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## Viper DIS Radio User's Manual



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## Version Information

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| 09 Dec 2016  | Fred Lehmann    | Updated comm plan CSV format.                             |
| 14 July 2017 | Fred Lehmann    | Audio dialog update                                       |

If you have questions or comments about the Viper DIS Radio, please contact us at [support@bssim.com](mailto:support@bssim.com).

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## **Viper Distributed Interactive Simulation (DIS) Radio Setup Guide & User's Manual**

### **Installation & Setup**

#### **System Requirements**

Viper requires the following minimum hardware and software:

2.0 GHz dual-core CPU or faster

Vista, Windows 7, 8, 10

4GB RAM

CD or DVD-ROM drive

150MB free hard drive space

DirectX 9 compatible graphics card

DirectX 9 compatible sound card

Keyboard

Mouse

#### **Installing Viper And Prerequisites**

*NOTE: You will need administrator privileges to install Viper and any required pre-requisites!*

Viper requires certain prerequisite software bundled with the BSIPrereqs Installer. Please follow the installation steps below:

1. Locate the BSIPrereqs.exe file from your downloads folder or the Setup folder on your Installation CD. Double-click to start the Installation. Accept the checked defaults.
2. Locate the ViperInstaller.exe file from your downloads folder or the Setup folder on your Installation CD. Double-click to start the Installation. If you are unsure if you have the latest Device Simulation Container installed, check that box in the installer.



## Viper DIS Radio

The Viper DIS Radio is part of a family of simulations that all run under a common framework. To get up and running with the DIS radio as fast as possible please familiarize yourself with the parts of the DIS radio system as shown below.

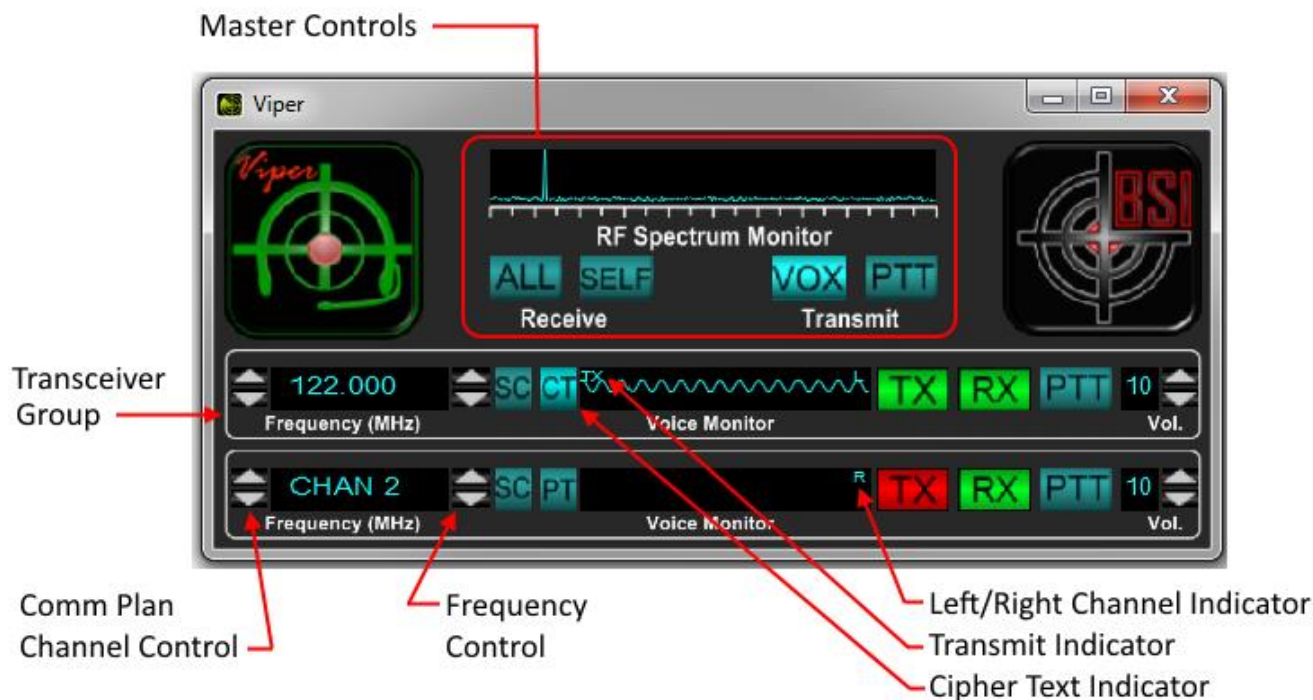
### Parts of the DIS Radio

The Viper Radio may be delivered with various 'skins' or Graphical User Interfaces (GUI). The default GUI shown below has the following parts:

**Device Simulation Container (DSC)** – This is the window that hosts one or more simulations (such as the Viper DIS Radio) and contains the settings common to all configurations. Please see the "DSC Manual" document for more information on DSC settings.

**The Viper DIS Radio** – This is the application that generates audio and transmits or receives DIS radio messages. It will contain one or more transceivers..

**Transceiver** – Transmits and receives DIS voice data on a per frequency basis. Each transceiver is controlled with it's own set of controls in a Transceiver Group. Each transceiver may be operated independently except that they share microphone and speaker devices.



Default Configuration of Viper

### Controls and Displays of the Viper Master Controls

**RF Spectrum Monitor** – Displays DIS radio traffic up to 1 GHz.

**ALL** – Toggle button to play (receive) all incoming radio signals regardless of tuned channels.



**SELF** – Listen to own voice from the microphone; will only be heard when actually transmitting.

**VOX** – Voice Operated eXchange: if the microphone receives a signal above a certain threshold Viper will transmit on all active (TX button lit) channels.

**PTT** – Push To Talk: Viper will transmit on all active channels.

## Controls and Displays of the Viper Transceiver Group

**Comm Plan Channel Controls** – If a Communications Plan has been loaded these up/down controls will allow the user to cycle through the comm plan channels.

**Frequency display** – Displays the current transmit and receive frequency in MHz. Click on the display to enter frequency from the keyboard. The escape key (usually “Esc”) on the keyboard cancels the input and “Enter” accepts it. Toggle between channel name (if set) and frequency by double clicking.

**Frequency Controls** – Click to change frequency up or down by 50 kHz.

**SC button** – Click to start scanning frequencies; click again to go to last tuned frequency.

**CT (or PT) button/indicator** – Displays the current cryptographic status. Push to temporarily swap between CT/PT for comm plan channels with encryption enabled.

**Voice Monitor** – Display shows incoming or outgoing audio activity and amplitude.

**TX/RX** – Transmit/Receive. Active when green, inactive when red. Change status by clicking the button. When TX is active, will transmit signals from the microphone if VOX is triggered or PTT or joystick button pressed. RX will receive incoming signals on this channel.

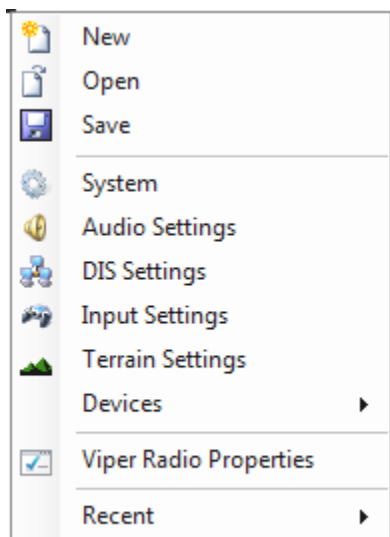
**PTT** - Push To Talk, transmits on this channel only.

**Volume** – Displays receive volume for incoming signals. From 0 (min) to 10 (max).

**Volume Controls** – Click to change volume up or down. Circular (e.g. 10 increments to 0).

## Context Menu

Right click anywhere on the Viper DIS Radio to activate the context sensitive menu shown below:



**New, Open, Save** – Allow you clear, load, and save the active Viper configuration and settings.

**System** – Displays a dialog containing system settings, version information, and diagnostics.

**Audio Settings** – Displays a dialog containing audio setup information.

**DIS (Network) Settings** – Displays a dialog containing DIS and network settings.

**Input Settings** – Displays a dialog for joystick or other input device settings.



**Terrain Settings** – Allows configuration of the Terrain Server.

**Devices** – Brings up sub-menus for adding or removing the Viper radio from the Device Simulation Container.

**ViperRadio Properties** – Brings up settings specific to the Viper radio (Note: to see this option you must right click on the Viper panel.)

**Recent** – Shows a sub-menu of recently used configurations.

## Quick Start

For this Quick Start, at least two networked computers with a Viper DIS Radio installed on each are required. At least one computer needs a microphone, but it is recommended for both to have a headset speaker / microphone. In most cases Viper will work right out of the box using the default configuration. Let's try the following:

1. Run the Viper DIS Radio on each of the networked computers.
2. Click and hold the PTT button on a channel.

You should see activity on the RF Spectrum Monitor and the Voice Monitor of both Vipers as well as hear spoken audio on the receiving radio. If this is the case, congratulations you are up and running with the DIS radio in its simplest mode (no attenuation or geospatial awareness).

### Quick Start Troubleshooting

If you did NOT see a spike on RF Spectrum Monitor or activity in the Voice Monitor of the transmitter radio, please see the section Audio Settings.

If you saw the a spike on RF Spectrum Monitor and activity in the Voice Monitor in the transmitter radio but did NOT see a spike on the receiving radio's RF Spectrum Monitor, please see the DIS Network Settings section of this manual.

For additional help see the section Troubleshooting Viper.

### Advanced Setup

To choose the active microphone or speakers see the section Audio Settings.

To map controls (such as a PTT button) to a joystick or other input device, see the section Input Settings.

To select a specific platform to transmit from see the section DIS Network Settings.

