HP Remote Graphics Software User Guide 5.4.0

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Acknowledgments

HP Remote Graphics Software was developed using several third party products including, but not limited to:

OpenSSL: This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes software written by Tim Hudson (*tjh@cryptsoft.com*). This product includes cryptographic software written by Eric Young (*eay@cryptsoft.com*)

Jack Audio Connection Kit (JACK): JACK is a low-latency audio server, written for POSIX conformant operating systems such as GNU/Linux and Apple's OS X. JACK is released in source code format under the GNU LESSER GENERAL PUBLIC LICENSE Version 2.1, February 1999. JACK is used in the HP Remote Graphics Software Receiver for Linux.

This product includes software developed by the Apache Software Foundation (http://www.apache.org/).

Portions of this software were originally based on the following: software copyright (c) 1999, IBM Corporation, http://www.ibm.com.

Where required, related source code and licenses are re-distributed with HP Remote Graphics Software.

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1 Introduction to HP Remote Graphics Software

This guide provides information that you will need to install, configure, and use HP Remote Graphics Software (RGS). RGS enables you to view and interact with the desktop of a remote computer over a standard TCP/IP computer network.

HP Remote Graphics Software (RGS) is a high-performance remote desktop connection protocol that delivers an exceptional remote desktop user experience for rich user environments that include video, web flash animations and graphics intensive applications. All applications run natively on the remote system and take full advantage of the compute and hardware graphics resources of the sending system.

HP RGS captures the desktop of the remote system and transmits it over a standard network to a window on a local client using advanced image compression technology specifically designed for text, digital imagery and high frame rate video applications. A local hardware keyboard and mouse is supported as well as USB device redirection to provide an interactive, high performance, multi-display desktop experience.

HP RGS supports a broad range of client virtualization technologies including multi-user virtual desktop infrastructure (VDI) solutions, blade PCs, blade workstations, desktop PCs, mobile PCs and workstations.

NOTE: Beginning at RGS 5.2.0, HP implemented licensing for the RGS Sender. The RGS Receiver remains a free download, and can be used on any number of computers. For an overview of RGS licensing, see RGS licensing on page 12 ." For detailed information on RGS licensing, see the HP Remote Graphics Software Licensing Guide, available at http://www.hp.com/support/rgs_manuals

This guide is organized as follows:

Chapter 1: Introduction to HP Remote Graphics Software on page 1—This chapter provides an introduction to RGS, describing a typical RGS configuration, and the roles of the Local and Remote Computers. This chapter also describes the primary features of RGS.

Chapter 2: RGS overview on page 9—This chapter gives an overview of the RGS capabilities, including the supported computers and operating systems, RGS connection topologies, multi-monitor configurations, remote USB, and remote audio.

Chapter 3: Installing RGS on page 45—Installation of the RGS Sender and Receiver is described in this chapter.

Chapter 4: Pre-connection checklist on page 77—Establishing an RGS connection from a Receiver to a Sender requires that the Local and Remote Computers be in the correct state. This chapter provides a checklist of items that should be verified before attempting an RGS connection.

Chapter 5: Using RGS on page 86—This chapter describes how to use RGS. Establishing a connection from the Local Computer to the Remote Computer in Normal Mode is described, including the different login methods. Features such as collaboration are also described.

Chapter 6: Advanced capabilities on page 102—This chapter describes the RGS advanced capabilities that are provided by each of the tabs in the Receiver Control Panel.

Chapter 7: Using Directory Mode on page 149—Establishing RGS connections using Directory Mode is described in this chapter.

Chapter 8: RGS properties on page 153—This chapter describes each of the RGS Sender and Receiver properties.

Chapter 9: Sender event logging on Windows on page 181—This chapter describes the Windows Event Logging capability of RGS.

Chapter 10: Remote Application Termination on page 186—This chapter describes how the Windows Event Logging capability of RGS can be used to terminate applications if a desktop session is left running without supervision.

Chapter 11: Optimizing RGS performance on page 201—This chapter provides a number of suggestions to optimize RGS performance.

Chapter 12: Troubleshooting RGS on page 205—This chapter describes how to troubleshoot issues related to establishing an RGS connection, network timeouts, graphics performance, remote audio, and remote USB.

Chapter 13: RGS error messages on page 206—This chapter lists each of the errors reported by the RGS Receiver and describes their probable cause.

Appendix A: Appendix A: Using RGS with HP VDI on page 209—This appendix describes how to use RGS with the HP Virtual Desktop Infrastructure solution.

Appendix B: Appendix B: USB devices supported by RGS on page 218—This appendix lists the USB devices that are supported by RGS. Note that, prior to RGS 5.2.0, this list was maintained in a separate document—this list is now integrated into this document as Appendix B.

Appendix C: Appendix C: Linux remote audio device support on page 225—This appendix provides information on audio devices that are supported on Linux-based Remote Computers.

NOTE: For a version of the *HP RGS 5.4.0 User Guide* that may be more current than this document, visit the HP website http://www.hp.com/support/rgs_manuals.

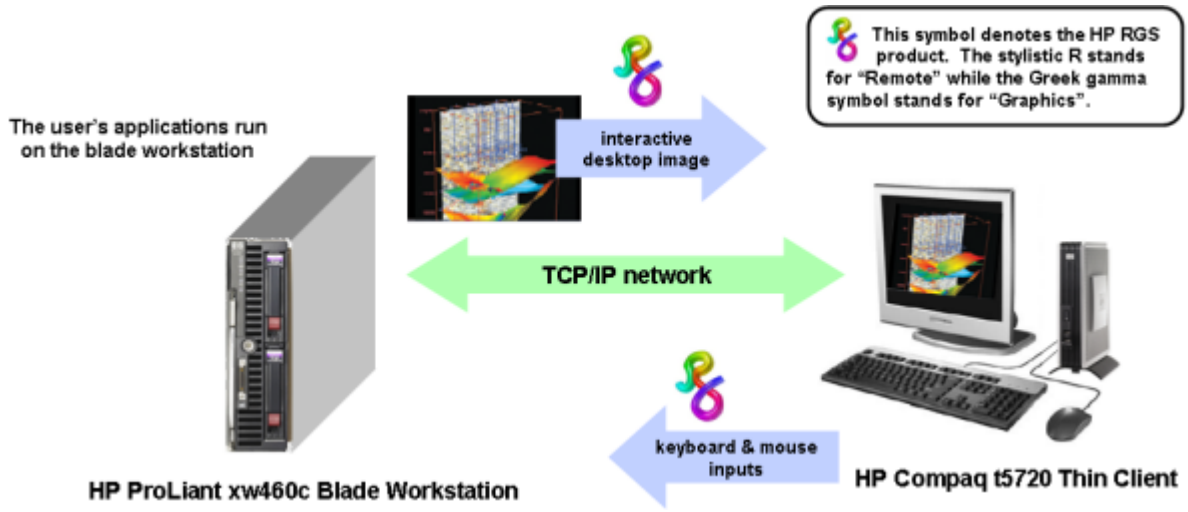
For release-specific information, refer to the release notes that are provided with the RGS product.

