populate the **Subnet mask** field with **255.255.255.0**.

18. Click **OK**. Click **OK** again. Click **Close**. Close the **Network and Sharing Center.**
19. This completes the installation of the USB driver and the configuring of the network connection.

Windows XP Configuration

1. From the web site: http://code.google.com/p/beagleboard/downloads/detail?name=linux.inf, download the file *linux.inf* to a location on the controller PC that is easily accessed.
2. Verify that the filename as stored on the PC is *linux.inf*.
3. Apply power to both the controller PC and the DRT unit.
4. Connect the controller PC to the DRT unit using a Type A (to controller PC) to Mini-B USB (to DRT unit) cable. Note which USB port on the PC is used for this connection.
5. When prompted for a driver, click **Have Disk** and direct the Windows search to the directory where you downloaded the *linux.inf* file.
6. Go to *Control Panel* then go to **Networking and Adapters**.
7. Right-click the connection labeled **RNDIS/Ethernet**.
8. Go into the **TCP/IPv4 properties**.

NOTE: The DRT unit was originally assigned the IP address **192.168.2.100**. The PC's IP address can be between **192.168.2.1** and **192.168.2.255** with the exception that the PC's IP address can NOT be set to the DRT unit's IP address. In the next step, the IP address 192.168.2.101 is just an example.

9. Set the **IP address** to: **192.168.2.101.**
10. Press the TAB key to populate the **Subnet mask** field with **255.255.255.0**.
11. Click **OK**, then click **OK** a second time.
12. This completes the installation of the USB driver and the configuring of the network connection.

3.6 Install Software on Android Device

3.6.1 DRT43xxB System Requirements

The DRT43xxB system may be controlled using an Android device. The DRT43xxB system must be running software R01.02.xx or greater.

Diagrams showing what cables are required and how to connect the system to the Android device for operations are shown ***below***.

3.6.2 Android Device Requirements

The Android device must meet these requirements:

- Tested Models: Google Nexus 7 Tablet, Samsung Galaxy Nexus Phone, and Asus Transformer Prime Tablet.
- Android OS: 4.x. (NOTE: A problem has been identified that may prevent the use of some AT&T smart phones.)
- Support USB connection: The USB connectivity *will NOT* work with any device that is not a Samsung, ASUS, HTC, LG, Motorola, Qualcomm, Sony, Sony Ericsson, or Google manufactured device.

Required Cables (not supplied):

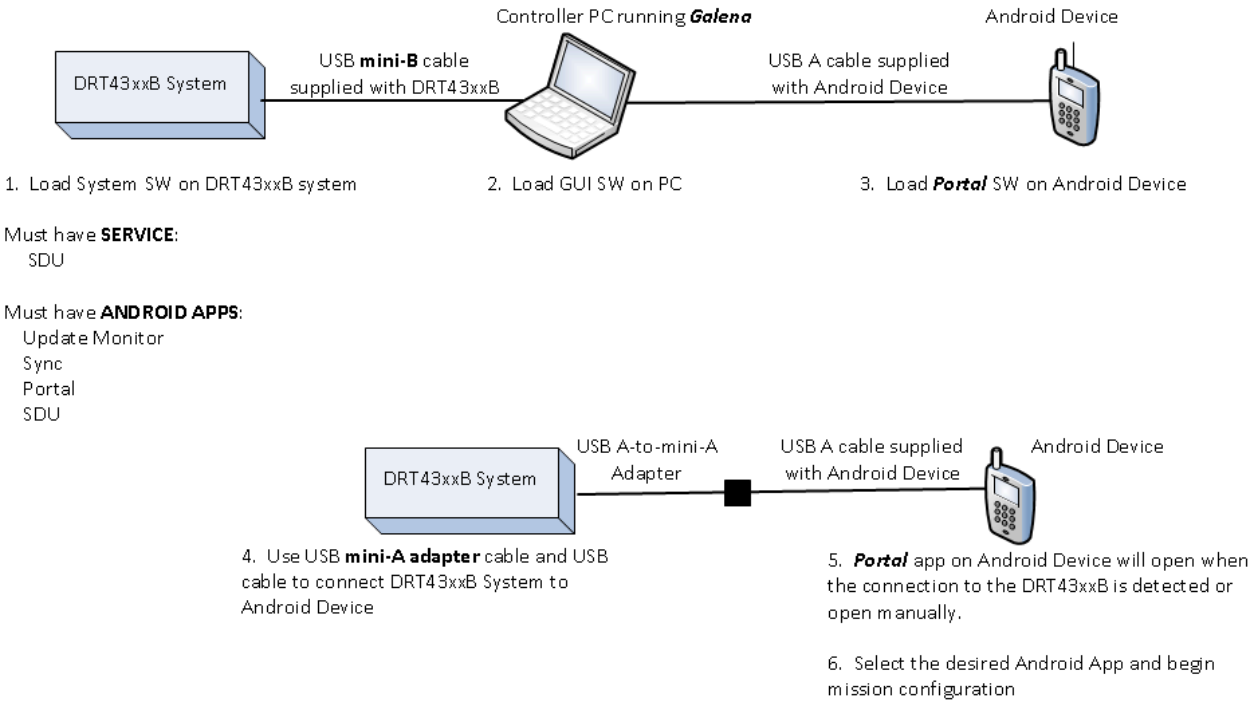
- USB A: to connect the PC to your Android device. Usually supplied with an Android device.
- USB Cable Adapter: A-to-mini-A to connect the DRT43xxB system to your Android device. The connector on the DRT43xx is a mini-A/B connector. The type of connector on the USB cable connections depends on whether the DRT43xx is acting as the host or the client. When connected to a PC, the PC is the host and a mini-B connector (supplied) is required. When connecting to an Android device, the DRT43xx is the host and a USB mini-A connection is required. Thus, you will need a USB A-to-mini-A adapter cable to connect from your Android device's USB A cable to the DRT43xxB.

3.6.2.1 PC Requirements for installing Portal

- PC must be running *Windows XP SP2* or later.
- PC must have *Windows Media Player 10 or later.* If you are running *Windows XP*, you will need to install *Windows Media Player 10* or later to enable Media Transfer Protocol (MTP). Otherwise, your Android device will be shown as unrecognized hardware by *Windows*.

3.6.3 Install Portal Application on Android Device

The diagram below shows the overall steps that will be required to load and use the *Portal* application. In general, it makes sense to load the system software and the GUI on the DRT43xxB system and the controller PC prior to loading the *Portal* application on the Android device.



3.6.3.1 Installing Portal onto on Android device for the first time

See above for the PC requirements.

3.6.3.1.1 Hardware Connections

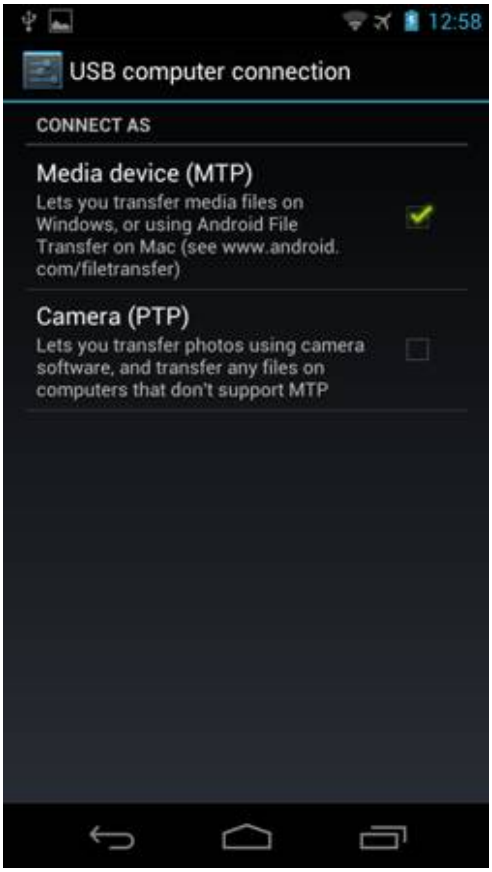
Using a USB cable (not supplied), connect the Android device to the PC.

3.6.3.1.2 Install Portal

The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

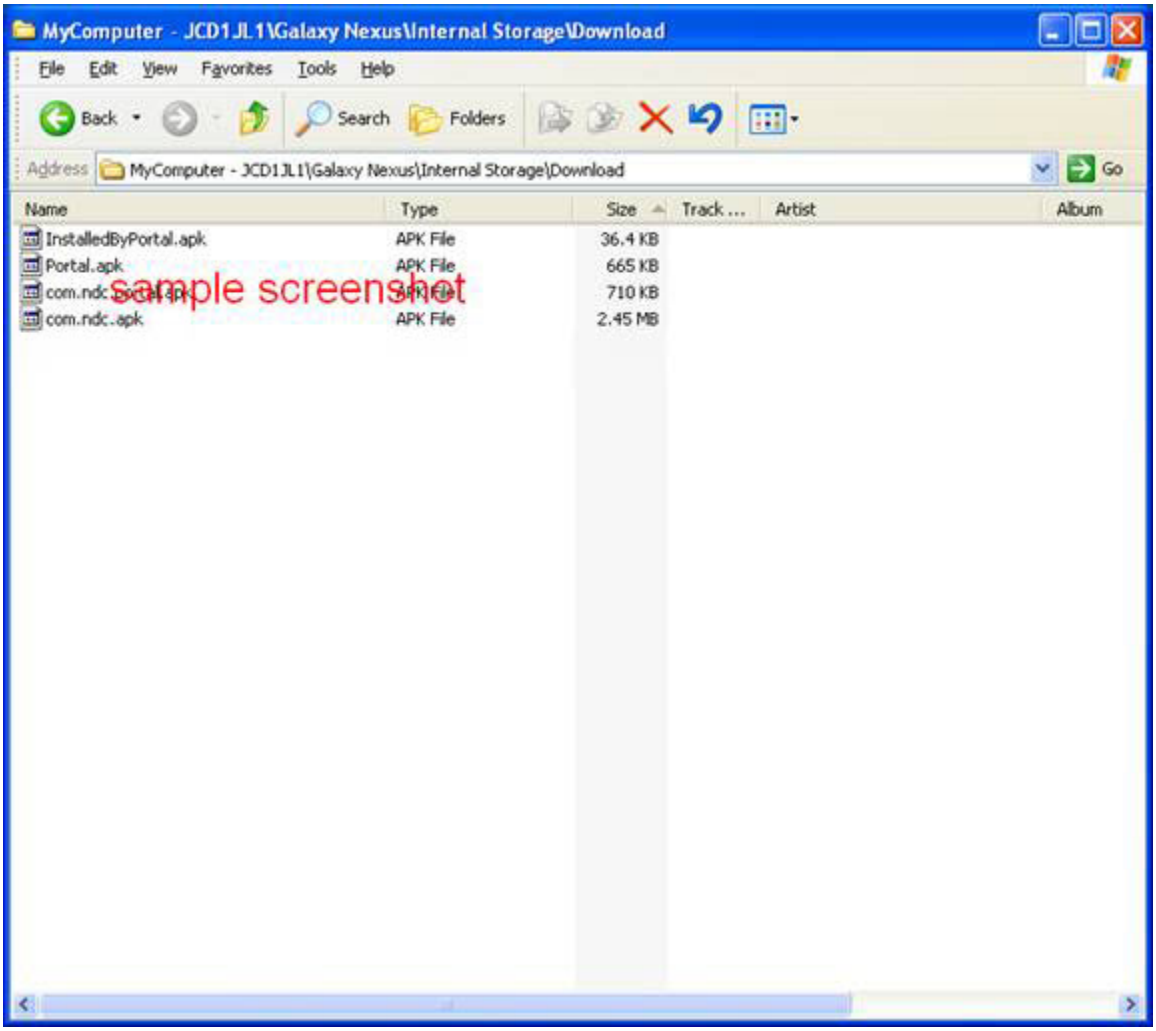
On the Android device, pull down the notification window from the top of the screen and find the USB connection.

If the device is not connected as a media device, touch the connection and select **Media Device (MTP)**.



On the PC:

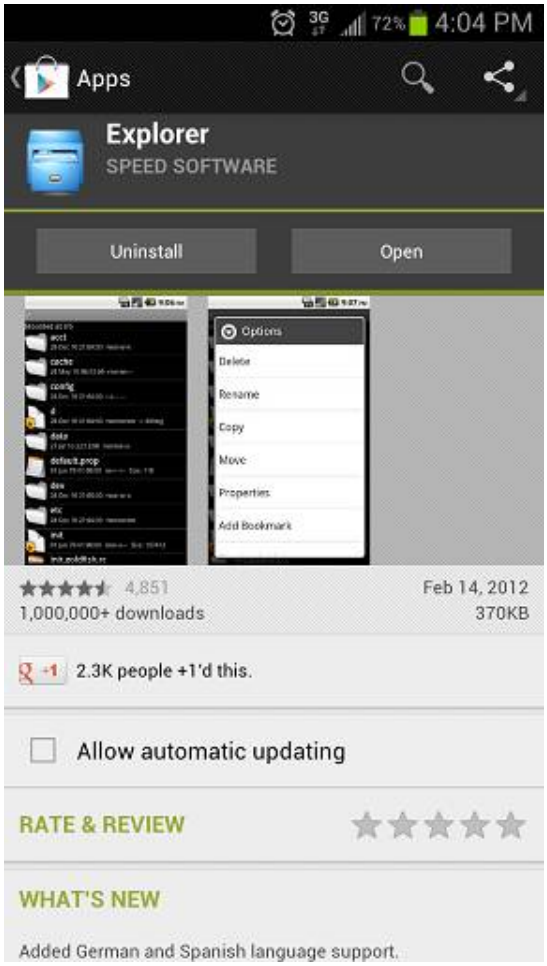
- Insert the DRT43xxB System Software CD in the CD/DVD drive. If the installation wizard starts, cancel it.
- Open My Computer or *Windows File Explorer* and find the Android device labeled as a Portable Media Player.
- Navigate to the Android device and then navigate to the Download directory (or another directory that you will remember).

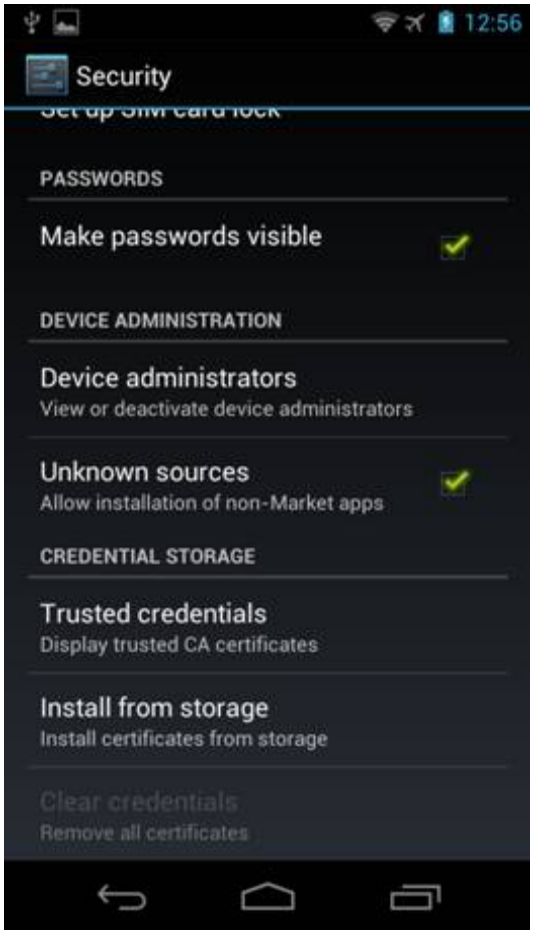


- Open another instance of *Windows File Explorer* (or My Computer):
  - Navigate to the DRT43xxB CD disk and navigate to the directory Utilities\Android.
  - Find the ***Portal apk*** file and copy it to the Android Device's Download directory you selected above.

On the Android device:

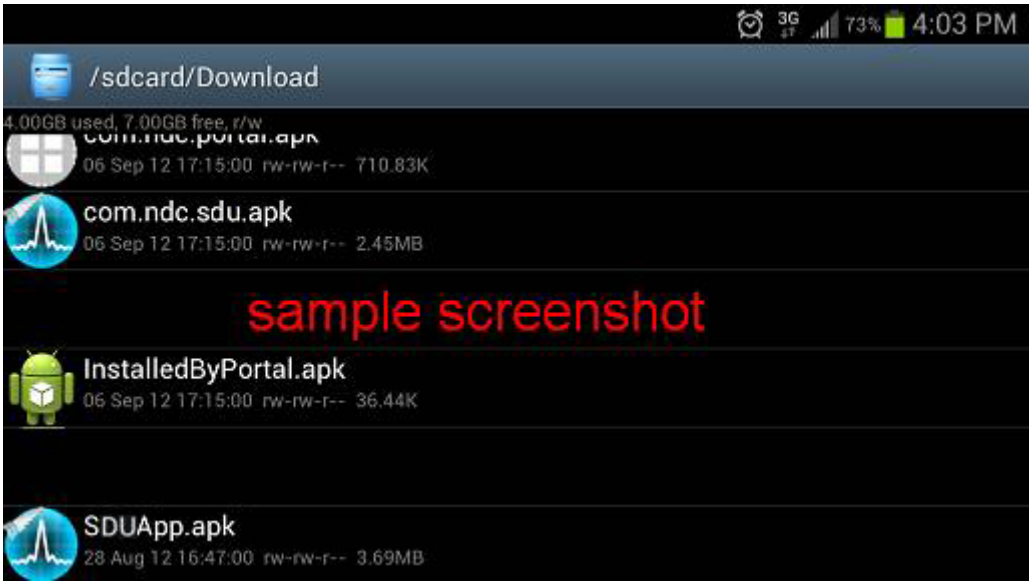
- Disconnect the USB cable from the Android device.
- On the Android device, launch the *Play Store* app and search for *Explorer* by Speed Software (https://play.google.com/store/apps/details?id=com.speedsoftware.explorer). Obtain and install this application. (NOTE: This step requires an internet connection.)



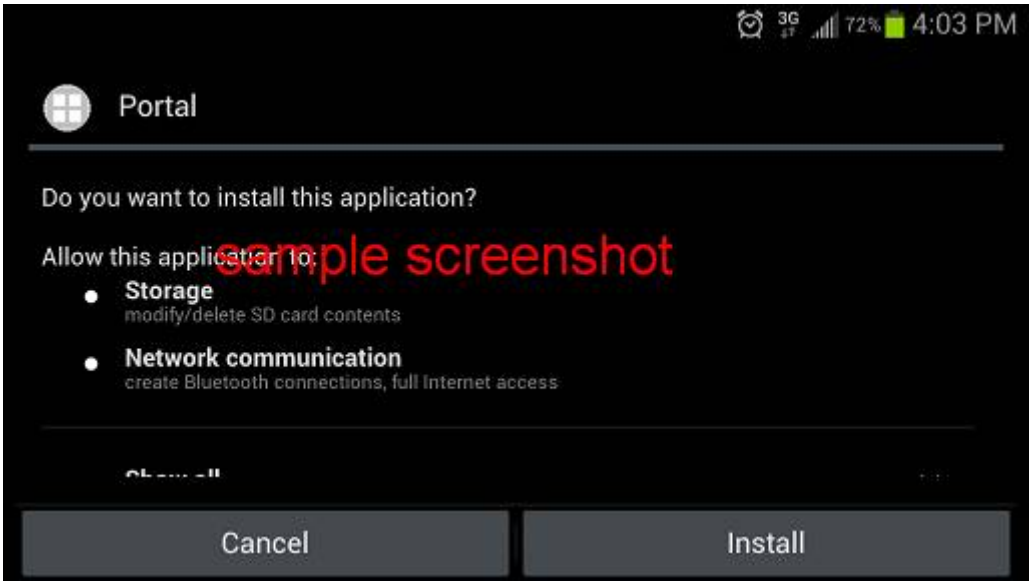


- Launch **Settings** from the app menu. Select **Security**, and check **Unknown Sources.** Confirm the selection by pressing **OK**.

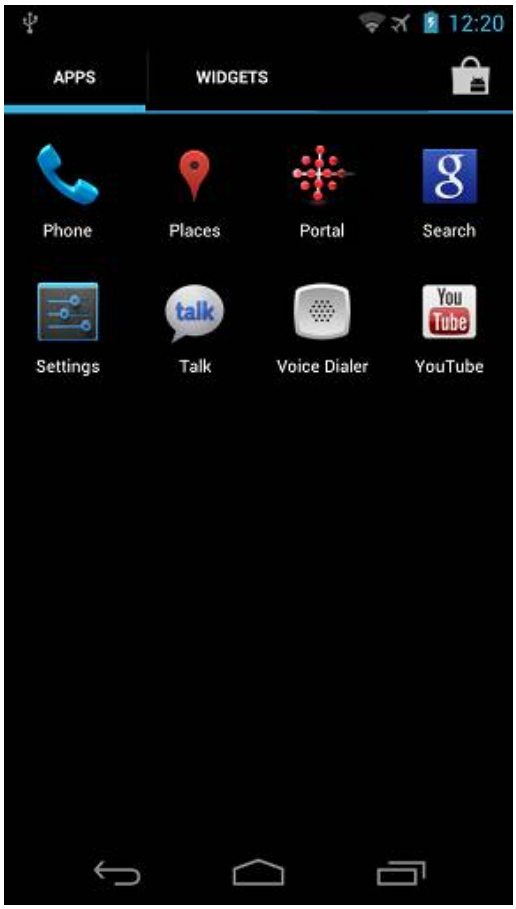
- Launch *Explorer* from the Android's app menu and navigate to the Download directory where you stored the ***Portal.apk*** file above. It may be located in “sdcard”.



- Select the ***Portal apk*** file, then select **Install** from the dialog.
- Press **Install** on the Android app install screen to install the application.



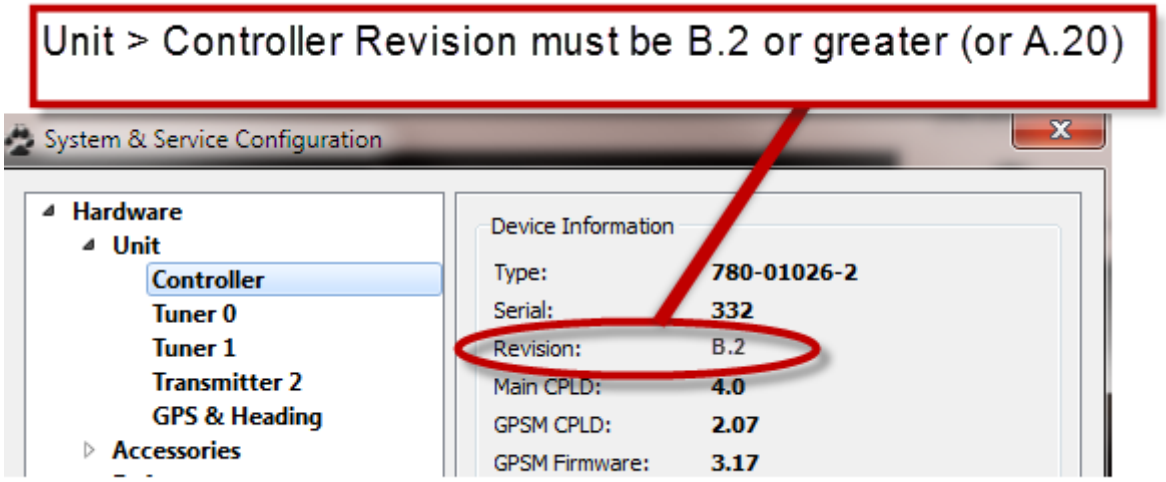
After the installation has completed, *Portal* should be an option on the Android's app menu.



3.6.4 Connect Android for Operations

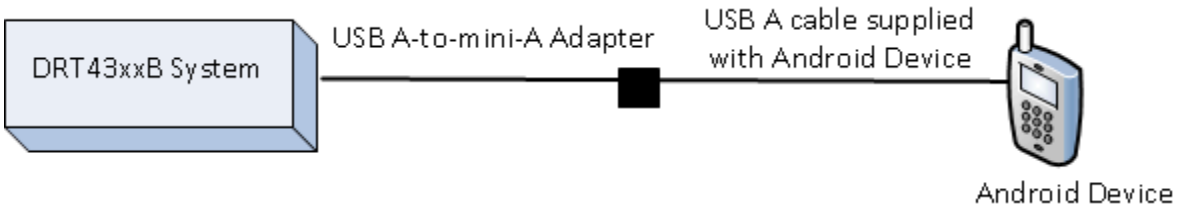
There are two methods for connecting the Android device to the DRT4300 in order to control the DRT system, but not all systems can do both.

- WiFi
  - Requires the DRT43xxB system to have an Ethernet connector
  - Requires a hub that supports both Ethernet and WiFi connections
  - Requires Android device that supports WiFi
- Bluetooth - See the ***Bluetooth*** section for details. Also consult DRT for an application note on hardware configuration requirements.
- USB
  - Requires DRT43xxB system with Digital Board Rev. B.2 or greater (if it is a Rev. A board, it could be Rev. A.20). To determine whether your system meets that requirement, connect to the system with *Galena* > from the main menu, select **Actions** > **View System Configuration** > on the left pane, under **Hardware** select **Unit** > **Controller**. On the right pane, the **Revision** field must say **B.2** or greater (or **A.20**).

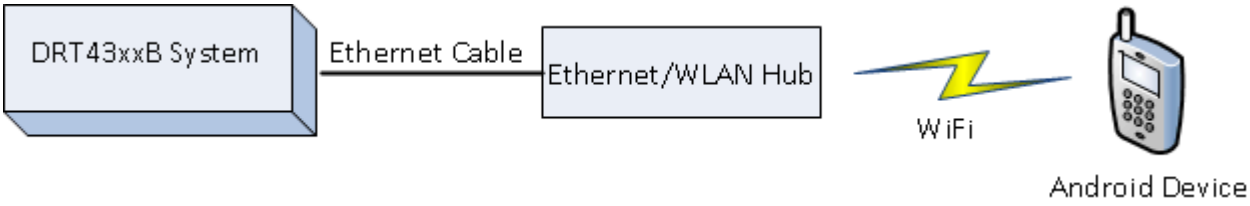


- Also note that a USB mini-A adapter cable is required as noted ***above*** under Android Device Requirements.

Connect to Android via USB



Connect to Android via WiFi



3.7 Bluetooth

3.7.1 Connect Bluetooth Adapter

A DRT system may be given Bluetooth capability using a Bluetooth adapter (sometimes called a dongle) attached to the DRT system via its USB port: most DRT4xxx systems with an exposed USB port may potentially utilize a Bluetooth adapter. Consult your DRT hardware manual or ask DRT for an application note that describes acceptable Bluetooth adapters for your DRT system and note whether your system will require a powered hub based on the revision of the system's Digital Board. The Digital Board must be Rev. B.2 or greater (if it is a Rev. A board, it could be Rev. A.20). To determine whether your system meets that requirement, connect to the system with *Galena* > from the main menu, select **Actions** > **View System Configuration** > on the left pane, under **Hardware** select **Unit** > **Controller**. On the right pane, the **Revision** field must say **B.2** or greater (or **A.20**).

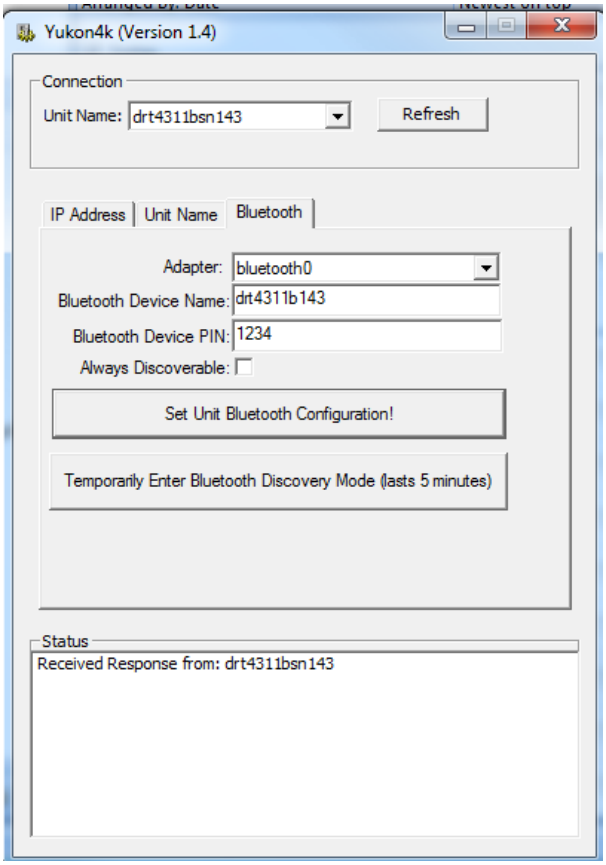
3.7.2 Yukon4k Compatibility

Yukon4k R1.4 or greater is required to configure Bluetooth on the DRT unit. *Yukon4k* is provided the *DRT4000B System Software DVD*. It is installed by default on the controller PC in the same directory with *Galena*. Note:

- *Yukon4k* R1.4 is backward compatible with earlier versions of *DRT4000 System Software*, but if connected to a unit running a system software release pre-dating release of the Bluetooth feature, the **Bluetooth** tab available will be disabled
- Alternatively, if *Yukon4k* R1.3 or earlier connects to DRT units running system software that has the Bluetooth feature enabled, the Bluetooth page will not be available for configuration. But if Bluetooth was already configured on the DRT unit, the Bluetooth configuration on the unit will be unchanged (older versions of Yukon4k are simply unaware of Bluetooth and cannot affect it).

3.7.3 Configure DRT System Bluetooth with Yukon4k

- Connect a PC to the DRT system using an Ethernet or USB connection.
- On the PC, open *Yukon4k* and in the **Unit Name** field, select to connect to the DRT system.
- On *Yukon4k*, click the **Bluetooth** tab.
- The **Adapter** field will show **bluetooth0** as the default.
- Enter the DRT system's name in the **Bluetooth Device Name** field. This is the name that the system will **broadcast** to be found by the Android device when the device is in **discovery mode**.
- Enter the PIN in the **Bluetooth Device PIN** field. When the DRT system is discovered, the Android device will prompt you to enter this pin so that the Android device (the client) can connect to the DRT Unit
- The DRT system needs to be "discoverable." You can make the system discoverable temporarily (for 5 minutes) or you can make the system "always discoverable." When the DRT Unit's Bluetooth is discoverable, any Bluetooth client can see the device and attempt to attach to it. When it's not discoverable, only devices that have previously paired with it may connect.
    - If the **Always Discoverable** box is checked, this will cause the unit to always be in discovery mode. Checking the **Always Discoverable** box also disables the temporary discovery mode button. If this is



selected, the Bluetooth adapter may be attached/detached at any time.

