



V+ Run-time System Remote Control Specification





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Revision History

Version	Description	Date
1.0	Initial Release	July 3, 1999
1.1	Added HLA federation to join name	May 30, 2006
1.2	Updated document format, added several commands and deprecated the LOAD FEDERATION NAME command.	August 3, 2007
1.3	Corrected errors in the previous document, and added command to set the federation to join name and set federation file name.	February 1, 2008
1.4	Updated to match software VRMS.H	February 29, 2008
1.5	Added secondary DIS network, host names, device names, and friendly names.	February 16, 2009
1.6	Added RID filename.	February 24, 2009
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1.8	Added DIS time format.	March 6, 2009
1.9	Added operational considerations section, cleaned up tables, changed fonts. Added a state transition diagram with explanatory text.	2009-03-10
1.10	Added the Join at Startup HLA switch to remote control. Removed header file contents since this information should be derived from the actual VRMS.H file. Removed release notes section 1.0 All release information is now located in this section.	2009-03-12
1.11	Added notes regarding the use of the development system and runtime system under remote control.	2009-10-31

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Table of Contents

1	V+ Run-time System Remote Control	5
1.1	V+ Run-time System Listen Port Configuration	5
1.2	Byte Ordering and Alignment.....	5
1.3	Demonstration GUI	6
1.4	Operational Considerations.....	6
1.4.1	HLA Operations	6
1.4.2	HLA RID Filename.....	6
1.4.3	Operational Sequences.....	6
1.4.3.1	Remote Control State Transitions.....	6
2	Client to V+ Packet Format	10
3	V+ TO Client Packet Format	12
4	DATA Structures	13
4.1	PLATFORM STATE Enumerations	13
4.2	COMMAND Enumerations	13
4.3	BIND ADDRESS FORMAT Enumerations	14
4.4	DESTINATION ADDRESS FORMAT Enumerations	14
4.5	HLA STATUS Enumerations	14
4.6	Configuration Data Structure.....	14

List of Tables

Table 1, Client to V+ Packet Format, Simple Commands	10
Table 2, LOAD .VNE FILE	10
Table 3, LOAD CONFIGURATION DATA	11
Table 4, REQUEST CONFIGURATION DATA	11
Table 5, V+ to Client REQUEST STATUS Packet Format	12
Table 6, V+ to Client REQUEST CONFIGURATION DATA Packet Format	12
Table 7, PLATFORM STATE Enumerations	13
Table 8, COMMANDS	13
Table 9, BIND ADDRESS FORMAT	14
Table 10, DESTINATION ADDRESS FORMAT	14
Table 11, HLA STATUS	14

List of Figures

Figure 1, V+ Remote Control State Transition Diagram	8
Figure 2, Remote Control GUI	9



1 V+ Run-time System Remote Control

The primary purpose of V+ Run-time system remote control is to provide a means for a client computer to control the run-time system programmatically. This is sometimes necessary in order to automate run-time system configurations for multiple machines. An example is a client computer that needs to load multiple simulator types on a single machine such as a reconfigurable simulator. Another example is a group of V+ run-time systems that must be configured simultaneously eliminating the need to manually setup each machine.

The V+ Run-time system is remotely controlled via a TCP/IP network connection allowing a client computer to control the operation of the V+ run-time system in real-time. The remote control system is ready to accept connects as soon as the Run-time system is started. If everything is setup properly a message is printed in the message window, "Remote control is initialized and listening for connections on Port 5068". The port number is configured in the registry. The following messages are displayed at the indicated times:

Waiting on a connection:

```
"Remote control is initialized and listening for connections on Port 5068"
```

Client Connection:

```
"Remote Control Client, 127.0.0.1 Connected."
```

Client Disconnection:

```
"Remote Control Client Disconnected."
```

1.1 V+ Run-time System Listen Port Configuration

When the V+ Run-time system is first installed, remote control is enabled by default. A registry entry determines the behavior. Use caution when changing registry values. Note that you must have administrative privileges when editing these keys. The registry keys for remote control are listed below.

```
LOCAL_MACHINE\SOFTWARE\SimPhonics\VPLus\RemoteControlEnabled
```

This key is a global switch for enabling and disabling the remote control feature.

```
LOCAL_MACHINE\SOFTWARE\SimPhonics\VPLus\RemoteControlListenPort
```

This is the listen port for the V+ Run-time system and the default is 5068.

```
LOCAL_MACHINE\SOFTWARE\SimPhonics\VPLus\RemoteControlTransmitPort
```

This is the transmit port for the run-time system and the default is 5067.