For additional HP RGS product information, visit the RGS homepage at http://www.hp.com/go/rgs

1.1 Typical RGS configuration

Figure 1-1 Typical RGS configuration on page 3 shows a typical RGS configuration, consisting of a blade workstation and a thin client. The user's applications run on the blade workstation while the user interacts with these applications from the thin client.

Figure 1-1 Typical RGS configuration



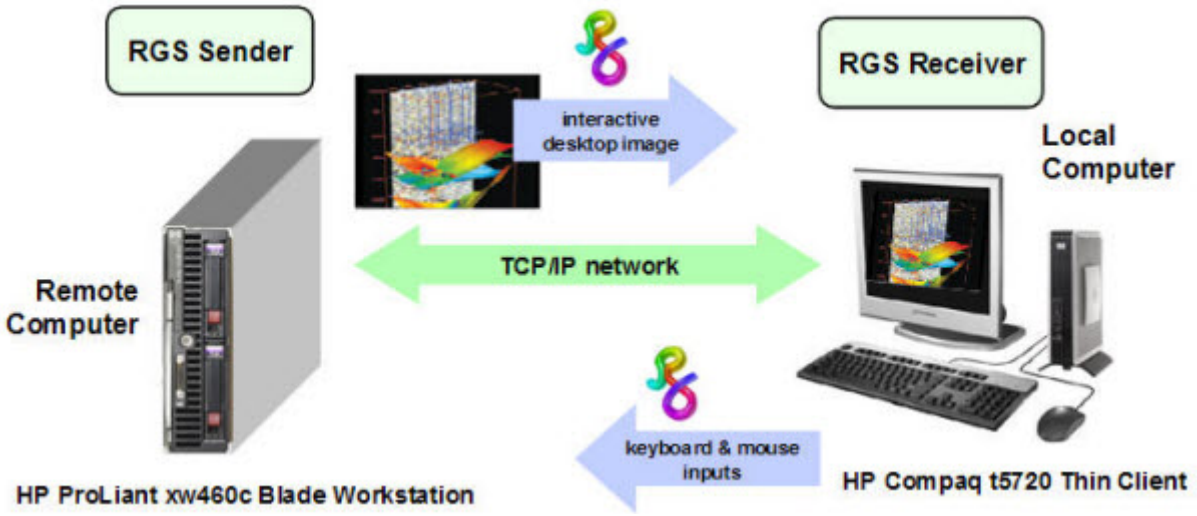
The blade workstation desktop image is transmitted over the network to the thin client, which displays the desktop image locally in a window. RGS is designed to provide fast capture, compression, and transmission of the desktop image over standard TCP/IP networks. RGS also captures user keyboard and mouse inputs from the thin client, and sends them to the blade workstation for processing by Windows or Linux, and the applications running on the blade workstation.

RGS also supports remote USB, which enables a user to connect USB devices to the thin client, and have the USB devices accessible by the blade workstation. In addition, HP RGS supports remote audio, whereby audio output from the applications is transported over the network for playback on the thin client.

1.2 RGS Sender and Receiver

Figure 1-2 RGS Sender and Receiver on page 4 shows the two primary RGS software components, the *RGS Sender* and *RGS Receiver*. The RGS Sender runs on the *Remote Computer* while the RGS Receiver runs on the *Local Computer*.

Figure 1-2 RGS Sender and Receiver



The Sender and Receiver provide the following functionality:

- **Sender**—Runs on the Remote Computer, and transmits graphics updates, audio, and USB data to the RGS Receiver on the Local Computer. The RGS Sender receives and processes keyboard events, mouse events, and USB data from the Receiver.
- **Receiver**—Runs on the Local Computer. The RGS Receiver establishes a connection to the Remote Computer, requests graphics updates from the Remote Computer Sender, and displays the desktop of the Remote Computer inside a window on the Local Computer. The RGS Receiver transmits keyboard and mouse events to the RGS Sender.

The RGS Sender captures the actual screen pixels that are generated by the graphics adapter on the Remote Computer. This process is often referred to as screen scraping, and operates independently of whether or not a monitor is actually connected to the Remote Computer.

NOTE: HP RGS uses a *pull model* when establishing a connection, in contrast to a *push model*. With a pull model, the connection is established by the Local Computer user, who uses the Receiver to "pull" the connection from the Remote Computer (RGS Sender). This is in contrast to a push model, where the Remote Computer would "push" the connection to the Local Computer. The pull model is preferred because, in many cases, the Remote Computer (RGS Sender) is operating unattended, and there is no user to establish a connection.

NOTE: *Local user* refers to the person physically located at the Local Computer. Remote user refers to the person physically located at the Remote Computer (if, in fact, a person is present at the Remote Computer).

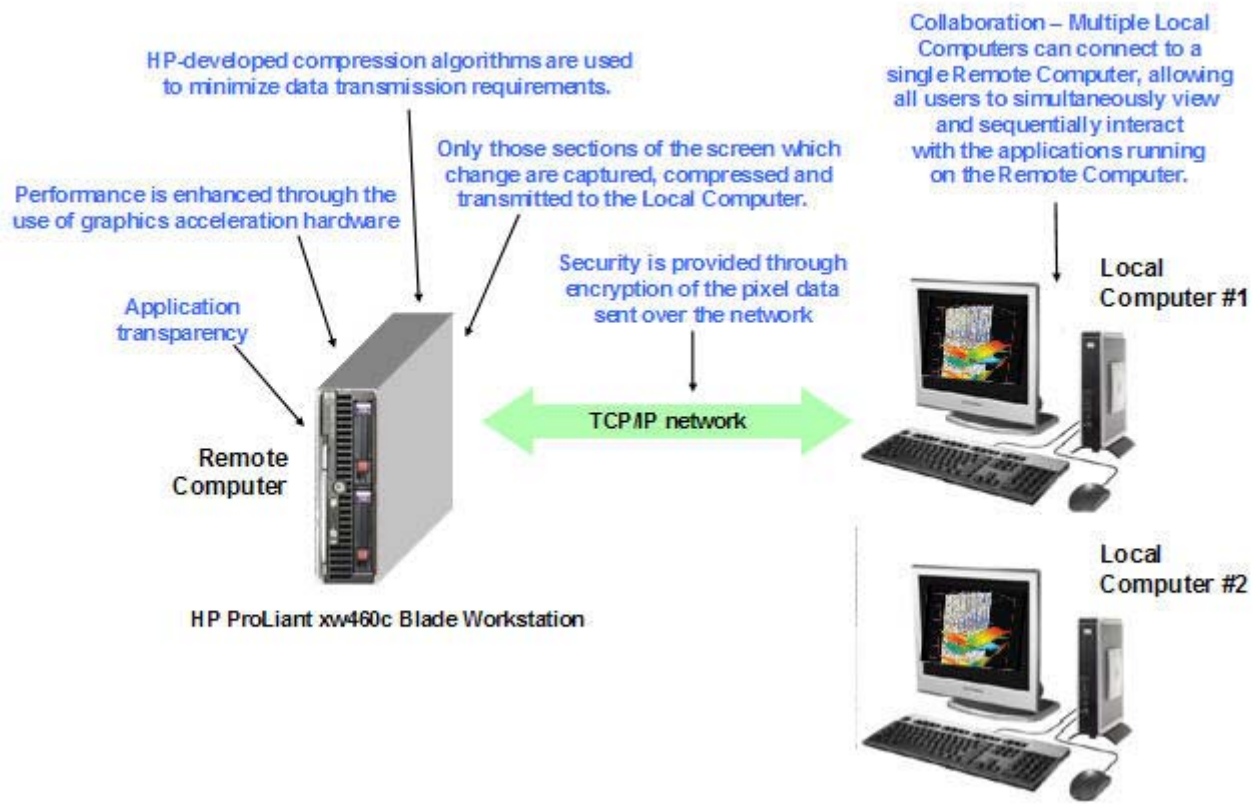
A local user who establishes an RGS login to the Remote Computer is known as the primary user. Once a primary user has been established, another local user can view the Remote Computer desktop session using RGS only if allowed by the primary user. There are situations, however, where a local user may replace the previous primary user and become the new primary user.