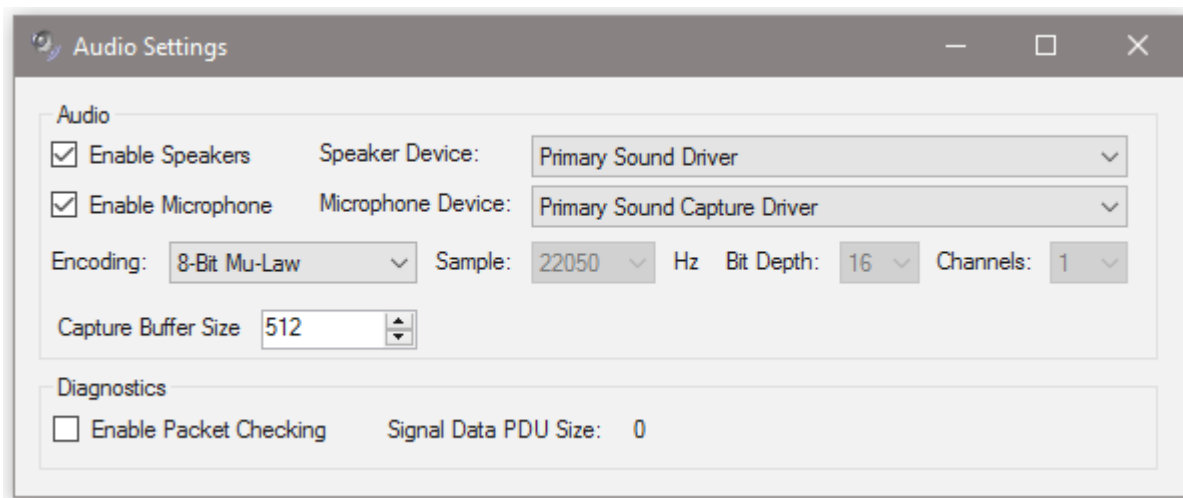
To setup Viper specific simulation values see the section Viper DIS Radio Properties.





## Audio Settings

The audio setting dialog allows you to select one speaker device, one microphone device, and the DIS encoding format of outgoing audio signals. The system will accept any of the formats listed, combination of formats, and any number of incoming audio signals.



**Figure 1: Audio Options**

### Speakers

To hear audio, ensure the “Enable Speakers” checkbox is checked and a valid speaker device is selected from the “Speaker Device” pull-down menu.

### Microphone

To direct Viper to process microphone input, the “Enable Microphone” box must be checked and a microphone must be selected from the “Microphone Device” pull-down menu.

### Encoding

The system supports 8-Bit Mu-Law (DIS Encoding 1), 16-Bit Linear PCM (DIS Encoding 4), and Custom (DIS Encoding 7) as a format for outgoing audio. 8-Bit Mu-Law is the default format and is used by most DIS radios. For custom encoding sample rate (8 to 44 kHz), bit depth (8 or 16), and number of channels (1 mono, 2 stereo) may be set.

### Capture Buffer Size

Determines the size of the recording buffer, in bytes, from 256 to 4096. Smaller sizes generally have less latency in the sidetone (hearing one’s own voice) but result in more network traffic. The Signal Data PDU Size is related to this value.

### Diagnostics

The diagnostics section is for use by BSI helpdesk professionals.

### Saving

Your selection will be remembered when you save the configuration. Note: If the selected device is not available (e.g., headset not plugged in) the default device will be used until the system detects the selected device.



## DIS Network Settings

The system communicates data via the Distributed Interactive Simulation (DIS) networking protocol over a computer local area network (LAN).

### Computer Network Settings

The network can be a wired LAN through a switch, a wireless network, or directly between two computers with a cross-over cable. A wireless network is not recommended though as it is prone to packet loss / delay. Enter the appropriate DIS Broadcast IP and Port under Network settings to ensure network packets sent from the local machine reach all the intended computers.

First, determine the appropriate broadcast address for DIS. The IP settings of the computer can be found under the computer network settings.

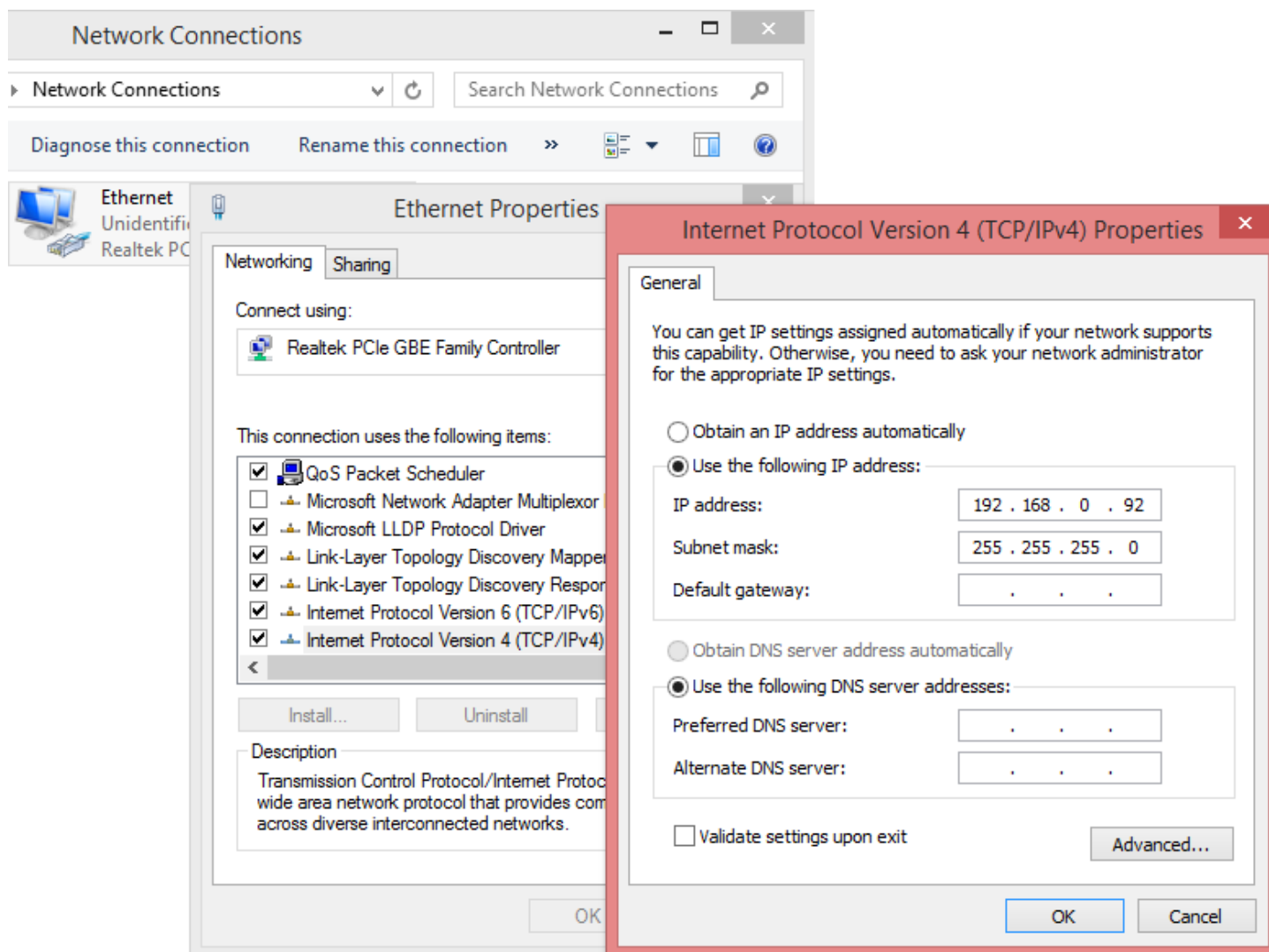
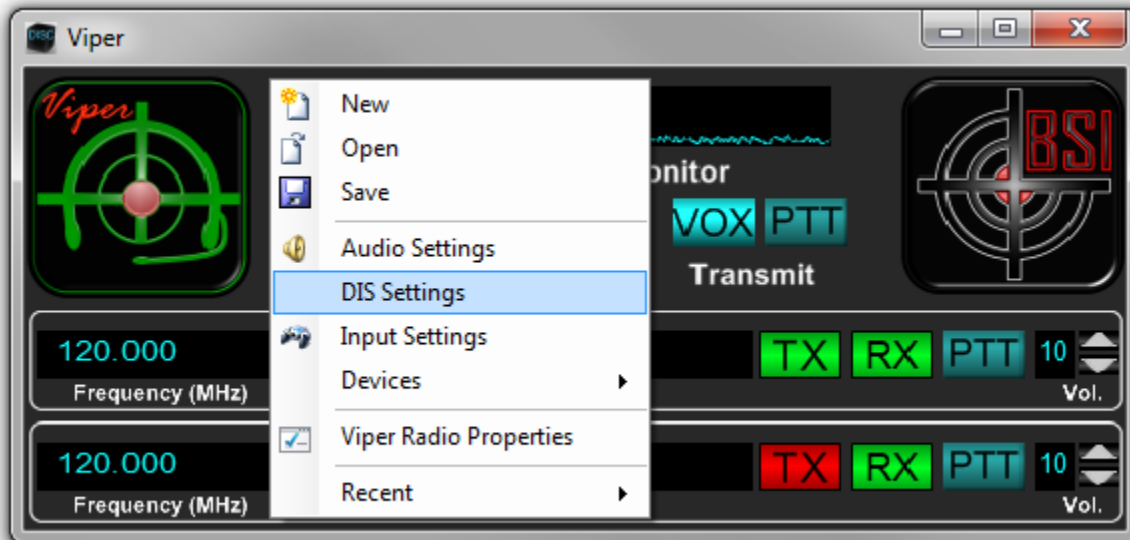


Figure 2: Network Setup



For example, if computer #1's IP address is 192.168.0.92 and computer #2's is 192.168.0.84, then to broadcast between the computers, the DIS Broadcast address would be 192.168.0.255. The last octet of the address set to 255 signifies the radio will broadcast to any computer with the three previous octets matching. These values will vary by network. Using the "Auto" function should configure this broadcast IP automatically.

To configure Viper's DIS Network Settings, right-click anywhere on the Viper skin and click the 'DIS Settings' option:





## DIS Settings

The DIS Settings dialog allows you to setup the DIS network and associated entity.