- The **Temporarily Enter Bluetooth Discovery Mode** button puts the Bluetooth adapter into discovery mode for 5 minutes. After 5 minutes, the adapter will automatically return to not being in discovery mode. NOTE: The Bluetooth adapter must be attached to the DRT system prior to making this selection.

- To finish, click the **Set Unit Bluetooth Configuration!** button to send the configuration to the unit. Sending the configuration also clears out any existing pairing information on the unit and resets the Bluetooth device connected to the DRT unit.
- You can close *Yukon4k*.

Bluetooth Adapter Detection

Bluetooth adapters attached to the DRT system are detected both at start-up and dynamically during runtime. If unplugged, the adapter and cable may be simply reinserted into the DRT 4000 unit to be reinitialized using the current Bluetooth configuration. The adapter should be attached before using *Yukon4k* to put the unit into Discovery Mode.

The Bluetooth adapter will be activated using the current Bluetooth configuration (see *Yukon4k* section above). Once activated, if the adapter has an embedded indicator light, it will usually begin blinking.

Sometimes the USB connection is not detected on attach and may need to be unplugged and plugged into the unit, but this only happens occasionally. The built-in Bluetooth adapter indicator light may be used to establish whether or not it was properly initialized.

3.7.4 Load Portal SW on the Android Device

Note that *Portal* must already be loaded on the Android device in order to finish the Bluetooth connection setup. See the ***Load Portal section***.

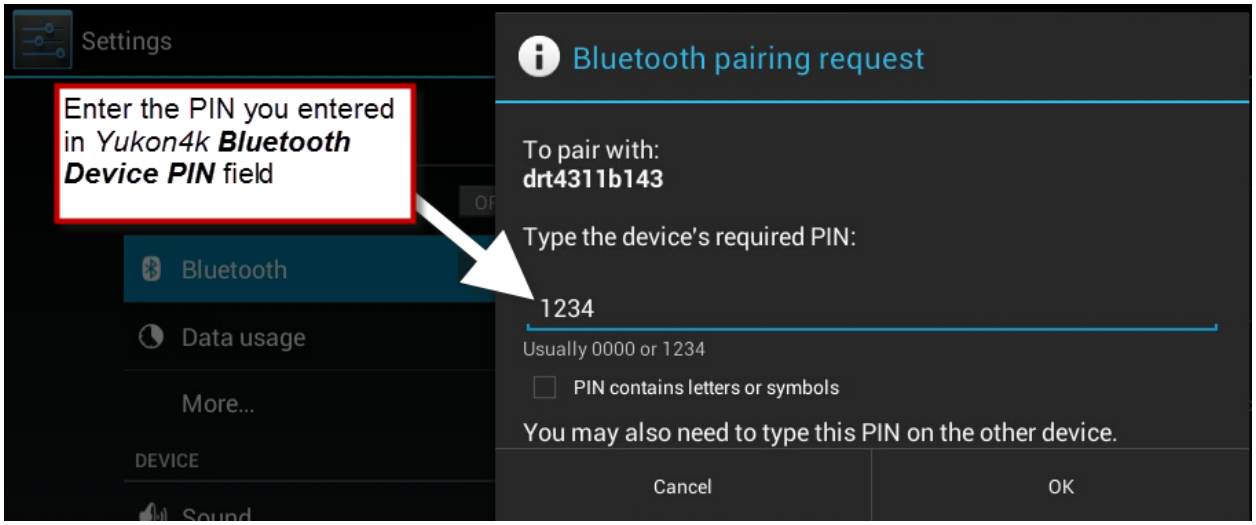
3.7.5 Pair DRT System with the Android Device

The DRT system's Bluetooth must be paired with the Android device's Bluetooth. In order to find and connect to a DRT 4000 system via Bluetooth, the DRT 4000 system (the Bluetooth host) must be in Discovery Mode. This is done using *Yukon4k* (see ***above***).

Consult your Android device instructions for details on how to pair that device with a Bluetooth device. When searching for devices, the DRT 4000 system should be visible to the Android device using the Bluetooth Device Name that was set using *Yukon4k*. The screen below shows a DRT system discovered by an Android device. Once the Android device has discovered the DRT system, on the Android device, select the DRT unit for pairing.

Android Device Screen Showing DRT System as a Discovered Device

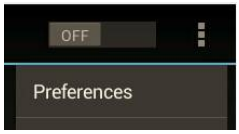
You will be prompted to enter the Bluetooth Device PIN you entered in *Yukon4k*. Click **OK** or follow the instructions for your Android device to complete the Bluetooth pairing. If you use *Yukon4k* to change any aspect of the DRT 4000 Bluetooth configuration at any point, the Android device will not recognize it unless you put the DRT4000 system back into discovery mode. Additionally, since the pairing information has been cleared from the DRT system, it may need to be re-paired with the Android device.



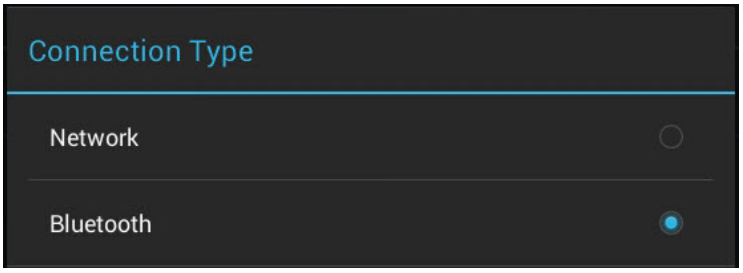
3.7.6 Connect Android Device to DRT System using Bluetooth

Once the DRT system and the Android device have been "paired" for Bluetooth, they can communicate over the Bluetooth connection; however, there is one more step to finish configuring the DRT *Portal* application running on the Android device. Once the Android device has been paired with the DRT4000 system, the Bluetooth connection must be established:

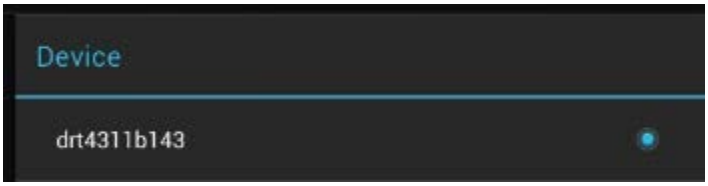
- Open *Portal* on the Android.
  - If *Portal* has been configured with this DRT system before, just set the *Portal* ON/OFF slider to ON. The Android device will connect and begin to sync up with the DRT system.
  - If this is the first time you are connecting to the DRT System:
    - Leave the *Portal* ON/OFF slider (usually located in the upper right corner of the display) in the OFF position.
    - Open the Android menu (icon and location vary) > select **Preferences.**



    - Under **Connection Type >** select **Bluetooth**.



- The devices that are currently paired with the Android are listed under **Bluetooth Settings.** Select which paired Bluetooth device *Portal* should connect to. A circle indicates the currently selected device.



- Go back to the main *Portal* window > set the *Portal* ON/OFF slider to ON.
- The Android device will begin to sync up with the DRT system.

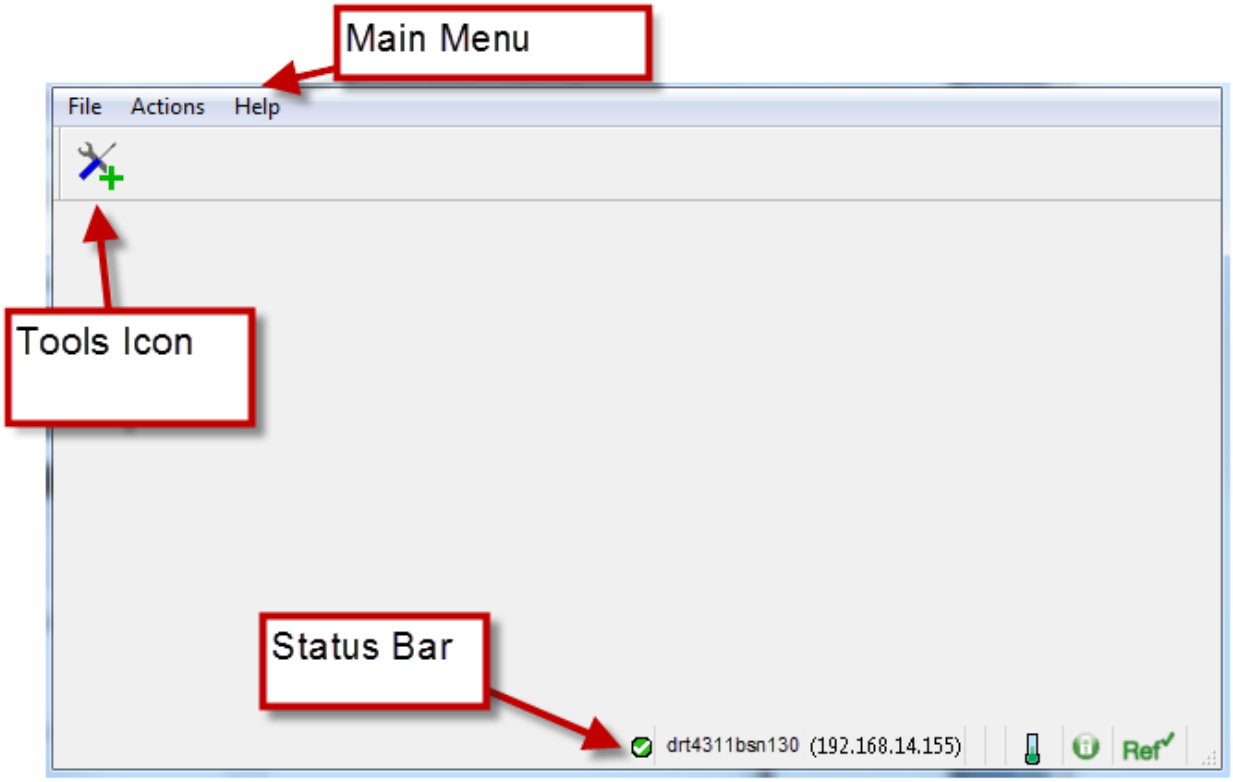
4 Control Software

4.1 PC GUI - Galena

Galena is the DRT-supplied GUI that runs on a controller PC. To open *Galena*, double-click the *Galena* icon on the controller PC's *Windows* Desktop. To connect to a unit, click **File** on the main menu and select **Connect**.

4.1.1 Connect to a Unit with PC (Galena)

This PC must be connected to the DRT system using an Ethernet cable, either directly using a crossover cable or through a network using a LAN cable. If the unit is not running a scan, the main window will look like this:

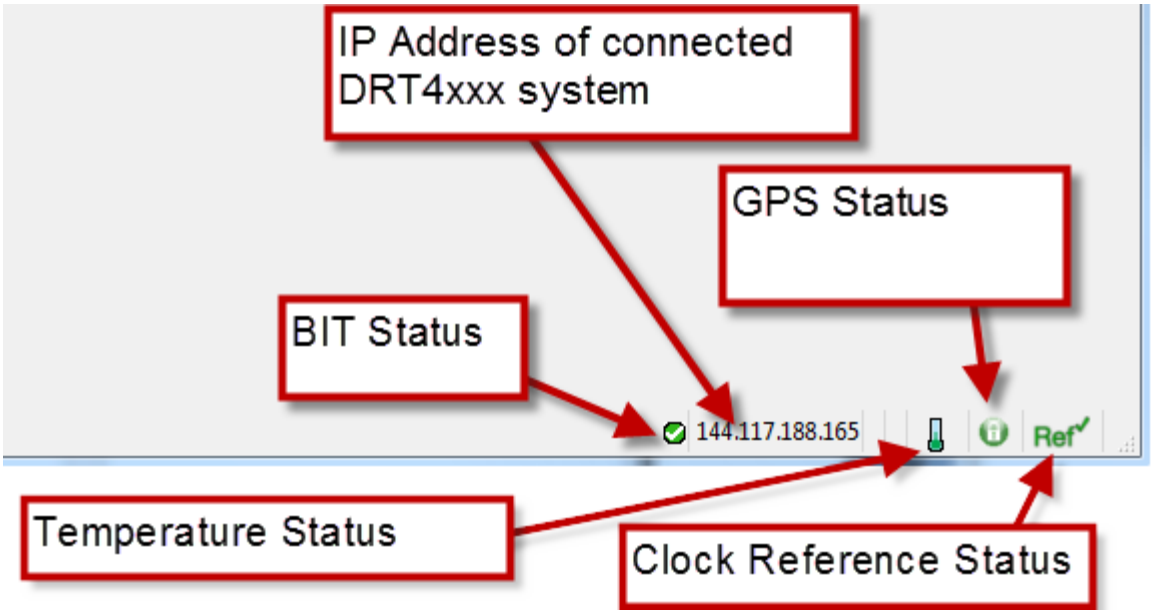


4.1.2 Status Bar

- Go/NoGo BIT Status: One of the first tasks that the unit performs is the Go/NoGo Built-in-Test (BIT). This BIT tests each of the main hardware groups. A green check, , indicates successful completion of the tests and a red "X," , is displayed if one or more problems are detected. With a Go result, you can proceed with the operation. However, if the result is NoGo you will need to resolve the NoGo problems before proceeding. More information is available on BIT results in the **System Information/*BIT*** section. Contact DRT Customer Service for more information.
- Unit model number and serial number: The model number and serial number of the unit this GUI is connected to is displayed.
- Unit IP Address: The IP address of the unit this GUI is connected to is displayed.
- Thermometer: A green thermometer indicates the DRT system's temperature is good. A red thermometer indicates the temperature is high with a critical severity reported by the embedded processor. A blue

thermometer indicates that the DRT system's temperature is low with a critical severity reported by the embedded processor.

- GPS Status:
  - o - indicates the selected GPS receiver is locked.
  - o - indicates the selected GPS receiver is not locked.
  - o - indicates the status of the selected GPS receiver is unknown
- o Reference Clock Status:
  - o Ref - indicates the selected clock reference is working correctly.
  - o Ref - indicates there is a problem with the selected clock reference.
  - o Ref - indicates an unknown state for the clock reference.
- o Battery Status - If a battery is attached, another icon will display the battery's status. The battery icon is green with 10 sections. As battery capacity is depleted, the sections will disappear. When battery capacity remaining goes below 50%, the icon turns yellow. Below 30%, the icon turns red. The system will notify you when the battery life drops to 30 minutes remaining and again when there are only 5 minutes remaining.



4.1.3 Main Menu

The *Galena* GUI currently supports Multi-Protocol Scanner (MPS) operations.

NOTE: Many options fields with default values can be changed in more than one way. Fields with a default value can be incremented and decremented using the up and down arrows on the right side, by highlighting the value and entering a new value using the controller PC's keyboard, or by highlighting the value and using the mouse's scroll wheel. When a field has multiple divided values, it will be necessary to highlight and change each section individually.

4.1.3.1 File Menu

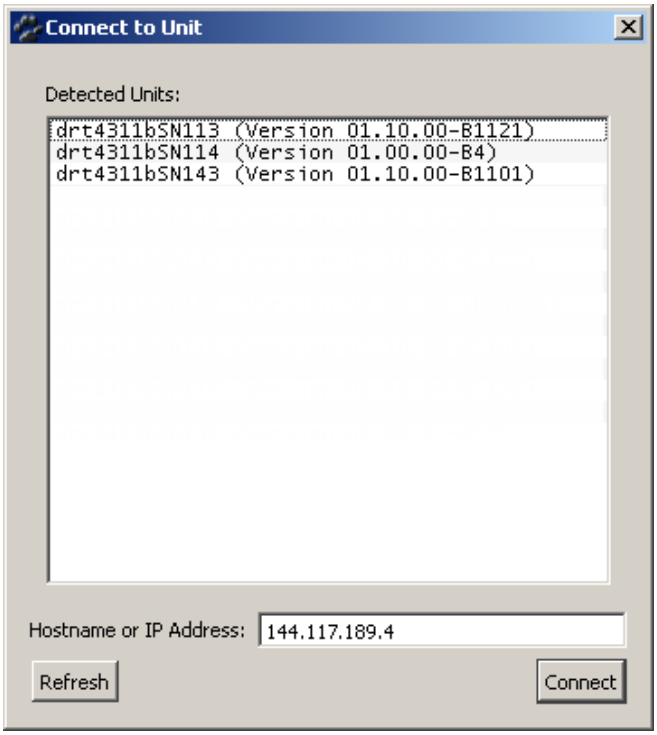
File has these options:

- **Connect** – Click **Connect** to connect your PC to a DRT unit.
- **Disconnect** – Click **Disconnect** to disconnect from the DRT unit.
- **Restore Unit Defaults** – Click **Restore Unit Defaults** to return the unit to the initial startup configuration with nothing running. Default configuration files are deleted but explicitly named configuration files are retained.
- **Manage Configurations** – Click **Manage Configurations** to load a configuration file from or delete a configuration file from the unit's SD card or the controller PC. See below for further information.
- **Save Configuration** – Click **Save Configuration** to save a configuration file to unit memory and/or the controller PC. See below for further information.
- **Reset Unit Configuration** – Click **Reset Unit Configuration** to bypass the embedded controller and reset the unit configuration. See below for further information.
- **Shut Down Unit** – Click **Shut Down Unit** to **Shut Down** the unit or **Reboot** the unit. See below for further information.
- **Exit** – Click **Exit** to exit the software.

4.1.3.1.1 Connect

Use the **Connect to Unit** dialog to select which unit the GUI should connect to. This dialog will automatically open when the GUI is opened or, select **File** > **Connect**. This dialog will display the name(s) of all available units on the network or the name of the unit connected directly to the PC along with the version of embedded software that each is running. Highlight the DRT unit you want to use and click **Connect** or double click the entry in the list. Up to eight instances of *Galena* may be connected to one DRT system.

If the serial number of the desired DRT unit is not displayed, but the unit is believed to be on the network and operational, click **Refresh**. You can also enter the unit's host name or IP address in the **Hostname or IP Address** field and click **Connect**.



NOTE: When connecting to a unit, the software will examine the current GUI software version as well as the embedded, or system, software version and advise you if the versions are different. It is highly recommended that the software versions are the same as dissimilar versions can cause improper operation.

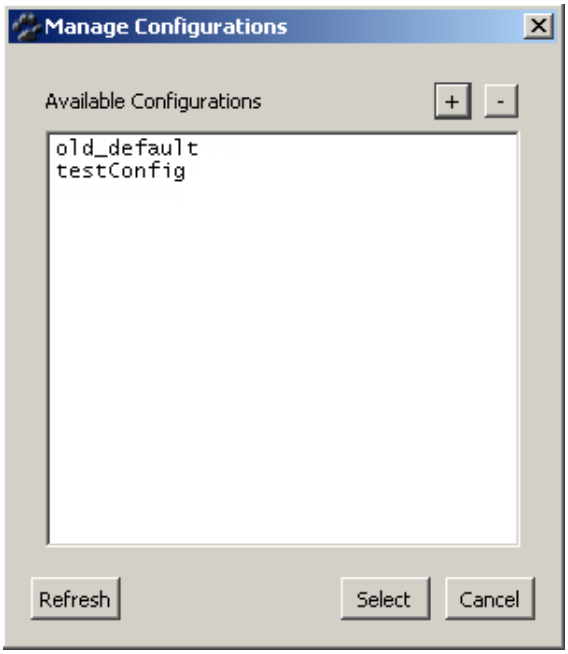
4.1.3.1.2 Disconnect

Select **File > Disconnect t**o disconnect the GUI from the DRT unit.

4.1.3.1.3 Restore Unit Defaults

Click **File > Restore Unit Defaults** to return the unit to the initial startup configuration with nothing running. Stored configuration files are retained.

4.1.3.1.4 Manage Configurations



Click **File > Manage Configurations** to load a previously saved configuration for reuse. A dialog will display a list of all the configuration files stored on the unit. Select one of these files by highlighting the file and click **Select**. The file will load and the scan will begin.

To remove a configuration file from storage, highlight the file and click the minus,  , button at the upper right above the field.

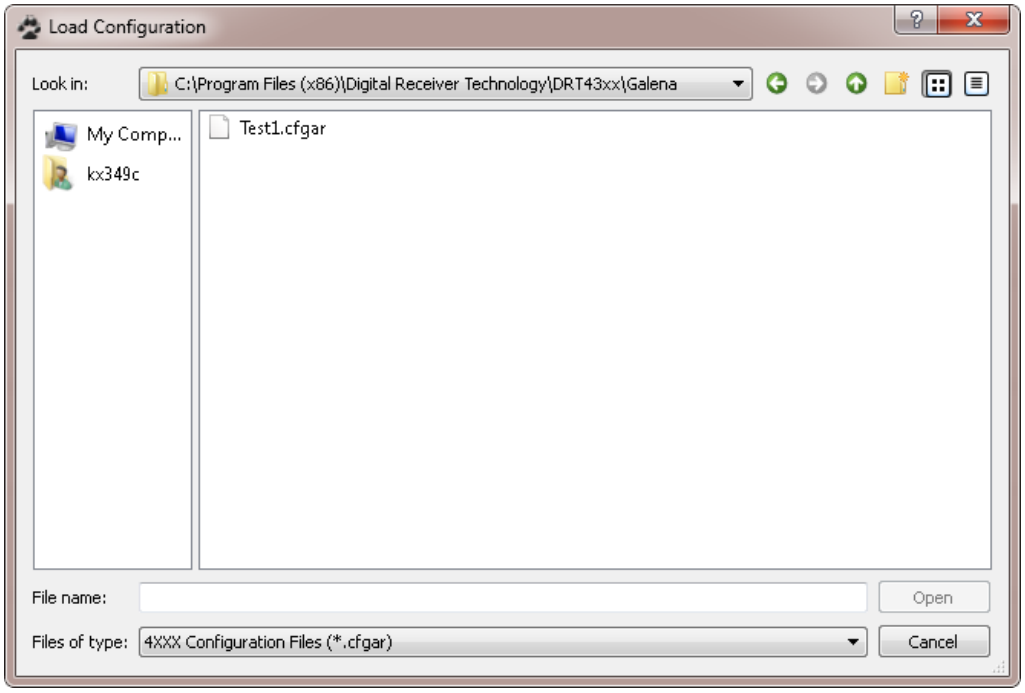
If the desired file is not on the unit, click the plus,  , button at the upper right above the field. A dialog will allow you to navigate to other configuration files stored on the controller PC. Refer to ***Load a Configuration from the Controller PC***, below.

Click **Cancel** to return to the main window without loading a file.

Load a Configuration from the Controller PC

When the desired configuration file is not available on the unit, the  button opens a dialog that will allow you to browse the PC to locate the desired file. Select the file and click **Open**. You will be asked where to save the file and the saved scan will be added to the list of available configurations. Load a configuration file by selecting the file name and clicking **Select**.

Click **Cancel** to return to the **Manage Configurations** dialog without loading a file.



4.1.3.1.5 Save Configuration

A configuration file can be saved for reuse. As an example, an MPS file could contain the protocol and scan configuraiton. When you select **Save Configuration,** a dialog box will be displayed with a **Filename** field for you to enter the name of the file and a **Location** field with the following location options:

- Remote – The file will be saved at a designated remote location.
- SD – The file will be saved on the unit's SD card (The card must be installed before the unit is powered on for the card to be recognized by the unit.).
- Temporary - This stores the file in the DRT system's temporary directory. The temporary directory is erased every time the unit is powered off.
- Computer – The file will be saved on the controller PC. (When this option is selected, a second **Save Configuration** dialog will appear to allow you to select a location for the file to be saved on the PC. If the initial location is not where you want the file saved, you can navigate to a different location or create a location for saving the file.)

The configuration file on the unit is available to any PC connected to the unit and the configuration file on the PC is available for use with any other unit. The file extension is .CFGAR.

NOTE: The saved file name will not contain any spaces. If a space is used when the file name is entered, an underscore will automatically replace the space. Therefore, if you enter **TEST 1** as the file name, the saved file will be named **TEST_1.**

Click **Cancel** to return to the main window without saving the file.

4.1.3.1.6 Reset Unit Configuration

When a configuration on a unit has become unresponsive and you are unable to connect to the unit, it may be necessary to reset the unit to factory defaults while bypassing the embedded controller on the unit:

1. Select **Reset Unit Configuration**.
2. At the **Connect to Unit** dialog, select the unit to be reset. If the unit name is displayed, enter the unit's host name or IP address in the **Hostname or IP Address** field.
3. Click **Connect**. A message is displayed.
4. Click **Reset Unit Configuration** to reset the unit. The unit will be reset and rebooted. Click **Close**. Allow time for the unit to reset before trying to reconnect to the unit. If you attempt to connect before the unit is ready, you will receive an error message. Acknowledge the error and wait a short time before reattempting to connect.

4.1.3.1.7 Shut Down Unit

When the Shut Down Unit option is selected, a dialog will appear with these selections:

- **Shut Down** – Saves the current configuration and powers the unit down to Standby. You will need to press the Power Control button on the unit to turn the unit ON.
- **Reboot** – Saves the current configuration and reboots the unit.
- **Nothing** – Cancels the selection and returns system to the current configuration with no changes made.

4.1.3.1.8 Exit

Select **File > Exit** to exit . **Exit** terminates GUI, but the DRT system continues to operate.

4.1.3.2 Actions Menu

Actions has these options:

- **Launch Tuner Configuration** – Manipulate the flow of data through the tuners.
- **View System Configuration** – Part of this selection is common to all services and will be discussed below. The portion unique to MPS will be discussed in the MPS section while the portion unique to Spectral Display is discussed in that section.
- **Shutdown Active Service –** Shuts down the active service.

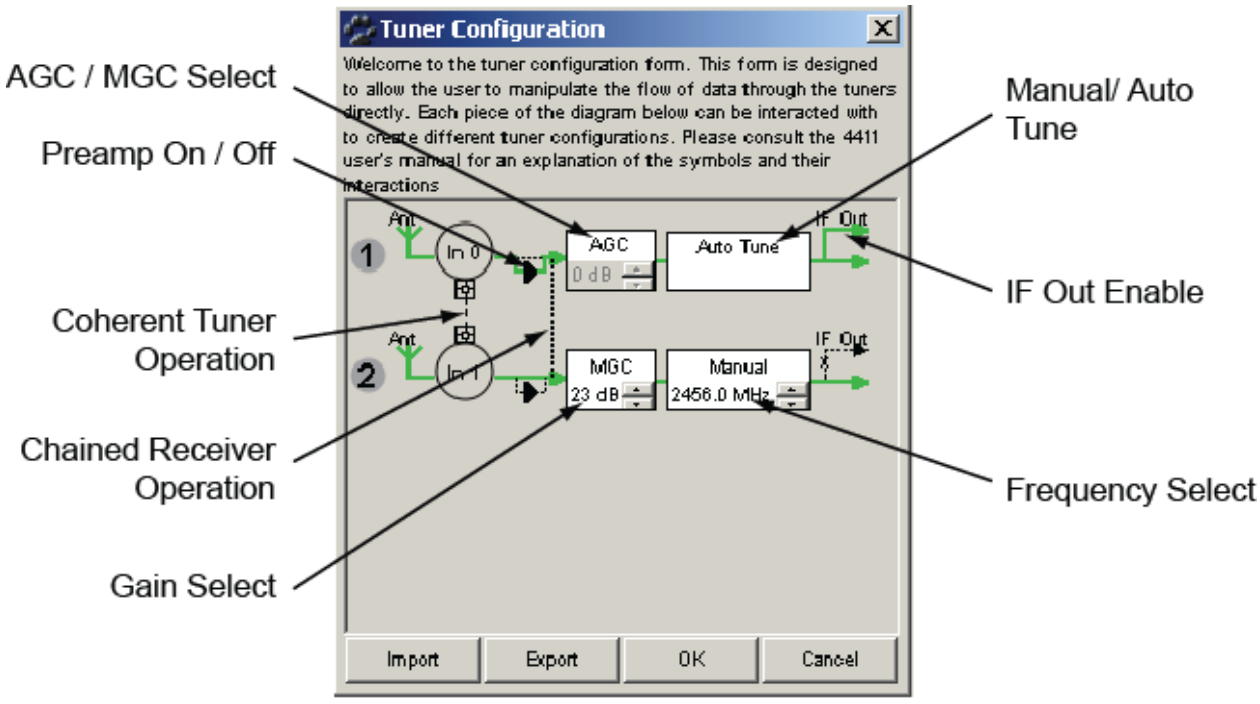
4.1.3.2.1 Launch Tuner Configuration

NOTICE

The software is written to optimize the tuner configuration for the current application. We recommend that you maintain the default settings and that you do not reconfigure the tuner(s).

The **Tuner Configuration** dialog allows you to manipulate the signal flow through the tuners. Several options are available:

NOTE: The **Tuner Configuration** dialog, shown below, depicts a unit with 2 tuners. For a system with only 1 tuner the dialog would show only the first tuner and for a system with 3 tuners, the dialog would depict 3 tuner sets with their available links.



- **Coherent Tuner Operation** – When there is a need for both tuners to operate coherently, click the dashed line between **In0** and **In1**. The two boxes contacting the sides of the **In0** and **In1** circles will turn green and join in the middle. When this is evident, the tuners are operating coherently. With coherent tuner operation, the **In1** circle is grayed out.

NOTE: **Coherent Tuner Operation** and **Chained Receiver Operation** cannot be used simultaneously. **Coherent Tuner Operation** cannot be established unless all tuners to be made coherent are set to **Manual Tune.**

- **Preamp On / Off** – You can add a 13 dB preamp into the input circuit. To select this option, click on the triangle icon,  , located below the solid green signal path. The solid green signal path will change to go through the triangle,  , indicating the preamp is turned on.
- **AGC / MGC** – The default for the gain control box is Automatic Gain Control (**AGC**). In AGC, the system determines the gain requirement and sets the gain accordingly. As an option, you can select Manual Gain Control (**MGC**) to set the gain to any value between 0 dB and 52 dB. Click **AGC** in the box to select **MGC**. Then enter / set the gain to be applied to the incoming signal. The arrows increment / decrement the gain value in 1 dB steps.
- **Chained Receiver Operation** – To supply the received signal to both tuners, click the dashed line between the AGC / MGC inputs. The green signal path from **RF In 2** will be removed as the feed to the lower AGC / MGC input and the green signal path from the upper input will go to both inputs. Operating in this mode reduces the input signal to both inputs by approximately 4 dB.
- **Manual / Auto Tune** – The default for the tuning box is **Manual**. In **Manual**, you set the frequency of the tuner. The limits are 24.0 MHz or 40.0 MHz to 2980.0 MHz. Any entry below 40 MHz will automatically be set to 24.0 MHz. Entries between 40 MHz and 2980 MHz will be 4 MHz steps and the entered value will be rounded to the nearest 4 MHz.