The process by which a local user can become a primary user or view the primary user's desktop is described in detail in this guide.

1.3 RGS features

HP RGS supports a number of features designed to optimize performance, security, and functionality (see Figure 1-3 Features of HP RGS on page 5).

Figure 1-3 Features of HP RGS



- **Application transparency**—HP RGS supports application transparency, which enables applications to be run on the Remote Computer, and accessed from the Local Computer, without modifications.
- **Graphics acceleration hardware**—Performance is enhanced because the applications running on the Remote Computer use its graphics acceleration hardware.

- **HP compression/decompression algorithms**—Proprietary, high-performance HP image compression/decompression algorithms enable real-time remote visualization that is visually lossless and highly interactive.
- **Selective screen updates**—Only those portions of the screen which change are captured, compressed, and transmitted from the Remote Computer to the Local Computer, further improving performance.
- **Security**—RGS supports many security features, including encryption of the pixel data sent from the Remote Computer to the Local Computer.
- **Collaboration**—Multiple users can simultaneously connect to the same Remote Computer, allowing the users to view and interact with the same desktop session and applications.

1.4 Additional RGS features

RGS provides many additional features, including:

- **3D application support**—Users can interact with OpenGL 3D applications running on the Remote Computer. Direct3D applications can be used as well, provided they are not in full-screen mode. 3D applications use the full power of graphics acceleration hardware on the Remote Computer.
- **Remote USB**—USB devices connected to the Local Computer can be attached to, and accessed by, the Remote Computer.
- **Remote Audio**—Smooth, continuous, low-latency, high-quality remote audio is transmitted from the RGS Sender to the RGS Receiver.
- **Audio follows focus**—The RGS Receiver can be configured to enable audio for the session displayed in the Remote Display Window that currently has focus, and is muted for all other remote sessions/windows.
- **Directory Mode**—Directory Mode enables the Receiver to look up a user's pre-assigned computers from a file.
- **Easy Login**—Enables fewer authentication steps when connecting to an HP blade workstation running Windows XP Professional.
- **Single Sign-on**—Enables fewer authentication steps and automatic login and unlocking of the desktop when connecting to an HP workstation running Windows XP Professional.
- **Windows Event Logging**—Network outages or loss of connectivity between a Receiver and Sender can leave a desktop session running without supervision. To safeguard running applications, customer-designed agents can monitor the status of connections to determine if termination of applications is required. Windows event logging provides a mechanism for agents to determine the status of the connection between the Receiver and Sender.

NOTE: See the RGS 5.4 data sheet for latest list of features.

1.5 Tabloid-size page

The PDF version of this guide contains a tabloid-size page that is best viewed either on your computer monitor or by printing it on size B (11 inches by 17 inches) or ISO A3 (297 mm by 420 mm) paper.

The tabloid page is included to permit a complex diagram (the diagram on the last page) to be documented on a single page while maintaining readability.

The tabloid page from the PDF document may be printed individually if you have access to a tabloid-capable printer. Go to the last page, select Current Page in the print dialog, and select Properties to view the paper size and orientation options. Depending on your printer, paper size may be listed as tabloid, size B, or size A3. Orientation should be set to landscape.

NOTE: The PDF version of the HP Remote Graphics Software Users Guide 5.4.0 can be found at: http://www.hp.com/support/rgs_manuals

1.6 Obtaining HP technical support

If you encounter an issue that requires technical support, please do the following prior to contacting HP for assistance:

- Be in front of the Local Computer or Remote Computer, whichever one is appropriate.
- Note the operating system.
- Note any applicable error messages.
- Note the applications you were using when you had the issue.
- Be prepared to spend the time necessary to troubleshoot the problem with the service technician.

  For a listing of all worldwide technical support phone numbers, visit http://www.hp.com/support, select your region, and click **Contact HP** in the upper-left corner.

NOTE: If your phone call is answered by a voice recognition system, and if you're asked to provide the name of the product, please say "Remote Graphics Software", not "RGS".

1.7 Software Service Strategy for Non-HP Hardware

RGS 5.4 and above is designed for and compatible with the following Microsoft Windows operating systems on hosted OS Virtual Machine and physical machine environments.

- Windows XP Professional 32 and 64 bit
- Windows Vista Business, Ultimate and Enterprise 32 and 64 bit
- Windows 7 Professional and Enterprise 32 and 64 bit.

RGS 5.3 and beyond is designed for and compatible with RHEL V4 and V5 32 and 64 bit operating environment on HP Blade Workstations and HP Personal Workstations.

Telephone support service is for RGS software installation and configuration support.

- Customer must have a fully functioning system with standard Microsoft Windows software loaded and running

Software patch updates are available through Software Depot at http://software.hp.com under Client Virtualization.

Software assurance (enhancement upgrades) are available through separate Software Assurance products.

1.8 Other RGS Documents

Other RGS documents such as the HP Remote Graphics Software Licensing Guide can be found at: http://www.hp.com/support/rgs_manuals

2 RGS overview

Before exploring how to use RGS, it's important to first understand the required system environments and security features used and supported by RGS.

- Supported computers and operating systems
- RGS version numbering
- RGS licensing
- RGS products
- Sender and Receiver interoperability
- Application support
- Networking support
- RGS connection topologies
  - One-to-one
  - Many-to-one
  - One-to-many
- RGS operating modes
- Multi-monitor configurations
- Remote USB operation
- Supported keyboards
- Security features

This chapter provides an overview of each of these features.