**DIS and Network Settings**

### Network

Under the Network settings, set the DIS Broadcast address appropriate for the network.



Network

Local IP: 192.168.2.4 and 192.168.1.88

Broadcast: ☐ Auto     DIS Port:  DIS Version

## Network Setup Section

For example, if your local IP address is 192.168.2.70 and you wish to share the radio audio with a 192.168.2.200 networked computer, you will set the DIS broadcast to 192.168.2.255.

The "Auto" option will automatically configure Broadcast address to the first network address the radio finds. However, the "Auto" option may not be desirable on computers with multiple network cards. ***In addition, 'Auto' is not recommended when running devices automatically on bootup.*** This is because the devices may start before the computer has established its IP address, leading to an incorrectly selected localhost IP (127.0.0.1). If you are going to start devices automatically on Startup, we recommend you manually set the correct Local and Broadcast IP addresses, then save the configuration and ***do not*** select Auto for Broadcast.

All computers that will communicate on the same DIS network must have matching DIS Ports. The standard Port is 3000 but can be changed under Network settings.

In order to ensure interoperability between sims the correct DIS version must be used.

## Messages

Under normal conditions the required messages will be set by the installed configuration. However, if the network is overloaded you can deselect the types of messages that are not required depending on the devices that will be running.

Messages

☒ Entity Entity Update Rate (Hz)  ☒ Radio ☒ Device Bus ☐ Use Emitter Library ☐ Radar ☐ Scan Pattern ☐ Pulse Table ☐ Beam ☐ Scan Control

Msg. Rates

Clear Cache

## Msg. Rates

Clicking this button displays the DIS Protocol dialog. Here there is a list of properties that can be set in accordance with your organization's guidelines on DIS message sending.

## Clear Cache

Clicking this button clears any cached DIS messages. Use of this button is primarily diagnostic.



| Misc              |           |
|-------------------|-----------|
| COLLISION_THRSH   | 0.0001    |
| DRA_ORIENT_THRSH  | 3         |
| DRA_POS_THRSH     | 1         |
| EE_AZ_THRSH       | 1         |
| EE_EL_THRSH       | 1         |
| EE_ERP_THRSH      | 0.0012589 |
| EE_FREQ_THRSH     | 1         |
| EE_FRNG_THRSH     | 1         |
| EE_HIGH_DENSITY_T | 10        |
| EE_PRF_THRSH      | 1         |
| EE_PW_THRSH       | 1E-06     |
| HBT_ESPDU_KIND_CI | 5         |
| HBT_ESPDU_KIND_EI | 5         |
| HBT_ESPDU_KIND_E  | 5         |
| HBT_ESPDU_KIND_LI | 5         |
| HBT_ESPDU_KIND_M  | 5         |
| HBT_ESPDU_KIND_R  | 5         |
| HBT_ESPDU_KIND_SI | 5         |
| HBT_ESPDU_KIND_SI | 5         |
| HBT_ESPDU_PLATFO  | 5         |
| HBT_ESPDU_PLATFO  | 5         |

**COLLISION\_THRSH**  
Gets or sets Collision PDU (min) speed threshold, in seconds.

*DIS Protocol Dialog*

## DIS Entity

Devices in the DSC are associated with a DIS Entity. The entity may be a locally created one ("Ownship") or selected from available entities in the exercise. Selected entity can be by callsign or site, app, entity values.

DIS Entity

☐ Attach by Callsign: A-10\_2

DIS ID Site: 1 App: 2 Entity: 1001 DIS Exercise: 1

DIS Entities Found: 2 ☒ Air ☒ Land ☒ Surf/Other ☒ Blue ☒ Red ☒ Neutral

A-10C\_2 Site: 1, App: 2, Entity: 1001

**DIS Entity**



Check the "Attach by Callsign" box if you wish to connect by the entity callsign regardless of the entities origination simulation id.

The Site, Application, and Entity values are used to denote a unique identification for each entity on a DIS network. At least one of the values should be unique for each DIS radio on a network.

DIS ID Site: 1 App: 1 Entity: 1

#### DIS Identification

For example, one DIS radio may have Site = 1, App = 1, and Entity = 1. The second DIS radio may have Site = 1, App = 1, and Entity = 2. A third DIS radio may have Site = 1, App = 2, and Entity = 1.

If the DIS Radio is set to mimic a pilot's radio on a DIS simulator cockpit, it is appropriate to match the radio's Site, Application, and Entity with that of the simulator. For example, if the DIS identification of the simulator cockpit is Site 10, App 20, and Entity 1, set the DIS radio to Site 10, App 20, and Entity 1. Then on the network, other DIS simulators see the radio transmissions as if they were emitting from the cockpit. Follow the same procedure to attach the radio to a ground soldier in your DIS scenario.

Finally, multiple DIS exercises may be running simultaneously on the same network and on the same port. To ensure those exercises don't conflict with one another, all simulators within an exercise will share the same "DIS Exercise" value.

DIS Exercise: 13

#### DIS Exercise

This is not common however, and most of the time all simulators will have the same value for "DIS Exercise."

A convenient way to attach to an existing DIS entity is by using the entity drop-down list. All detected DIS entities on the network will be added to this list. In large scenarios you can use the filter check boxes to eliminate unwanted entity types from the available selection. If there are no DIS entities available, one is created and named "Ownship".

DIS Entities Found: 1 ☒ Air ☒ Land ☒ Surf/Other ☒ Blue ☒ Red ☒ Neutral

Ownship Site: 1 App: 1 Entity: 1

#### DIS Entity Selection

### Unattached Entity Position

If the DIS entity is locally created and controlled the Latitude, Longitude, and Altitude text boxes will be enabled allowing you position control over the platform (ownship) associated with this DSC instance.

### DIS Playback

If you are utilizing DISCord to playback recorded DIS messages you can setup an offset to the current DIS Application parameter and choose and exercise number to receive messages on.



Playback

☐ Enabled      App Offset: 10000      Exercise: 254

### Environment

The system is capable of attenuating signals either automatically for a received DIS entity or by manually entering coordinates for the locally generated ownship.

Environment

☒ Calculate Propagation      ☐ Center of Earth (Disable Radio Propagation)

### Environment Section of the DIS settings Dialog

Check the “Calculate Propagation” checkbox to attenuate incoming signals for distance, terrain and radio horizon.

Check the “Center of Earth” checkbox to send (radio) messages with values set to indicate there should be no attempt to calculate propagation. Checking this box automatically unchecks the “Calculate Propagation” checkbox.

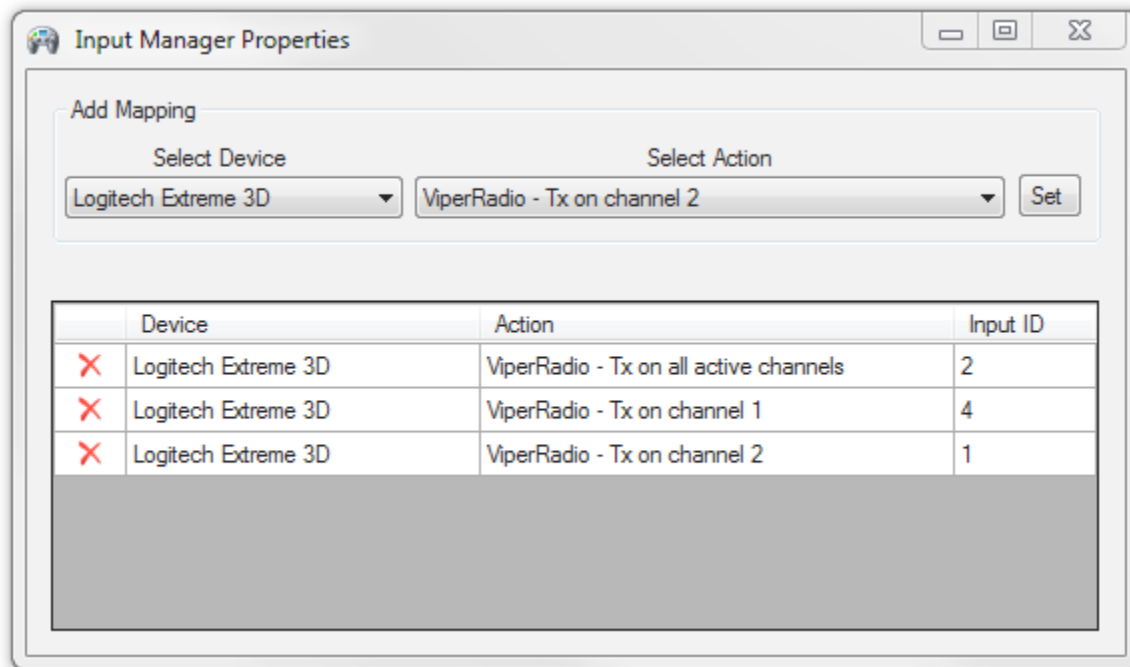
Note that under DIS standards, if the received (radio) transmitter antenna height is center of Earth then propagation is ignored. If the selected platform is “Ownship” then the text boxes Latitude, Longitude, and Altitude will determine the position of the ownship. For DIS purposes, “Ownship” is considered “unattached” since no Entity State PDU is sent. If “Center of Earth” is checked the ownship position is overridden in radio messages.





## Input Settings

The input settings dialog allows the user to trigger events in Viper (for example, to map a joystick button as a PTT switch for a particular frequency) from an attached device such as a joystick, yoke, HOTAS, keyboard, or even mouse button. To set this up the device input must be mapped to the desired action:



**Input Settings Dialog**

### Mapping

To map a device to an action perform the following steps:

1. Select a device from the “Select Device” pull-down.
2. Select an action from the list under the “Select Action” pull-down. Note that for an action to appear in the list the associated simulation (such as the Viper DIS radio) must already be loaded. See Saving and Loading Configurations for more information.
3. Click the “Set” button with the mouse. The button background will turn red indicating it is awaiting an input selection. (Note: To cancel the selection click the button again.)
4. Push the button or control on the selected device that you wish to map. If successful, the mapping will appear in the table.