1.2 Byte Ordering and Alignment

All data is passed between the client and the V+ Run-time system using big endian byte ordering format. If the machine controlling the V+ Run-time system is a little endian machine, then byte swapping is required for all data. Note also, that when using C or C++, structures must be byte packed. Use the #pragma pack(). See VRMS.H.



1.3 Demonstration GUI

In order to use remote control, the V+ Run-time system must be running on the client machine. Normally the V+ Run-time system is started in the START menu so that it runs when the client computer starts. This behavior is application specific. When the remote control client connects to the V+ Run-time system, the V+ Run-time system will send a status to the remote control client automatically. SimPhonics provides source code to a remote control application that provides an example of the typical use of the remote control interface to the V+ Run-time system. The remote control application is shown below.

1.4 Operational Considerations

The operation of the remote control system is straight forward. Once connected, the status can be read at any time. In some cases this status information is sent to the client without a request being sent such as when HLA is joined to a federation.

1.4.1 HLA Operations

V+ may be running and performing DIS radio communications and not be joined to an HLA federation which means that HLA can be joined or resigned from a federation at any time V+ is running.

1.4.2 HLA RID Filename

The HLA RTI RID filename is specified in an environment variable which is normally installed by the RTI installation software. This environment variable is RTI_RID_FILE. For example, this variable contains "C:\MAK\makRti3.0.1\rid.mtl" for the MAK RTI and is obviously RTI and version dependant.

The V+ run time system networked audio tab contains a field, RID Filename, which holds an optional RID filename that overrides the environment variable. This filename is valid only while the V+ run time system is running. If the field is left blank, the environment variable is used to specify the filename. The field must contain a complete valid path and valid filename.

1.4.3 Operational Sequences

The switch **Join Fed on Start** on the V+ runtime system **Configure** menu, **Networked Audio** tab, informs V+ to start HLA when V+ starts. If this switch is off, HLA will not be started until the remote control system has commanded it to start once V+ has started. This is referred to an HLA *dynamic join*, since the joining and resigning from the federation can be controlled dynamically while V+ is running other applications such as DIS radios.

1.4.3.1 Remote Control State Transitions

Permissible states for V+ are shown in the following state transition diagram. [Figure 1](#) illustrates the state transitions for V+ with respect to its remote control interface. There are seven states in the diagram, described as follows:

1. Idle
 - a. VNE not loaded
 - b. Not running
 - c. Not connected to a Remote Client
 - d. Not joined to a Federation
2. Idle, Connected
 - a. VNE not loaded
 - b. Not Running
 - c. Connected to a Remote Client
 - d. Not Joined to a Federation



V+ Run-Time System, Remote Control Specification, 1.11

3. Idle, Loaded, Connected
 - a. VNE loaded
 - b. Not Running
 - c. Connected to a Remote Client
 - d. Not Joined to a Federation
4. Idle, Loaded, Not Connected
 - a. VNE loaded
 - b. Not Running
 - c. Not connected to a Remote Client
 - d. Not Joined to a Federation
5. Running
 - a. VNE loaded
 - b. Running
 - c. Not connected to a Remote Client
 - d. Not Joined to a Federation
6. Running, Connected
 - a. VNE loaded
 - b. Running
 - c. Connected to a Remote Client
 - d. Not Joined to a Federation
7. Running, Joined
 - a. VNE loaded
 - b. Running
 - c. Connected to a Remote Client
 - d. Joined to a Federation

The Initial State is defined to be the state prior to starting the V+ Run Time System program. There are two transition paths from the initial state in which to start the application. One is to start the V+ program without loading a VNE. This will transition to the Idle state. The other is to auto start the V+ program with a VNE. This can be done by various methods, such as double-clicking a VNE file, putting a VNE file in the startup folder, or through a command line with a VNE filename provided as a parameter.