For a description of new features and other late breaking topics, see the README.txt file in the installation directory of either the RGS Receiver or RGS Sender. The file is best viewed using Wordpad, Microsoft Word or Openoffice swriter.

2.1 Supported computers and operating systems

This section describes the computers and operating systems which support HP RGS 5.4.0. Any RGS Sender can interoperate with any RGS Receiver.

Table 2-1 Computers and operating systems that support RGS 5.4.0

Receiver Support Matrix	Windows XPe/ WES	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	Embedded Linux	RHEL V4 (update 5 or later) V5 (update 2 or later) 32-bit, 64-bit
Desktops					
Personal Workstations		X	X		HP xw and z series
Mobile Workstations		X	X		
Desktop PCs		X	X		
Notebook PCs		X	X		
Performance Thin Clients					
HP GT7725				HP ThinPro GT	
HP GT7720	XPe				
HP GT7720w	WES				
HP dc73 Blade WS Client				HP Blade WS Client	
HP dc72 Blade WS Client				HP Blade WS Client	
Mobile Thin Clients (may not be suitable for 720p and higher multi-media content)					
HP 4410t	WES				
HP 6720t	XPe				
HP 2533t	XPe				
Flexible and Mainstream Thin Clients (may not be suitable for 720p and higher multi-media content)					
HP t5730w	WES				
HP t5630w	WES				
HP t5730	XPe				
HP t5630	XPe				
HP t5720	XPe				
HP t5545				HP ThinPro	

Table 2-2 Computers and operating systems that support RGS 5.4.0

Sender Support Matrix	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	RHEL V4 (update 5 or later) V5 (update 2 or later) 32-bit, 64-bit
Blade Clients			
HP Blade Workstations	X	X	HP only
HP Blade PCs	32–bit only	Windows Vista 32–bit non-aero only Windows 7 32 and 64 bit non-aero only	
VDI Servers	32–bit hosted desktop	32–bit non-aero only	
Desktops			
Personal Workstations	X	X	HP only
Mobile Workstations	X	X	
Desktop PCs	X	X	
Notebook PCs	X	X	

NOTE: Desktop Sender systems require 1.5 GHz or greater processor with SSE2 multi-media instruction extension, 32-bit color display adapter and 512 MB minimum RAM.

Microsoft Windows Vista or Windows 7 Aero theme desktop running on a Sender requires an nVidia graphics card and a compatible nVidia driver.

Supported VDI Client Virtualization Software: VMware ESX 3.01, 3.02, 3.02 Update 1, ESX 3.03, ESX 3.5 Update 1, 2, 3, 4 and ESX 4.0.

In this document, references to “Windows” in the context of the RGS Sender refer to those Microsoft operating systems in Supported computers and operating systems on page 9 that support the RGS Sender. Similarly, references to “Windows” in the context of the RGS Receiver refer to those Microsoft operating systems in that support the RGS Receiver.

For more information on HP products, please visit http://www.hp.com/support

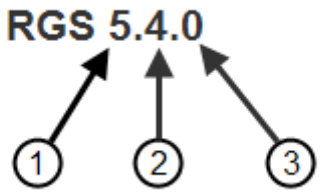
2.2 RGS version numbering

The RGS version (for example, version 5.4.0) contains the following three numbers:

1. Version major number
2. Version minor number
3. Version patch number

Figure 2-1 RGS version numbering on page 12 shows the positioning of the three version numbers.

Figure 2-1 RGS version numbering



RGS Version Description

1. **major** – A major release contains sufficient changes such that interoperability with the prior major release is not guaranteed. For example, Sender version 5.4.0 is not guaranteed to interoperate with Receiver version 4.2.0.
2. **minor** – A minor release introduces new RGS features and functionality. Minor releases will also include (roll up) the changes in any prior patch releases.
3. **patch** – A patch release is generated for a security issue or for a major defect in a feature. A patch release is indicated by this number being **non-zero**. Therefore, RGS 5.4.0 is not a patch release. RGS 5.4.1 would be a patch release.

NOTE: Each patch release is a *complete* release of the entire RGS product, regardless of what components have changed. For example, if a patch release is needed to make an RGS Sender security fix available, the entire RGS product (including both the RGS Sender and Receiver) would be included in the patch release.

2.3 RGS licensing

NOTE: RGS licensing applies to the RGS Sender only. The RGS Receiver is a free download and can be used on any number of computers. Therefore, the following discussion of RGS licensing applies only to the RGS Sender. For detailed information on RGS licensing, see the *HP Remote Graphics Software Licensing Guide*, available at http://www.hp.com/support/rgs_manuals.

Two types of licenses are supported by the RGS Sender:

1. Local license file—With local licenses, each system running the RGS Sender requires a license file.
   - A license must be purchased and the license file installed for each RGS Sender computer.
2. **Floating licenses**—With floating licenses, a pool of RGS licenses is purchased, which are dynamically allocated on a first-come, first-serve basis whenever an RGS Receiver first attempts to

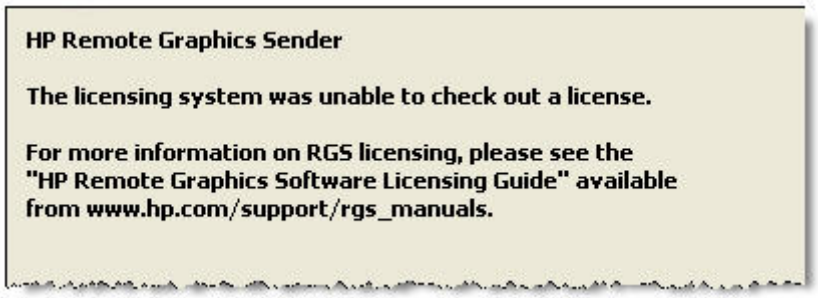
connect to an RGS Sender. In licensing terminology, a floating license is checked-out when a connection is established to the RGS Sender, and is checked-in when the connection terminates.

Floating licenses allow a company to purchase, for example, 75 licenses but support a user community of perhaps hundreds of users as long as no more than 75 users ever attempt to establish an RGS connection simultaneously.

Floating licenses require a license server, which can be installed on one of the computers running the RGS Sender, or the license server can be installed on a separate computer. The RGS product includes a setup.exe file that installs the license server—see the *HP Remote Graphics Software Licensing Guide*, available at http://www.hp.com/support/rgs_manuals.

Prior to installing the RGS Sender license, you can still establish a connection from the Local Computer to the Remote Computer, and can interact with the Remote Computer desktop. However, in the absence of a license, the dialog shown in Figure 2-2 Dialog generated when the RGS Sender is unlicensed on page 13 will be generated by the Remote Computer, and displayed in the window on the Local Computer that is showing the Remote Computer desktop.