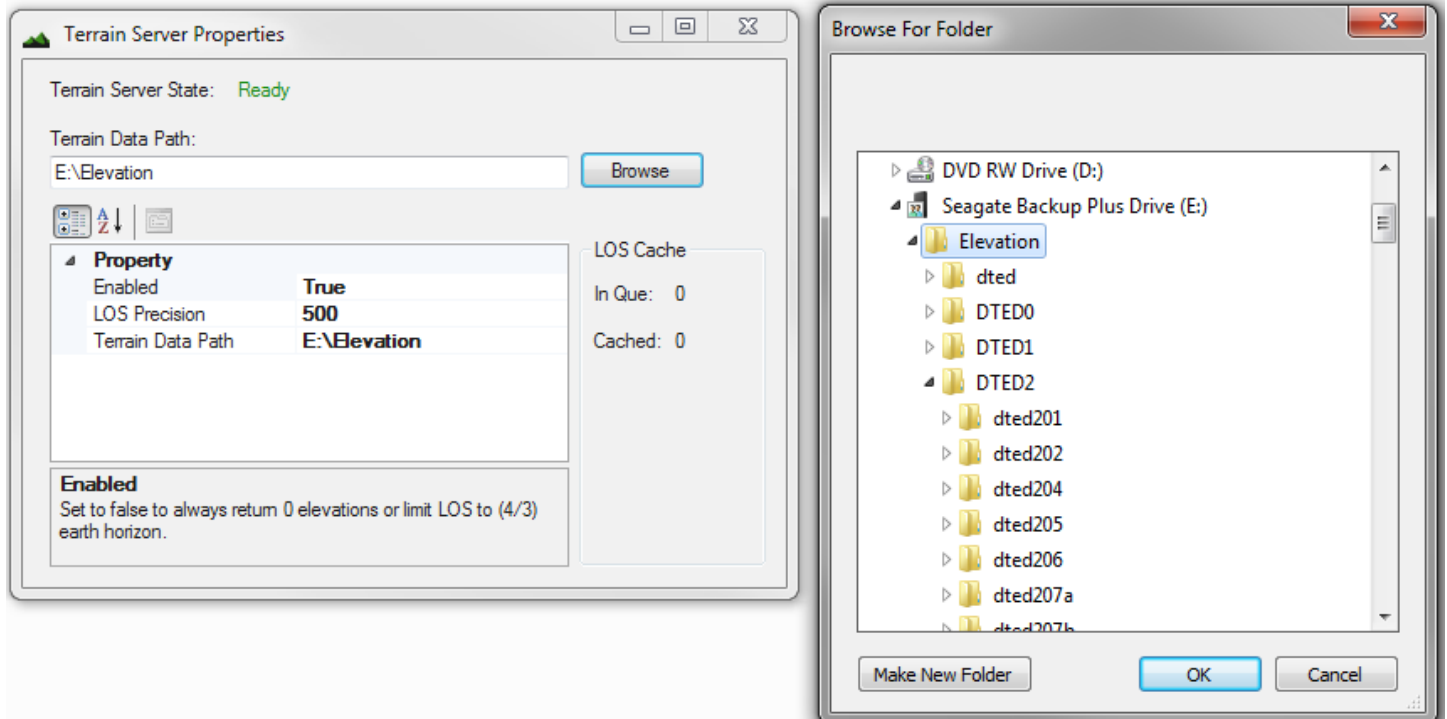
To remove a mapping just click the red ✗ to the left of the mapping to be deleted.



## Terrain Settings

The terrain settings dialog allows the user to enhance realism in a mission by adding terrain effects such as Fresnel zones and diffraction to the signal propagation calculations. Setup the terrain server by navigating to the top level elevation data folder and select. To disable terrain effects set the enabled property to 'false'. To gain greater precision or more performance, change the LOS precision to the number of meters between terrain height samples.

The LOS Cache data on the right is a diagnostic measure of the number of to be processed and cached LOS calculations being performed.





## Viper DIS Radio Properties

The properties dialog contains several tabs that allow the user additional control over the DIS radio simulation.

### Properties tab

The properties tab contains settings specific to the Viper Radio simulation.

Viper Radio Properties

Properties Radio Type Modulation Crypto Join Comm Plan

DIS Radio Settings

Kind: (7) Radio Domain: (2) Air Country: (225) United States

Nomenclature Version: 0 Nomenclature: 0

Radio Simulation

☐ Half-Duplex ☒ Use Modulation ☒ Use Cryptography Radio Sim. Viper Radio Transceivers 2

Antenna Height (ft) 7 Noise Level (0 - 1) 0.2 UI Version 1

VIPER Settings

☒ Enable Microphone ☒ Fill Window Default Size ☐ Listen Self ☒ CAF DMO ☐ Comm Plan Only

Diagnostics

Play WAV File ☒ Looping Radio IDs: 1, 2

**Radio Properties Dialog – Properties Tab**

**DIS Radio Settings** - This section covers data added to the DIS transmitter PDU's before the messages are sent out over the network such as DIS radio "Kind" and "Country". The settings in this section affect all transceivers.

**Radio Simulation** - This section contains the following controls:

**Half Duplex** - This setting will allow two-way communications but not at the same time. With "Half-Duplex" selected, users will not be able to hear received transmissions while transmitting. This is the same principle experienced when using walkie-talkies.

**Use Modulation** – Check this box if you want to filter incoming DIS radio traffic using the settings selected in the modulation tab.

**Use Cryptography** - Check this box if you want to filter incoming DIS radio traffic using the settings selected in the Crypto tab.

**Radio Sim.** – If additional radios simulations are available they may be selected from this pull-down menu. **WARNING:** If you change simulations your original radio settings may be lost.



**Viper Radio - PRC-117G Simulation (optional)**

Transceivers – Select a value from 1 to the maximum of 12 (Note that this number can be increased by changing the app config file). This is the number of simultaneous radio frequencies that are displayed within Viper and available for transmit/receive. **WARNING: If you remove transceivers your settings for those channels will be lost.**

Antenna Height (units) – This is the vertical distance of the antenna offset from the associated entity or Ownship (unattached entity).

Noise Level – When “Propagation Settings” is checked in the DIS Settings dialog this setting determines how much static is heard when approaching the point where the radio will lose signal.

UI Version – Changing this value will change the User Interface to an alternate (if available in the Radio Sim.)

**VIPER Settings** – This section contains the following controls:

Enable Microphone – This is an alternative to enable microphone in Audio Settings.

Fill Window – If this box is checked the Viper Radio panel will change size to fit the current window.

Default Size – This button resizes the Viper radio panel to its default size.

Listen Self – Checking this box enables side tone for radio simulations such as the PRC-117G, etc.

CAF DMO – Checking this box ensures compliance with CAF DMO standards when using the user interface (but not the properties pages).

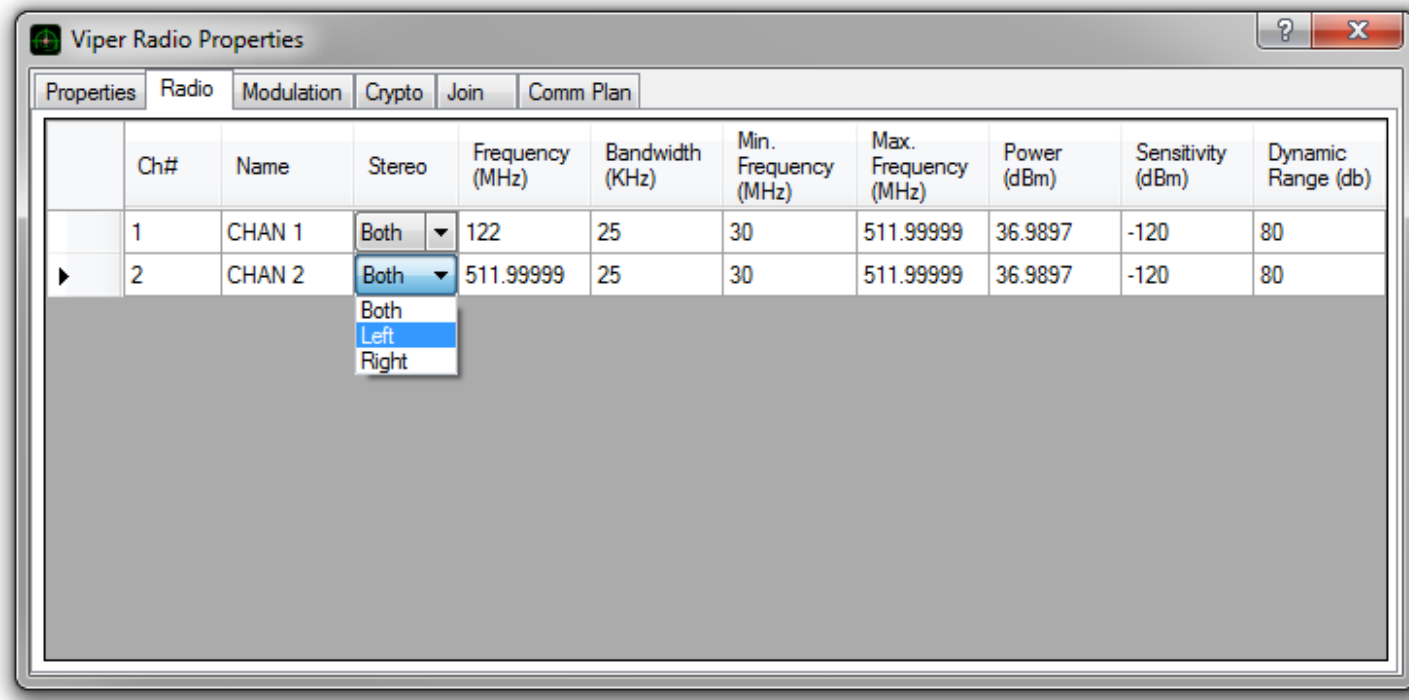
Comm Plan Only – On user interfaces where applicable, only comm plan entries may be used.