NOTE:

- The **Manual / Auto Tune** mode cannot be changed once a service is running; however, if in **Manual**, you can change the tune frequency while a service is running.
- For frequency values entered while in **Manual**, the frequency is set in 4 MHz increments. A frequency entered with a value between a 4 MHz increment and 1.9 MHz above that increment will be rounded down to the 4 MHz increment and any value entered between 2.0 MHz and 3.9 MHz above the 4 MHz increment will be rounded up to the next higher 4 MHz increment.

- **IF Out** – The IF frequency of each tuner, centered at 120 MHz, is available for recording and monitoring. To enable the **IF Out** port for either tuner, click the "x" in the **IF Out** path. The path will turn green indicating that the signal is available at the **IF Out** connector.

The **RF IN 1** input, associated with tuner 1, is indicated by the  icon and the **RF IN 2** input, associated with tuner 2, by the icon.

A different configuration might be to use the **RF IN 2** for the signal's RF input and have the mixed output passed to the **RF IN 1** input for display. This would require an SMA to SSMC jumper.

1. Connect the jumper from the **IF2** (out) connector to the **RF IN 1** connector.
2. Click the "**x**" in the **IF Out** path to enable the **IF2** output port (solid line) and disable the other port (broken line).
3. Set the tuner 2 **Manual** term to the center of the band to be examined and the tuner 1 **Manual** term to 120 MHz, the center of the IF output.

Tuner configurations can be saved as .TCF.xml files and recalled using the **Import** and **Export** buttons. For more information on saving and loading tuner configurations see below.

Click **OK** to accept the current configuration and exit the **Tuner Configuration** dialog. Click **Cancel** to exit the **Tuner Configuration** dialog and return to the main window without accepting the current configuration.

4.1.3.2.2 Importing and Exporting Tuner Configuration Files

When a tuner configuration has been successfully used, it can be saved for reuse. When you select **Export,** a **Save As** *Windows* dialog will allow you to save the file to your PC. If the initial location is not where you want the file saved, you can navigate to a different location or create a location for saving the file. Enter the file name in the **File Name** field at the bottom of the screen and click **Save**. The configuration will be saved on the controller PC with that name and a .TCF.xml extension.

The configuration file on the PC is available for use with any other unit.

Once the tuner configuration file has been saved, it can be recalled by clicking **Import** and selecting the desired file.

4.1.3.3 View System Configuration

Selecting **View System Configuration** brings up the **System & Service Configuration** dialog.

NOTE: The **System & Service Configuration** dialogs, shown below, depict a unit with 2 tuners, **Tuner 0** and **Tuner 1**. For a system with only 1 tuner the dialog would show only **Tuner 0** and for a system with 3 tuners, the dialog would have **Tuner 0, Tuner 1,** and **Tuner 2**.

The **System & Service Configuration** dialog has these main options – **Hardware, Software,** and **BIT.**

4.1.3.3.1 Hardware

Unit

The **Unit** view provides a summary of the current status of the unit.

- **Summary** – This area contains the **Unit Name**, the unit's **IP Address**, the **Model** and the unit's **Serial Number**. (The **Unit Name** includes the unit's model and serial numbers.)
- **Date and Time** – This area contains the unit's **Date** and **Time**. Time is based on a 24-hour clock and is typically based on GPS time, but can be modified.
- **Status:**

NOTE: The **GPS Locked** status is repeated in **System Information > Hardware Information > Unit > Internal GPS > Summary > Locked**.

  - **GPS Locked** has three possible states:
    - **Not Locked** – There are not sufficient usable locked satellites to obtain a fix.
    - **Locked 2D** – There are sufficient locked satellites to obtain a two-dimensional (latitude and longitude) position fix.
    - **Locked 3D** – There are sufficient locked satellites to obtain a three-dimensional (latitude, longitude, and altitude) position fix.
  - **Temperature** – **Temperature** provides the internal temperature of the unit. The internal temperature, in degrees C, and a thermometer icon are presented. The icon will be green, meaning an acceptable internal temperature, when the temperature is below 60° C. When the internal temperature reaches 60° C, the thermometer changes to red. Unless continued operation is critical, the unit should be shut down when 60° C is reached.

- **Battery:**

NOTE: If the unit is being powered from an external source and a battery is not attached, values for these three entries will not be displayed.

- **Battery Level** – **Battery Level** indicates the amount of charge remaining in the attached battery. The **Battery Level**, when a battery is connected, is expressed as **XX%** (**YY min**) where **XX%** indicates the percentage of charge remaining in the battery and **YY min** indicates the estimated usable time, in minutes, of operation remaining with the attached battery. If the battery is being charged while attached to the unit, the display will read **Charging**.
- **Battery Voltage** – **Battery Voltage** indicates the voltage level of the attached battery, expressed as **X.XXX** V. If the battery is being charged while attached to the unit, disregard this entry.
- **Battery Amperage** – **Battery Amperage** indicates the amount of current being supplied by the attached battery, expressed as **X.XXX** A. If the battery is being charged while attached to the unit, disregard this entry.

- **Status LED**

NOTE: The LED is enabled by default. Once disabled, to re-enable the LED you must return to this dialog.

- Located on the front panel of the DRT4311B is a status LED. When lit, this LED indicates the system status. The status LED can be enabled (lit) or disabled (not lit). Powering the unit off / then on will not change the configuration of the LED. Once disabled, you must return to this dialog and enable the LED to have it lit.
  - To enable the LED, check the Enable System Status LED box. Uncheck the box to disable the LED.

CAUTION

Do not attempt to load software on a DRT4311B with the LED disabled. The LED provides important information about the status of the software load that will not be available with the LED disabled.

Click the"**+**" beside **Unit** to reveal:

- **Controller**
- **Tuner 0**
- **Tuner 1**
- **GPS & Heading**

Controller

The **Controller** view provides information about the system controller and the versions of software loaded in specific areas. The **Device Information** area provides:

- **Type** – The type of Controller
- **Serial** – The serial number of the Controller
- **Revision** – The revision of the Controller
- **Main CPLD** – The version of software being run on the Main Complex Programmable Logic Device (**CPLD**)
- **GPSM CPLD** – The version of software being run on the Gypsum (**GPSM**) **CPLD**
- **GPSM Firmware –** The version of software being run on the **GPSM Firmware**
- **GPSM GPS** – The version of software being run on the **GPSM GPS** Receiver.
- **P1 / P2 BLL** – The version of software being run on the Bootloader Loader (**BLL**) for Processor 1 (**P1**) / Processor 2 (**P2**)

- **P1 / P2 Bootloader** –The version of software being run on the **Bootloader** for Processor 1 (**P1**) / Processor 2 (**P2**)
- **P1 / P2 OS** – The version of software being run on the Operating System (**OS**) for Processor 1 (**P1**) / Processor 2 (**P2**)
- **P1 / P2 Filesystem** – The version of software being run on the File System for Processor 1 (**P1**) / Processor 2 (**P2**)

NOTE: P1 and P2 represent Processor 1 and Processor 2. It is not necessary for P1 and P2 entries to have the same software versions.

Tuner 0 / 1

The **Tuner 0 / 1** views provide information about the system tuners and the versions of software loaded. The **Device Information** area provides information on the versions of the tuners in the unit. This includes the **Type** of tuner, the **Serial** number of the tuner, and the **Revision** of the tuner. This area also includes information on the **FPGA Revision** of software being run by the Tuner as well as the status of the unit's calibration.

GPS & Heading

The **Data** area provides the following information:

- **Date** – The current date in MM/DD/YYYY format. The display format of the date can be changed. Refer to ***Display_Options***, below.
- **Time** – The current GPS UTC time.
- **Locked** – The current state of the GPS is:
    - **Unlocked** – There are not sufficient usable locked satellites to obtain a fix.
    - **Locked2D** – There are sufficient locked satellites to obtain a two-dimensional (latitude and longitude) position fix. With **Locked 2D**, the **Horizontal DOP** value will be a small number and the **Vertical DOP** value will be a dash. An exception to the dash can occur for a short period of time while the system is in a transition from **Locked 3D** to **Locked 2D** or from **Unlocked** to **Locked 2D,** when the value will be very large.
    - **Locked3D** – There are sufficient locked satellites to obtain a three-dimensional (latitude, longitude, and altitude) position fix. With Locked 3D, the **Horizontal DOP** and **Vertical DOP** values will be small numbers.

NOTE:

- When position is displayed in MGRS, the **Latitude** and **Longitude** fields are replaced by a single MGRS field.
- The display format for the location (Latitude and Longitude) can be changed. Refer to ***Display_Options***, below.

- **Latitude** – The current latitude in decimal degrees; degrees, minutes, & seconds; or Military Grid Reference System (MGRS).
- **Longitude** – The current longitude in decimal degrees; degrees, minutes, & seconds; or MGRS.
- **Altitude** – The current altitude of the unit in meters. Available only when **Locked 3D**.
- **Heading** – The direction of movement of the unit referenced to true north in decimal degrees.
- **Speed** – The velocity of movement of the unit in kilometers per hour (km/h)
- **Visible Satellites** – The number of satellites being used by the GPS

- **Horizontal DOP** – The current value of **Horizontal** Dilution of Precision (**DOP**). This term will have a value whenever there is a **Locked 2D** or **Locked 3D** lock status.
- **Vertical DOP** – The current value of **Vertical** Dilution of Precision (**DOP**). This term will have a value whenever there is a **Locked 3D** lock status. With a **Locked 2D** status, the entry could be a dash or a number greater than 20.

The **GPS Source** area provides the following information:

- **Source** – The current source of location information:
    - **GPSM Device** – Position information is derived from the internal GPS system
    - **Manual GPS** – Position information is entered manually based on best available information
        - **Latitude** – Manually enter the best available information on the latitude of the current position in decimal degrees.
        - **Longitude** – Manually enter the best available information on the longitude of the current position in decimal degrees.
        - **Altitude** – Manually enter the best available information on the altitude of the current position in meters.

The **Heading Source** area provides the following information:

- **Source** – The current source of location information:
    - **GPSM Device** – Position information is derived from the internal GPS system
    - **Manual Heading** – Heading information is entered manually based on best available information
        - **Heading** – Manually enter the best available information on the direction of movement in decimal degrees.
        - **Speed** – Manually enter the best available information on the speed of movement in decimal kilometers per hour (km/h).

Accessories

Click the"**+**" beside **Accessories** to reveal:

- **SD**

The **SD** view provides information about the status of the SD card.

The **Details** area provides the following information:

- **SD Card Inserted** – The status of whether an SD card is recognized as being inserted in the unit. NOTE: The SD card must be installed in the unit before power is applied to the unit for the card to be recognized.

Reference

The **System & Service Configuration > Hardware > Reference** area displays the **Reference Settings,** the **Synchronization Settings,** and the **Output Settings** of the unit.

Reference Settings

The **Reference Settings** area's **Clock Reference** field allows you to select the source of the reference. The default is **Internal GPS (Trained)** and the options are:

- **Internal GPS (Trained)** – This selection establishes a trained clock using the system's internal GPS as a reference.
- **External 1PPS (Trained)** – This selection establishes a trained clock using an external 1PPS sync signal as a reference. Although not required, it is recommended that the **External 1PPS** is selected for the **Synchronization Pulse.** The external 1PPS signal must be connected to the system. See your hardware manual for details on connecting the external 1PPS signal.

- **External 10 MHz (Trained)** – This selection establishes a trained clock using an external 10 MHz source as a reference. The external 10 MHz signal must be connected to the system. See your hardware manual for details on connecting the external 10 MHz signal.
- **External 10 MHz (Bypass)** – This allows an external source to be used as the system reference. The external 10 MHz signal must be connected to the system. See your hardware manual for details on connecting the external 10 MHz signal.

The **Reference Settings** area's **Reference Lock** field indicates whether the unit's internal oscillator is locked to the selected GPS signal or external 10 MHz input.

External 10 MHz Present – This area indicates whether an external 10 MHz signal is present.

External 1PPS Present – This area indicates whether an external 1PPS signal is present.

Synchronization Settings

The **Synchronization Pulse** options allow you to select the source for the synchronization pulse used to synchronize to other equipment. The options are:

- **Internal Generated PPS** – This selection chooses an internally-generated (based on the Reference Settings selection) 1PPS signal.
- **External 1PPS** – This selection allows you to select a 1PPS signal supplied from an external source. The external 1PPS signal must be connected to the system. See your hardware manual for details on connecting the external 1PPS signal.

Output Settings

The **Output Settings** options allow you to select to output signals for synchronizing other equipment. Check the preferred option. The options are:

- **External 10 MHz** – Output a 10 MHz reference signal to a connector. See your hardware manual for details on connecting the external 10 MHz signal.
- **External 1PPS** – Output a 1PPS signal to a connector. See your hardware manual for details on connecting the external 1PPS signal.

4.1.3.3.2 Software

The **Software** view displays the software on the unit. Other views under **Software** are described below.

Audible Alerts

The **System & Service Configuration > Software > Audible Alerts** area allows you to configure the software to provide an audible alert when there is a change in state of the **GPS** lock, the **Reference** loop lock, and / or the unit's temperature. The alarm will occur when there is a transition to the selected state.

- **GPS** - An audible alarm can be set to occur when the GPS status changes to **Locked** and / or **Unlocked**.
- **Reference** - An audible alarm can be set to occur when the reference clock loop status changes to **Locked** and / or **Unlocked**.
- **Temperature** - An audible alarm can be set to occur when the unit temperature status changes to **Low**, **Normal**, and / or **High**.

To configure an alarm: The software makes use of the .WAV files included with your *Windows* software.

1. Click **Browse.** You will be directed to the .WAV files on your PC.
2. Select a .WAV file and click **Open**. This will load the available .WAV files into the software for selection.
3. Highlight a parameter that should produce an alarm when that state is achieved.
4. Using the list of available .WAV files, click the file to be associated with that status change. The file name will be placed in the **Sound** column of the selected state.
5. Check the box associated with that state to activate that alarm.

6. Repeat Steps 1 through 5 for each desired alarm.
7. To test any sound of the alarm, highlight that sound and click **Test**.
8. When all alarms have been set, click **OK**.

Applications

The **Software / Applications / Embedded Application** area provides information about the version of software and the build being run on the unit.

File Access

The **System & Service Configuration > Software > File Access** area allows you to connect to a remote server, to specify the auto-save location, and to identify the destination for output files.

1. Depending on what is desired, in the **Auto-save Configuration To** and/or the **Save Output Files To** field make a selection.

   Auto-Save options are:

   - **None** – Output files not saved.
   - **SD** – Storage on the unit's SD card (requires an SD card installed at startup).
   - **Remote** – Storage at a remote location (requires a remote server connection, see above).

   Save Output Files options are:

   - **None** – Output files not saved.
   - **SD** – Storage on the unit's SD card (requires an SD card installed at startup).
   - **Remote** – Storage at a remote location (requires a remote server connection, see above).

2. If you selected **Remote:**

   - Enter the IP address of the server in the IP field.
   - Enter the **Path** within the server to locate the files.

3. Click **Apply**.

- **Status** - This field displays the status of the remote server's connection. Until the remote server has been enabled and configured, the status will indicate **Not Configured**. If an attempt was made to enable and configure the remote server, but the configuration was invalid, the status will indicate **Configured and Disconnected.** However, the status will change to **Configured and Connected** when the remote server has been selected, configured, and the configuration confirmed.

Date & Time Display

The **System & Service Configuration > Software > Date & Time** area displays the **Current Time,** allows you to **Configure Unit Time,** and allows you to select an **NTP Server**. When the changes are complete, click **Apply** to enable the changes.

Current Time

The **Current Time** area displays:

- **Windows Time** – The current date and time of the controller PC in the designated **Display Format**. Clock display is in 24-hour format.
- **Unit Time** – The Unit's current date and time in the designated **Display Format**. Clock display is in 24-hour format.

Configure Unit Time

The **Configure Unit Time** area allows you identify the source of system time and to set the date / time.

- Identify the time source:
    1. Set the **Time Source** field to **Internal Clock**, **GPS Device**, or **NTP.**

       NOTE: If NTP is selected, it is necessary to provide the IP address of the NTP server. See ***NTP Server***, below.

- To set the unit to a date / time, the time source must be set to **Internal Clock** then:
    1. The date / time field will display the current date and time of the unit in the selected format. To change the date or time, highlight the first segment of the display to be changed and use the up / down arrows to make the change or enter in the correct date / time.
    2. Repeat for each additional segment to be changed.

NTP Server

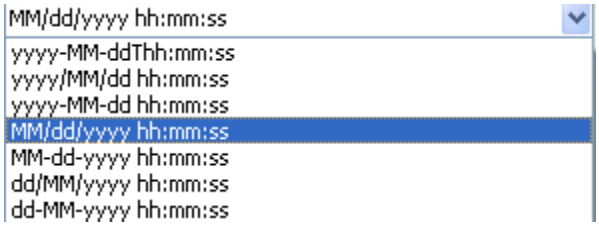
When NTP is selected in the **Time Source** field, the **NTP Server** field will accept an entry. In this field enter the IP address of the NTP server that will be the time source.

NOTE: Unless the PC's time has been recently synced to a time standard, Windows Time and Unit Time can differ by several seconds.

Display Options

The **System & Service Configuration / Display Options** area configures the **Date and Time Format** in the GUI, the units of the **Display Compass Angle**, and the method of position display. When the changes are complete, click **Apply** to enable the changes.

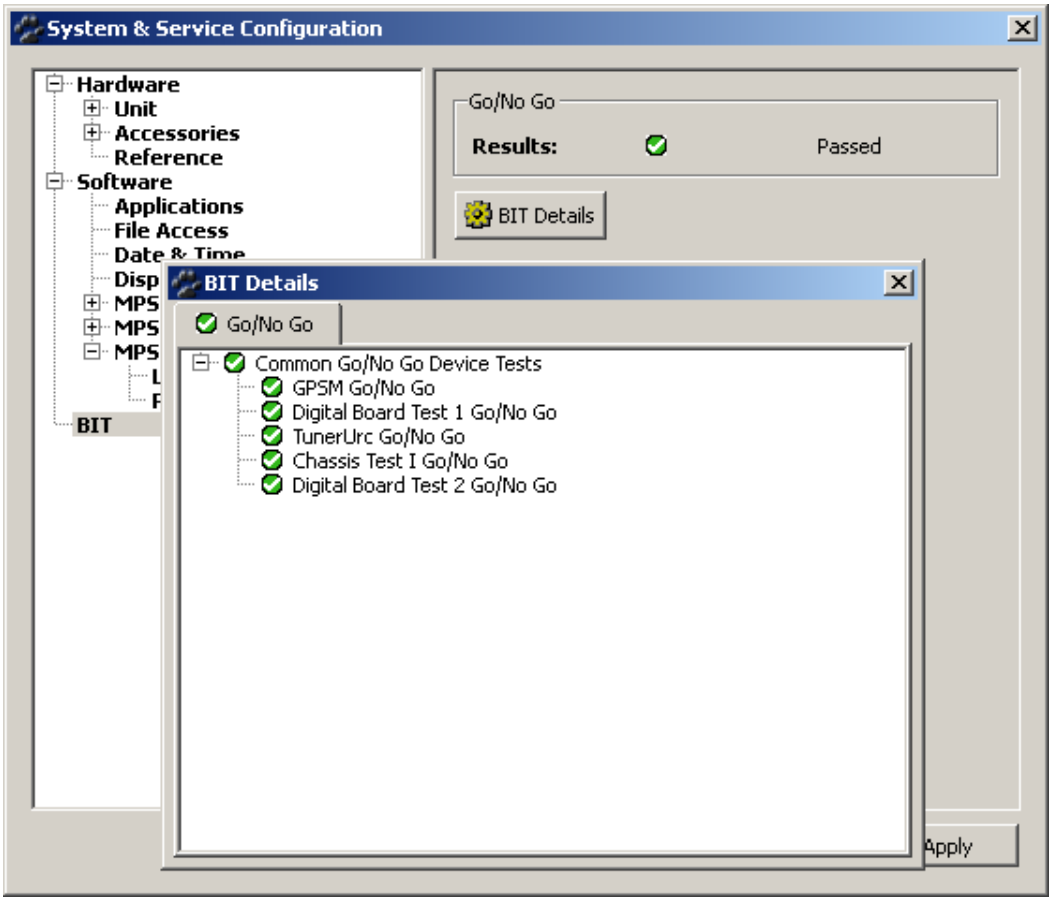
- The **Date and Time Format** area allows you to change the way the date and time are displayed by the unit. The available options are:



- The **Compass Angle** can be expressed either in **Degrees** or in **Mils**. The default is **Degrees.**
- The position as determined by GPS can be displayed in three formats:
    - **12.3456°** (Decimal degrees) – The values of latitude and longitude are displayed in decimal degrees. The default is decimal degrees.
    - **12° 34' 56"** (Degrees, Minutes, & Seconds) – The values of latitude and longitude are displayed in degrees, minutes and seconds.
    - **MGRS** – The position is given using the Military Grid Reference System (MGRS).

4.1.3.3.3 BIT

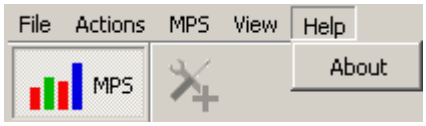
On startup, Go/No Go BIT is run and the results presented here. Selecting **BIT** provides a summary of the BIT results. The results, provided in the **Go/NoGo** area of the **System Information / BIT** page, will indicate that the overall system **Passed** ( ) or **Failed (**). Click the **BIT Details** button to display a tree which shows the each of the test categories and results of each, given as a or a . Click in the upper right corner to close the **Bit Details** screen then click **OK** or **Cancel** to exit **System & Service Configuration** or select another category. The GUI's Status Bar also shows whether the system passed BIT.



4.1.3.4 Help Menu

Help has one option:

- **About** – Click **About** for information about the version of the GUI that is running on the PC.



4.1.4 User Preferences

The GUI automatically saves certain user preferences. The preferences are saved when the GUI is closed. The preferences are:

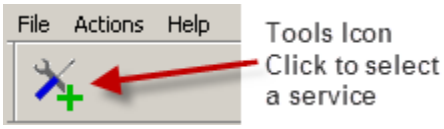
- Window Size / Location – The current location of the GUI on the PC screen and size of the GUI's window will be retained.
- Connection to Unit – The last connected unit will be auto-populated into the **Connect** dialog the next time is run.

NOTE: After making any configuration changes to the unit, allow a minimum of five seconds for the user preferences files to update before powering down the unit.

4.1.5 Select the Service

Currently, there are two types of services with the *Galena* GUI, MPS (Multi-protocol Scanner) and Spectral Display. MPS will provide information on cellular activity while Spectral Display provides information on signals in general.

Click the Tools icon to select the service.



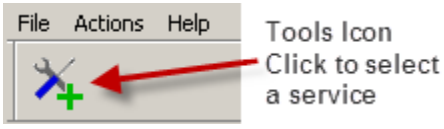
A **New Service** dialog will be displayed with the available operating mode options. Currently, the options are:

- **MPS**
- **Spectral Display**

Highlight the desired service and click **Next**. A configuration wizard is launched. Go to the *Galena* ***MPS*** section if **MPS** was selected and to *Galena* ***Spectral_Display*** if **Spectral Display** was selected.

4.1.6 Spectral Display

To start a new service when another service is already running, on the main menu click **Actions** > **Shutdown Active Service**. Then to start Spectral Display, click the **Tools** icon > select Spectral Display and click **Next**.



Refer to ***Manage_Scanner_Configuration*** to configure the initial scan.

4.1.6.1 Main Menu

Selections common to both the MPS operating mode and the Spectral Display operating mode are covered in the ***Galena GUI*** section.

4.1.6.1.1 Actions Menu

Actions has these options:

- **Launch Tuner Configuration** – this option is covered in the ***Galena GUI / Actions Menu*** section.
- **View System Configuration** – a portion of this option is covered in the ***Galena GUI / Actions Menu*** section. The portion that is Spectral Display specific is discussed in ***Spectral Display Properties*****,** below.
- **Shutdown Active Service –** this option is covered in the ***Galena GUI / Actions Menu*** section.

4.1.6.1.2 View System Configuration

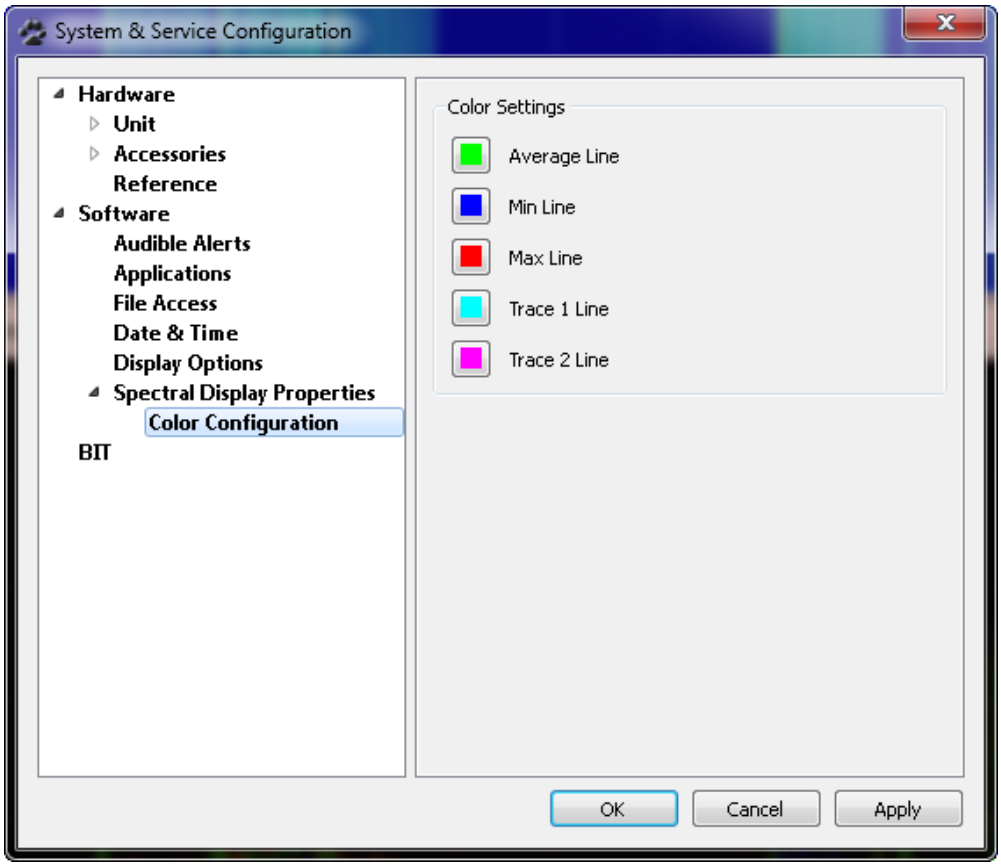
When all selections and edits on System & Service Configuration are complete, click **OK**.

Spectral Display Properties

The **System & Service Configuration** dialog has an additional section that is only available for Spectral Display, **Spectral Display Properties**. It is through this section that **Color Configuration** is selected.

Color Configuration

The **Color Configuration** view allows you to set the colors for spectral display's trace view lines.



There are five **Color Settings** for the spectral display lines:

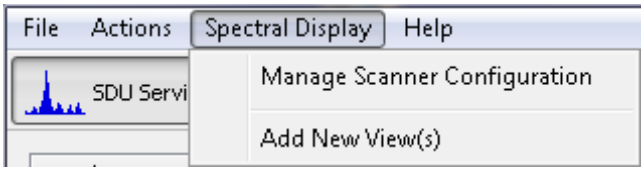
- **Average Line –** The current signal level, by frequency, of the displayed signal.
- **Min Line** – The minimum signal level, by frequency, of the displayed signal while using Peak Hold.
- **Max Line** – The maximum signal level, by frequency, of the displayed signal while using Peak Hold.
- **Trace 1 Line** – The signal level, by frequency, of the displayed signal at a particular point in time.
- **Trace 2 Line** – The signal level, by frequency, of the displayed signal at a particular point in time.

Each spectral display line can be set to any of 48 pre-configured basic colors, you can create up to sixteen custom colors using the accompanying palette, or you can select any color on the palette. To change a line's color, click on the button associated with that line. The **Select Line Color** dialog will be displayed. Click on a basic color, click on a custom color, click on any color within the palette, or enter values for **Hue**, **Sat**uration, **Val**ue, **Red**, **Green**, and **Blue** for the color to be displayed.

4.1.6.2 Spectral Display Menu

Spectral Display has these options:

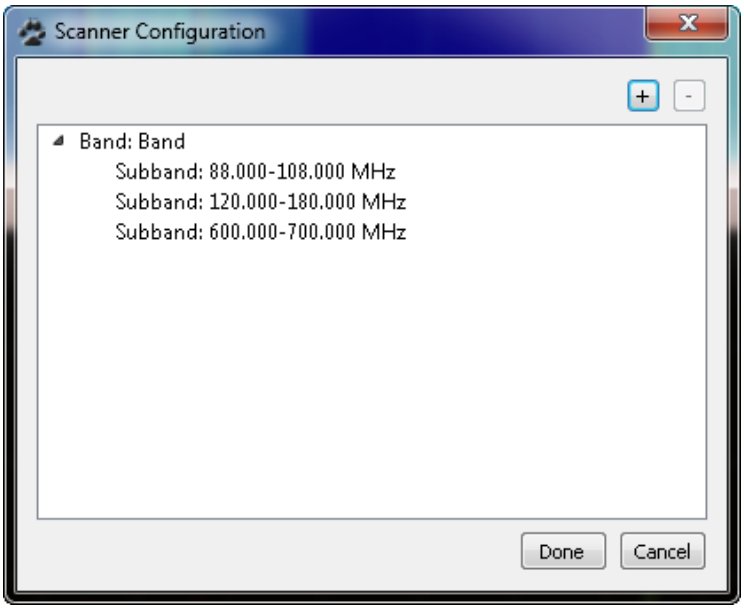
- **Manage Scanner Configuration** – create and modify scan bands.
- **Add View(s) –** add a copy of a current scan band to the display (requires an active scan).



4.1.6.2.1 Manage Scanner Configuration

Clicking **Manage Scanner Configuration** opens the **Scanner Configuration** dialog. The **Scanner Configurations** dialog allows you to create and remove scan bands.