Figure 2-2 Dialog generated when the RGS Sender is unlicensed



Once the RGS Sender is licensed, the above dialog will no longer be displayed.

2.4 RGS products

HP offers these RGS products :

1. **HP RGS Desktop Trial Edition** — HP offers a free, 60-day trial version of RGS Desktop; no license purchase is required.
2. **HP RGS VDI local license** — This RGS product runs on HP and non-HP VMware VDI (Virtual Desktop Infrastructure) and HP Blade PC platforms. HP RGS VDI uses a local license file key. A separate HP RGS VDI license is required for each virtual machine using RGS.
3. **HP RGS Desktop local license** — This RGS product runs on all RGS supported platforms, including: notebooks, desktop PCs, mobile workstations, personal workstations and HP blade workstations. In addition, this key will also run on VMware VDI and HP Blade PC platforms that are supported by the RGS VDI license key.
4. **HP RGS Desktop floating license** — This RGS product runs on all RGS supported platforms, including: notebooks, desktop PCs, mobile workstations, personal workstations and HP blade workstations. In addition, this key will also run on VMware VDI and HP Blade PC platforms that are supported by the RGS VDI license key.

All RGS products include the same RGS Sender and the same RGS Receiver. The RGS Receiver is unlicensed and can be installed on any number of computers.

NOTE: Except for the 60-day **HP RGS Desktop Trial Edition**, the above RGS products never expire once they are installed and licensed.

When you purchase RGS, you are entitled to free upgrades to all future patch releases. For example, if you purchase RGS 5.4.0, you are entitled to a free upgrade to patch release 5.4.1, if available. In order to upgrade to new enhancement releases, you must purchase RGS Software Assurance or re-purchase a new license at upgrade time. To ensure you can download and install future minor and major releases (such as RGS 5.4 or 6.0), HP offers the following 1 Year RGS Software Assurance products for each of the above RGS products (except the **HP RGS Desktop Trial Edition**).

- **1 Year RGS Software Assurance**—This product entitles you to upgrade to new major/minor releases of RGS for one year from purchase date. The software assurance can be renewed annually at 25% of the internet list price of a new license.

For more detailed information on the RGS products, see the *HP Remote Graphics Software QuickSpec* available on the RGS homepage at http://www.hp.com/go/rgs.

2.5 Sender and Receiver interoperability

RGS provides interoperability between versions of RGS Senders and Receivers that have the same major version number. For example, Sender version 5.0 and Receiver version 5.1 will interoperate together. However, Sender version 4.2 is not guaranteed to interoperate with Receiver version 5.0. Connection between a Receiver and a Sender should only be attempted when their major version numbers are the same. Beginning with RGS 5.3.0 the Microsoft Windows Vista Sender and in RGS 5.4.0 the Windows 7 Sender added the capability to notify the Receiver prior to shutting down. The Microsoft Windows Vista Sender and Windows 7 Sender must exit and then restart under several conditions such as: login, logoff, fast user switching or Remote Desktop Protocol (RDP) transition. This behavior allows the Receiver to automatically reconnect after the Sender has restarted. Receivers prior to 5.3.0 will show a pink or black screen and then a Reconnect dialog box if the Sender has exited.

2.6 Application support

Except as noted in the next paragraph, RGS provides application transparency, meaning that the Local Computer user, in executing applications on the Remote Computer, is typically unaware that the application is executing remotely.

RGS supports all applications, except those applications that use full screen exclusive mode. RGS may not be suitable for most full screen games. If a full-screen MS-DOS command prompt window is created on the Sender (using, for example, command.com), the window will be reset to its default size by RGS. Likewise, if a full-screen Windows XP Professional command prompt window is created (using cmd.exe or the command prompt icon), the window will also be reset to its default size by RGS. Full-screen DirectDraw applications are not supported (however, DirectDraw applications in a Window may work, and should be qualified individually).

On Remote Computers running Linux, OpenGL-based applications can only be remoted if the Remote Computer is using NVIDIA graphics.

RGS 5.2.6 and newer Sender and Receiver executables are signed for compatibility with strict anti-virus programs.

2.7 Networking support

RGS uses TCP/IP over a standard computer network, and supports Ethernet connection speeds of 10/100/1000BASE-T (Gigabit). The RGS Sender listens on TCP/IP port 42966. The port used by the RGS Receiver is assigned by the Local Computer OS and can vary. HP recommends full-duplex operation between the Sender and Receiver. For information on using RGS through a firewall, see Using RGS through a firewall on page 84.

Beginning in RGS 5.4.0, the Sender defaults to "listening" to all available network interfaces. The Sender also has the ability to dynamically add or remove network interfaces and update I.P. address changes of a network interface while there are no active RGS connections. If there are one or more active RGS sessions, the Sender will update the network interface bindings after the connections are disconnected. For instance, if an additional network interface is enabled and configured, the Sender will add that network interface to the binding list and begin listening on that network interface for connect requests. If the I.P. address of a network interface changes due to a DHCP change for instance, the Sender will update the network interface binding. The Sender does not have to be restarted as with previous versions of RGS to update network interface bindings.

NOTE: At RGS 5.2.5, the capability was added to specify the port number used by the RGS Sender. The default Sender port number is 42966, as noted above. The Sender port number can be changed using the Rgsender.Network.Port property. If this property is used to change the Sender port number from its default value of 42966, the Sender port number must then be specified in establishing an RGS connection from the Receiver to the Sender.

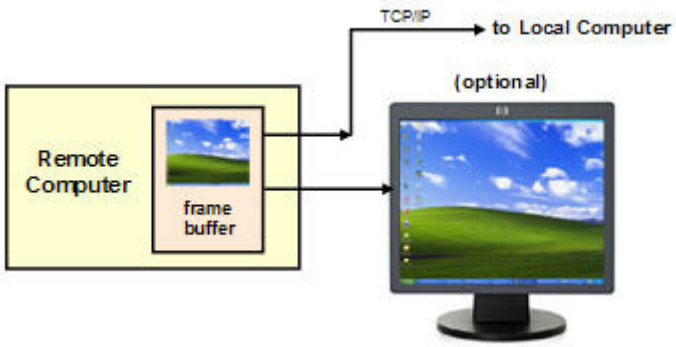
2.8 Connection topologies

This section describes the connection topologies supported by RGS, such as how a single Local Computer may connect to multiple Remote Computers.

2.8.1 The Remote Computer frame buffer

After making a connection between a Local Computer and a Remote Computer, the Remote Computer Sender transmits its complete frame buffer to the Local Computer. The frame buffer is the memory on the Remote Computer video adapter that holds the bitmapped image that is typically displayed on a monitor—for Windows XP, the frame buffer contains the familiar Windows desktop (see Figure 2-3 The Remote Computer frame buffer containing the Windows desktop on page 15).