**Diagnostics** – This section is for use by BSI helpdesk professionals.



## Radio tab

This tab provides a grid control over the radio simulation parameters from left to right as follows:



**Radio Properties Dialog –Radio Tab**

**Ch#** - The transceiver number to associate settings with. In the default Viper radio simulation transceivers start at 1 from the top down. This value is non-settable.

**Name** – The textual name of the transceiver. If text is entered in this field it will be shown instead of the frequency on the default viper simulation.

**Stereo** – Right, left, or both speakers to output transceiver audio.

**Frequency** – The frequency of the transmitter-receiver in MHz.

**Bandwidth** – The bandwidth of the transmitter-receiver in KHz. If this value is set too large signals may overlap into nearby channels, too small and minor frequency variations may result in an intended signal not being heard.

**Min Frequency** – The minimum tunable frequency in MHz.

**Max Frequency** – The maximum tunable frequency in MHz.

**Power** – Also known as Effective Radiated Power (ERP), the power of the signal immediately after it leaves the transmitters antenna. By clicking the units you can set this value in watts or dBm (decibels referenced to 1 mw).



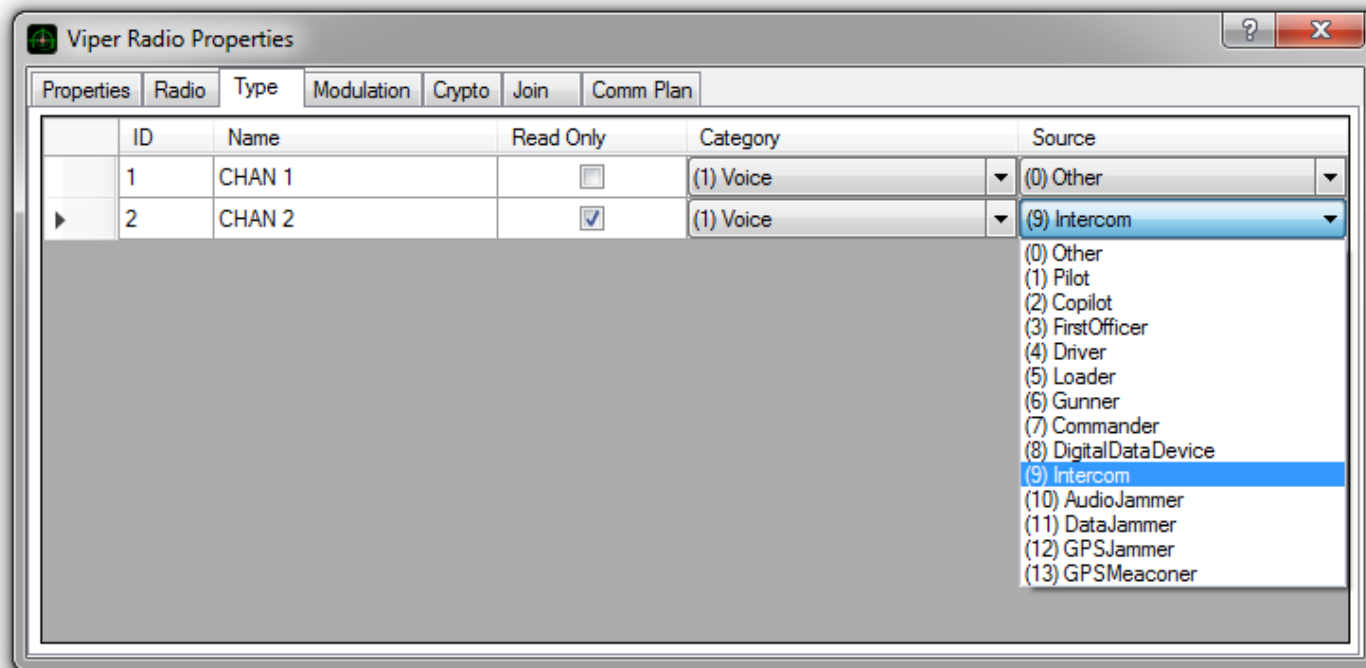
Sensitivity – Sets the maximum receiver sensitivity in dBm.

Dynamic Range - Sets the dynamic range of the receiver in dB.



## Type tab

This tab provides a grid control over the radio simulation parameters from left to right as follows:



**Radio Properties Dialog –Type Tab**

**Ch#** - The transceiver number to associate settings with. In the default Viper radio simulation transceivers start at 1 from the top down. This value is non-settable.

**Name** – The textual name of the transceiver. If text is entered in this field it will be shown instead of the frequency on the default viper simulation.

**Read Only** – Checking this box ensures that applying a comm plan will not overwrite the data in this transceiver. Applies only to multi-transceiver radio simulations such as the base Viper.

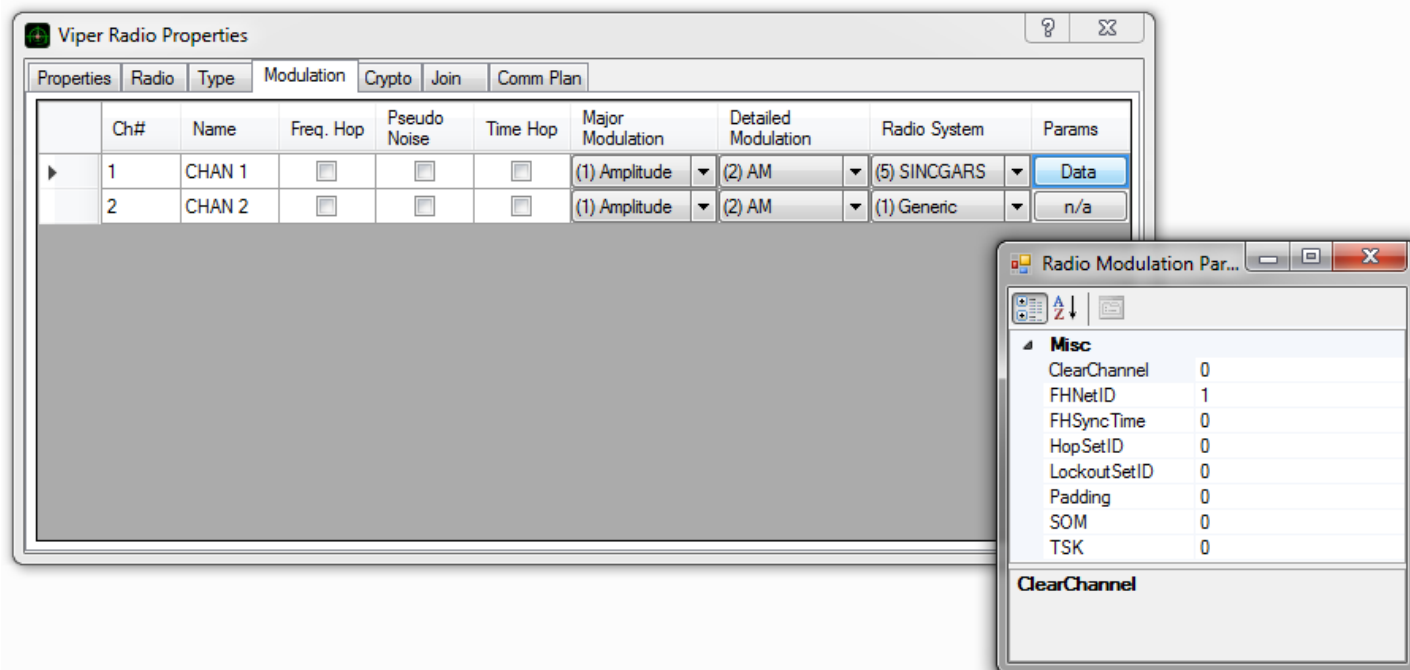
**Category** – This field allows you to select a DIS category for the transceiver. Typically this is set to “Voice”.

**Source** – This field allows you to select the radio source. Selecting “Intercom” will ensure radio propagation is ignored for this transceiver.



## Modulation tab

This tab provides a grid control over the radio simulation parameters from left to right as follows:



**Radio Properties Dialog –Modulation Tab**

**Ch#** - The transceiver number to associate settings with. In the default Viper radio simulation transceivers start at 1 from the top down. This value is non-settable.

**Name** – The textual name of the transceiver. If text is entered in this field it will be shown instead of the frequency on the default viper simulation.

**Freq. Hop** – If checked this box will add a frequency hopping spread spectrum modulation to the signal and will allow the receiver to receive frequency hopper modulations.

**Pseudo Noise** – If checked this box will add a noise type spread spectrum modulation to the signal and will allow the receiver to receive noise modulations.

**Time Hop** – If checked this box will add a time hopping type spread spectrum modulation to the signal and will allow the receiver to receive time hop modulations.

**Major Modulation** – This selection allows you to set the major modulation type and to receive matching modulation types.

**Detailed Modulation** – This selection allows you to set the sub type of the modulation and to receive matching modulation types. Note that this selection changes depending on the Major Modulation type.