If the Spectral Display option has not been used before, **Manage Scanner Configuration** is the only available option under the **Spectral Display** pulldown at startup. An information box will notify you that no bands are currently configured in this scan and a subband with an initial start frequency of 2 MHz and an initial stop frequency of 3000 MHz has been loaded. Other subbands can be added as necessary. The **Band** field will list all subbands currently available.



To add a subband, click the plus button,  , in the upper right corner of the dialog. Each new subband will also have an initial start frequency of 2 MHz and an initial stop frequency of 3000 MHz. To change a start or stop frequency, first double-click on the frequency to be changed. Then:

1. For a frequency resolution to 1 kHz, enter the frequency in the format xxxx.xxx MHz using the keyboard or
2. For a frequency resolution to 1 MHz, enter the frequency in the format xxxx MHz using the keyboard or
3. Use the mouse to highlight one or more digits of the frequency and replace those digits using the keyboard or
4. Use the up and down arrows, either the keyboard's or the dialog's, to increment or decrement the frequency in 0.100 MHz steps

NOTE: The start frequency must be lower than the stop frequency. Should you change the start frequency or the stop frequency with the result that start frequency ends up greater than the stop frequency, the unchanged term will be reset to match the changed value which will result in a single frequency scan. For example 240 MHz - 280 MHz changed to 300 MHz - 280 MHz will become 300 MHz - 300 MHz and 240 MHz - 280 MHz changed to 240 MHz - 200 MHz will become 200 MHz - 200 MHz.

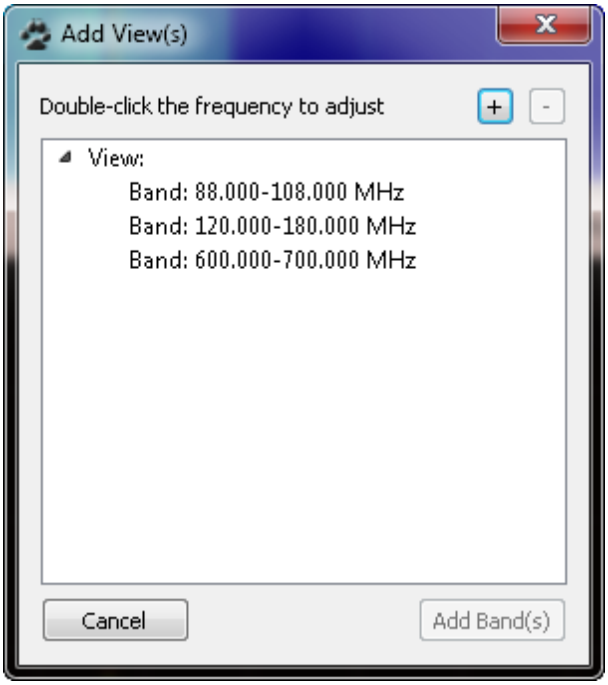
To remove a subband, highlight that subband and click the minus,  , button. A subband can also be removed by clicking the remove "X**",**  **,** in that subband's tab above the display(s).

When through with the changes, click **Done** to accept the changes and exit or click **Cancel** to undo any changes and exit.

4.1.6.2.2 Add New View(s)

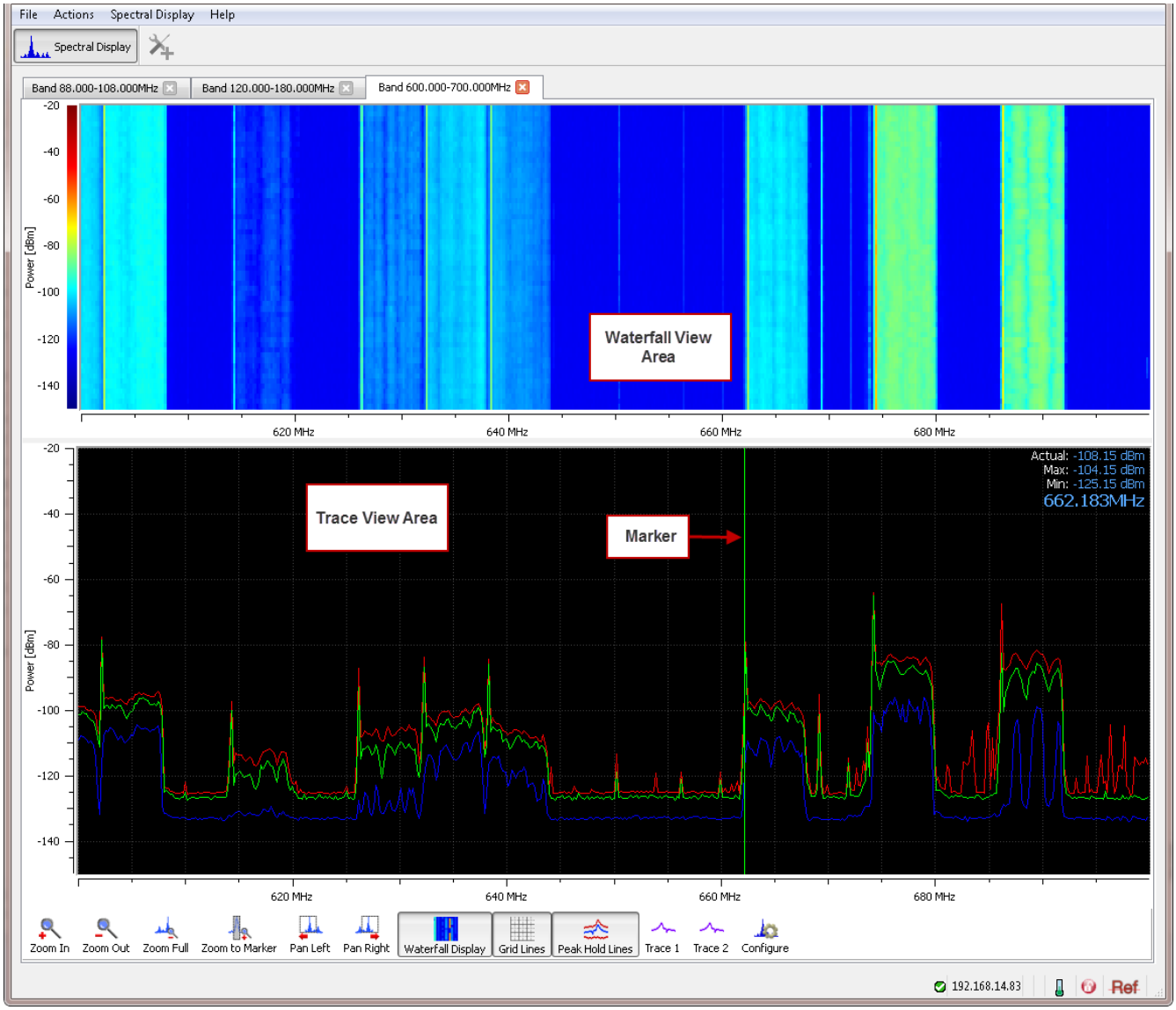
To add a new view, select **Add New View(s)** and click the plus button,  . If a current band had been highlighted, the new band will duplicate the start and stop frequencies of the highlighted band and if no band was highlighted, the new band will duplicate the start and stop frequencies of the first band in the current list.

For information on changing a start or stop frequency, refer to ***Manage_Scanner_Configuration***, above.



4.1.6.3 Spectral Display Operations

4.1.6.3.1 *Galena* Spectral Display Main Window



Spectral Display

The Spectral Display is a spectrum analyzer that provides a graphic display of detected radio-wave frequency and power activity. You control the display by setting parameters that define the frequency range(s) to be monitored. The maximum frequency range displayed is 2 MHz to 3000 MHz.

The main window can contain two spectral plot views. One is called a trace view and the other is called a waterfall or spectrogram view.

The trace view presents a point-by-point plot connected by lines. The frequency, in MHz, is displayed along the horizontal axis, with the higher frequency to the right and the amplitude (Power), in dBm, is displayed along the vertical axis with the strongest signal to the top. Moving the cursor to any location on the display area will cause the

cursor to become a cross and a tool tip to appear. The box will contain the frequency in MHz and the power level in dBm at the center of the cross.

The waterfall (spectrogram) view presents a graph with the frequency in the X axis, time in the Y axis, and signal power as a shade of color. Moving the cursor over any location on the display area will cause the cursor to become a cross and a tool tip to appear. The box will contain the frequency in MHz, the power level in dBm, and the time at the cross's location. For more information on the **Waterfall Display**, see ***Waterfall Display***, below.

The original size of the Display may be changed by grabbing the lower right corner of the screen with the mouse and pulling. Pressing the **Waterfall display** toolbar button will hide the waterfall area at the top of the display and, expand the vertical size of the trace view. The views may be sized by clicking and dragging the bar that separates the two views.

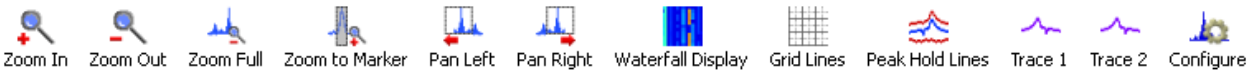
The default configuration is **Waterfall Display** on, **Grid Lines** on, and **Peak Hold Lines** on.

A marker can be placed on the display by clicking on the trace view where you like the marker to appear. The marker can be moved by clicking in a different location. A marker is not available in the waterfall view. For more information on the marker, see ***Trace View Marker***, below.

To change scans, select the tab above the display for the desired scan.

Spectral Display Toolbar

The Spectral Display has a toolbar:



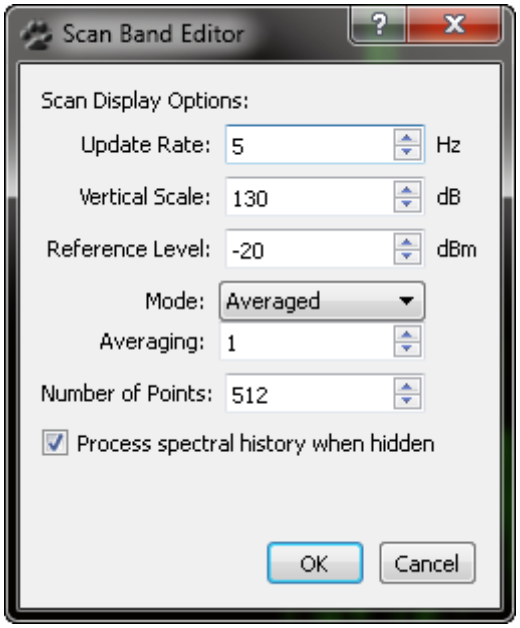
The available toolbar selections are:

- – **Zoom In** – Zoom in on the display 1 step per mouse click (Displayed frequency span is 50% of previous span per step).
- – **Zoom Out** – Zoom out on the display by 1 step per mouse click (Displayed frequency span is 200% of previous span per step and zoom cannot exceed original magnification).
- – **Zoom Full** – Return display to original magnification.
- – **Zoom to Marker** –Zoom to the marker and attempt to center the marker within the display's width.
- – **Pan Left**– Move a zoomed display to the left 25% of the displayed frequency range. As an example, If the original scan frequency was 80 MHz to 120 MHz, but the display was zoomed to a span of 90 MHz to 110 MHz and then **Pan Left** was selected, the displayed frequency range would shift to 85 MHz to 105 MHz.
- – **Pan Right** – Move a zoomed display to the right 25% of displayed frequency range. (See **Pan Left**, above).
- – **Waterfall Display** – Show / hide the waterfall view.
- – **Grid Lines** – Turn on / off the grid display.
- – **Peak Hold Lines** – Show and Hide the maximum and minimum frequency values in the spectral area.

-  – **Trace 1 / 2** – Create a curve plot copy of the current frequency values in the spectral area.
-  – **Configure** – Edit the parameters of the current pan.

Scan Band Editor Dialog

Clicking the Spectral Display toolbar's **Configure** icon brings up the **Scan Band Editor** dialog. When the pan was first created, you were asked to enter the scan's start Frequency and stop Frequency. The **Scan Band Editor** dialog allows additional controls over the scan display. The options are:



- **Update Rate** field – The display refresh rate in Hz (updates per second). A higher refresh rate consumes more bandwidth from the network connection to the DRT unit. The default value is 5 Hz and the limits are 1 Hz to 250 Hz. The arrows increment / decrement the value in 1 Hz steps.
- **Vertical Scale** field – The range in dB between the maximum level of signal displayed and the minimum level center frequency. The default value is 130 dB and the limits are 50 dB to 200 dB. The arrows increment / decrement the value in 1 dB steps.
- **Reverence Level** field – The level in dBm of the maximum signal strength displayed. The default value is -20 dBm and the limits are -200 dBm to 200 dBm. The arrows increment / decrement the value in 1 dBm steps.
- **Mode** selection – The operating mode of the display. The options are:
    - **Averaged** – The average of a specified number of scans is displayed.
    - **Peak Hold –** The trace is composed of the strongest observed measurements for each frequency.
    - **Freeze** – The next scan processed is displayed and held until the Mode is changed
- **Averaging** field – The number of scans to be averaged for the plot displayed. This term is grayed out unless the **Mode** is set to **Averaged**. The default value is 1 and the limits are 1 to 99. The arrows increment / decrement the value in steps of 1.
- **Number of Points** field – The number of points displayed on the spectral display. The default value is 512 and the limits are 100 to 1000. The arrows increment / decrement the value in steps of 1.

- **Process spectral history when hidden** check box – Allows you to select if the spectral data continues to be processed while the waterfall view is hidden. With the box unchecked, if the waterfall view is turned off and then turned back on, the waterfall view will initially be blank, but will fill. However, with the box checked, if the waterfall view is turned off and then turned back on, the waterfall view will contain recently processed data.

Waterfall Display

The waterfall (spectrogram) view presents spectral density over time. Like the trace view, the frequency is on the horizontal axis and the waterfall view's horizontal axis is synced with the trace view's horizontal axis. The vertical axis represents the time and the shade of color represents signal power at that given frequency and time. Time in the spectrogram runs chronologically from bottom to top. As the spectrogram runs, the previous measurements move up one position, so that the current measurements are the bottom of the plot. The view presents approximately 45 seconds of data.

Trace View Marker

In addition to the tool tip to obtain frequency and power information from the trace view, you can also place a marker anywhere on the display. To place a marker anywhere on the trace view, position the cursor on a particular location on the display and click the mouse. A display will appear at the upper right corner of the trace view which lists the center frequency of the marker in MHz and the current (**Actual**) power level of the signal in dBm. If the **Peak Hold Lines** option is selected, in addition to the current (**Actual**) power level, the display will also provide the minimum (**Min**) and maximum (**Max**) observed power levels measured since **Peak Hold Lines** was selected.

Once placed on the display, the marker cannot be removed.

4.1.7 MPS (Multi-Protocol Scanner)

A quick start guide (***Configure an MPS Scan***) is provided at the end of these instructions.

4.1.7.1.1 Configure a New Scan

- Click the Tools icon, highlight the **MPS** selection and click **Next** to launch the **MPS Configuration Wizard**.

4.1.7.1.2 MPS Main Menu

Actions Menu

Actions has these options:

- **Launch Tuner Configuration** this option is covered in the Main Menu / Actions Menu section.
- **View System Configuration** – a portion of this option is covered in the Main Menu / Actions Menu section. The portion that is MPS specific is discussed in View MPS_System_Configuration, below.
- **Shutdown Active Service –** this option is covered in the Main Menu / Actions Menu section.

MPS View System Configuration

Selecting **View System Configuration** brings up the **System & Service Configuration** dialog. Logging, provider aliasing, and what overhead fields are displayed are selected on the **System & Service Configuration>Software** dialog. The settings are different for each wireless protocol. When all selections and edits on **System & Service Configuration** are complete, click **OK**.

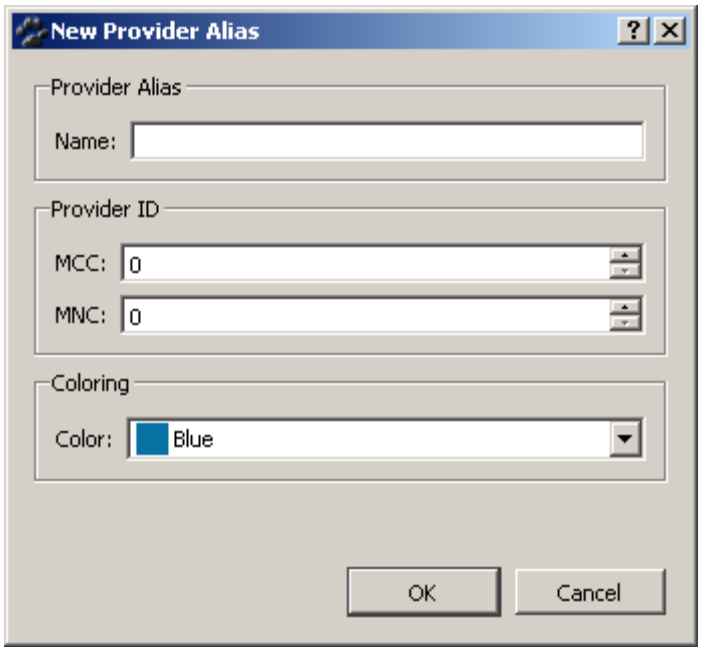
Provider Aliasing

Provider Aliasing allows you to apply a highlight color to the displayed signal to identify the provider.

Add an Alias

To create an alias, click the [+] box in the upper right area of the **Aliases** section of the dialog. This will bring up a **New Provider Alias** page.

This page is populated as follows:



- **Provider Alias** – Enter a name to describe the cellular provider in the associated field. The name can be any combination of letters and numbers with spaces allowed.
- **Provider ID** – Enter the provider's ID code in the associated fields:
  - **MCC** – Enter the provider's MCC code:
    If there is a question about the correct code to use with:
    - GSM, the MCC is detected and reported in the **Channel Details / Overhead Data** area of the main display.
    - LTE, the MCC is detected and reported as the first column in the **PLMN Identity** List table.
    - WCDMA, the MCC is detected and reported in the **Channel Details / Overhead Data** area of the main display.
  - **MNC** – Enter the provider's MNC code:
    If there is a question about the correct code to use with:
    - GSM, the MNC is detected and reported in the **Channel Details / Overhead Data** area of the main display.
    - LTE, the MNC is detected and reported as the second column in the **PLMN Identity List** table.
    - WCDMA, the MNC is detected and reported in the **Channel Details / Overhead Data** area of the main display.
  - For CDMA2K, the values are **SID** and **NID**. They are reported in the **Channel Details/ Overhead Data** area of the main display.
- **Coloring** –
  - **Color** – Select the desired highlight color from the list provided. The default is **Blue**. Note that the color will not automatically change when a new alias is created.

Edit an Alias

To edit an entry, either double-click the entry or highlight the entry and click **Edit.** To clear a single entry, highlight the entry and click the [-] box or to clear the complete list, click the **Clear** button (you will be asked to confirm the request to clear all providers). When the aliasing is complete, click **Apply**.

Importing and Exporting Aliasing Files

When an Aliasing configuration has been successfully created, it can be saved for reuse. When you select **Export,** the file will be saved on the unit and a **Save As** *Windows* dialog will allow you to save the file to your PC. If the initial location is not where you want the file saved, you can navigate to a different location or create a location for saving

the file. Enter the file name in the **File Name** field at the bottom of the screen and click **Save**. The configuration will be saved on the controller PC with that name and a .pac extension.

The configuration file on the PC is available for use with any other unit.

Once the Aliasing configuration file has been saved, it can be recalled by clicking **Import** and selecting the desired file.

Display Fields

The **Displayed Fields** dialog allows you to select the fields that will be displayed in the **Channel Details** area. Once selected, the order of the fields can be changed using the buttons on the right side of the page. To change the order, highlight the field to be moved and click:


Move the field to the top of the list


Move the field up one line


Move the field down one line

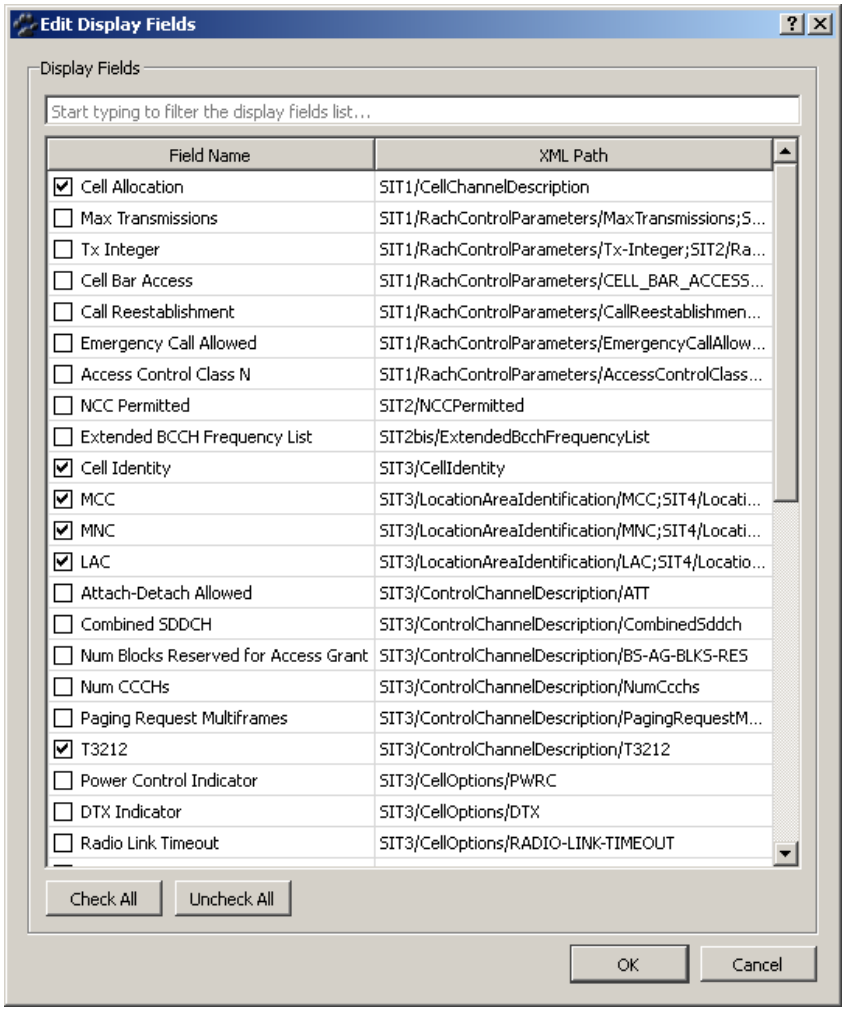

Move the field to the bottom of the list.

When the order is correct, click **Apply**.

Modify the Displayed Fields

To modify the fields displayed, click **Edit**. The **Edit Display Fields** dialog will appear. From the list, check each **Field Name** line that is to be displayed and ensure that all others are unchecked. Clicking the **Check All** button will check all the **Field Name** lines and clicking the **Uncheck All** button will remove the check from all the **Field Name** lines. There is no limit to the number of fields you can select.

The **XML Path** column identifies where in the XML tree the parameter is defined. The top field, an entry field containing the grayed text **Start typing to filter the display fields list,** is used to filter the selections displayed. As an example, enter the word "**cell"** in this field and only Field Names and XML Paths that contain the word "cell**"** will be displayed or enter **"BCH"** and only field names and/or XML Paths that contain BCH will be displayed. To display the full selection, remove the typed entry. When the selection is complete, click **OK**.



4.1.7.1.3 View Menu

View has several options:

- **Scan Speeds – Scan Speeds** option allows you to view the **Scan Rate**, the **Cell Scan Rate**, The **Revisit Rate**, and the **Number of Channels** scanned for each protocol and for each band examined in the protocol.
- **Channel Details** – **Channel Details** option allows you to display or not display **Channel Details** information. (All protocols)
- **Channel History View** – **Channel History View** option allows you to present or not present a graphical display of selected metrics, such as C/I and RSSI. (All protocols)
- **Scan Results** – **Scan Results** option allows you to present or not present tabulated data by channel / cell of the signals found in the selected band. (All protocols)
- **Neighbor List** – **Neighbor List** option allows you to present or not present a list of neighboring cells that can be used for the handoff of a mobile call. (CDMA2K and GSM protocol only)
- **PLMN Identity List** – **PLMN Identity List** option allows you to present or not present the **MCC** and **MNC** for the channel and any **Cell Barred** conditions that could exist. (LTE protocol only)
- **Cell Info List** – **Cell Info List** option allows you to present or not present tabulated information about the cell, such as PSC, Cell ID, Tx Diversity, and Reference Time Difference To Cell. (WCDMA protocol only)

4.1.7.1.4 MPS Menu

MPS menu options:

- **Enable Logging** – Select to enable logging for all configured protocols.
- **Launch Wizard** – Opens the **MPS Configuration Wizard** which you should use to set up the scan criteria.

Launch Wizard

The **Launch Wizard** menu item opens the **MPS Configuration Wizard** which allows you to select the protocol and then the bands associated with that protocol:

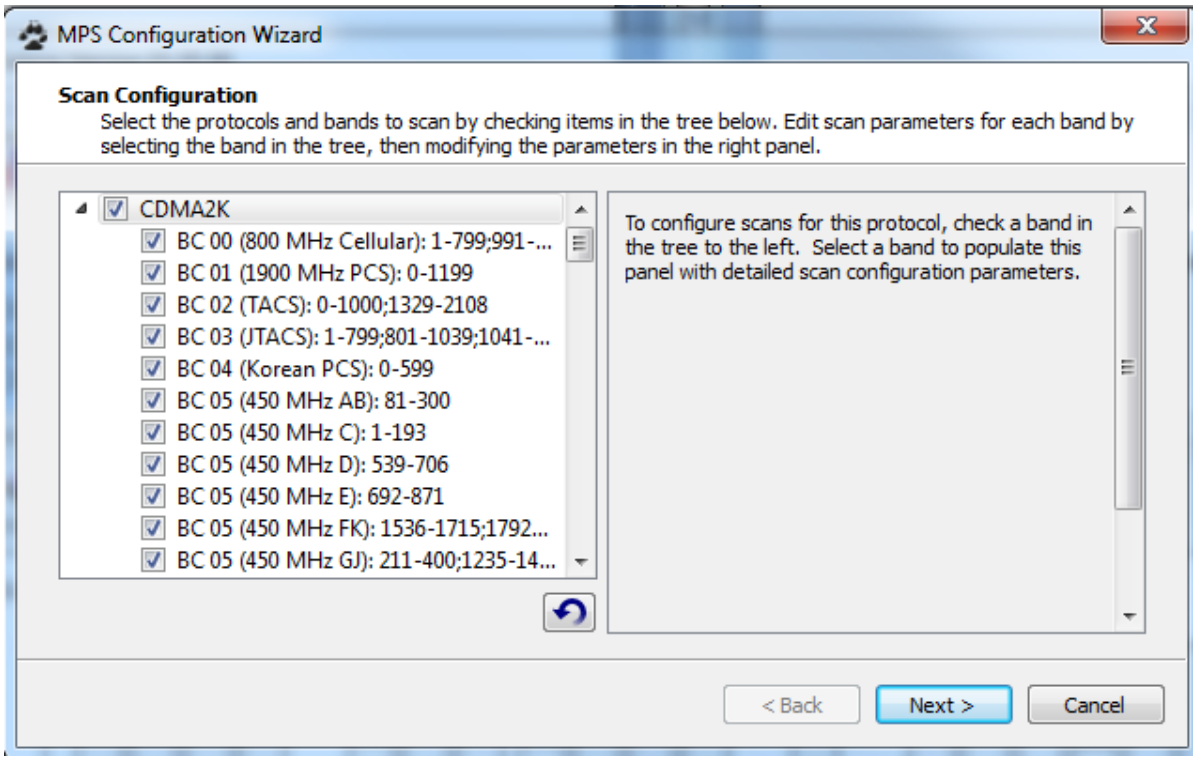
- Checking **CDMA2K** selects all bands of the protocol. As an option, you can select specific bands by checking the box associated with that band.
- Checking **GSM** selects all bands of the protocol. As an option, you can select specific bands by checking the box associated with that band.
- Checking **LTE** selects all bands of the protocol. As an option, you can select specific bands by checking the box associated with that band.
- Checking **WCDMA** selects all bands of the protocol. As an option, you can select specific bands by checking the box associated with that band.

NOTE: Selecting CDMA2K will deselect GSM, WCDMA,and/or LTE. Selecting GSM, WCDMA, and/or LTE will deselect CDMA2K, but will retain the other GSM/LTE/WCDMA selections.

When the wizard opens, configure the MPS scan:

1. Determine the protocol(s) to be scanned.
2. In the left pane of the **MPS Configuration Wizard** check each of the bands within the protocol(s) that you wish to scan. If needed, click the **Revert** button  to revert the selected bands back to the default list of bands for that protocol.
3. Configure the **Channel Range** for each band selected. Refer to Basic Settings, below.

4. Configure the Advanced Settings for each band selected. Refer to CDMA2K Advanced Settings, LTE Advanced Settings and WCDMA Advanced Settings, below.
5. Once the protocol(s), band(s) and channels have been selected, click **Next** to advance to the Logging Configuration page. Refer to Logging Configuration, below.
6. Configure the **Logging Parameters** then click **Finish**.

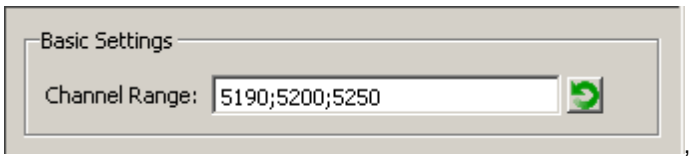


Once the protocol has started and the window has reconfigured, the **Channel Details** area will appear on the right side of the window and, depending on the protocol, the **Channel History View, Scan Results**, **Neighbor List, PLMN Identity List,** or **Cell Info List** area will appear at the bottom of the window. Any of these items can be deselected from the **View** pull-down menu or by clicking the "**X**" in the upper right corner. Also, the area can be moved to any area of the monitor's screen by clicking and dragging on the area's label. Once relocated, the area can be moved back to the window in the same way.

NOTE: Channels in the GUI are based on the channel center frequencies as defined in the protocol specification. The signal bandwidth centered on each channel depends on the task type. For some task types, the bandwidth exceeds the center frequency step size, and for other types it is less.

Basic Settings

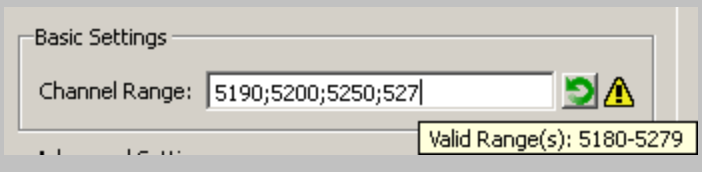
The Channel Range field will be displayed at the top of the right pane of the **MPS Configuration Wizard** when a band is highlighted. The channels within the designated band can be edited. Anytime a band's configuration is modified, that band is checked. All channels in each band are selected by default.