Figure 2-3 The Remote Computer frame buffer containing the Windows desktop



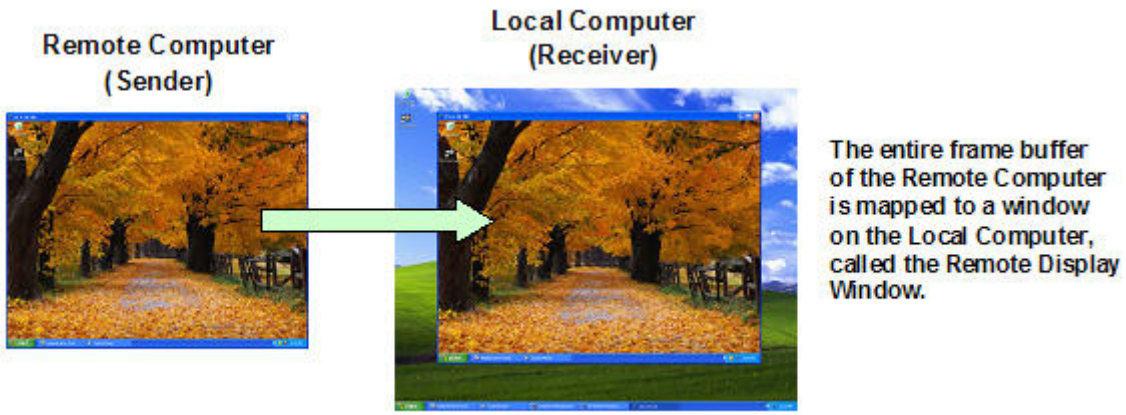
The monitor itself is optional on the Remote Computer. For example, if the Remote Computer is a Personal Workstation, a monitor (plus a keyboard and mouse) would typically be attached. If the Remote Computer is an HP ProLiant Blade Workstation, it is not possible to attach a monitor to view the primary (NVIDIA) frame buffer because the video signal from the NVIDIA graphics adapter is not available on a connector—the contents of the frame buffer can only be viewed remotely using RGS.

NOTE: For clarity in this guide, the bitmapped image contained in the Remote Computer frame buffer will often be shown in association with the Remote Computer, independent of whether a monitor is actually connected (or can be connected) to the Remote Computer.

2.8.2 One-to-one connection

The simplest RGS connection is a single Local Computer making a connection to a single Remote Computer. The entire frame buffer of the Remote Computer is displayed in a window on the Local Computer (see Figure 2-4 Display of the Remote Computer frame buffer on the Local Computer on page 16). The window on the Local Computer is called the *Remote Display Window*.

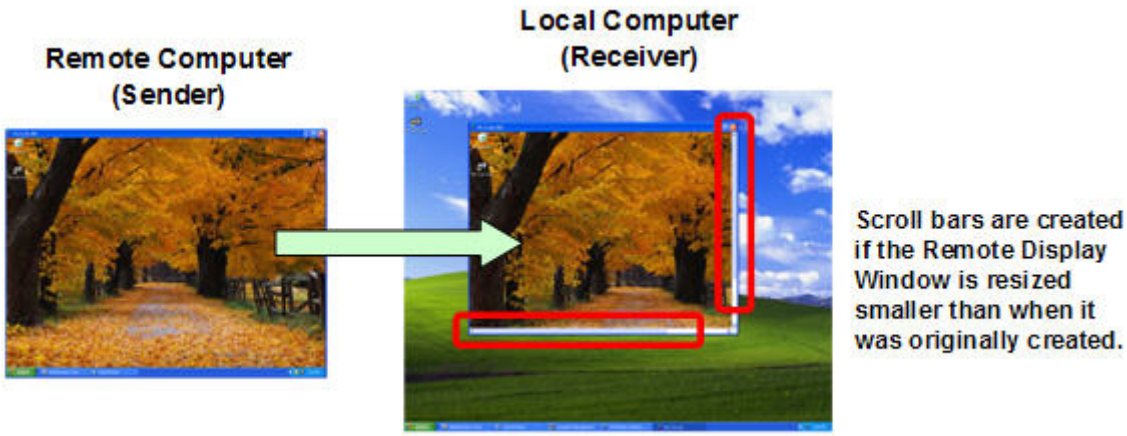
Figure 2-4 Display of the Remote Computer frame buffer on the Local Computer



In Figure 2-4 Display of the Remote Computer frame buffer on the Local Computer on page 16, the Remote Computer frame buffer fits completely within the Remote Display Window on the Local Computer monitor. However, it is possible for the Remote Computer frame buffer size to exceed the size of the Local Computer monitor (as measured in horizontal pixels by vertical pixels). As before, the Remote Display Window will be the size of the Remote Computer frame buffer. If the Remote Display Window is larger than the Local Computer monitor, the window will extend off the monitor.

Regardless of the size of the Remote Display Window (that is, whether it fits on the Local Computer monitor or extends off the monitor), if the local user resizes the Remote Display Window to be smaller than when it was originally created, scroll bars will be added to allow the local user to view the complete Remote Computer frame buffer (see Figure 2-5 Addition of scroll bars if the Remote Display Window is resized smaller on page 17).

Figure 2-5 Addition of scroll bars if the Remote Display Window is resized smaller

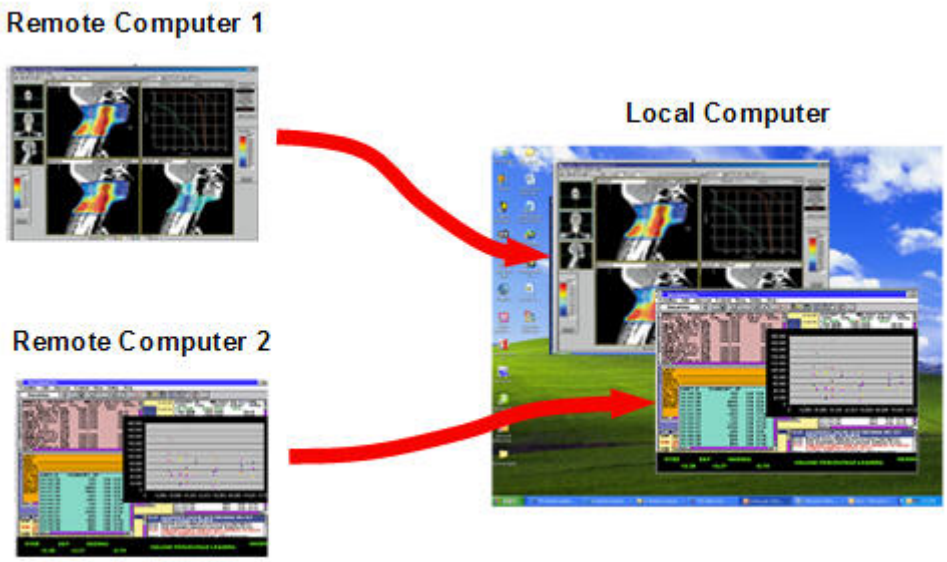


NOTE: RGS does not provide a scale-to-fit capability to allow the contents of the Remote Computer frame buffer to be scaled to fit the Local Computer monitor. If the Remote Computer frame buffer is larger than the Local Computer monitor, the Remote Display Window will simply extend beyond the edges of the monitor. If the Remote Display Window is resized to fit on the monitor, scroll bars will be added.