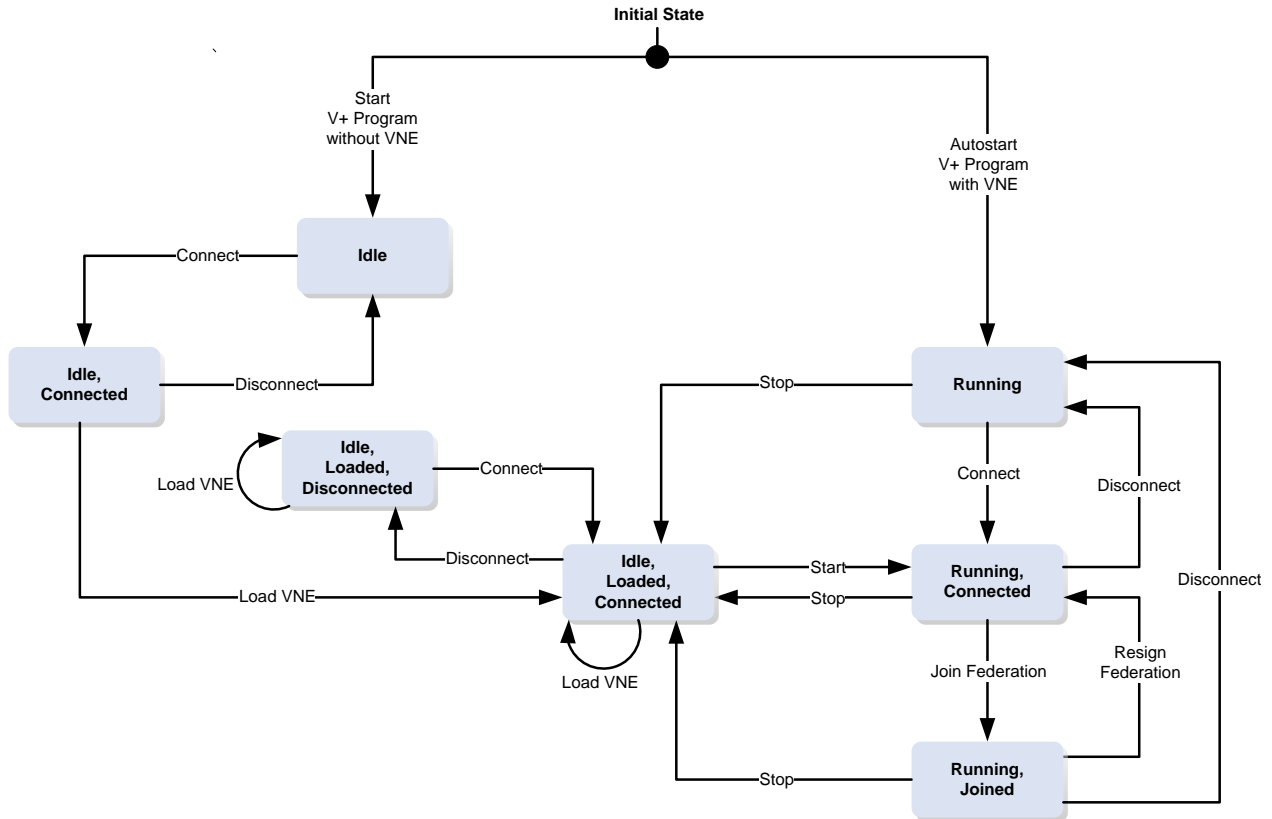


Figure 1, V+ Remote Control State Transition Diagram

In particular circumstances, the V+ remote control system will react as follows:

1. If commanded to disconnect while currently loaded, V+ will disconnect but the current VNE will remain loaded.
2. If commanded to **Stop** while currently joined to an HLA Federation, V+ will resign from the Federation and stop. The remote control client must issue the **Start** command, followed by the **Join** command to rejoin a Federation.
3. If commanded to **Disconnect** while currently running and joined to an HLA Federation, V+ will **Resign** from the Federation and Disconnect. The remote control client must issue the **Connect** command followed by the **Join** command to rejoin a federation.