To edit the channels numbers selected, highlight the current bands / range then:

- Enter individual channels separated by a semicolon or a comma. The channels must be within the selected band. As an example, enter channel numbers 5190, 5200, and 5250 from the band 5180 to 5279 (5190;5200;5250). NOTE: Although entered as a comma, a semi-colon will be displayed in the list.
- Enter a range of channels with the upper and lower limits separated by a dash and without spaces. As an example, enter channels 5200 through 5210 from the band 5180 to 5279 (5200-5210).
- Use a combination of the two. The channels can be selected using either of the two ways or the two methods can be combined. As an example, enter channel 5190 and channels 5200 through 5210 from the band 5180 to 5279 (5190;5200-5210).

NOTE: While changes are being made, a yellow triangle will appear at the end of the line to indicate that an error exists in the line. This error can be as simple as you have exceeded the range of the band, you have too few digits in the channel number, or you have a semicolon at the end of the list and you need to add another channel or remove the semicolon. The default is all channels in each band are selected. At any time you can revert to all the channels in the band by clicking the reset icon,  . If you attempt to exit the editor while an error condition exists, you will receive an Invalid Input error box and the input will be reset to the original values. In the example below, removing the three numbers and semicolon or adding a final digit to the list will correct the error condition.

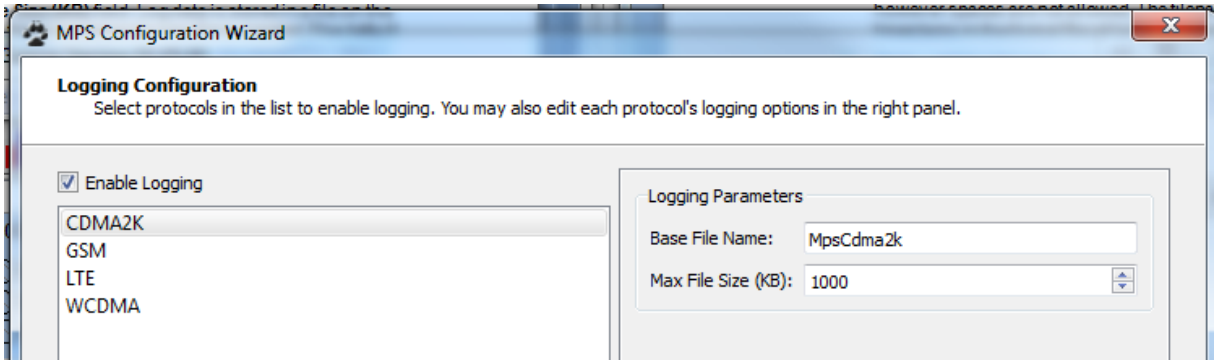


Logging Configuration

Once the protocol, band(s) and channels have been selected, you will advance to the **Logging Configuration** page. Here you can enable logging by checking the **Enable Logging** box above the list of protocols and select the base file name and max file size.

NOTE:

- More than one protocol can be selected, but scan data will only be logged for the protocol(s) that are actively scanning.
- Logging can also be enabled at any time using main menu > **MPS** > **Enable Logging.**



For each protocol:

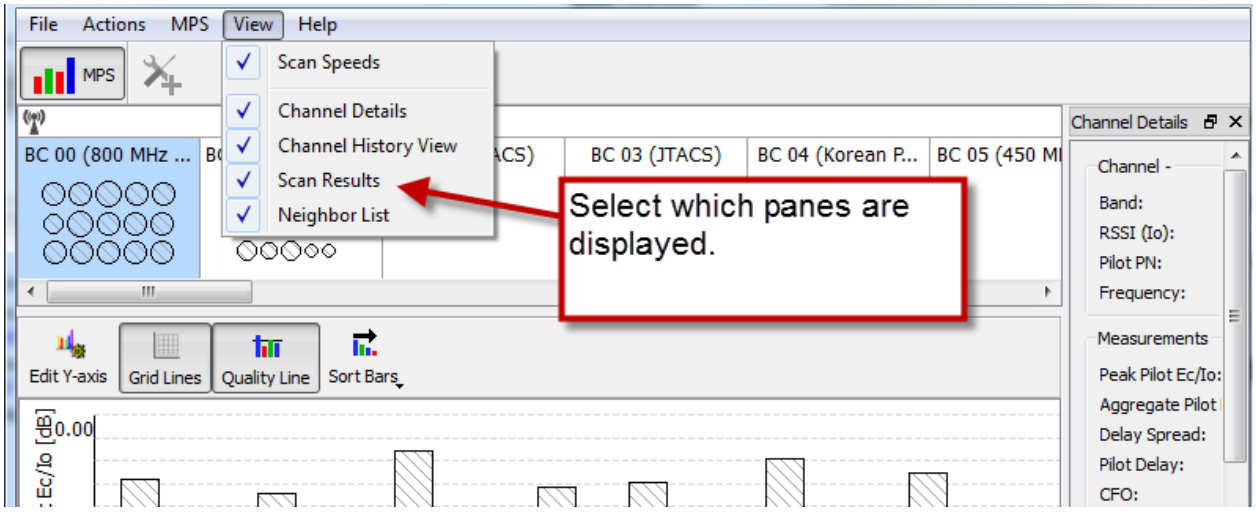
- Enter a file name in the **Base File Name** field. This entry can be any combination of letters and numbers; however spaces are not allowed. The full filename will contain this base filename plus a timestamp in the format BaseName_Timestamp.log.
- Enter / set the desired size of each log file in the **Max File Size (KB)** field. Log data is stored in a file until the file size limit is reached. At that time the file is closed and a new file is created. The default file size is 1000 kB and the limits are 100 kB to 100,000 kB. The arrows increment / decrement the value in 1 kB steps.

When all values have been set, click **Finish**.

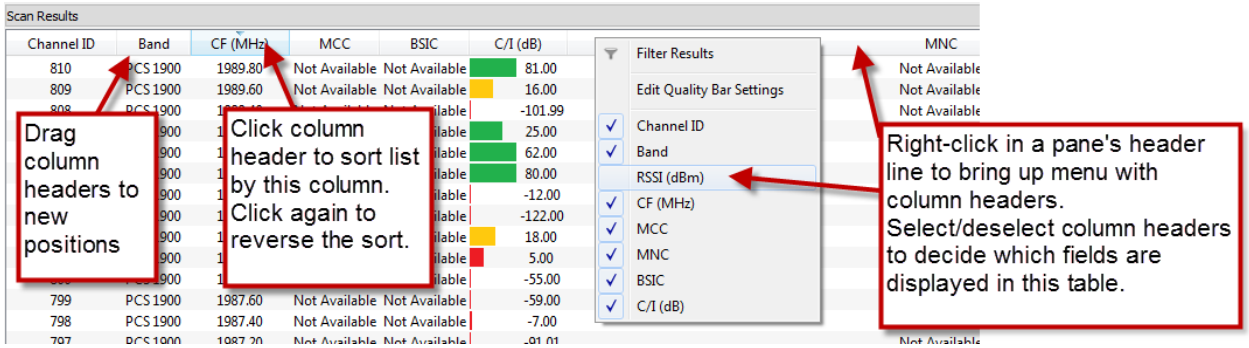
4.1.7.1.5 Dockable / Floating Panes

Once a scan is configured, the various panes available for display in the main window are floating and they can be closed out, repositioned, resized, or put back into the main window. This allows flexibility so you can get the exact screen layout that you need for your mission.

If a pane was deleted from the display, you can bring it back via the main menu > **View** where the panes for the protocol are listed. The type of available panes varies by the protocol being scanned.



You can organize the displays of many tables using the column headers as shown in the graphic below:

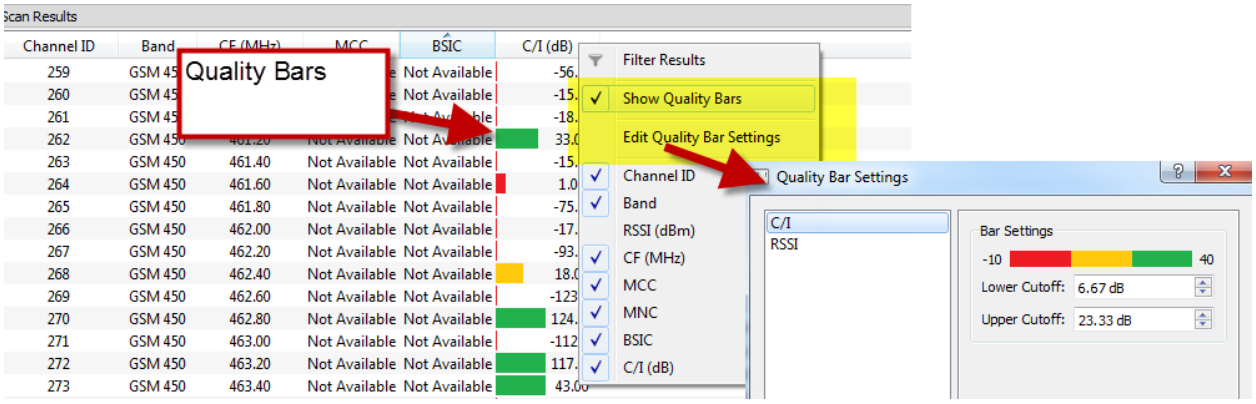


Panes may be empty. They will only display that data is "Not Available" if you have selected a channel, but that particular piece of data is not currently available for that channel.

4.1.7.1.6 Scan Result Metrics

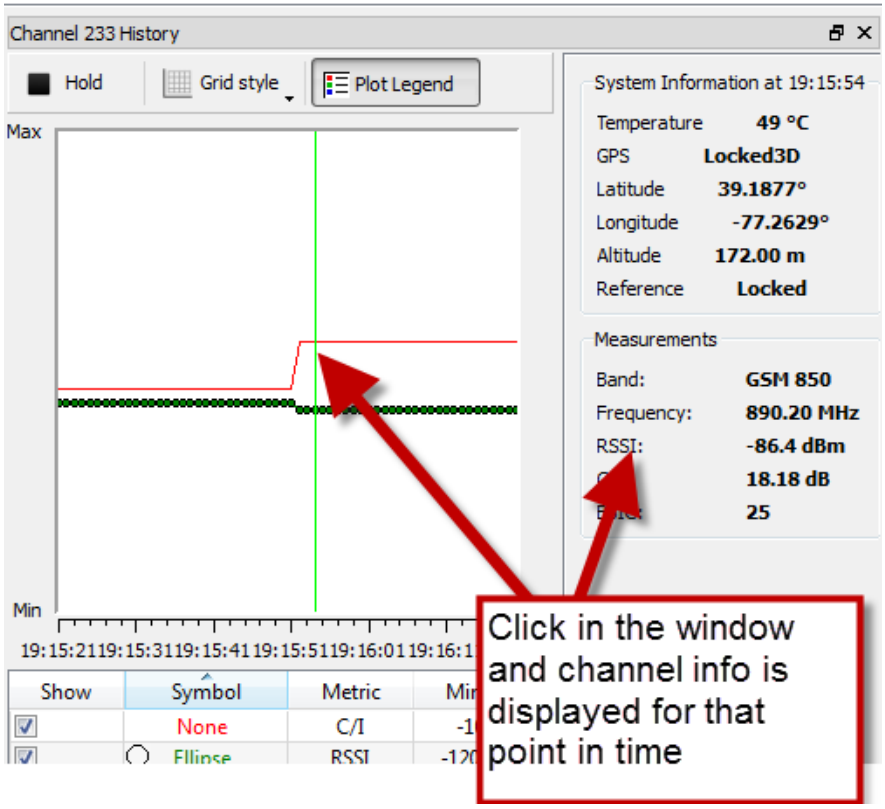
By default, the Scan Results pane shows bars to indicate the bars in the top 33% are drawn in green; bars in the bottom 33% are red; and bars in the middle 33% are yellow.

- You can select to not show the bars: right-click in the header for the value and deselect **Show Quality Bars**. This should be done for each measurement and does not apply to all columns in the table.
- You can also modify the cutoff points at which bars change color: right-click in the header of the Scan Results table and select **Edit Quality Bar Settings**.



4.1.7.1.7 Channel History

The **Channel History** view provides a trend graph for a selected channel. This graph plots the measurements of a channel over time. Multiple metrics are graphed using symbols and colors to denote the different metrics. There is also a table below the graph that shows the plotted metrics, their associated symbols, and the bounds for each. Since this graph is plotting multiple metrics with potentially different bounds and units of measure, only “Min” and “Max” are shown on the y-axis.



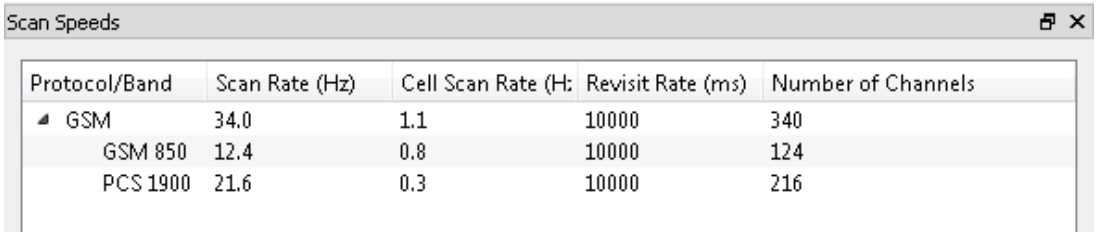
You can click anywhere in the graph to select a snapshot of the measurements. The selected timestamp is highlighted with a green vertical line.

The panel to the right shows the measurements for the currently selected snapshot. The text will include system information at the time of the snapshot including GPS data, reference clock lock status and system temperature. If there is a problem with the system, such as losing GPS or reference lock, or the temperature reaching a dangerous temperature, a warning icon will be drawn on the graph for each snapshot for the duration of the problem. For example, if the system loses GPS lock for 10 seconds then regains lock, there will be 10 warning icons drawn along with the metrics for that 10 seconds.

4.1.7.1.8 Scan Speeds

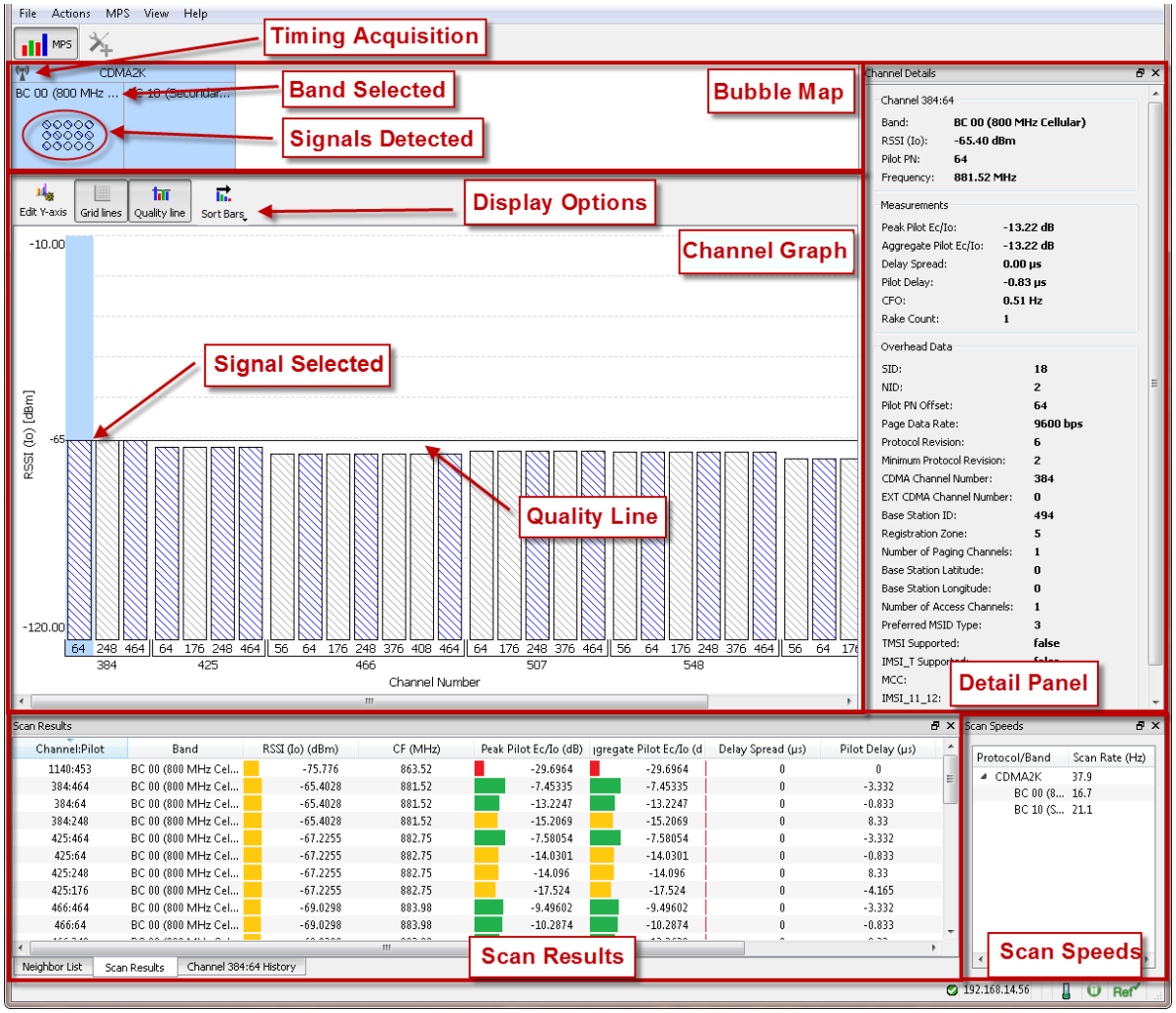
The **Scan Speeds** view provides a list of the **Scan Rate**, the **Cell Scan Rate**, the **Revisit Rate**, and the **Number of Channels** scanned for each protocol scanned and for each band scanned within that protocol. The parameters presented are:

- **Scan Rate** – The frequency at which channels in the protocol / band are scanned (in channels/second or Hz).
- **Cell Scan Rate –** The frequency at which each cell within the protocol / band is scanned (in Hz).
- **Revisit Rate –** The time between scans of each protocol / band (in ms).
- **Number of Channels** – The total number of channels selected to be scanned within that protocol / band.



4.1.7.2 CDMA2K

NOTE: For CDMA2K, prior to indoor operation, the system should be synchronized with the GPS system outdoors. This ensures proper indoor operation for up to 8 hours for all scan scenarios under typical conditions. Once the GPS signal is lost, the number of RF channels that can be properly scanned will depend on how long the GPS has been lost.



Once the band(s) have been selected, scanning for signals will begin. The main window will have these primary areas:

- **Bubble Map** – The first step is to select a band in this area. This area identifies the bands selected to be scanned and provides a graphic indication of the signals detected within each band. The signals detected will reflect the aliasing colors if aliasing has been configured for that signal's provider. Click in a band box to display the channels detected in that band in the Channel Graph area. Hold CTRL and click bands to select multiple bands or click the protocol line ("GSM") to select all bands.
    - The CDMA2K protocol includes a Timing Acquisition icon on the left side of the protocol line. This icon will display a question mark when network timing is unknown, will display a magnifying glass while searching for network sync, and will display a tower when network timing is acquired.
    - If network timing is not acquired within 1 minute, an error box will appear stating that network timing is taking longer than expected. It will also provide possible solutions to the problem.
- **Channel Graph** –This area displays the channels detected (in the band(s) selected in the **Bubble Map**) and the signal quality of each signal. Clicking on a signal will select that signal for display in the **Detail Panel** area.

- **Display Options** – This area provides you with the ability to modify the way channel information is displayed. The options are:
  - **Edit Y-axis** – Allows you to select the quality metric plotted on the y-axis and specify the bounds of the y-axis for the selected metric. The available quality metrics are:
    - **Aggregate Pilot Ec/Io** (in dB) – The ratio of the pilot peak signal to the aggregation of all the peaks in the Chip Window above the Chip Window Threshold. [Default]
    - **Delay Spread** (in µs) – A measure of the richness of the channel, the difference between the earliest significant multipath component's time of arrival (typically line of sight) and the latest.
    - **Peak Pilot Ec/Io** (in dB) **–** The ratio of the pilot peak signal to the power of the signal within the Chip Window.
    - **RSSI** (in dBm) – The strength by channel of a signal received by the unit which can be from any source -- a base station, a mobile station, or noise.
  - **Grid lines** – Places horizontal grid lines on the Channel Graph. Click the button to add the lines and click again to remove the lines. The default is on.
  - **Quality line** – When a channel in this display is selected, place a line on the display that identifies the level of the y-axis parameter of the selected signal. The default is on.
  - **Sort Bars -** Two sorting schemes are available: channel number and signal quality. Click and hold the button to display both options and then select one. Bars may get out of order over time, so once the display has been populated, click the button briefly to force the bars to be sorted again by the last selection.
- **Signal Fill / Colors**: If aliases have been established, the detected signals will display the associated colors. Refer to ***Provider Aliasing*** for information on setting up aliasing. The Channel Graph display will show all the detected signals. If multiple bands are selected, the signals of all bands will be displayed in the Channel Graph. Signals with gray cross hatch have been only detected (no provider information decoded). Signals with blue cross hatch have been detected and decoded, but not aliased by the user. Signals with a color fill (aliased) have been detected, decoded, and aliased. Signals with a gray fill represent signals that were detected and then lost. They will return to a gray cross hatch when redetected, blue cross hatch when redetected and redecoded, or a color when redetected, redecoded, and realiased.

- **Channel Detail Panel** – Once a signal has been selected in the Channel Graph area, the information about that signal is displayed in this area. The information is in two groups:
  - **Channel–** Basic channel information and measurements of the signal selected.
  - **Measurements** – Detailed channel measurements.
  - **Overhead Data –** Detailed overhead data decoded for the channel. Select the Overhead Data to be displayed and the order of the items displayed in ***Display Fields***.
- **Scan Results –** Information about each Channel ID for all bands scanned in the selected protocol. Refer to ***Scan_Result_Metrics***.
- **Neighbor List –** Basic information about each of the neighbors of the selected channel:
  - The signal's **Pilot PN,**
  - The signal's **Configuration**,
  - The signal's **Search Priority**,
  - The signal's **Band**,
  - The **Frequency** of the signal, and
  - The signal's **Search Window Size**.
- **Channel XXX:XX History –** Information about operating parameters for the selected channel. Refer to ***Channel_History***.
- **Scan Speed –** Information by protocol and band about: Refer to ***Scan_Speeds***.

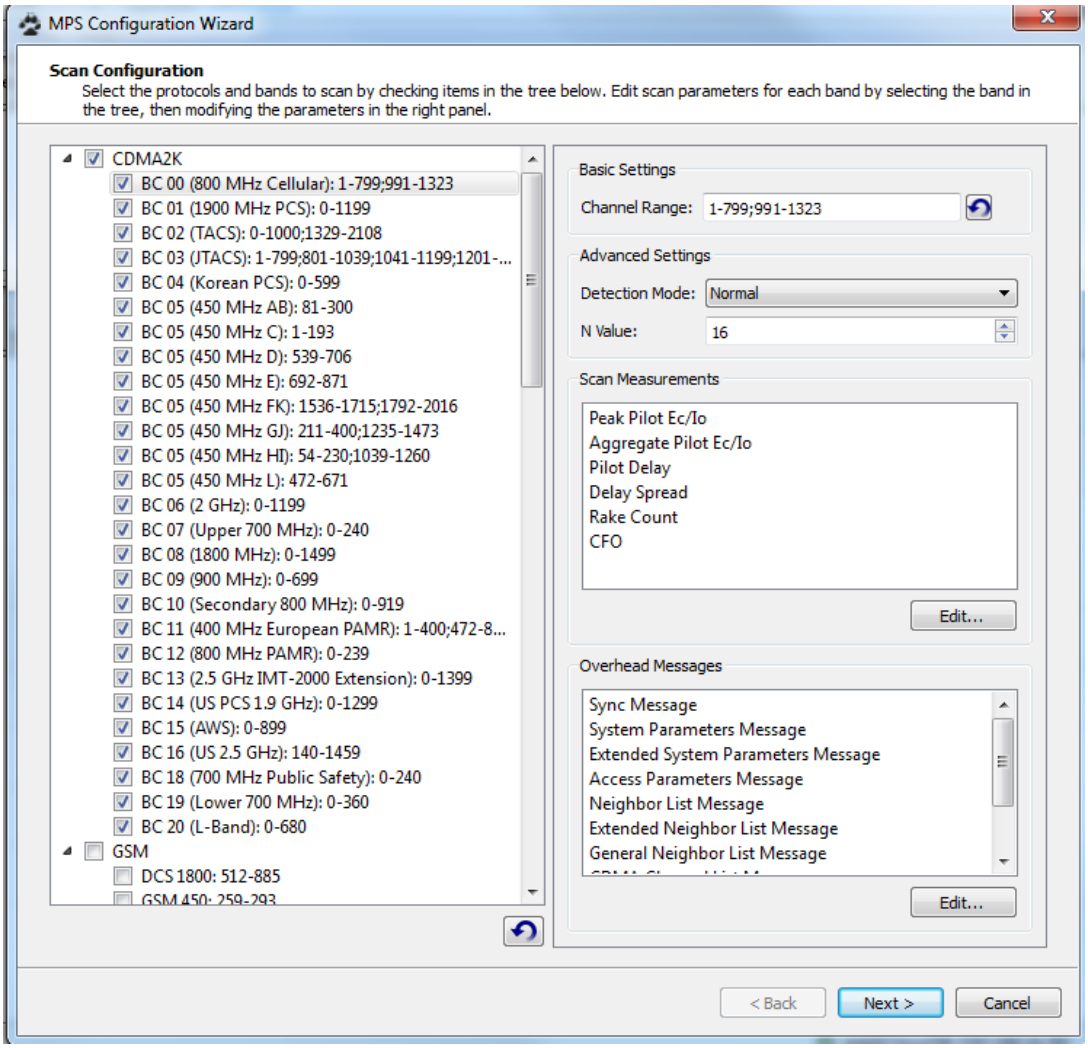
- The **Scan Rate** in Hertz (Hz),
- The **Cell Scan Rate** in Hertz (Hz),
- The **Revisit Rate** in milliseconds (ms), and
- The **Number of Channels** scanned.

NOTE: **Channel Details**, **Scan Results**, **Neighbor List**, **Channel History,** and **Scan Speed** can be displayed in several configurations: side-by-side, tabbed, or a combination of the two. The characteristics are:

- In side-by-side mode, all the selections are nested side-by-side and a portion of each selected parameter is displayed across the width of the display at the bottom.
- In the tabbed mode, all the selections are nested on top of each other and the total width of the display presents only one of the tabbed parameters. To view a specific parameter, select that tab.
- In the combined mode, some selections are nested on top of each other and some are side-by-side at the bottom of the display.

4.1.7.2.1 CDMA2K Scan Configuration

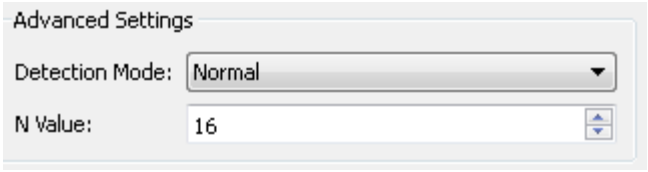
The configuration options available for CDMA2K are selectied on the **Scan Configuration** page. For information on **Channel Settings**, refer to ***Basic Settings***.



4.1.7.2.2 CDMA2K Advanced Settings

The remaining Scan Parameters are also configured from the **MPS Configuration Wizard**. Refer to the ***Launch Wizard*** section. Once a band has been selected, the right panel of the **MPS Configuration Wizard** will display the **Basic Settings** area which allows you to set the **Channel Range**, the **Advanced Settings** area which allows you to configure the scan parameters, and the **Scan Measurements** area which indicates the measurements being made and allows you to edit the measurements selection.

The parameters configured for this band will not apply to other bands.



The Advanced Scan Parameters dialog allows the following selections and their options:

- **Detection Mode**:
    - **Normal –** High speed scanning with normal sensitivity.
    - **Enhanced –** Enhanced sensitivity with reduced scan speed.
- **N Value –** The maximum number of pilots within each channel for which data will be returned. Enter / set the number of pilots. The limits are 0 to 32. The arrows increment / decrement the value in steps of 1. The default value is 16.

4.1.7.2.3 CDMA2K Scan Measurements and Overhead Messages

To select the scan measurements or overhead measurements, click **Edit** in the **Scan Measurements** or **Overhead Messages** area to bring up the **Scan Measurements** dialog. This dialog will allow you to identify the measurements that will be performed in addition to the basic measurements. The **Scan Measurements** dialog is divided into two sections: **Inactive** and **Active**. In each category, **Inactive** identifies the measurements that will not being performed and **Active** lists all the measurements that will be performed.

To add a measurement, highlight that measurement in the **Inactive** area and click 

; or to remove a measurement from the **Active** list, highlight that measurement and click 

. When all measurements are configured on the S**can Measurements/Overhead Messages** dialog, click **OK** to accept the changes and return to the **MPS Configuration Wizard**. The Scan Measurements and Overhead Messages list s will update to reflect the changes made in the **Scan Measurements** dialog.