2.8.3 Many-to-one connection

The RGS Receiver supports a many-to-one connection, allowing a single Local Computer to connect to multiple Remote Computers (see Figure 2-6 A Local Computer displaying two desktop sessions on page 17) each running a desktop session—see RGS operating modes on page 21, specifically **Directory Mode**. The frame buffer of each Remote Computer is displayed in a separate Remote Display Window on the Local Computer.

Figure 2-6 A Local Computer displaying two desktop sessions



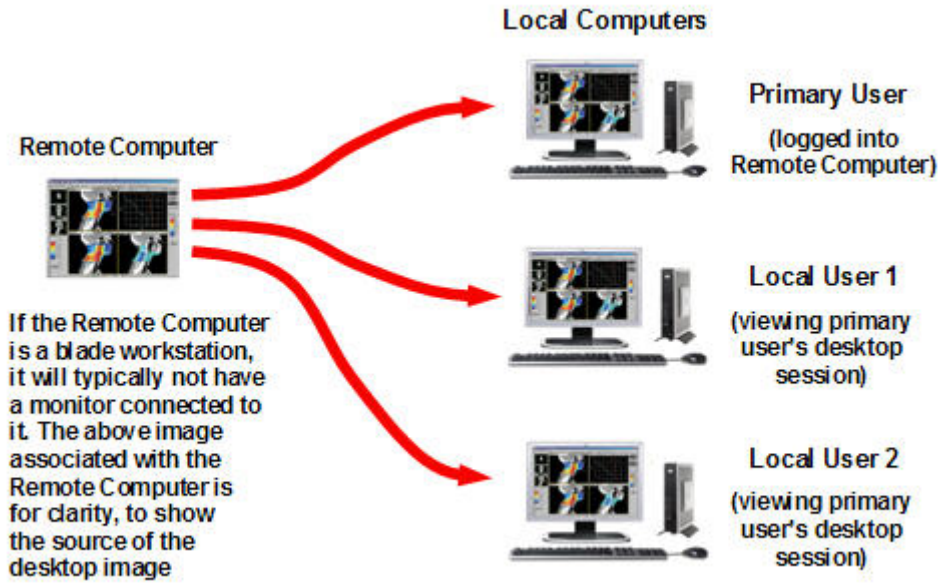
NOTE: Starting up two (or more) instances of the RGS Receiver to achieve a many-to-one connection is not supported. Achieving a many-to-one connection is only supported by Using Directory Mode on page 149 .

The many-to-one connection capability allows implementation of a *virtual KVM (keyboard, video, and mouse) switch*. The virtual KVM switch emulates the functionality of a standard KVM switch in software to provide a convenient method to connect a single monitor, keyboard, and mouse (all on the Local Computer) to multiple Remote Computers. Using the RGS Setup Mode (see Setup Mode on page 89) you can switch the local monitor to display each of the Remote Computer frame buffers. The Receiver can also switch audio between active sessions as described in the Controlling Receiver Settings section using the audio follows focus option.

2.8.4 One-to-many connection

RGS also supports a one-to-many connection, allowing the frame buffer of a Remote Computer to be displayed on multiple Local Computers (see Figure 2-7 Multiple users can access the desktop of a Remote Computer on page 18). In this figure, there is one primary user who is logged into the Remote Computer, and two local users who are viewing the primary user's desktop session on the Remote Computer.

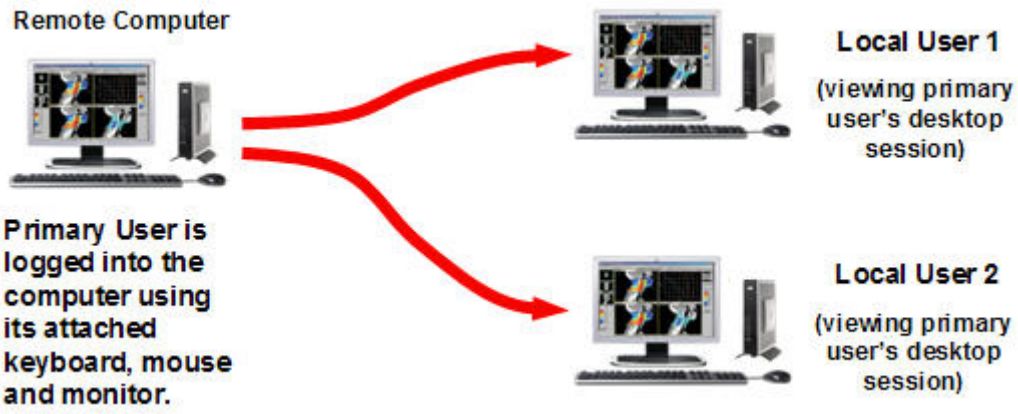
Figure 2-7 Multiple users can access the desktop of a Remote Computer



The one-to-many configuration is ideal for collaboration because each user can interact with the applications running on the Remote Computer (subject to RGS policies which arbitrate which user is able to provide keyboard and mouse inputs to the Remote Computer at any particular time). As one user interacts with the applications on the Remote Computer, all other users can view these interactions. See Collaborating on page 98, for details.

In the previous example, it was assumed that the primary user and the local users were all physically separate from the Remote Computer. This, however, doesn't have to be the case. RGS works equally well sharing between workstations (see Figure 2-8 Sharing between workstations on page 19).

Figure 2-8 Sharing between workstations



In Figure 2-8 Sharing between workstations on page 19, the primary user is directly logged into the Remote Computer using its attached keyboard, mouse and monitor. In other words, the primary user is physically present at the Remote Computer, while local user 1 and local user 2 are physically separate from the Remote Computer. RGS can be used by local users 1 and 2 to connect to the primary user's desktop.