**Radio System** – This selection allows you to set the radio system and to receive matching radio system types.

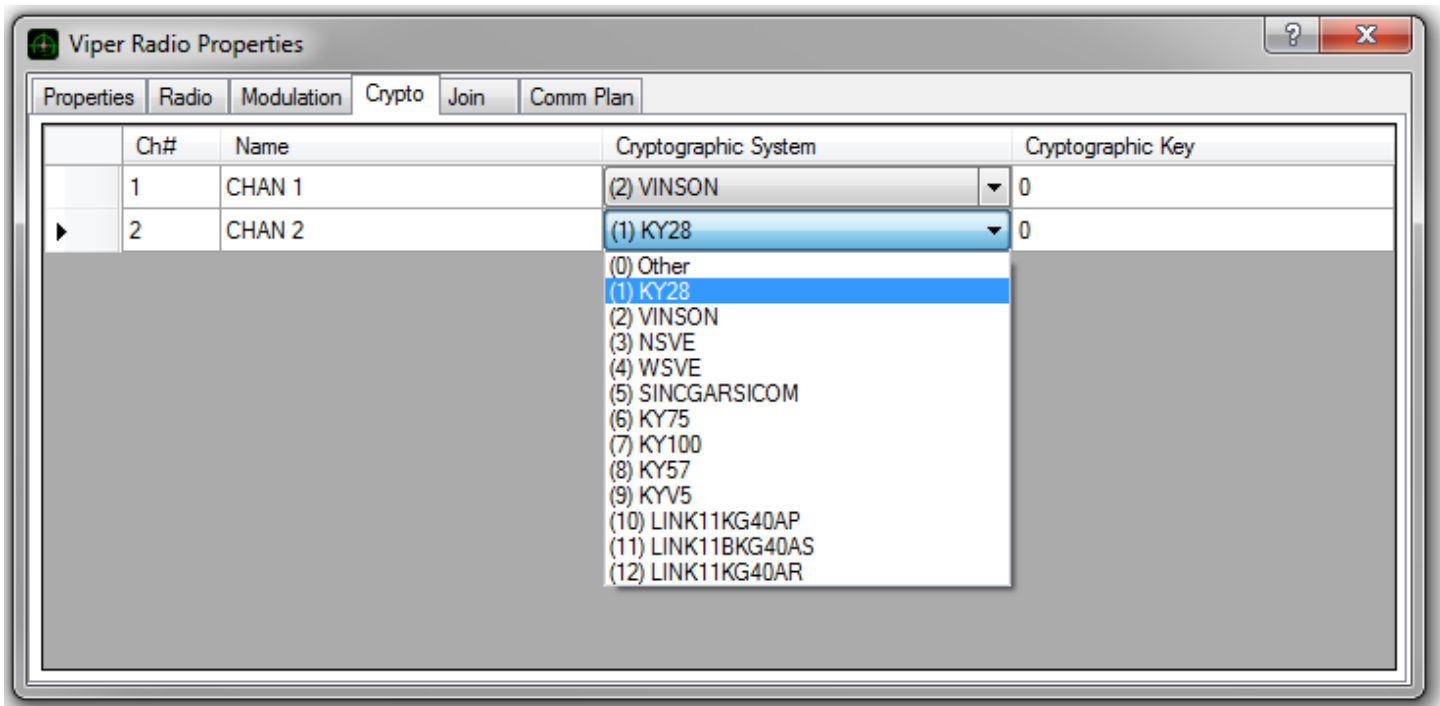




Params – Certain Radio System selections will enable this button. Clicking the button will display a dialog for editing DIS transmitter modulation parameters. Set appropriate parameters for your organization.

## Crypto tab

This tab provides a grid control over the radio simulation parameters from left to right as follows:



**Radio Properties Dialog –Crypto Tab**

Ch# - The transceiver number to associate settings with. In the default Viper radio simulation transceivers start at 1 from the top down. This value is non-settable.

Name – The textual name of the transceiver. If text is entered in this field it will be shown instead of the frequency on the default viper simulation.

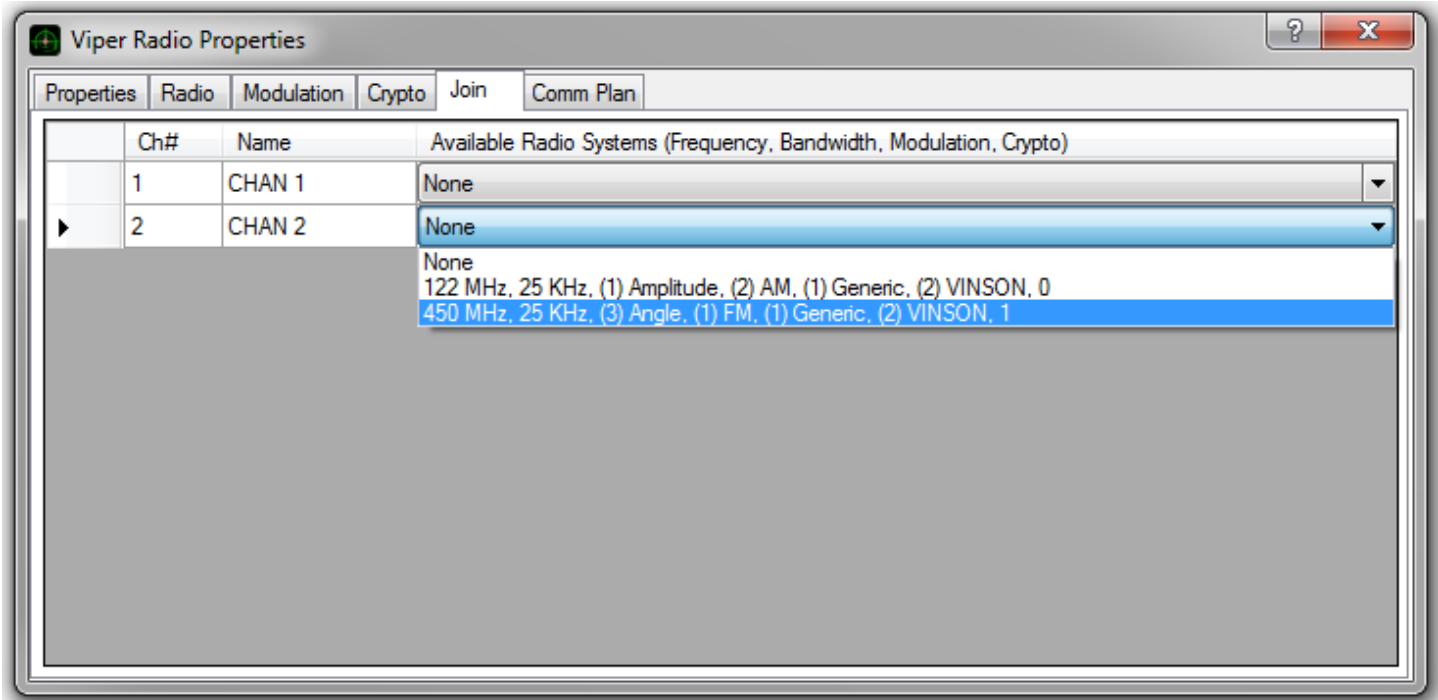
Cryptographic System – This selection allows you to set the cryptographic system transmitted and to receive matching system signals.

Cryptographic Key – This field allows you to enter a key number transmitted and to receive matching key signals.



## Join tab

This tab provides a grid control that allows you to replace a transceiver's parameters with those detected in other radios available in the DIS space.



**Radio Properties Dialog –Join Tab**

**Ch#** - The transceiver number to associate settings with. In the default Viper radio simulation transceivers start at 1 from the top down. This value is non-settable.

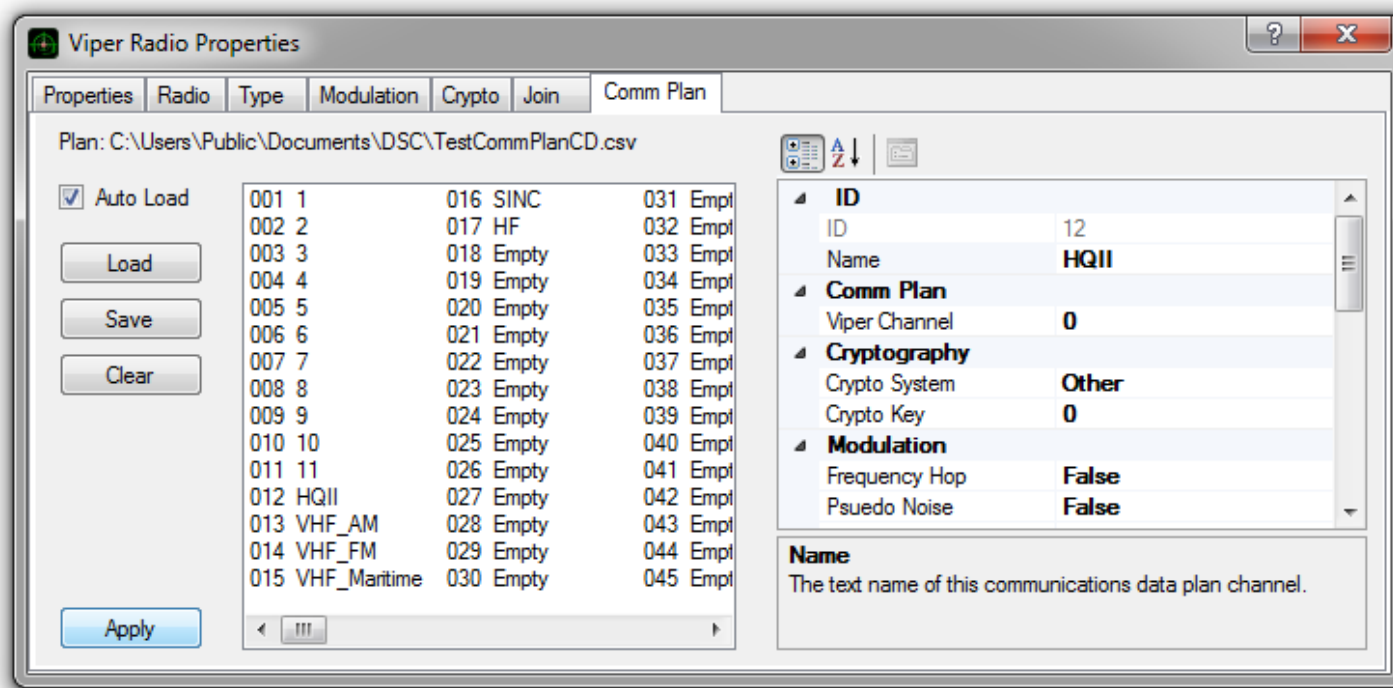
**Name** – The textual name of the transceiver. If text is entered in this field it will be shown instead of the frequency on the default viper simulation.

**Available Radio Systems** – If other transmitters are available in the DIS space you can select their parameters from the list to fill the current transceiver's data (shown in the preceding Radio, Modulation, and Crypto tabs).