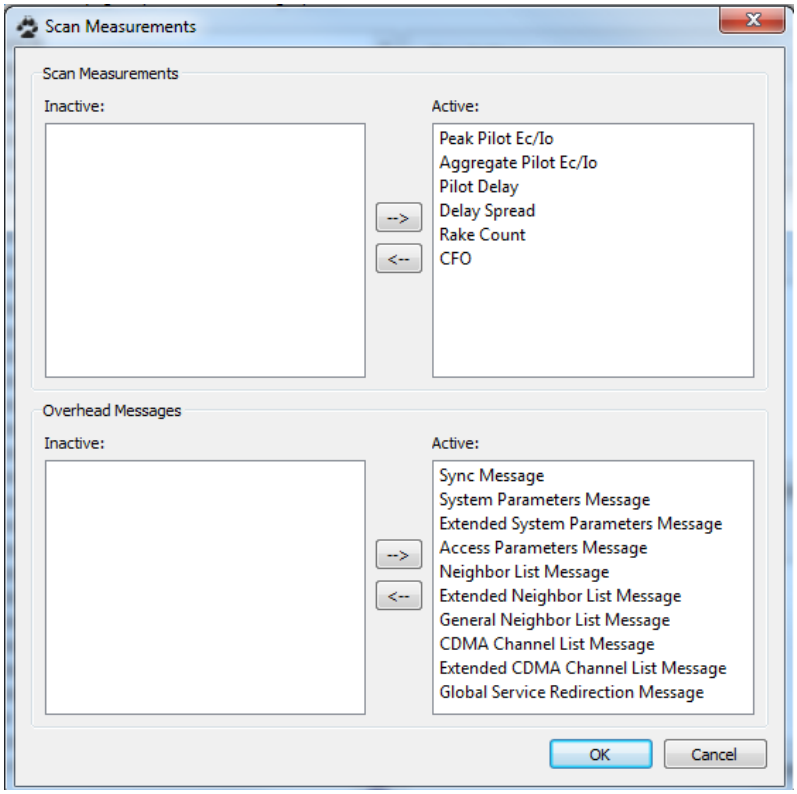
The available measurements are:

Scan Measurements:

- Peak Pilot Ec/Io
- Aggregate CPICH Ec/Io
- Pilot Delay
- Delay Spread
- Rake Count
- CFO

Overhead Messages

- Sync Message
- System Parameters Message
- Extended System Parameters Message
- Access Parameters Message
- Neighbor List Message
- Extended Neighbor List Message
- General Neighbor List Message
- CDMA Channel List Message
- Extended CDMA Channel List Message
- Global Service Redirection Message



When all measurements are configured on the Scan Measurements/Overhead Messages dialog, click OK to accept the changes and return to the **MPS Configuration Wizard**. The Scan Measurements list will update to reflect the changes made in the Scan Measurements dialog.

4.1.7.2.4 Log Data

Refer to ***Logging Configuration*** section for information on setting up and enabling CDMA2K Logging. Logging can also be configured after you select the protocol / bands in the **MPS Configuration Wizard**.

Items Measured and Logged

Selecting logging will return the following parameters:

- ConfigureScans – Configure a Scan (client to server and server to client, client information followed by server response).
- ReportScanData – Scan measurement data records (server to client).
- ReportOverheadData – Overhead data records (server to client).
- ReportTimingStatus – Reports if the system has determined a timing reference either from GPS or a CDMA network (server to client).

The values of the items measured will be repeated until the data card has been filled or the logging requirement has been removed. The complete list of selected items includes:

- PilotPNOffset
    - Pilot PN Offset for base station, in units of 64 PN chips (0 - 511 units).
- OperationMode – Choose an operational mode:
    - Normal – High speed scanning with normal sensitivity.
    - Enhanced – Enhanced sensitivity with reduced scan speed.
- PagingChannelCollectionSettings – Enable either all Paging Channel message IDs or a list of specific Paging Channel IDs. Refer to Table 3.1.2.3.1.1.2-1 of 3GPP2 C>S00004-C "Signaling Link Access Control (LAC) Standard for cdma2000® Spread Spectrum Systems" for a list of Paging Channel message IDs.
    - CollectAll – The system will collect ands report all Paging Channel messages.
    - CollectMessageIds – If Collect All is disabled, only message IDs from this list will be reported in the overhead data.
- Overhead Collection
    - Revisit Period **–** How often the overhead data should be reported when the scanner revisits a channel
    - DwellTime – How long the system should decode data for a single PN (units of milliseconds).
    - SupressDuplicates – Only the first decoded message for each enabled message ID will be reported for each overhead revisit if this option is set to true.
    - CollectSyncMessage – Enable/disable measurements to include Sync Message from the Sync Channel if it could be decoded.
    - PagingChannelSettings
- TimePositionData – Binary data with timestamp and position.
    - Time
    - Data
- Message Data
    - MessageID – Message ID of a decoded message. Refer to the appropriate code channel in 3GPP2 C.S0004-C "Signaling Link Access Control (LAC) standard for cdma2000® Spread Spectrum Systems" - Table 3.1.2.3.1.1.2-1 for Paging Channel Message IDs.
    - Data – Decoded code channel message. The message is packed as follows:
        - Message - Length
        - Message ID
        - LAC PDU

      Refer to the appropriate code channel in 3GPP2 C.S0004-C "Signaling Link Access Control (LAC) Standard for cdma2000® Spread Spectrum Systems" - Section 1.2.5.2 for how LAC PDUs are assembled on the Paging channel.

      Refer to the appropriate code channel in 3GPP2 C.S0005-C "Upper Layer (Layer 3) Signaling Standard for cdma2000® Spread Spectrum Systems" - Table 3.7.2.3-1 for Paging Channel Layer 3 messages

- MeasurementEnable
    - EnablePilotDelay – Enable/disable measurements to include pilot delay (usec).
    - EnablePeakPilotEcIo – Enable/disable measurements to include Peak Pilot Ec/Io (dB).
    - EnableAggregatePilotEcIo – Enable/disable measurements to include Aggregate Pilot Ec/Io (dB).
    - EnableDelaySpread – Enable/disable measurements to include delay spread (usec).

- EnableRakeCount – Enable/disable measurements to include rake count
- EnableCFO – Enable/disable measurements to include CFO (Hz)
- OverheadCollectionSettings

- MeasurementData
  - PilotPnOffset – Pilot PN Offset for the base station, in units of 64 PN chips.
  - PeakPilotEcIo – The received energy per chip of the peak pilot component divided by the total power. Units (dB)
  - AggregatePilotEcIo – The received energy per chip of all the resolvable pilot multipath components divided by the total power. Units (dB)
  - DelaySpread – The difference between first and last resolvable multipath components within power delay profile. Units (usec)
  - PilotDelay – The difference between the reference pilot PN offset and the received PN offset. Units (usec)
  - CFO – Carrier Frequency Offset. The difference between a reference frequency and the frequency of a received Radio Frequency (RF) carrier. Units (Hz)
  - RakeCount – Measurement of the resolvable multipath components in the power delay profile of a pilot PN.
- MeasurementRecord
  - Time – Timestamp relative to the unit system time of the data record
  - Position – GPS Position of the data record
  - Channel – CDMA Channel Number
  - IO (RSSI IO) – The received power within the relevant channel bandwidth. Units (dBm)
  - Pilot Measurements – The measurement data
- ScanParameters
  - Band – The RF band that is to be scanned – "BC 00 (800 MHz Cellular)", "BC 01 (1900 MHz PCS)", "BC 02 (TACS.)", "BC 03 (JTACS)", "BC 04 (Korean PCS)", "BC 05 (450 MHz AB)", "BC 05 (450 MHz C)", "BC 05 (450 MHz D)" "BC 05 (450 MHz E)", "BC 05 (450 MHz FK)", "BC 05 (450 MHz GJ)", "BC 05 (450 MHz HI)", "BC 05 (450 MHz L)", "BC 06 (2 GHz)", BC 07 (Upper 700 MHz)", "BC 08 (1800 MHz)", "BC 09 (900 MHz)", "BC 10 (Secondary 800 MHz)", "BC 11 (400 MHz European PAMR)", "BC 12 (800 MHz PAMR)", "BC 13 (2.5 MHz IMT-2000 Extension)", "BC 14 (US PCS 1.9 GHz)", "BC 15 (AWS)", "BC 16 (US 2.5 GHz)", "BC 18 (700 MHz Public Safety)", "BC 19 (Lower 700 MHz)", "BC 20 (L-Band)"
  - ChannelList – List of Cdma2k channel numbers of the band to be scanned
  - TopNValue – Number of the top pilots to report for each channel (1 – 32)
  - Operation – Detection mode enumeration
  - MeasurementModes – Selected measurement data to be measured
- ScanConfig
  - Configuration
- ScanData
  - Channel Measurements
- OverheadData
  - Channel – CDMA Channel Number
  - PilotPnOffset – Pilot PN Offset for the base station, in units of 64 PN chips.

- SyncMessage – Layer 3 PDU of the Sync Channel Message. Refer to section 3.7.2.3.2.26 in 3GPP2 C.S0005-C "Upper Layer (Layer 3) Signaling Standard for cdma2000® Spread Spectrum Systems".
- PagingChannelMessages – Messages decoded on the Primary Paging Channel. Will only include those that were enabled in the scan config.

- TimingStatus – Indicates the status of network timing acquisition.
  - Time – Timestamp relative to the unit system time of the timing status
  - State – Indicates whether the system has acquired the system timing offset:
    - Acquired – The system has successfully determined the timing offset.
    - Searching – The system is attempting to determine the timing offset based off of CDMA network timing information.
    - Timedout – The system timedout while searching for system timing.
    - Undetermined – The system was unable to determine the timing offset.
  - Source:
    - CDMA – Timing offset was determined using the local CDMA system as a reference.
    - None – Timing offset was not determined.

4.1.7.3 GSM

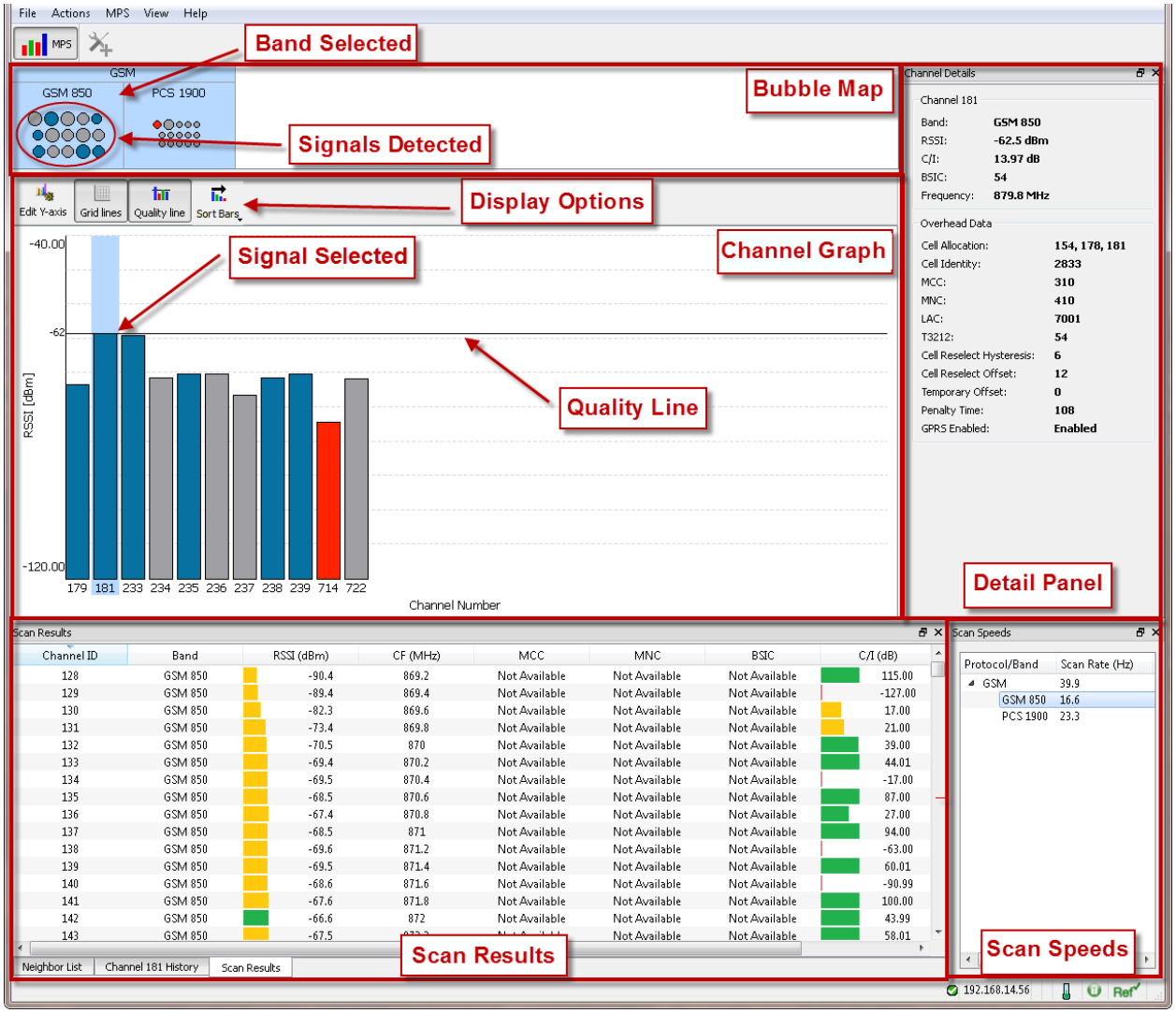
Once the band(s) have been selected, scanning for signals will begin. The main window will have these primary areas:

- **Bubble Map** – The first step is to select a band in this area. This area identifies the bands selected to be scanned and provides a graphic indication of the signals detected within each band. The signals detected will reflect the aliasing colors if aliasing has been configured for that signal's provider. Click in a band box to display the channels detected in that band in the Channel Graph area. Hold CTRL and click bands to select multiple bands or click the protocol line ("GSM") to select all bands.
- **Channel Graph** –This area displays the channels detected (in the band(s) selected in the **Bubble Map**) and the signal quality of each signal. Clicking on a signal will select that signal for display in the **Detail Panel** area.
  - **Display Options** – This area provides you with the ability to modify the way channel information is displayed. The options are:
    - **Edit Y-axis** – Allows you to select the quality metric plotted on the y-axis and specify the bounds of the y-axis for the selected metric. The available quality metrics are:
      - **RSSI** (in dBm) – The strength by channel of a signal received by the unit which can be from any source -- a base station, a mobile station, or noise. [Default]
      - **C/I** (in dB) – The carrier-to-interference ratio by channel.
    - **Grid lines** – Places horizontal grid lines on the Channel Graph. Click the button to add the lines and click again to remove the lines. The default is on.
    - **Quality line** – When a channel in this display is selected, place a line on the display that identifies the level of the y-axis parameter of the selected signal. The default is on.
    - **Sort Bars -** Two sorting schemes are available: channel number and signal quality. Click and hold the button to display both options and then select one. Bars may get out of order over time, so once the display has been populated, click the button briefly to force the bars to be sorted again by the last selection.
  - **Signal Fill / Colors**: If aliases have been established, the detected signals will display the associated colors. Refer to ***Provider Aliasing*** for information on setting up aliasing. The Channel Graph display will show all the detected signals. If multiple bands are selected, the signals of all bands will be displayed in the Channel Graph. Signals with gray cross hatch have been only detected (no provider information decoded). Signals with blue cross hatch have been detected and decoded, but not aliased by the user. Signals with a color fill (aliased) have been detected, decoded, and aliased. Signals with a gray fill represent signals that were detected and then lost. They will return to a gray cross hatch when redetected, blue cross hatch when redetected and redecoded, or a color when redetected, redecoded, and realiased.
- **Channel Detail Panel** – Once a signal has been selected in the Channel Graph area, the information about that signal is displayed in this area. The information is in two groups:
  - **Channel–** Basic channel information and measurements of the signal selected.
  - **Measurements** – Detailed channel measurements.
  - **Overhead Data –** Detailed overhead data decoded for the channel. Select the Overhead Data to be displayed and the order of the items displayed in ***Display Fields***.
- **Scan Results –** Information about each Channel ID for all bands scanned in the selected protocol. Refer to ***Scan_Result_Metrics***.
- **Neighbor List –** Basic information about each of the neighbors of the selected channel:
  - The signal's **Band,**
  - The signal's **Channel** number,
  - The **Signal Strength** of the signal, and
  - The **Neighbors** of the signal.

- **Channel XXX History –** Information about operating parameters for the selected channel. Refer to ***Channel History***.
- **Scan Speeds –** Information by protocol and band about: Refer to ***Scan Speeds***.
  - The **Scan Rate** in Hertz (Hz),
  - The **Cell Scan Rate** in Hertz (Hz),
  - The **Revisit Rate** in milliseconds (ms), and
  - The **Number of Channels** scanned.

NOTE: **Channel Details**, **Scan Results**, **Neighbor List**, **Channel History,** and **Scan Speeds** can be displayed in several configurations: side-by-side, tabbed, or a combination of the two. The characteristics are:

- In side-by-side mode, all the selections are nested side-by-side and a portion of each selected parameter is displayed across the width of the display at the bottom.
- In the tabbed mode, all the selections are nested on top of each other and the total width of the display presents only one of the tabbed parameters. To view a specific parameter, select that tab.
- In the combined mode, some selections are nested on top of each other and some are side-by-side at the bottom of the display.



4.1.7.3.1 GSM Scan Configuration

The configuration options available for GSM are selected on the **Scan Configuration** page. For information on **Channel Settings**, refer to ***Basic Settings***.

Scan Measurements and Overhead Messages

To select the scan measurements or overhead measurements, click **Edit** in the **Scan Measurements** or **Overhead Messages** area to bring up the **Scan Measurements** dialog. This dialog will allow you to identify the measurements that will be performed in addition to the basic measurements. The **Scan Measurements** dialog is divided into two sections: **Inactive** and **Active**. In each category, **Inactive** identifies the measurements that will not being performed and **Active** lists all the measurements that will be performed.

To add a measurement, highlight that measurement in the **Inactive** area and click --> **;** or to remove a measurement from the **Active** list, highlight that measurement and click <--. When all measurements are configured on the S**can Measurements/Overhead Messages** dialog, click **OK** to accept the changes and return to the **MPS Configuration Wizard**. The Scan Measurements and Overhead Messages list s will update to reflect the changes made in the **Scan Measurements** dialog.

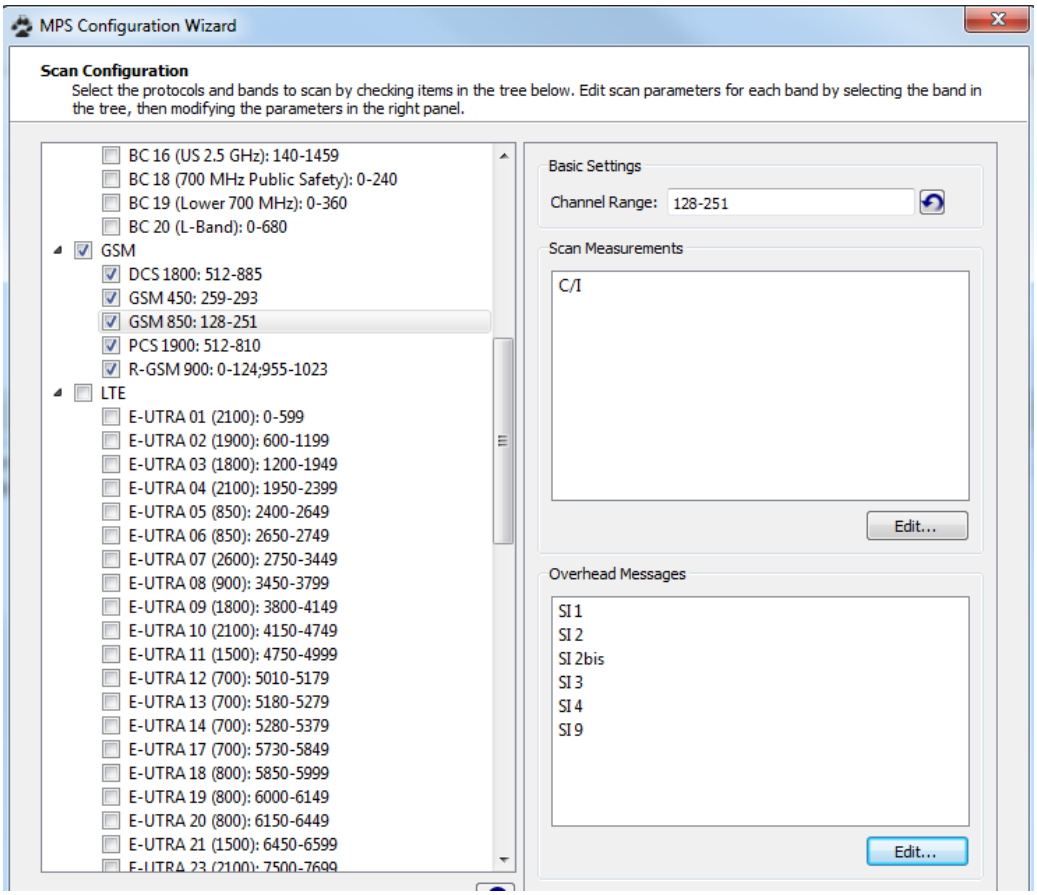
The available measurements are:

Scan Measurements:

- C/I

Overhead Messages:

- SI 1
- SI 2
- SI 2bis
- SI 3
- SI 4
- SI 9



4.1.7.3.2 Log Data

Refer to ***Logging Configuration*** section for information on setting up and enabling GSM Logging. Logging can also be configured after you select the protocol / bands in the **MPS Configuration Wizard**.

Items Measured and Logged

Selecting logging will return the following parameters:

- Measurement Record – This record type is generated for all scanned channels and provides RSSI, C/I, and BSIC (if available)
    - Time – The time the measurement was collected
    - Position – If there was a GPS lock, the location where the measurement was taken
    - Channel – The channel being scanned
    - BSIC – If detected, the BSIC of the channel
    - RSSI – The RSSI of the channel
    - CIR – The C/I of the channel. This is only valid if a BSIC was detected
- SIDATA – For channels that have a BSIC, this message represents an overhead message that was decoded
    - Time – The time the data was collected
    - Position – If there was a GPS lock, the location where the data was taken
    - FrameNumber – The frame number of the overhead message decoded
    - MinCIR – The minimum C/I calculated during the decoding of the overhead message
    - Type - An integer representing the Message Type as defined by 3GPP TS 04.08 Section 10.4.
    - Data – The raw data for the layer 3 overhead message

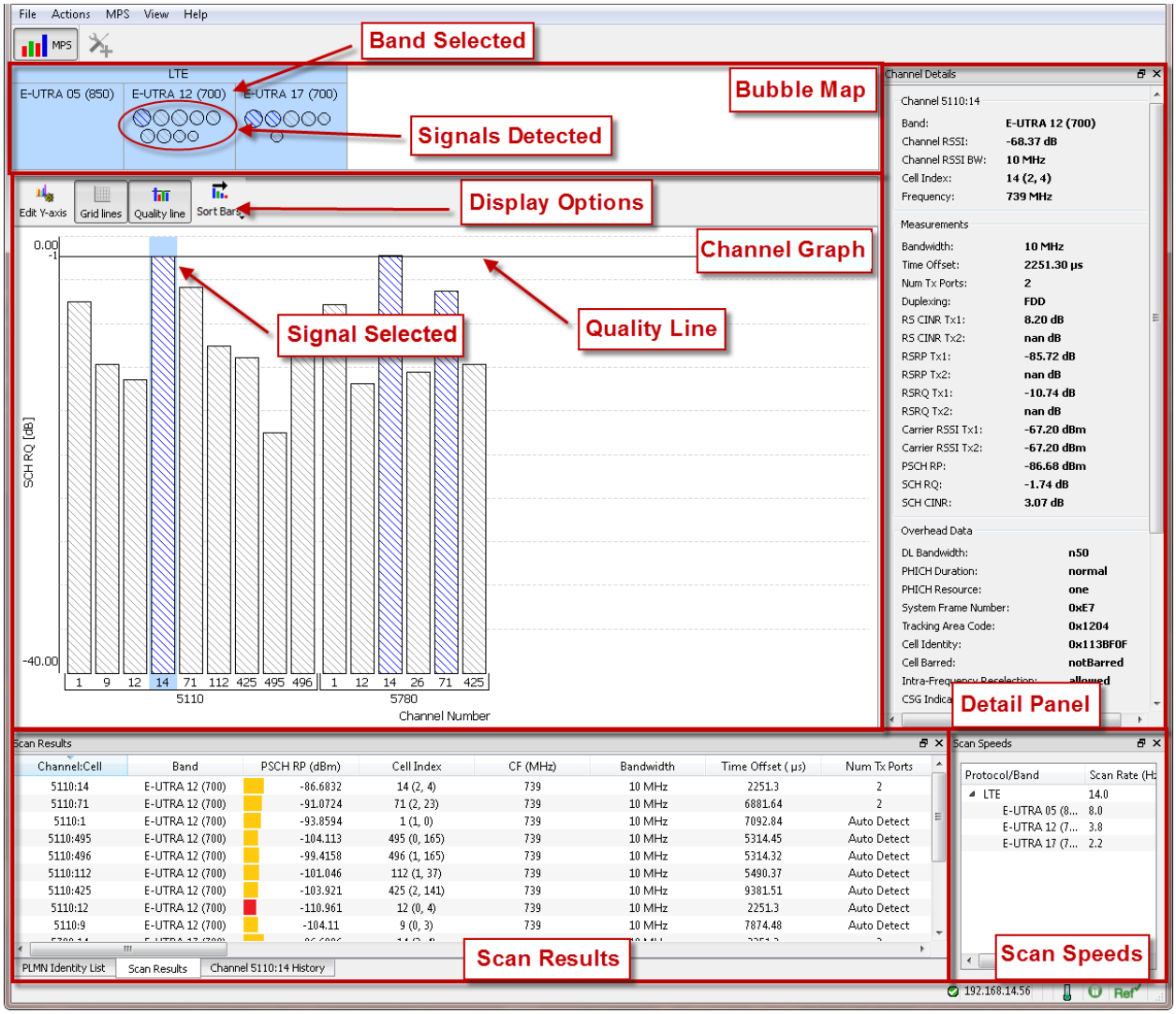
4.1.7.4 LTE

Once the band(s) have been selected, scanning for signals will begin. The main window will have these primary areas:

- **Bubble Map** – The first step is to select a band in this area. This area identifies the bands selected to be scanned and provides a graphic indication of the signals detected within each band. The signals detected will reflect the aliasing colors if aliasing has been configured for that signal's provider. Click in a band box to display the channels detected in that band in the Channel Graph area. Hold CTRL and click bands to select multiple bands or click the protocol line ("LTE") to select all bands.
- **Channel Graph** –This area displays the channels detected (in the band(s) selected in the **Bubble Map**) and the signal quality of each signal. Clicking on a signal will select that signal for display in the **Detail Panel** area.
    - **Display Options** – This area provides you with the ability to modify the way channel information is displayed. The options are:
        - **Edit Y-axis** – Allows you to select the quality metric plotted on the y-axis and specify the bounds of the y-axis for the selected metric. The available quality metrics are:
            - **BCH RP** (dBm) - Measure and return BCH Receive Power
            - **CFO** (Hz) - Center frequency offset of the channel
            - **Carrier RSSI Tx1** (dBm) –RSSI value of the RF carrier at full channel bandwidth
            - **Carrier RSSI Tx2** (dBm) –RSSI value of the RF carrier at full channel bandwidth
            - **Carrier RSSI Tx3** (dBm) –RSSI value of the RF carrier at full channel bandwidth
            - **Carrier RSSI Tx4** (dBm) –RSSI value of the RF carrier at full channel bandwidth
            - **Delay Spread** (µs) - Average delay spread
            - **PSCH RP** (dBm) – Received power value of the PSCH per sub-carrier (in dBm) [Default]
            - **RS CINR Tx1** (dB) - CINR value of the Reference Signal for TX port 0
            - **RS CINR Tx2** (dB) - CINR value of the Reference Signal for TX port 1
            - **RS CINR Tx3** (dB) - CINR value of the Reference Signal for TX port 2
            - **RS CINR Tx4** (dB) - CINR value of the Reference Signal for TX port 3
            - **RSRP Tx1** (dBm) - Reference Signal Received Power for TX port 0
            - **RSRP Tx2** (dBm) - Reference Signal Received Power for TX port 1
            - **RSRP Tx3** (dBm) - Reference Signal Received Power for TX port 2
            - **RSRP Tx4** (dBm) - Reference Signal Received Power for TX port 3
            - **RSRQ Tx1** (dB) - Reference Signal Received Quality Es/Io for TX port 0
            - **RSRQ Tx2** (dB) - Reference Signal Received Quality Es/Io for TX port 1
            - **RSRQ Tx3** (dB) - Reference Signal Received Quality Es/Io for TX port 2
            - **RSRQ Tx4** (dB) - Reference Signal Received Quality Es/Io for TX port 3
            - **SCH CINR** (dB) – Carrier-to-Interference Noise Ratio (CINR) of the synchronization channel
            - **SCH RQ** (dB) – Receive quality of the synchronization channel signal
            - **SSCHP RP** (dBm) - Received power value of the SSCH per sub-carrier
            - **Time Offset** (µs) - Time offset
        - **Grid lines** – Places horizontal grid lines on the Channel Graph. Click the button to add the lines and click again to remove the lines. The default is on.
        - **Quality line** – When a channel in this display is selected, place a line on the display that identifies the level of the y-axis parameter of the signal selected. The default is on.

- **Sort Bars -** Two sorting schemes are available: channel number and signal quality. Click and hold the button to display both options and then select one. Bars may get out of order over time, so once the display has been populated, click the button briefly to force the bars to be sorted again by the last selection.

o **Signal Fill/Colors**: If provider aliases have been established, the detected signals will display the associated colors. Refer to the ***Provider Aliasing*** section for information on setting up aliasing. The Channel Graph display will show all the selected detected signals. Signals with gray cross hatch have been only detected (no provider information decoded). Signals with blue cross hatch have been detected and decoded, but not aliased by the user. Signals with a color fill (aliased) have been detected, decoded, and aliased. Signals with a gray fill represent signals that were detected and then lost. They will return to a gray cross hatch when redetected, blue cross hatch when redetected and redecoded, or a color when redetected, redecoded, and realiased.



- **Channel Detail Panel** – Once a signal has been selected, the information about that signal is displayed in this area. The information is in three groups:

o **Channel –** Basic channel information and measurements.

o **Measurements –** Detailed measurements for the channel.

o **Overhead Data –** Detailed overhead data decoded for the channel. Select the Overhead Data to be displayed and the order of the items displayed in ***Display Fields***.

NOTE: Configuration of the ***Advanced Settings*** and the ***Scan Measurements***, below, will not change the parameters displayed in **Overhead Data** and **Measurements**.