1.4.3.2 V+ Development System Problems under Remote Control

The remote control system is intended to be used without the V+ Development System present. While this can be done its problematic. Remember that remote control connects to the run time system not the development system. Therefore a design on the runtime system must have been run successfully from the development system without errors to be running on the run-time system or loaded from a .vne file. Run your design and save it as a .vne file before using the remote control to execute a V+ runtime design.



Figure 2, Remote Control GUI

V+ Remote Control Demonstration

Remote V+ Machine IP and Port Number
V+ IP Address or Host Name: 127.0.0.1 Port: 5068
Connect Disconnect

Run/Stop Control
Start Stop
Filename (.vne): Untitled
Load .vne File

Remote Machine Network Audio Configuration

Primary DIS Network
Bind To: Default DIS Version: 6
Send To: Broadcast Port: 3000 TTL: 5

Secondary DIS Network
Bind To: Default Enable Secondary:
Send To: Broadcast Port: 3000 TTL: 5

HLA Info
Federation Name: VCommHLA
FED Filename: RPR-FOM.FED
RID Filename:
Join Resign

Terrain Server
Bind IP Address: 0 . 0 . 0 . 0 Server IP Address: 0 . 0 . 0 . 0 Port: 5080

DIS Time
 Absolute
 Relative

Xmit Audio Buffer Size: 960 Xmit Sample Rate: 8000 Heartbeat: 3500

Status Area
Connected...
Platform is Stopped
HLA: Resigned
Refresh Status

Send Configuration
Get Configuration
Close



2 Client to V+ Packet Format

The Client to V+ packet of data is transmitted from the controlling client computer to the V+ computer system being controlled. The format of the data is a fixed header format consisting of a signature and a command. The command describes the data that is to follow. Each command data structure is listed in separate tables.

Table 1, Client to V+ Packet Format, Simple Commands			
Offset	Bytes	Units	Description
0	4	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
4	4	Value	COMMAND This format is used for those packets that have no data that follows the command value, such as STOP and START. See COMMAND 4.2 for enumerations.

Table 2, LOAD .VNE FILE			
Offset	Bytes	Units	Description
0	4	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
4	4	Value	COMMAND = LOAD .VNE FILE See Table 8, COMMANDS.
8	255	ASCII	ASCII string name of the .VNE file. The filename must contain a filename extension of ".vne", and consists of at least 6 characters and less than 255 characters including the terminating NULL, i.e. "n.vne".



Table 3, LOAD CONFIGURATION DATA			
Offset	Bytes	Units	Description
0	4	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
4	4	Value	COMMAND = SET CONFIGURATION See Table 8, COMMANDS. Notes: For the IP addresses set the fields to 0.0.0.0 if the address is not needed, and the address field will not be enabled in the run-time system.

Configuration data structure, 4.6

Table 4, REQUEST CONFIGURATION DATA			
Offset	Bytes	Units	Description
0	4	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
4	4	Value	COMMAND = REQUEST CONFIGURATION See Table 8, COMMANDS Note, that V+ will not send a status unless requested to do so.

Configuration data structure, 4.6



3 V+ TO Client Packet Format

The V+ to Client packet of data is transmitted from the V+ system being controlled to the client.