## Comm Plan tab

This tab provides controls that allow you to build, save and recall a communications plan. The purpose of the communication plan is to distribute the same channel settings to multiple Viper radios. Any Viper radio or Viper radio simulation (e.g. PRC-148) may be used to create a comm plan, however there may be differences in the way the comm plan is related to radio settings. Unlike the Viper radio simulations, the base Viper does NOT change the data in the comm plan by changing the data in the radio, therefore comm plans must be created using the Comm Plan tab rather than using the radio itself. In addition, Comm plans must be saved explicitly (usually to a network accessible location). Comm plans are NOT automatically saved with the configuration.



**Radio Properties Dialog –Comm Plan Tab**

**Plan** – If a plan was loaded, the path and filename are displayed here.

**Auto Load** – When checked the comm plan shown in “Plan” above will be loaded at startup.

**Load** – This button opens a dialog that allows the user to load a comm plan file. In addition to the Viper comm plan format, CSV (Comma Separated Variable) format is also accepted. The format of the text in file is name, frequency, where the frequency is in MHz unless “.hz.csv” extension is used. For example “myCommPlan.hz.csv” expects the frequency in hertz.

**The default settings are as follows for CSV (where frequency is in MHz):**

108.0 - 400.0 => BW: 25 kHz, Major: 1 Detail: 2 System: 1

30.0 - 999.0 => BW: 25 kHz, Major: 3 Detail: 1 System: 1

2.0 - 30.0 => BW: 25 kHz, Major: 1 Detail: 7 System: 1



Save – This button opens a dialog that allows the user to save the existing comm plan to a file. **WARNING: Unlike most settings in the DSC and Viper, comm plan changes are NOT saved with the configuration. You MUST specifically save the comm plan using the “Save” button.**

Clear – Clears the current comm plan from the radio.

Apply – This button applies changes in the comm plan to the Viper transceivers in multi-transceiver implementations of the DIS radio (e.g. base Viper radio).

Channel Selection Box – This box displays the channels that are available for use in the comm plan. To add a new channel just select any “Empty” channel and fill in data in the property grid at the right. To clear a channel, select the channel and press the “Delete” key.

Comm Plan Channel Property Grid – You can edit the properties of the selected comm plan channel. Note that additional properties may be available for viewing or editing depending on the radio simulation loaded (e.g. PRC-148, etc.).



## Saving and Loading Configurations

Viper allows the user to save and load radio configurations. This is to more easily support multiple Viper radios running on a single computer, and to allow the user to save multiple radio configurations to save time and reduce the need for manual reconfiguration of the radio. In addition you can choose the size and placement of the Viper GUI within the [Device Simulation Container](#) or DSC.



**Viper with Multiple Channels, Manually Sized.**

### Display Configuration

**Window Resizing** - The DSC window can be resized by dragging the border to the desired size. Window size is saved with the configuration (ensure Fill Window is not checked in the Viper DIS Radio Properties).

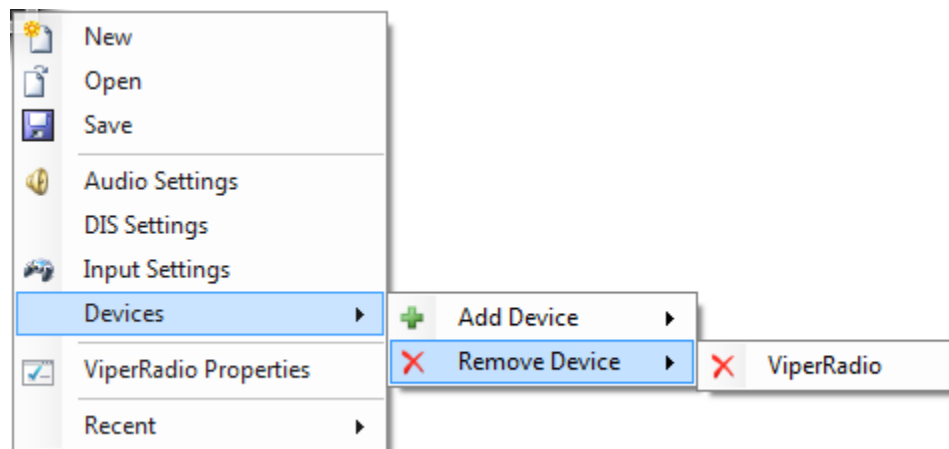
**Window Position** – The DSC window can be moved by dragging the window from its title bar. Position is saved with the configuration.

### Device Configuration

**Adding/Removing** – Devices (such as the Viper DIS Radio simulation) may be added, removed or positioned within the DSC window.

**Adding** – Right click anywhere in the DSC window to access the context sensitive menu. Select “Devices->Add Device” to display available device simulations. Click on the desired device and it will appear in the container.

**Removing** – To delete a device from the container follow the above procedure except select “Remove Device”.



**Context Menu Used to Add or Remove a Device**

### **Device Positioning**

Device simulations may be moved anywhere in the Device Simulation Container window using a few simple controls. Note that the DSC is actually hosting device simulations in 3D space therefore resizing a device panel is actually moving it further away or closer.

**Moving** – To move the device within the window hold down the “Ctrl” key and drag the device to the desired location within the DSC.

**Resizing** – To resize the device, hold down the “Ctrl” key and roll the mouse wheel.

**Rotation** – To rotate the device, hold down the “Ctrl” key and click the left or right arrow keys.

### **Saving and Loading**

Using the context sensitive menu you may clear, save, or load configurations.

**Clear** – To delete any devices and reset all settings to their default values click the “New” menu item.

**Save** – To save a configuration ‘as is’ or save under a new name click the “Save” menu item to bring up the save file dialog. Upon closing the application you will be given a chance to save any changes to the current configuration. Saving a configuration includes saving the Audio Settings, DIS Settings, Input Settings, the window size and position, the location and properties of the devices and in most cases the state of the device buttons.

**Load** – To load an existing configuration click the “Open” menu item to display the open file dialog box. To recover the last state the system was in on closing open the “LastConfig.xml”.

**MRU** – Under the “Recent” menu item is a list of Most Recently Used (MRU) configurations. Selecting one of these will load that configuration without having to use the open file dialog.



## Application Configuration

To provide addition control and convenience the DSC has the following additional features.

### Command Line

The Viper DIS Radio also supports command line arguments. You may specify the configuration to load as a command line argument. Note that this is especially useful when you are running multiple Vipers on one computer, and would like to start each instance with a different configuration, for example, using different input/output devices.

To add a command line argument to an icon on the desktop do the following:

1. Create a shortcut from the application directory (e.g. "C:\Program Files (x86)\Battlespace Simulations\Viper DIS Radio\AppContainer.exe").
2. Move the shortcut to the desktop or other desired location.
3. Edit the shortcut. In the "Target:" box add the location of the config file after the close quote of the path. Do NOT use quotes around the config file path.

Example 1:

```
"C:\Program Files (x86)\Battlespace Simulations\Viper DIS Radio\AppContainer.exe" viper1
```

Example 2:

```
"C:\Program Files (x86)\Battlespace Simulations\Viper DIS Radio\AppContainer.exe"  
C:\ProgramData\BSI\AppContainerConfigData\viper1.xml
```

These are both acceptable arguments. Note that the first one assumes the config file is in its default location. Also the DSC searches for the config in the path specified first. If not found it will look in the default location.

### App Configuration File

In the application directory there is a file called "AppContainer.exe.config". This file contains some settings that may be changed. It is not recommended that you change any other values without consulting BSI helpdesk professionals.

To prevent users from accessing the context sensitive menu or save changes to a configuration change the following value to "false".

```
<add key="AllowConfig" value="true" />
```

To increase or decrease the maximum number of available channels change the following value to a number between 1 and 100.

```
<add key="MaxRadioChannels" value="10" />
```



## Remote Control of Viper

The Viper DIS radio may be controlled remotely by DIS Data and Set Data PDU messages. In addition there is a DSC device (downloaded separately) called Viper Controller that uses these messages and serves as a diagnostic tool for DIS radios on the network.

### ViperControlData Message

This message is a DIS Data PDU sent periodically from all Viper radios. This same message can be modified and sent back to effect changes in the Viper radio. On receipt, Viper will send the message back as acknowledgement. The following structure defines the data contained in the message. The structure is converted to an array of bytes in network byte order and copied to a single, variable data record field of a Data PDU. The message structure is shown below:

Message 503003:

```
''' <summary>
''' Data structure that allows remote control over Viper.
''' DIS Data PDU message ID = 503003
''' </summary>
<StructLayout(LayoutKind.Sequential)> _
Public Structure ViperControlData

    ''' <summary>
    ''' Radio ID.
    ''' </summary>
    ''' <remarks>Ensure this value is first in the sequential structure as it
    ''' may used before the entire structure is changed from network byte order.</remarks>
    Public RadioID As ULong

    ''' <summary>
    ''' Flags indicating action for this message. See comments on ViperControlFlags enum.
    ''' </summary>
    ''' <remarks>Readonly when this message is sent FROM Viper. Write when sent TO Viper. </remarks>
    Public Flags As ViperControlFlags

    ''' <summary>
    ''' DIS Transmitter PDU.
    ''' </summary>
    Public TransmitterPDU As disStructureTransmitterPacket

    ''' <summary>
    ''' Transmitter enable state.
    ''' </summary>
    ''' <remarks></remarks>
    Public EnableTransmit As Boolean

    ''' <summary>
    ''' Receiver enable state.
    ''' </summary>
    ''' <remarks></remarks>
    Public EnableReceive As Boolean

    ''' <summary>
    ''' Radio bandwidth in Hz.
    ''' </summary>
    ''' <remarks></remarks>
    Public Bandwidth As Double

    ''' <summary>
    ''' Deprecated. Do not use.
    ''' </summary>
    ''' <remarks></remarks>
    Public Power As Double
```





```
''' <summary>
''' Radios min frequency in Hz.
''' </summary>
''' <remarks></remarks>
Public FrequencyMin As Double

''' <summary>
''' Radios max frequency in Hz.
''' </summary>
''' <remarks></remarks>
Public FrequencyMax As Double

''' <summary>
''' Receiver frequency in Hz.
''' </summary>
''' <remarks></remarks>
Public FrequencyRx As Double

''' <summary>
''' Radios sensitivity in dBm
''' </summary>
''' <remarks></remarks>
Public Sensitivity As Double

''' <summary>
''' Radios dynamic range in dB.
''' </summary>
''' <remarks></remarks>
Public DynamicRange As Double

''' <summary>
''' True to induce a transmitter failure.
''' </summary>
''' <remarks></remarks>
Public FailTransmitter As Boolean

''' <summary>
''' True to induce a receiver failure.
''' </summary>
''' <remarks></remarks>
Public FailReceiver As Boolean

''' <summary>
''' Volume from 0.0 to 1.0.
''' </summary>
''' <remarks></remarks>
Public Volume As Single

''' <summary>
''' Pan as a value -1.0 (left speaker) to 1.0 (right speaker).
''' </summary>
''' <remarks></remarks>
Public Pan As Single

''' <summary>
''' 24 UTF8 characters for the radio name.
''' </summary>
''' <remarks>Change the radio simulation if available (e.g. "Viper Radio" to "PRC 152")</remarks>
<MarshalAs(UnmanagedType.ByValArray, SizeConst:=24)> _
Public RadioType As Byte()

''' <summary>
''' Creates an empty (but with arrays allocated) structure.
''' </summary>
''' <returns>New empty structure.</returns>
''' <remarks></remarks>
Public Shared ReadOnly Property Empty As ViperControlData
    Get
```



```
Dim vcd As ViperControlData = New ViperControlData

' Allocate arrays.
' MAX_TRANSMITTER_MODULATIONS = 100.
vcd.TransmitterPDU.modulationParam = New [Byte](DISConst.MAX_TRANSMITTER_MODULATIONS - 1) {}

' MAX_TRANSMITTER_PATTERNS = 100.
vcd.TransmitterPDU.antennaParam = New [Byte](DISConst.MAX_TRANSMITTER_PATTERNS - 1) {}
vcd.RadioType = New [Byte](24 - 1) {}

Return (vcd)
End Get
```

End Property

End Structure

The following ViperControlFlags determine which portions of the ViperControlData structure will be handled by the receiving Viper radio.

```
''' <summary>
''' Flags to set for data to be written to the viper radio.
''' </summary>
''' <remarks></remarks>
Public Enum ViperControlFlags As UInt64

    ''' <summary>
    ''' Message will not set values in Viper.
    ''' </summary>
    ''' <remarks></remarks>
    Read = &H0

    ''' <summary>
    ''' Set values in Viper.
    ''' </summary>
    ''' <remarks></remarks>
    Write = &H1

    ''' <summary>
    ''' The transmitter PDU field has valid data, read or write this data.
    ''' </summary>
    ''' <remarks></remarks>
    TransmitterPDU = &H2

    ''' <summary>
    ''' Radio data (EnableReceive, EnableTransmit, FailTransmitter, FailReceiver)
    ''' </summary>
    ''' <remarks></remarks>
    RadioState = &H4

    ''' <summary>
    ''' Receiver data (Sensitivity, DynamicRange, Bandwidth, FrequencyMax, FrequencyMin, FrequencyRx)
    ''' </summary>
    ''' <remarks></remarks>
    ReceiverData = &H8

    ''' <summary>
    ''' Audio control settings. (Volume, Pan)
    ''' </summary>
    ''' <remarks></remarks>
    AudioControls = &H10

    ''' <summary>
    ''' Use the radio type string to change simulation ("Viper Radio", "PRC-148", etc)
    ''' </summary>
    ''' <remarks>Note: When this is set no other data from the message is used.</remarks>
```



RadioSimulation = &H20

End Enum

### ViperCommPlanRequest Message

This message is a DIS Set Data PDU that can be sent to Viper Radios. The message will request that Viper load the specified Comm Plan file. The following structure defines the data contained in the message. The structure is converted to an array of bytes in network byte order and copied to a single, variable data record field of a Set Data PDU. The message structure is shown below:

Message 503004:

```
''' <summary>
''' Data structure that requests Viper to load the specified comm plan.
''' DIS Data PDU message ID = 503004
''' </summary>
<StructLayout(LayoutKind.Sequential)> _
Public Structure ViperCommPlanRequest

    ''' <summary>
    ''' Radio ID.
    ''' </summary>
    ''' <remarks>Ensure this value is first in the sequential structure as it
    ''' may used before the ensure structure is changed from network byte order.</remarks>
    Public RadioID As ULong

    ''' <summary>
    ''' 256 UTF8 characters for the path and filename.
    ''' </summary>
    ''' <remarks>SetData PDU Message that requests Viper to load the specified comm plan.</remarks>
    <MarshalAs(UnmanagedType.ByValArray, SizeConst:=256)> _
    Public CommPlanFilename As Byte()

    ''' <summary>
    ''' Creates an empty (but with arrays allocated) structure.
    ''' </summary>
    ''' <returns>New empty structure.</returns>
    ''' <remarks></remarks>
    Public Shared ReadOnly Property Empty As ViperCommPlanRequest
    Get
        Dim vcpr As ViperCommPlanRequest = New ViperCommPlanRequest

        vcpr.CommPlanFilename = New [Byte](256 - 1) {}

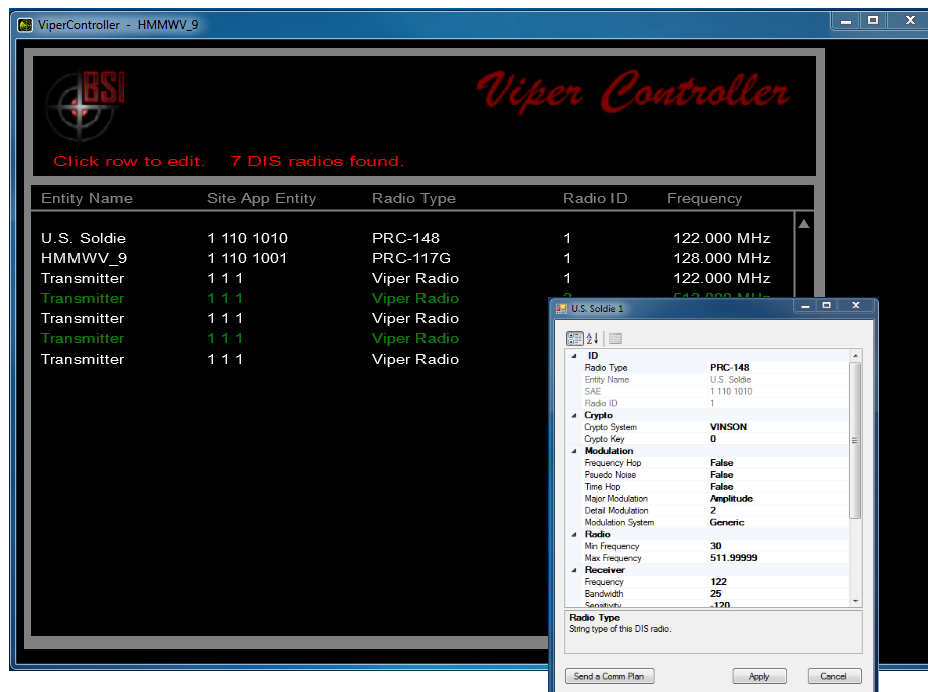
        Return (vcpr)
    End Get
End Property

End Structure
```



## Viper Controller

The ViperController is a device (similar to Viper) that monitors all DIS radio traffic and allows the user to modify a Viper radio remotely using the messages above.



To use Viper Controller:

Install using the ViperControllerInstaller and configure DIS as with Viper. Run ViperController, any other DIS radios on the network will begin to show up as their Transmitter PDU's are received. If the radio is transmitting the text will change to green. Note that transceivers on Viper show up as individual DIS radios but will all have the same DIS Site, App, Entity values.

Left clicking on the radio will bring up a properties dialog. If the radio is a Viper radio type (i.e. Viper Radio, PRC-148, etc) the properties are enabled and may be changed. When "Apply" is clicked the ViperControlData message is sent.

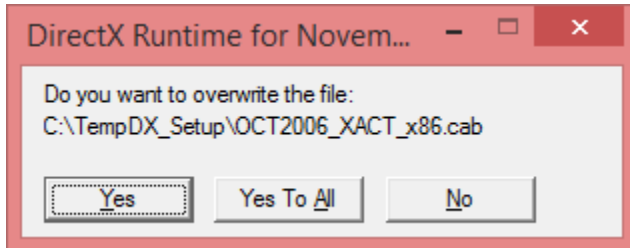
Click the "Send Comm Plan" button to locate and send a request to that radio to load the specified comm plan.



ViperController with Transceiver Property Grid.

## Troubleshooting Viper

### 1. During Installation, you see this message:



This means that DirectX 9 was previously installed on this computer by Viper, but for some reason the temporary installation files were not removed. You can select 'Yes to All' to safely overwrite the files, and when the Viper installation is complete, the directory (for example, C:\TempDX\_Setup in the screenshot above) should be removed. Note that this also means that DirectX is probably already installed, and you can safely select 'Cancel' when ...

### 2. Can't hear Viper Transmissions on another Viper

If you are not receiving Viper transmissions, first ensure that your Network Settings are correct. In particular ensure that your local IP and Broadcast IP addresses are correct. Generally your Broadcast IP will be the same as your local IP, but with 255 entered as the last number:

Also, please remember that for one Viper to hear another Viper, they must be on the same frequency and DIS Exercise.

### 3. Viper stops working, or reports an error with your sound device

If Viper stops working or appears frozen, wait a few minutes. In some cases Viper is locating hardware such as network cards or joysticks.

If you are using a headset that plugs into your computer via 3.5mm plugs, you should try using a USB headset instead; this will generally use a different audio driver than the one built into your motherboard, bypassing the outdated drivers.

And of course, if you are having problems and can't resolve them using the steps above, please contact us at [support@bssim.com](mailto:support@bssim.com).