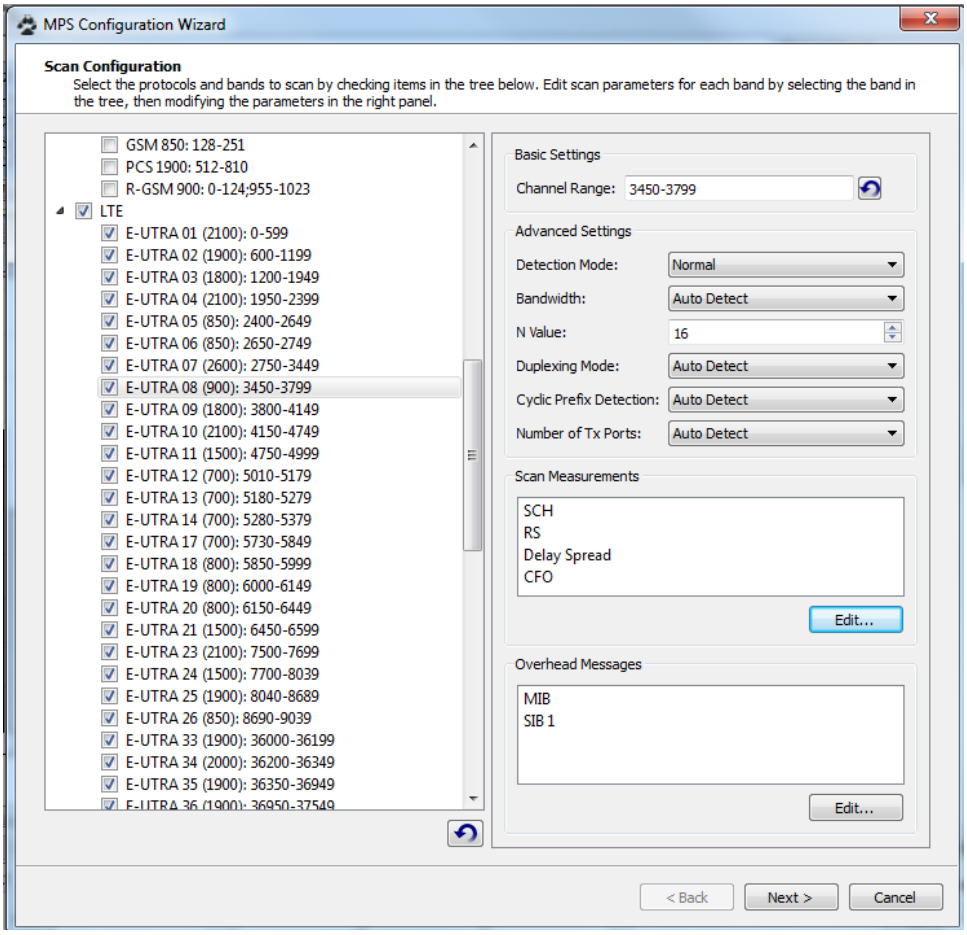
- **Scan Results** – Information about each Channel ID for all bands scanned in the selected protocol. Refer to ***Scan_Result_Metrics***.
- **PLMN Identity List** – The PLMN Identity List area displays the **MCC** and **MNC** of each of the selected cells and whether that PLMN identity is barred.
- **Channel XXX:YY History** – Information about operating parameters for the selected channel. Refer to **Channel_History**.
- **Scan Speeds** – Information by protocol and band about: Refer to **Scan_Speeds**.
  - The **Scan Rate** in Hertz (Hz),
  - The **Cell Scan Rate** in Hertz (Hz),
  - The **Revisit Rate** in milliseconds (ms), and
  - The **Number of Channels** scanned.

NOTE: **Channel Details**, **Scan Results**, **PLMN Identity List**, **Channel History,** and **Scan Speeds** can be displayed in several configurations: side-by-side, tabbed, or a combination of the two. The characteristics are:

- In side-by-side mode, all the selections are nested side-by-side and a portion of each selected parameter is displayed across the width of the display at the bottom.
- In the tabbed mode, all the selections are nested on top of each other and the total width of the display presents only one of the tabbed parameters. To view a specific parameter, select that tab.
- In the combined mode, some selections are nested on top of each other and some are side-by-side at the bottom of the display.

4.1.7.4.1 LTE Scan Configuration

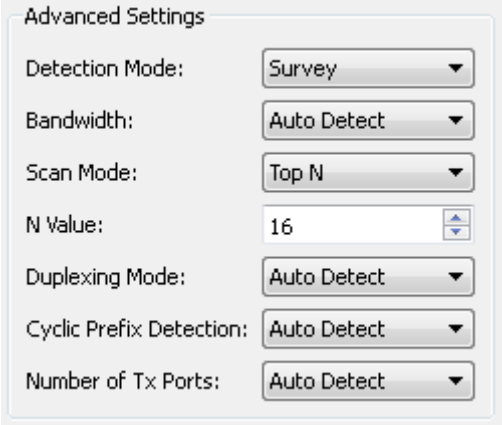
The configuration of LTE scans is performed through the **MPS Configuration Wizard**'s **Scan Configuration** page. For information on **Channel Settings**, refer to ***Basic Settings***.



4.1.7.4.2 LTE Advanced Settings

The **Advanced Settings** area allows you to configure the scan parameters. The parameters configured for this band will not apply to other LTE bands.

The **Advanced Settings** are:



- **Detection Mode**:
    - **Normal –** High speed scanning with normal sensitivity.
    - **Enhanced –** Enhanced sensitivity with reduced scan speed.
    - **Survey –** Reserved for future use.
- **Bandwidth** – The signal bandwidth to be used:
    - **AutoDetect –** The signal bandwidth will be automatically detected.
    - **1.4MHz –** A signal bandwidth of 1.4 MHz will be used to measure the received signal.
    - **3MHz –** A signal bandwidth of 3 MHz will be used to measure the received signal.
    - **5MHz –** A signal bandwidth of 5 MHz will be used to measure the received signal.
    - **10MHz –** A signal bandwidth of 10 MHz will be used to measure the received signal.
    - **15MHz –** A signal bandwidth of 15 MHz will be used to measure the received signal.
    - **20MHz –** A signal bandwidth of 20 MHz will be used to measure the received signal.
- **N Value –** The maximum number of cells within each channel for which data will be returned. Enter / set the number of cells. The limits are 0 to 32. The arrows increment / decrement the value in steps of 1. The default value is 16.
- **Duplexing Mode**
    - **AutoDetect –** Selects the duplexing mode based on the band(s) being monitored
    - **FDD** – Return data sets for signals decoded using **FDD** (Frequency Division Duplexing).
    - **TDD** – Return data sets for signals decoded using **TDD** (Time Division Duplexing)
- **Cyclic Prefix Detection –** Return data sets for signals decoded using the designated cyclic prefix mode.
    - **AutoDetect–** Blind detection of cyclic prefix length.
    - **Normal–** Detection using normal cyclic prefix length.
    - **Extended–** Detection using extended cyclic prefix length.
- **Number of Tx Ports –** Return data sets for signals using a specific number of transmit ports (antennas) by the base station. Unless the number of ports is known, it is recommended that you use **AutoDetect.**
    - **AutoDetect–** Return data sets for base stations with all transmit port configurations.
    - **1 –** Return data sets for base stations with one transmit port.
    - **2 –** Return data sets for base stations with two transmit ports.
    - **4** – Return data sets for base stations with four transmit ports.

4.1.7.4.3 Scan Measurements and Overhead Messages

To select the scan measurements or overhead measurements, click **Edit** in the **Scan Measurements** or **Overhead Messages** area to bring up the **Scan Measurements** dialog. This dialog will allow you to identify the measurements that will be performed in addition to the basic measurements. The **Scan Measurements** dialog is divided into two sections: **Inactive** and **Active**. In each category, **Inactive** identifies the measurements that will not being performed and **Active** lists all the measurements that will be performed.

To add a measurement, highlight that measurement in the **Inactive** area and click --> **;** or to remove a measurement from the **Active** list, highlight that measurement and click <--. When all measurements are configured on the S**can Measurements/Overhead Messages** dialog, click **OK** to accept the changes and return to the **MPS Configuration Wizard**. The Scan Measurements and Overhead Messages list s will update to reflect the changes made in the **Scan Measurements** dialog.

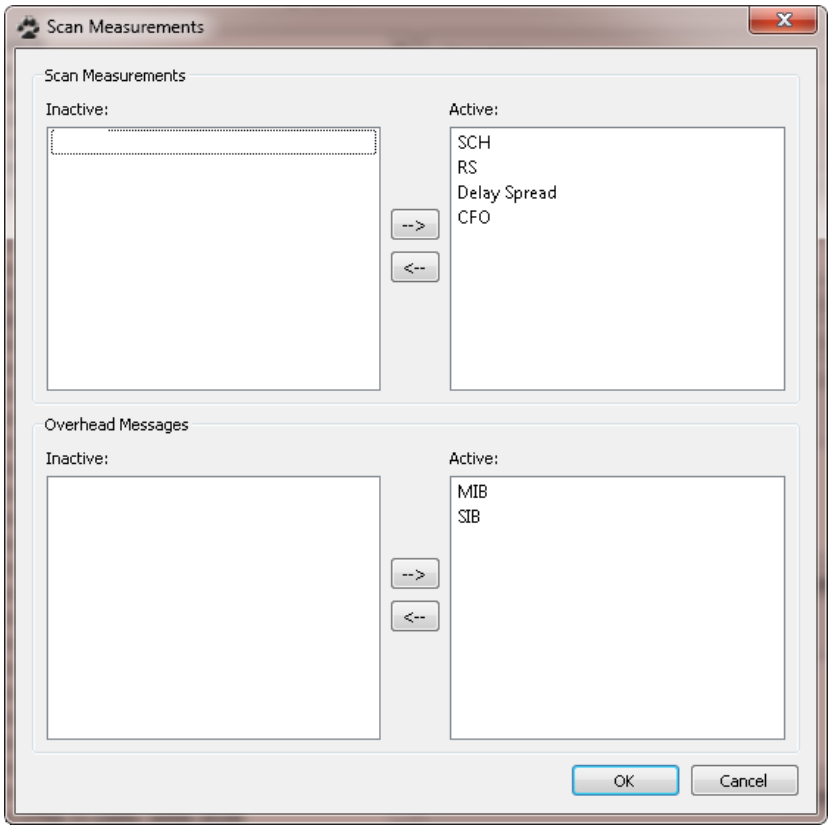
The available measurements are:

Scan Measurements:

- SCH
- BCHRP
- Carrier RSSI
- RS
- Delay Spread
- CFO

Overhead Messages:

- MIB
- SIB



4.1.7.4.4 Log Data

Refer to ***Logging Configuration*** for information on setting up and enabling LTE Logging. Logging can also be configured after you select the protocol / bands in the **MPS Configuration Wizard**.

Items Measured and Logged

Selecting the following Scan Measurements options will return the following parameters:

- SCH – Measure and return Cell Index, PSCH RP, SSCH RP, and SCHRQ.
- BCHRP – Measure and return the BCH received power.
- Carrier RSSI – Measure and return E-UTRA carrier power.
- RS – Measure and return RSRP, RSRQ.
- Delay Spread – Measure and return delay spread.
- CFO – Measure and return CFO.
- MIB – Return Master Information Block (MIB) message (see 3GPP TS 36.331 Sec. 6.2.2).
- SIB Type 1 – Return System Information Block (SIB) Type1 message (see 3GPP TS 36.331 Sec. 6.2.2).

The values of the items measured will be repeated until the data card has been filled or the logging requirement has been removed. The complete list of selected items includes:

- Cell Index
  - LTE Cell Index

  - Physical-Layer Cell Identity. [0:2]
  - Physical-Layer Cell Identity Group. [0:167]

- Cell Indexes
  - MPS LTE Types Cell Index
- Measurement Data
  - Physical-Layer Cell Identity
  - The channel bandwidth detected
  - Number of TX antennas measured
  - Indicates type of duplexing detected
  - Indicates type of cyclic prefix detected
  - Time offset in microseconds
  - The RSSI value of the RF carrier at full channel bandwidth (dBm)
  - The received power value of the PSCH per sub-carrier (dBm)
  - The received power value of the SSCH per sub-carrier (dBm)
  - The received power value of the BCHCH per sub-carrier (dBm)
  - The SCH Received Quality Es/Io value (dB)
  - The CINR value of the SCH (dB)
  - The received power value of the BCH per sub-carrier (dBm)
  - The Reference Signal Received Power for port 0,1,2,3 (dBm)
  - The Reference Signal Received Quality Es/Io for port 0,1,2,3 (dB)
  - The CINR value of the Reference Signal for port 0,1,2,3 (dB)
  - The average delay spread in microseconds
  - The center frequency offset of the channel (Hz)
  - MIB
  - SIB Type1
- Measurement Record
  - Timestamp of the data record
  - Status of the data record (Future)
  - Channel number
  - The measurement data
- Scan Parameters
- Data logging mode
- The RF band that is to be scanned - "E-UTRA 01 (2100)", "E-UTRA 02 (1900)", "E-UTRA 03 (1800)", "E-UTRA 04 (2100)", "E-UTRA 05 (850)", "E-UTRA 06 (850)", "E-UTRA 07 (2600)", "E-UTRA 08 (900)", "E-UTRA 09 (1800)", "E-UTRA 10 (2100)", "E-UTRA 11 (1500)", "E-UTRA 12 (700)", "E-UTRA 13 (700)", "E-UTRA 14 (700)", "E-UTRA 17 (700)", "E-UTRA 18 (800)", "E-UTRA 19 (800)", "E-UTRA 20 (800)", "E-UTRA 21 (1500)", "E-UTRA 23 (2100)", "E-UTRA 24 (1500)", "E-UTRA 25 (1900)", "E-UTRA 26 (850)", "E-UTRA 33 (1900)", "E-UTRA 34 (2000)", "E-UTRA 35 (1900)", "E-UTRA 36 (1900)", "E-UTRA 37 (1900)", "E-UTRA 38 (2600)", "E-UTRA 39 (1900)", "E-UTRA 40 (2300)", or "E-UTRA 41 (2500)"

NOTE: E-UTRA 01 through E-UTRA 26 are FDD bands and are included in the original LTE key. E-UTRA 33 through E-UTRA 41 are TDD bands are included in an optional LTE key. Contact DRT for more information.

  - List of ARFCNs of the above band to be scanned

- The channel bandwidth
    - The duplexing detection mode
    - The cyclic prefix detection mode
    - Number of TX antennas

4.1.7.5 WCDMA

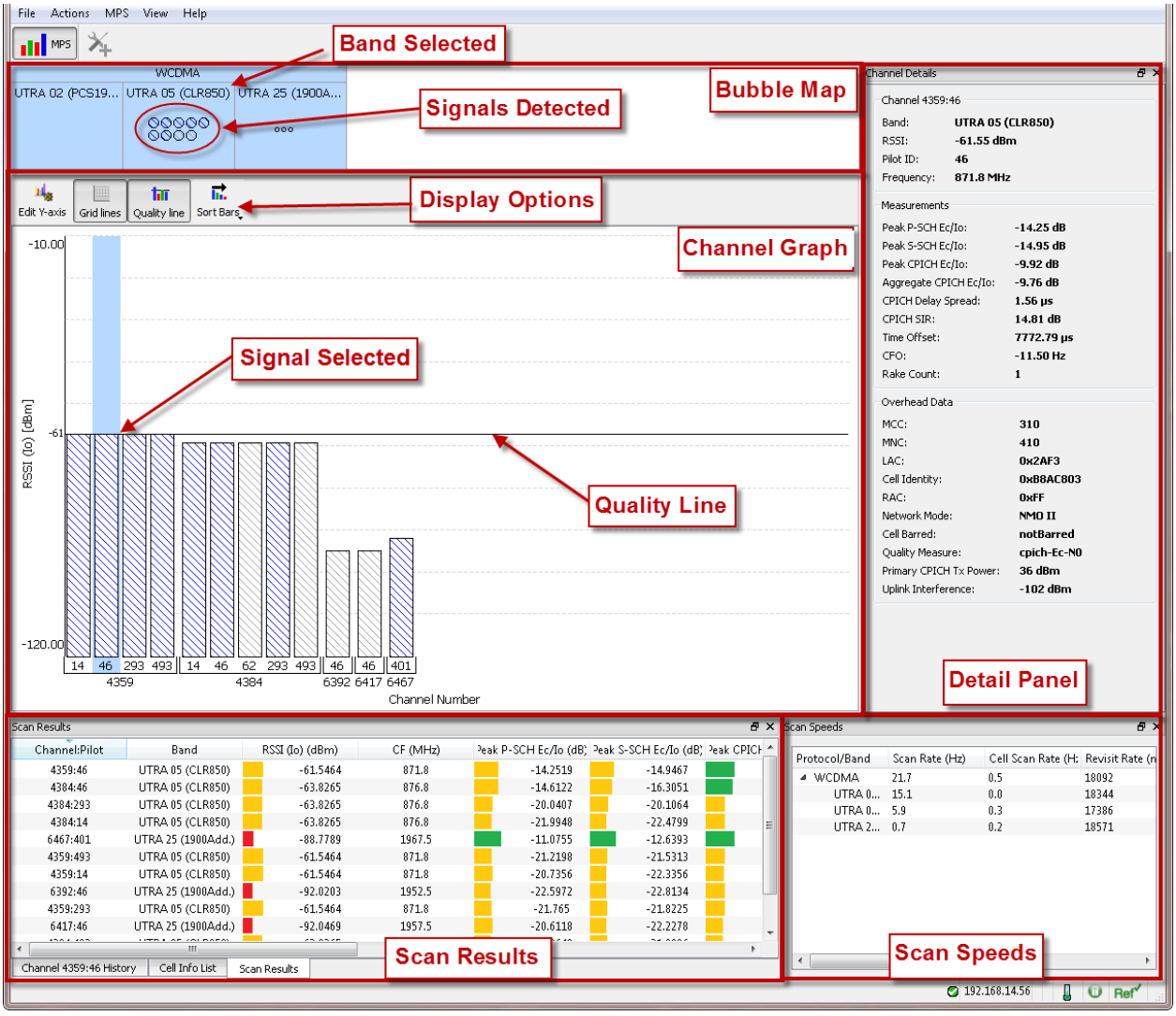
Once the band(s) have been selected, scanning for signals will begin. The main window will have these primary areas:

- **Bubble Map** – The first step is to select a band in this area. This area identifies the bands selected to be scanned and provides a graphic indication of the signals detected within each band. The signals detected will reflect the aliasing colors if aliasing has been configured for that signal's provider. Click in a band box to display the channels detected in that band in the Channel Graph area. Hold CTRL and click bands to select multiple bands or click the protocol line ("WCDMA") to select all bands.
- **Channel Graph** –This area displays the channels detected (in the band(s) selected in the **Bubble Map**) and the signal quality of each signal. Clicking on a signal will select that signal for display in the **Detail Panel** area.
    - **Display Options** – This area provides you with the ability to modify the way channel information is displayed. The options are:
        - **Edit Y-axis** – Allows you to select the quality metric plotted on the y-axis and specify the bounds of the y-axis for the selected metric. The available quality metrics are:
            - **Agg. CPICH Ec/Io** (in dB) – The aggregate ratio of the common pilot channel power to the total channel power.
            - **CPICH Delay Spread** (in µs)
            - **CPICH SIR** (in dB) – The common pilot channel signal interference ratio.
            - **Peak CPICH Ec/Io** (in dB) – The ratio of the common pilot channel peak power to the total channel power. [Default]
            - **Peak P-SCH Ec/Io** (in dB) – The ratio of the primary synchronization channel peak power to the total channel power.
            - **Peak S-SCH Ec/Io** (in dB) – The ratio of the secondary synchronization channel peak power to the total channel power.
            - **RSSI (Io)** (in dBm) – The strength by channel of the broadband interference received by the unit.
        - **Grid lines** – Places horizontal grid lines on the Channel Graph. Click the button to add the lines and click again to remove the lines. The default is on.
        - **Quality line** – When a channel in this display is selected, place a line on the display that identifies the level of the y-axis parameter of the signal selected. The default is on.
        - **Sort Bars -** Two sorting schemes are available: channel number and signal quality. Click and hold the button to display both options and then select one. Bars may get out of order over time, so once the display has been populated, click the button briefly to force the bars to be sorted again by the last selection.
    - **Signal Fill/Colors**: If provider aliases have been established, the detected signals will display the associated colors. Refer to ***Provider Aliasing*** for information on setting up aliasing. The Channel Graph display will show all the selected detected signals. Signals with gray cross hatch have been only detected (no provider information decoded). Signals with blue cross hatch have been detected and decoded, but not aliased by the user. Signals with a color fill (aliased) have been detected, decoded, and aliased. Signals with a gray fill represent signals that were detected and then lost. They will return to a gray cross hatch when redetected, blue cross hatch when redetected and redecoded, or a color when redetected, redecoded, and realiased.
- **Channel Detail Panel** – Once a signal has been selected, the information about that signal is displayed in this area. The information is in four groups:
    - **Channel –** Basic channel information and measurements.

NOTE: Configuration of the ***WCDMA Advanced Settings*** and the ***WCDMA Scan Measurements***, below, will not change the parameters displayed in **Measurements**.

    - **Measurements –** Detailed measurements for the channel.

- **Overhead Data –** Detailed overhead data decoded for the channel. Detailed overhead data decoded for the channel. Select the Overhead Data to be displayed and the order of the items displayed in ***Display Fields*****.**



NOTE: Configuration of the ***Advanced Settings*** and the ***Scan Measurements***, below, will not change the parameters displayed in **Overhead Data** and **Measurements**.

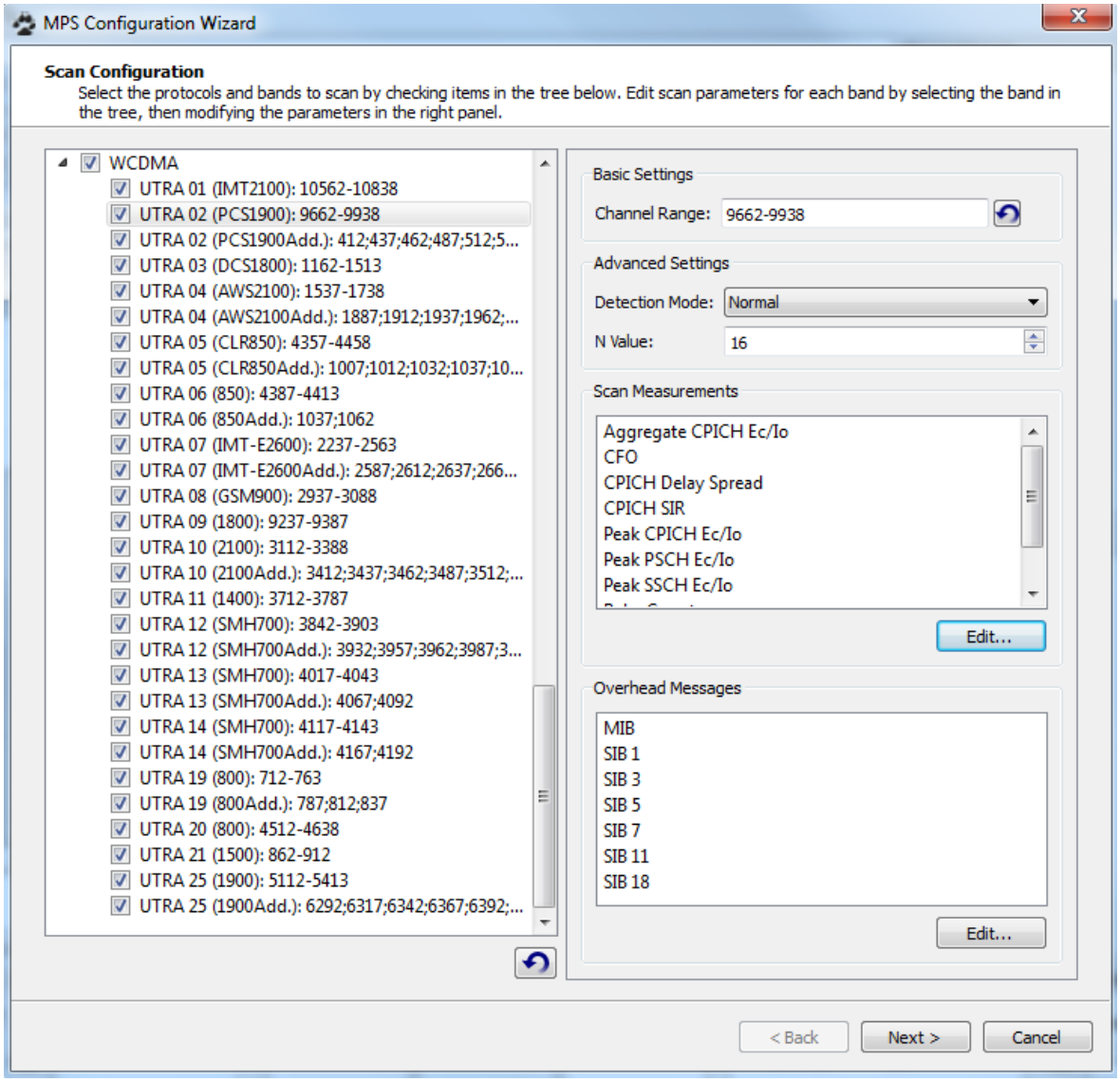
- **Scan Results –** Information about each Channel ID for all bands scanned in the selected protocol. Refer to ***Scan_Result_Metrics***.
- **Cell Info List –** Basic information about each neighbor of the channel**.**
- **Channel XXX:YY History –** Information about operating parameters for the selected channel. Refer to ***Channel_History***.
- S**can Speeds –** Information by protocol and band about: Refer to ***Scan_Speeds*****.**
  - The **Scan Rate** in Hertz (Hz),
  - The **Cell Scan Rate** in Hertz (Hz),
  - The **Revisit Rate** in milliseconds (ms), and
  - The **Number of Channels** scanned.

NOTE: **Channel Details**, **Scan Results**, **Neighbor List**, **Channel History,** and **Scan Speeds** can be displayed in several configurations: side-by-side, tabbed, or a combination of the two. The characteristics are:

- In side-by-side mode, all the selections are nested side-by-side and a portion of each selected parameter is displayed across the width of the display at the bottom.
- In the tabbed mode, all the selections are nested on top of each other and the total width of the display presents only one of the tabbed parameters. To view a specific parameter, select that tab.
- In the combined mode, some selections are nested on top of each other and some are side-by-side at the bottom of the display.

4.1.7.5.1 WCDMA Scan Configuration

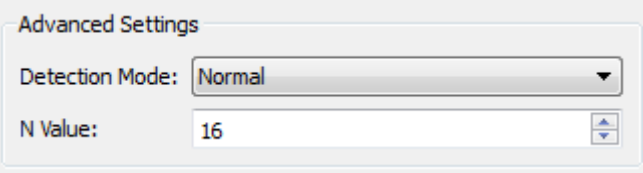
The configuration of WCDMA scans is performed through the **MPS Configuration Wizard**'s **Scan Configuration** dialog. For information on **Channel Settings**, refer to ***Basic Settings***.



4.1.7.5.2 WCDMA Advanced Settings

The remaining WCDMA Scan Parameters are also configured from the **MPS Configuration Wizard**. Refer to the ***Launch Wizard*** section. Once a WCDMA band has been selected, the right panel of the **MPS Configuration Wizard** will display the **Basic Settings** area which allows you to set the **Channel Range**, the **Advanced Settings** area which allows you to configure the scan parameters, and the **Scan Measurements** area which indicates the measurements being made and allows you to edit the measurements selection.

The parameters configured for this band will not apply to other WCDMA bands.



The Advanced Scan Parameters dialog allows the following selections and their options:

- **Detection Mode**:
  - **Normal –** High speed scanning with normal sensitivity.
  - **Enhanced –** Enhanced sensitivity with reduced scan speed.
  - **Survey –** Optimized for blind detection of active channels across multiple bands.
- **N Value –** The maximum number of pilots within each channel for which data will be returned. Enter / set the number of pilots. The limits are 0 to 32. The arrows increment / decrement the value in steps of 1. The default value is 16.

4.1.7.5.3 WCDMA Scan Measurements and Overhead Messages

To select the scan measurements or overhead measurements, click **Edit** in the **Scan Measurements** or **Overhead Messages** area to bring up the **Scan Measurements** dialog. This dialog will allow you to identify the measurements that will be performed in addition to the basic measurements. The **Scan Measurements** dialog is divided into two sections: **Inactive** and **Active**. In each category, **Inactive** identifies the measurements that will not being performed and **Active** lists all the measurements that will be performed.

To add a measurement, highlight that measurement in the **Inactive** area and click --> **;** or to remove a measurement from the **Active** list, highlight that measurement and click <--. When all measurements are configured on the S**can Measurements/Overhead Messages** dialog, click **OK** to accept the changes and return to the **MPS Configuration Wizard**. The Scan Measurements and Overhead Messages list s will update to reflect the changes made in the **Scan Measurements** dialog.

The available measurements are:

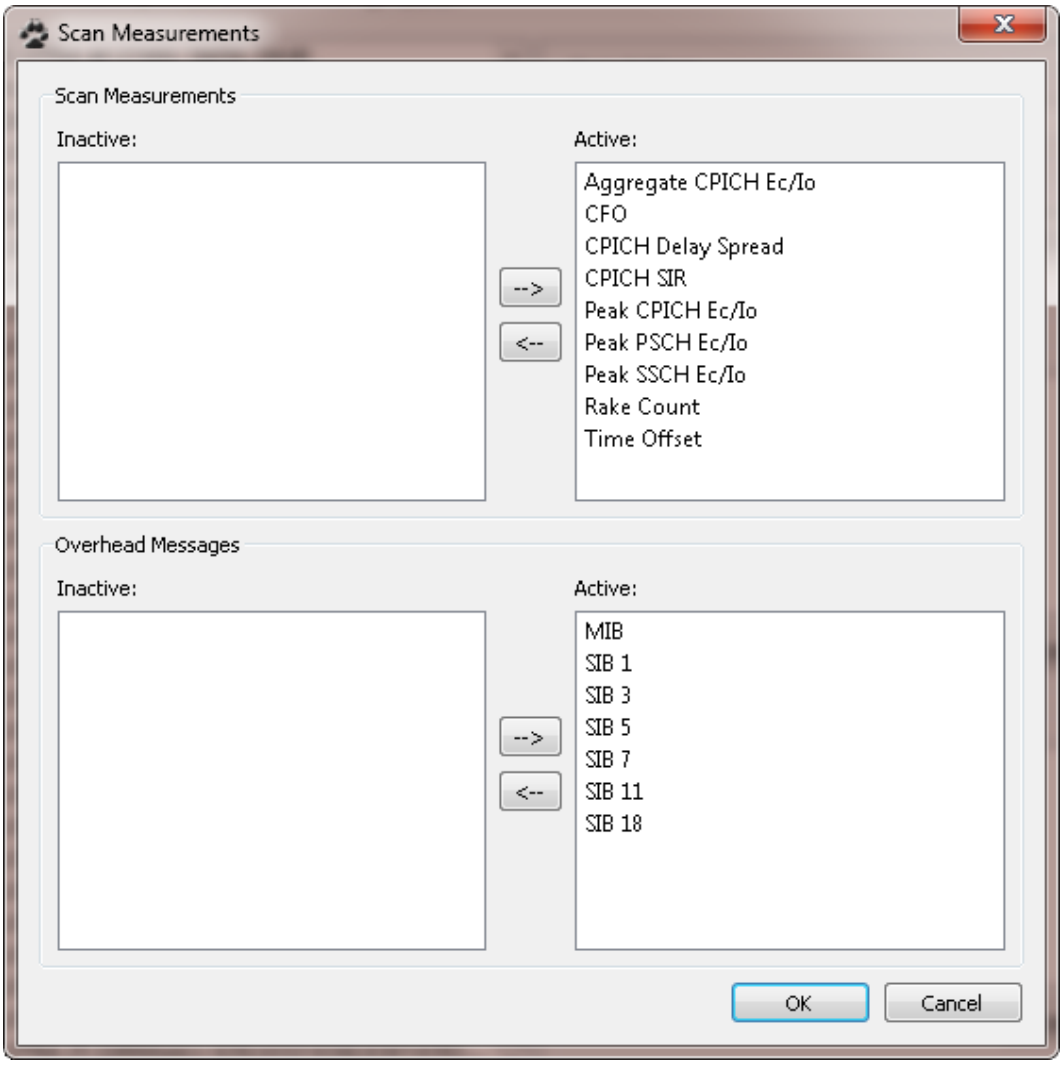
Scan Measurements:

- Aggregate CPICH Ec/Io
- CFO
- CPICH Delay Spread
- CPICH SIR
- Peak CPICH Ec/Io
- Peak PSCH Ec/Io
- Peak SSCH Ec/Io
- Rake Count

- Time Offset

Overhead Messages:

- MIB
- SIB 1
- SIB 3
- SIB 5
- SIB 7
- SIB 11
- SIB 18



4.1.7.5.4 Log Data

Refer to ***Logging Configuration*** for information on setting up and enabling WCDMA Logging. Logging can also be configured after you select the protocol / bands in the **MPS Configuration Wizard**.