Table 5, V+ to Client REQUEST STATUS Packet Format			
Bytes	Offset	Units	Description
4	0	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
4	4	Value	COMMAND = REQUEST STATUS See Table 8, COMMANDS.
4	8	Value	PLATFORM STATE See PLATFORM STATE Enumerations table, 4.1
4	12		PLATFORM SPARE TIME
4	16		PLATFORM EXECUTION TIME
255	20	ASCII	CURRENT RUNNING FILENAME This is the .VNE filename the run-time system is currently using. (executing) This string will be terminated with a NULL character.
4	275	Value	HLA STATUS See HLA STATUS Enumerations table, 4.5

Table 6, V+ to Client REQUEST CONFIGURATION DATA Packet Format			
Bytes	Offset	Units	Description
4	0	See Description	PACKET ID Used to uniquely identify this packet as a remote control packet. This field will always be set to the following value: 524D4354, Hexadecimal "RMCT", ASCII
Configuration data structure, 4.6			



4 DATA Structures

This section lists the descriptions and format of data structures used in the packet formats.

4.1 PLATFORM STATE Enumerations

Table 7, PLATFORM STATE Enumerations

VALUE	DESCRIPTION
0	INVALID - OR UNDETERMINED STATE
1	STOPPED The run-time system is stopped.
2	STARTED Start the run-time system execution

4.2 COMMAND Enumerations

This section lists each command in sequence.

Table 8, COMMANDS

VALUE	COMMAND	DESCRIPTION
0	RESERVED	Reserved
1	START	This command starts the run-time system execution. There is no data that follows. A valid .vne filename must be loaded before the system can start. The status should be checked after this command is issued to ensure that the system actually starts with the specified .vne file.
2	STOP	This command stops the run-time system execution. There is no data that follows. The status should be checked after this command is issued to ensure that the system actually stops. In some cases V+ may require several seconds or even minutes to stop depending on the size of the application.
3	REQUEST STATUS	Request a status packet from the client. There is no data that follows. A status result should appear within a few seconds at the most. A timeout of five seconds is a safe value to use.
4	LOAD .VNE FILE	Load the specified file. See Table 2
5	RESERVED	Reserved
6	LOAD CONFIGURATION	Load specified configuration data, See Table 3 The REQUEST CONFIGURATION should be issued after this command to verify that information
7	REQUEST CONFIGURATION	Request the configuration data from the run-time system. The run-time system will respond immediately with a packet.
8	HLA JOIN	Join the configured HLA federation. V+ must be running an application before this command is issued.
9	HLA RESIGN	Resign from the HLA federation. V+ must be running an application before this command is issued.



4.3 BIND ADDRESS FORMAT Enumerations

This section lists the valid values for a Bind Address Format.

Table 9, BIND ADDRESS FORMAT		
VALUE	NAME	DESCRIPTION
0	DEFAULT	Bind to default network adapter. No bind address is specified.
1	IP	Bind to IP address. Address is specified in IP Address field (e.g. primaryLocalBindIPAdx)
2	HOST NAME	Bind to host name specified in Bind name field. (e.g. primaryLocalBindName)
3	DEVICE NAME	Bind to device name specified in Bind name field.
4	FRIENDLY NAME	Bind to friendly name specified in Bind name field.

4.4 DESTINATION ADDRESS FORMAT Enumerations

This section lists the valid values for a Destination Address Format.

Table 10, DESTINATION ADDRESS FORMAT		
VALUE	NAME	DESCRIPTION
0	BROADCAST	Send using broadcast. No destination address is specified.
1	IP	Send to IP address. Address is specified in IP Address field (e.g. primaryDestIPAdx)
2	HOST NAME	Send to host name specified in host name field. (e.g. primaryDestHostName)

4.5 HLA STATUS Enumerations

This section lists the valid values for an HLA Status.

Table 11, HLA STATUS		
VALUE	NAME	DESCRIPTION
0	RESIGNED	Not joined to a federation.
1	JOINED	Joined to a federation.
2	ERROR	An error has occurred.
3	NOT_ENABLED	HLA is not enabled.

4.6 Configuration Data Structure

The configuration data structures are defined in the file VRMS.H that is part of the source code. Contact SimPhonics for this download location. Note the #pragma pack() to setup byte level packing.