Items Measured and Logged

Selecting the following Scan Measurements options will return the following parameters:

- PeakPschEcIo – Measure and return Peak P-SCH Ec/Io
- PeakSschEcIo – Measure and return Peak S-SCH Ec/Io
- PeakCpichEcIo – Measure and return Peak CPICH Ec/Io
- AggregateCpichEcIo – Measure and return Aggregate CPICH Ec/Io
- CpichDelaySpread – Measure and return CPICH delay spread
- CpichSIR – Measure and return CPICH SIR
- TimeOffset – Measure and return time offset
- CFO – Measure and return CFO
- RakeCount – Return a count of the fingers used in RAKE receiver implementation calculations
- MIB – Return Master Information Block (MIB) message
- SIB1 – System Information Block (SIB) Type 1 message
- SIB3 – System Information Block (SIB) Type 3 message
- SIB5 – Return System Information Block (SIB) Type 5 message
- SIB7 – Return System Information Block (SIB) Type 7 message
- SIB11 – Return System Information Block (SIB) Type 11 message
- SIB18 – Return System Information Block (SIB) Type 18 message

The values of the items measured will be repeated until the data card has been filled or the logging requirement has been removed. The complete list of selected items includes:

- Measurement Data
    - Primary Scrambling Code
    - Peak P-SCH Ec/Io (Ec/No or RSCP/RSSI) The received energy per chip of the peak P-SCH multipath component divided by the power density in the frequency band. See 3GPP TS 25.302 Sec 9.2.3 (dB)
    - Peak S-SCH Ec/Io (Ec/No or RSCP/RSSI) The received energy per chip of the peak S-SCH multipath component divided by the power density in the frequency band. See 3GPP TS 25.302 Sec 9.2.3 (dB)
    - Peak CPICH Ec/Io (Ec/No or RSCP/RSSI) The received energy per chip of the peak CPICH multipath component divided by the power density in the frequency band. See 3GPP TS 25.302 Sec 9.2.3 (dB)
    - Aggregate CPICH Ec/Io (Ec/No or RSCP/RSSI) The received energy per chip of all the resolvable CPICH multipath components divided by the power density in the frequency band. See 3GPP TS 25.302 Sec 9.2.3 (dB)
    - CPICH Delay Spread The difference between first and last resolvable multipath components within power delay profile (usec)
    - CPICH SIR ((RSCP/ISCP)*SF) Signal-to-Interference Ratio See 3GPP TS 25.215 Sec. 5.2.2 (dB)
    - Time Offset The time offset of the radio frame (modulo 10 ms) referenced to internal clock (usec)
    - CFO Carrier Frequency Offset. The difference between a reference frequency and the frequency of a received Radio Frequency (RF) carrier (Hz)
    - The number of fingers used in the RAKE receiver
    - Master Information Block

  - System Information Block Type 1
  - System Information Block Type 3
  - System Information Block Type 5
  - System Information Block Type 7
  - System Information Block Type 11
  - System Information Block Type 18
- Measurement Record
  - Timestamp relative to the unit system time of the data record
  - GPS Position of the data record
  - Status of the data record (Future)
  - UTRA Absolute Radio Frequency Channel Number (UARFCN)
  - RSSI (Io) The wideband received power within the relevant channel bandwidth. See 3GPP TS 25.302 Sec 9.2.10 (dBm)
  - Pilot Measurements
- Scan Parameters
  - Data logging mode
  - The RF band that is to be scanned - "UTRA 01 (IMT2100)", "UTRA 02 (PCS1900)", "UTRA 02 (PCS1900Add.)", "UTRA 03 (DCS1800)", "UTRA 04 (AWS2100)", "UTRA 04 (AWS2100Add.)", "UTRA 05 (CLR850)", "UTRA 05 (CLR850Add.)", "UTRA 06 (850)", "UTRA 06 (850Add.)", "UTRA 07 (IMT-E2600)", "UTRA 07 (IMT-E2600Add.)", "UTRA 08 (GSM900)", "UTRA 09 (1800)", "UTRA 10 (2100)", "UTRA 10 (2100Add.)", "UTRA 11 (1400)", "UTRA 12 (SMH700)", "UTRA 12 (SMH700Add.)", "UTRA 13 (SMH700)", "UTRA 13 (SMH700Add.)", "UTRA 14 (SMH700)", "UTRA 14 (SMH700Add.)", "UTRA 19 (800)", "UTRA 19 (800Add.)", "UTRA 20 (800)", "UTRA 21 (1500)", "UTRA 25 (1900)", "UTRA 25 (1900Add.)"
  - List of ARFCNs of the band to be scanned
  - Number of the top pilots to report for each channel
  - Detection mode enumeration
  - Selected measurement data to be measured
- Scan Config
  - Configuration
- Scan Data
  - Channel Measurements

4.2 Android 4300 Software

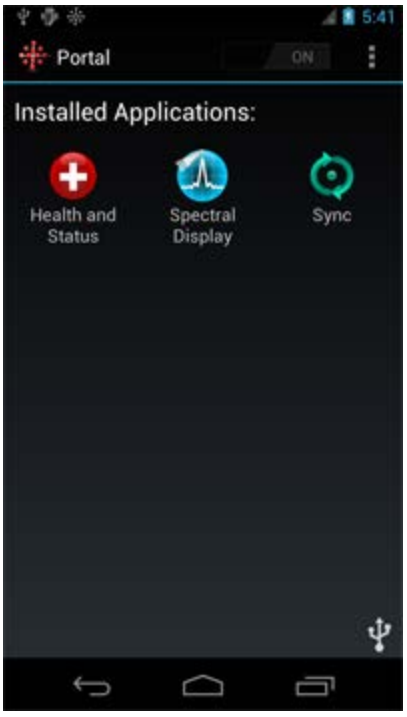
4.2.1 Open Portal App

The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

The *Portal* application is an umbrella application that provides access from the Android device to the DRT43xxB system. *Portal* is installed on the Android device as described ***above***.

To start:

- Connect the Android device to the DRT system via USB or Bluetooth, *Portal* should open automatically. When connecting via WiFi over a network, *Portal* will attempt to connect to the last provided unit address.
- If the device does not successfully connect with a DRT unit, the device will prompt you for an IP address. Select or enter an IP address and select **Connect**. If the Android device cannot resolve the IP address, an error message will appear.
- When the device successfully contacts the DRT unit, you may be asked whether you want this device to open Portal whenever this connection is made. Answer as desired.
- Once connected to the DRT unit, *Portal* checks for updates to the sub-applications managed by *Portal*.
    - If a version of the application is detected that is different from that installed on the Android device, you will be notified that a Portal Update is required. Select **OK** and select **Install** to replace the application currently on the device.
    - You will be asked whether you want to update other applications such as **Update Monitor** too. Select **OK** and **Install** as needed.
- You will be asked whether you want the Android device to be synchronized with the versions of software on the DRT system. If you say yes, this will cause *Portal* to overwrite the files on the Android device with the new versions.
- Once the Android device is updated, the name of the DRT43xxB system is displayed on the device and the installed applications are displayed. From here you can begin by opening an application to begin configuration.



4.2.2 Android Sync

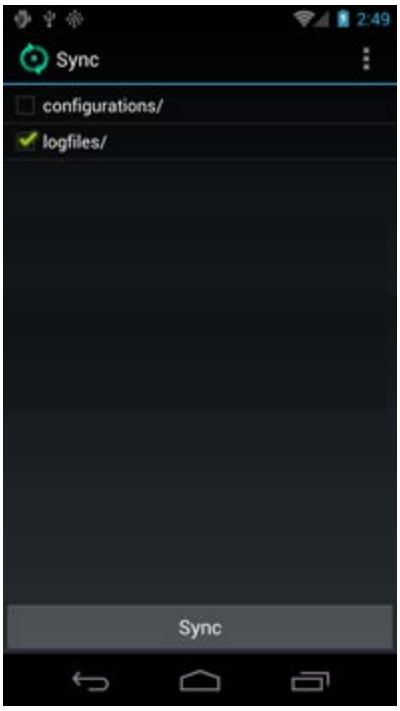
The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

The *Sync* application is used to pull files from the DRT system to the Android device. The type of files pulled are:

- Configuration Files
- Logs

The *Sync* application is started from the Android device on the **Installed Applications** window. Selecting ***Sync*** will display the directories on the SD card. You should select which items you want to bring to the Android device. Then click the **Sync** button.

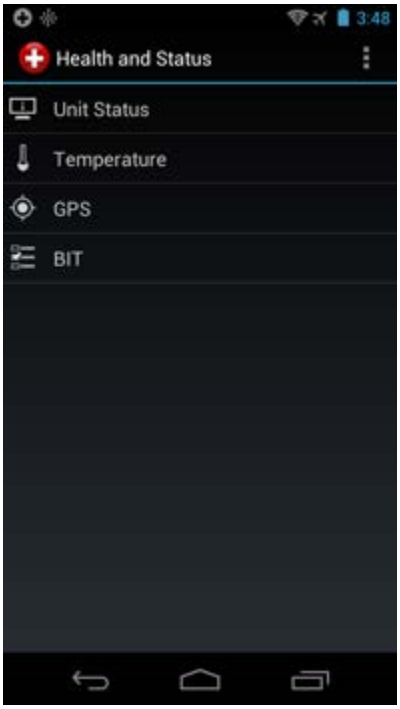
Other files are not utilized by the Android applications.



4.2.3 Android Health and Status

The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

The *Health & Status* application provides you with information concerning the operating conditions of your DRT unit.



The information provided includes:

- The ***Unit Status*** selection provides you with:
  - The unit's **Model Number.**
  - The unit's **Serial Number.**
  - The **Software Version** running on the DRT unit.
  - The **SD Card Present** (**true** or **false**).
  - The **Battery** status (percent of available charge and estimated running time remaining in minutes), if installed.
- The ***Temperature*** selection provides you with:
  - The **Temperature Status** of the unit (**LOW**, **HIGH**, **UNKNOWN**, or **OK**).
  - The **Max Temperature**, the current maximum temperature (in ^{o}C) reported by any temperature sensor in the unit.
  - The **Min Temperature**, the current minimum temperature (in ^{o}C) reported by any temperature sensor in the unit.
- The ***GPS*** selection provides you with:
  - The GPS **Lock Status** (**Unlocked, locked 2D**, or **locked 3D**).
  - The unit's **Latitude** (in decimal degrees).

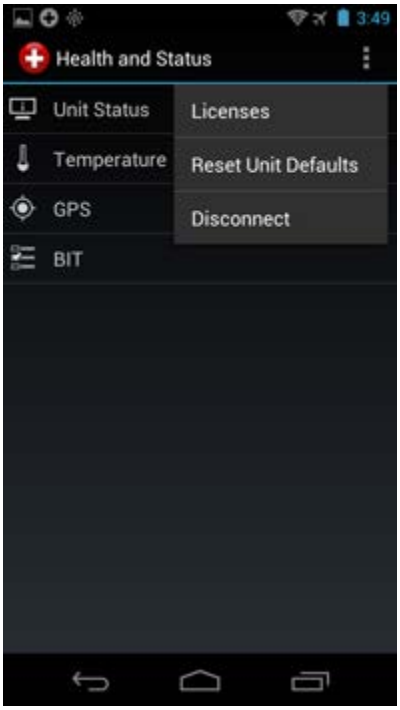
- The unit's **Longitude** (in decimal degrees).
- The unit's **Altitude** (in meters) [Only available when GPS is **locked 3D**.]
- The unit's **Bearing** (in degrees).
- The unit's **Speed** (in kph).
- The **Visible Satellites**, the number of satellites being used by the GPS.
- The unit's GPS **Time** (expressed as dd MMM yyyy hh:mm:ss am/pm).
- The GPS **Time DOP**, the current value of Time Dilution of Precision (DOP). The smaller the value the better.
- The GPS **Horizontal DOP**, the current value of Horizontal Dilution of Precision (DOP). This term will have a value whenever there is a **locked 2D** or **locked 3D** status. The smaller the value the better.
- The GPS **Vertical DOP**, the current value of Vertical Dilution of Precision (DOP). This term will have a valid value whenever there is a **locked 3D** status. With a **locked 2D** status, the entry could be a dash or a number greater than 20. The smaller the value the better.

- The ***BIT*** selection provides you with:
  - The **BIT Results**, the status of the last time Built-in-Test (BIT) was run on the unit (**Passed** or **Failed**).

4.2.3.1 Menu Icon

While in the ***Health and Status*** app, selecting the Menu icon,  , provides other selections:

- **Licenses**
- **Reset Unit Defaults**
- **Disconnect**



Selecting **Licenses** provides you with the information about third party software licenses associated with software used to retrieve, transport, and display the data in the Android App.

Selecting **Reset Unit Defaults** resets the DRT unit to the factory defaults.

Selecting **Disconnect** provides you with these options:

- **Shut Down** - Stops the operation of the DRT unit and shuts it down.
- **Reboot** - Disconnects the DRT unit from the Android device and reboots the DRT unit in the existing configuration. The Android device will not automatically be reconnected, you must reconnect it manually.
- **Disconnect** - Disconnects the Android device from the DRT unit but keeps the DRT unit running using the existing configuration.

4.2.4 Android SDU App

The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

The Android Spectral Display Unit (SDU) application does not perform general system or tuner configuration: Tuner and system configuration should be done using *Galena* on a PC prior to connecting to the DRT system with the Android device.

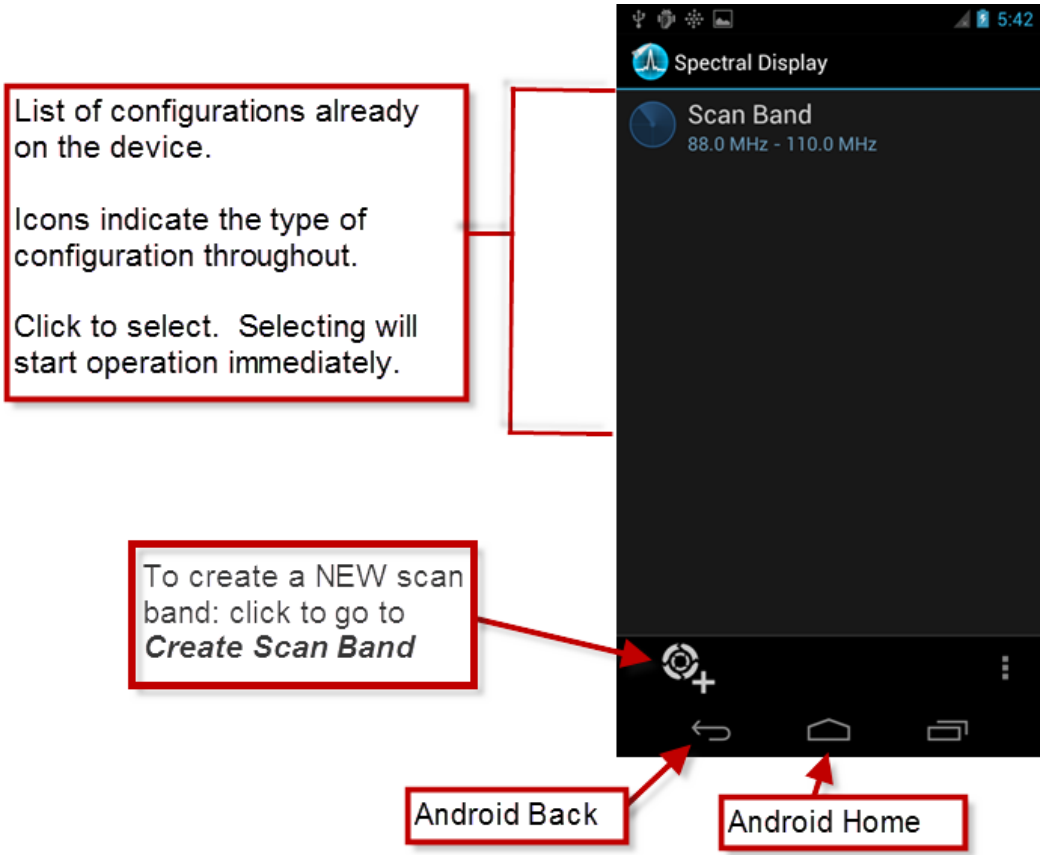
- Tuner configuration includes items such as tuner gain settings and coherent tuner operation.
- System settings include GPS, syncing to external 1PPS signal, etc.
- When the Android device disconnects from the DRT system, the DRT system will continue its operations.
  - For the Scan Band configuration, the system will simply continue to scan.

4.2.4.1 Start

To start using the SDU app, on the Android device select **Spectral Display** from the **Installed Applications** page. The **Navigation** page is the starting page of the SDU app, from where all other activities are started. If there are configured scan bands, the system will display a list of them on the **Navigation** page.

On certain pages, the SDU icon in upper left  will take you back to the **Navigation** page.

Android SDU: Navigation Page



4.2.4.2 Scan Band

Selecting **Scan Band** will open the **Create Scan Band** dialog. The cursor is positioned in the **Start Frequency** field. Enter the **Start Frequency** of the new scan band and click **Next**. The cursor will advance to the **End Frequency** field. Enter the **End Frequency** and click **Create**.

Clicking **Create** takes you to the **Spectral Display** page which shows a list of the defined scan bands. Selecting any one scan band will then configure the unit to scan that frequency range. Multiple scan bands may be defined, but only one can be active at a time. To define another scan band, click this icon, which will take you back to the **Create Scan Band** dialog: 

Android SDU

Create Scan Band

Navigation page lists Scan Bands

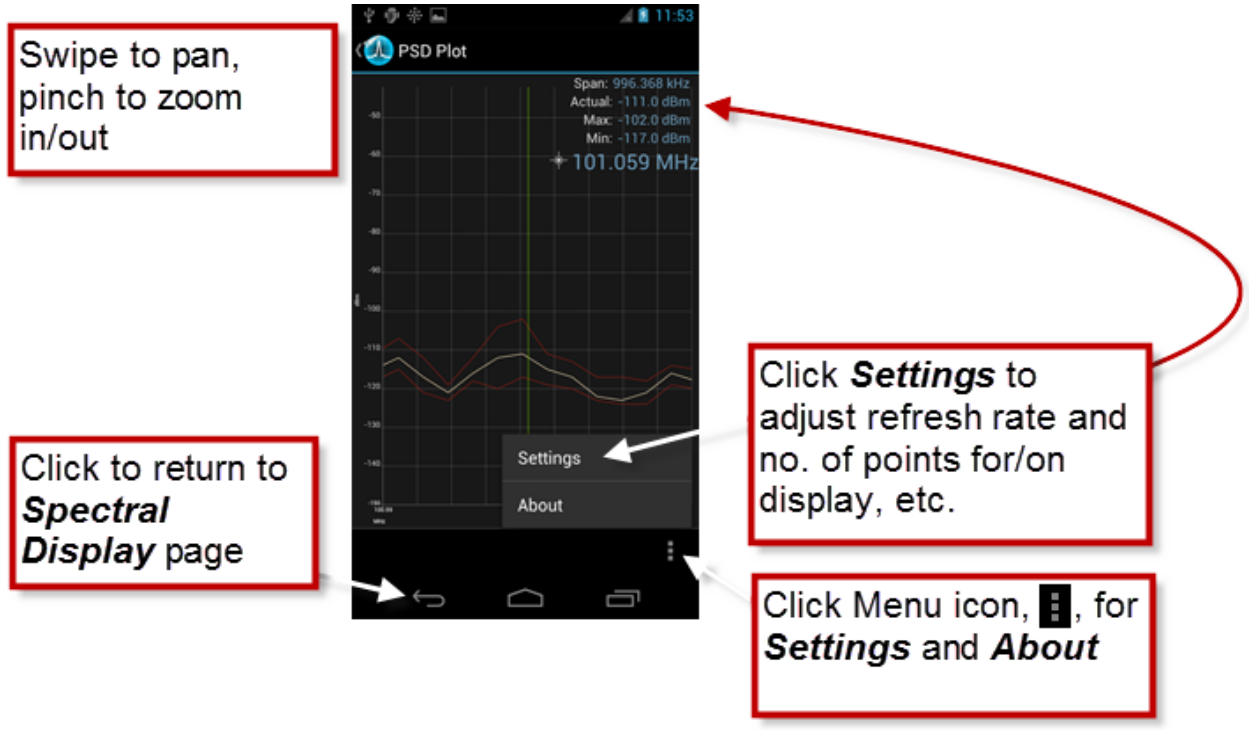
4.2.4.2.1 Scan Band: PSD Plot

From the **SDU Navigation** page, clicking on a Scan Band item opens the **PSD Plot** option for that scan band, a spectral display of the band being scanned. The PSD Plot is probably most easily viewed using the landscape view (turn the Android device sideways).

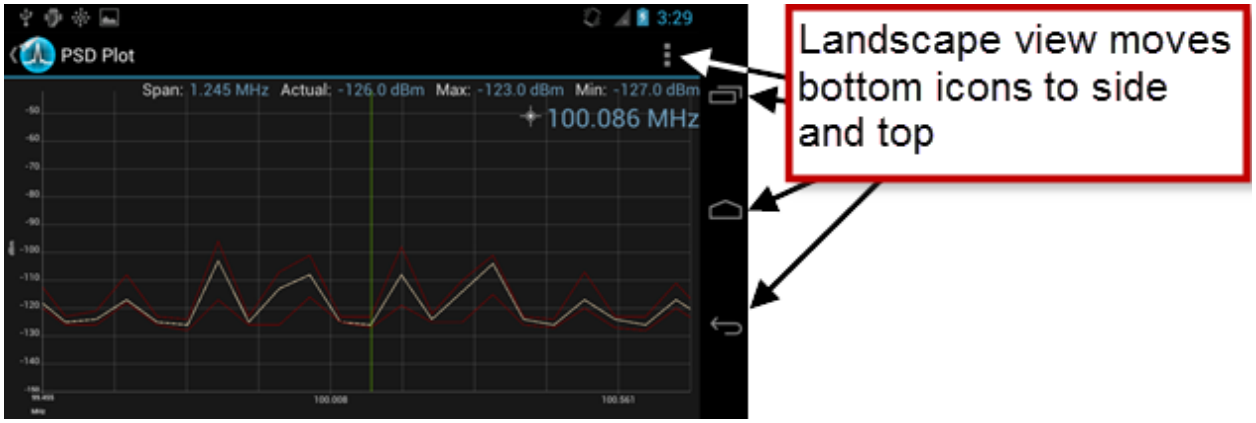
You can pinch to zoom in and out of the spectral display, and swipe left and right to pan around the graph.

Return to the **Spectral Display** page for the list of scan bands by clicking the icon shown in the screenshots below. This icon changes position based on whether the view is landscape or portrait.

Android SDU: Scan Band PSD Plot



Android SDU: Landscape Scan Band PSD Plot



The drawing of PSD Plot may be modified. On multiple windows there is a Menu icon in the lower right (portrait phone display) / upper right (landscape phone display & tablets) , . Click this icon and select **Settings** to configure the display or **About** for information about the version of software that is running on the DRT unit.

Spectral Display Settings

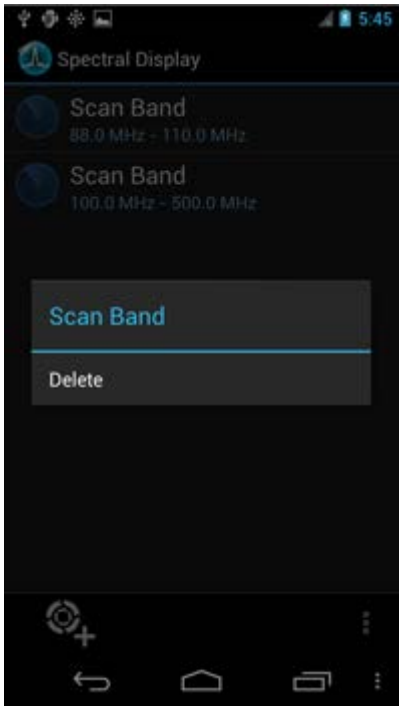
The **Settings** dialog allows you to configure the display. The options are:

- **Refresh Rate** - The rate at which the PSD plot refreshes. Default is 1/sec. Options are 1, 2, 4, and 8 per second. The value is the number of times per second data is requested from the DRT unit. A higher refresh rate consumes more bandwidth from the network connection to the DRT unit.
- **No. of Points** - The number of points displayed on the PSD plot. Default is 250 points. Options are 250, 500, 750, and 1000 points. A higher number of points consumes more bandwidth from the network connection to the DRT unit.
- **Peak Line Color** - Click to select the color of the PSD max and min value lines (if selected, see below).
- **Enable Max Line -** Click to display the PSD maximum value line**.**
- **Enable Min Line** - Click to display the PSD minimum value line.

4.2.4.3 Delete Scan Band Configuration

Android SDU: Delete Configuration

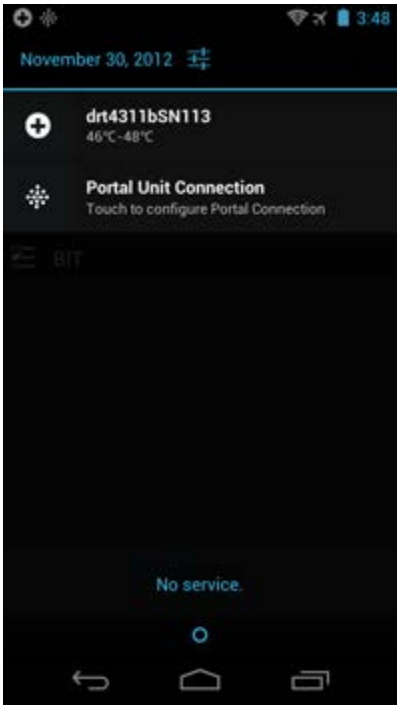
Pressing and holding a scan band configuration on the **Navigation** page will bring up a menu with an option to delete it. Pressing **Delete** on this menu will delete the selected scan band.



4.2.5 Optional Android Navigating

The images in this section are screenshots from a prototype GUI running on an Android device connected to a DRT4311B. Screens may look slightly different on different Android devices.

An optional way to move around the Android App is initiated by swiping down the face of the display. This will bring up a display with the *Health and Status* application icon, , and the *Portal* application icon, . Selecting the *Health and Status* icon, which displays the model number, serial number, and operating temperature of the unit, will take you to the Android Health and Status application. Selecting the *Portal* application will take you to the ***Portal*** application to configure the Portal connection.



5 Open-Source Software

During the creation of the *DRT4300B System Software*, specific functionality was realized through the use of targeted open-source software libraries. In compliance with the terms of use of these software libraries, DRT is providing the licenses and required source for these libraries on the *DRT4300B System Software* DVD.

In addition to the installation files found on the System Software DVD, there are five folders. One of these folders, titled **Open-Source Software**, contains the licenses and required source for the open-source software libraries used. For any questions about any of the open-source software, consult this folder or contact DRT.

6 MPS Quick Start Guide

6.1 Configure an MPS Scan

To configure an MPS scan, you can start the Wizard either of two ways:

- When MPS begins from a cold start, the **MPS Configuration Wizard** opens immediately.
- At any time when an MPS mission is running, you can use from the main menu select **MPS** > **Launch Wizard.** This will open the **MPS Configuration Wizard.**

The left side of the dialog lists the available protocols and their available bands. The right side displays settings for the band when a band is highlighted. To configure the scan, for each protocol:

NOTES:

The CDMA2K protocol must be scanned by itself but GSM, LTE and WCDMA protocols can be scanned by themselves or combined.

For CDMA2K, prior to indoor operation, the system should be synchronized with the GPS system outdoors. This ensures proper indoor operation for up to 8 hours for all scan scenarios under typical conditions. Once the GPS signal is lost, the number of RF channels that can be properly scanned will depend on how long the GPS has been lost.

1. On the left side:
    - Check the protocol's box to scan all bands within that protocol or
    - Check the box for each band to be scanned.
2. To modify the scan characteristics within a band, highlight the band on the left side of the dialog. On the right side of the dialog:
    - **Basic Settings** > **Channel Range** field (all protocols) identifies the channels to be scanned. Edit this field to restrict the channels scanned.
    - **Advanced Settings** fields (CDMA2K, LTE & WCDMA) allow you to control the scan parameters. Edit these parameters as necessary.
    - **Scan Measurements** field displays the measurements to be made on this band. Click the **Edit** button to modify the measurements.
    - **Overhead Messages** field displays the overhead messages that are collected and reported for this band. Click the **Edit** button to modify the messages.
3. When all protocols and bands have been set, click **Next**. The **Scan Configuration** page is replaced by the **Logging Configuration** page. Refer to ***Logging Configuration*** to configure MPS data logging. (Logging may also be enabled after the scan is configured: from the main menu > select **MPS** > select **Enable Logging**.)
4. Click **Finish** to exit the dialog and begin the operation.