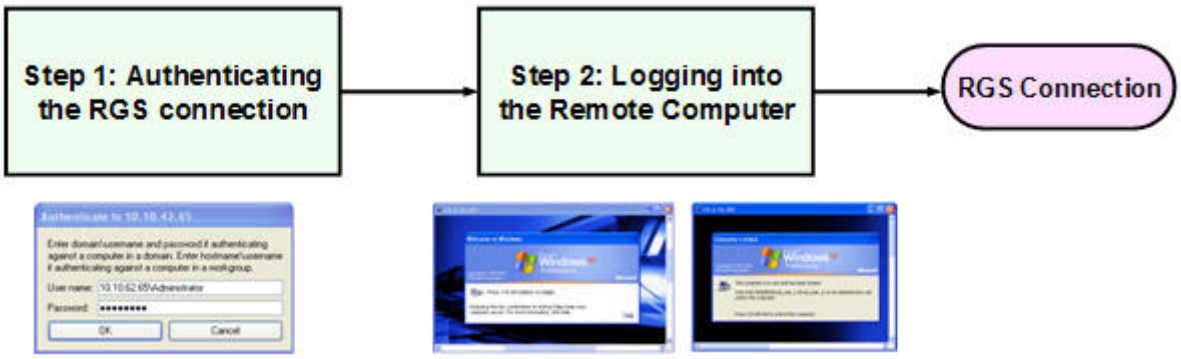
2.9 Establishing an RGS connection using Standard Login

In normal operation, users are required to authenticate twice when establishing an RGS connection from a Local Computer to a Remote Computer. This is the Standard Login process—the two steps are:

1. The first authentication step is from the RGS Receiver to the RGS Sender— this is called *authenticating the RGS connection*. The dialog for this authentication step is generated and displayed by the RGS Receiver on the Local Computer.
2. The second authentication step is when logging into or unlocking the Remote Computer desktop session— this is called *logging into the Remote Computer*. The login or unlock dialog is generated by the Remote Computer, and is displayed in the Remote Display Window on the Local Computer.

Figure 2-9 Standard Login process on page 19 shows the two-step **Standard Login** RGS connection process.

Figure 2-9 Standard Login process



If another user is already logged into the Remote Computer, the second authentication step is replaced by an *authorization step*, in which the currently logged-in user receives an authorization prompt to allow or disallow the new user to join (connect to) the existing desktop session (see Figure 2-10 RGS connection process if another user is already logged into the Remote Computer on page 20). The new user is allowed to connect to the existing RGS connection only if the currently logged-in user authorizes the connection.

Figure 2-10 RGS connection process if another user is already logged into the Remote Computer

There are a number of variations of the **Standard Login** process, as detailed in the diagram of the Standard login process on the tabloid page (the last page of the PDF version) of this guide.

2.10 Single Sign-on and Easy Login

RGS supports two additional login methods on certain Windows-based Remote Computers. These login methods are currently only supported on Windows XP Sender platforms. These two methods allow users to enter their credentials only once in connecting to a Remote Computer—these methods are described below, along with which authentication process is used:

- **Single Sign-on**—The RGS connection authentication process is used (step 1 in Figure 2-9 Standard Login process on page 19 and Figure 2-10 RGS connection process if another user is already logged into the Remote Computer on page 20). If authentication is successful, the user will immediately see the Windows desktop session without needing to explicitly log into Windows or unlock the desktop. Single Sign-on is described further in Single Sign-on on page 97.
- **Easy Login**—The user is pre-connected to the system and standard Windows login screens are used to login to the desktop or unlock the screen. If Windows authentication is successful, the user will immediately see the desktop session without needing to be first authenticated by the RGS Receiver/Sender. Easy Login is described further in Easy Login on page 96.

If neither Single Sign-on nor Easy Login is selected, the default Standard Login will be used. In terms of selecting between Single Sign-on and Easy Login, two factors to consider are:

- If **Single Sign-on** is used with HP Session Allocation Manager (SAM), the user will only need to enter their credentials once to connect to multiple Remote Computers. The credentials are entered when authenticating with SAM—thereafter, each RGS connection is automatically authenticated, and a Remote Display Window from each Remote Computer is automatically displayed on the Local Computer.
- **Easy Login** supports GINA (Graphical Identification and Authentication) chaining, allowing custom 3rd party login mechanisms to be integrated into RGS. Single Sign-on does not support chaining of 3rd party GINA modules.

For example, a 3rd party fingerprint reader will typically install a custom GINA module. The GINA module will allow the user to be authenticated through their standard username/password mechanism (because the GINA modules are chaining) or with their fingerprint. The fingerprint reader would be physically attached to the Local Computer but would be logically connected to the Remote Computer using remote USB. If Easy Login is used, only a single login step is required —the fingerprint reader will provide the credentials for logging into the Remote Computer.

2.11 RGS operating modes

RGS supports two basic operating modes:

1. **Normal Mode** — This mode enables RGS to connect to a single Remote Computer, as described in One-to-one connection on page 16, Normal Mode is described in Using RGS in Normal Mode on page 86.
2. **Directory Mode** — This mode enables RGS to connect to multiple Remote Computers, as described in Many-to-one connection on page 17. Directory Mode is based on a user-created file which specifies which Remote Computers the RGS Receiver should connect to. Directory Mode is described in Using Directory Mode on page 149.

NOTE: Prior to RGS 5.2.0, RGS supported a third operating mode—**Enterprise Service Mode**. Enterprise Service Mode was based on the creation of a network service which specified which Remote Computers the RGS Receiver should connect to. Enterprise Service Mode has been superseded by HP Session Allocation Manager (SAM), and therefore has been discontinued as of the RGS 5.2.0 release.

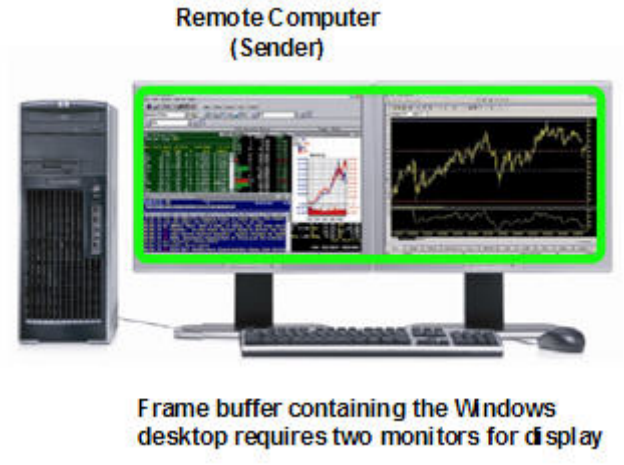
2.12 Multi-monitor configurations

Many computers have a frame buffer that is larger in size (as measured in horizontal pixels by vertical pixels) than what can be displayed on a single monitor. In these situations, the default operation is that a portion of the frame buffer is used, allowing the utilized portion (containing the Windows desktop) to be displayed on a single monitor. It is possible, however, to configure a computer so that the Windows desktop occupies the complete frame buffer—this typically requires multiple monitors to view the complete frame buffer (Windows desktop).

In Figure 2-11 Remote Computer frame buffer requires two monitors to view the Windows desktop on page 22, the Windows desktop is configured to occupy the complete frame buffer of the Remote

Computer, which, for this particular Remote Computer, requires two monitors to display the Windows desktop.

Figure 2-11 Remote Computer frame buffer requires two monitors to view the Windows desktop

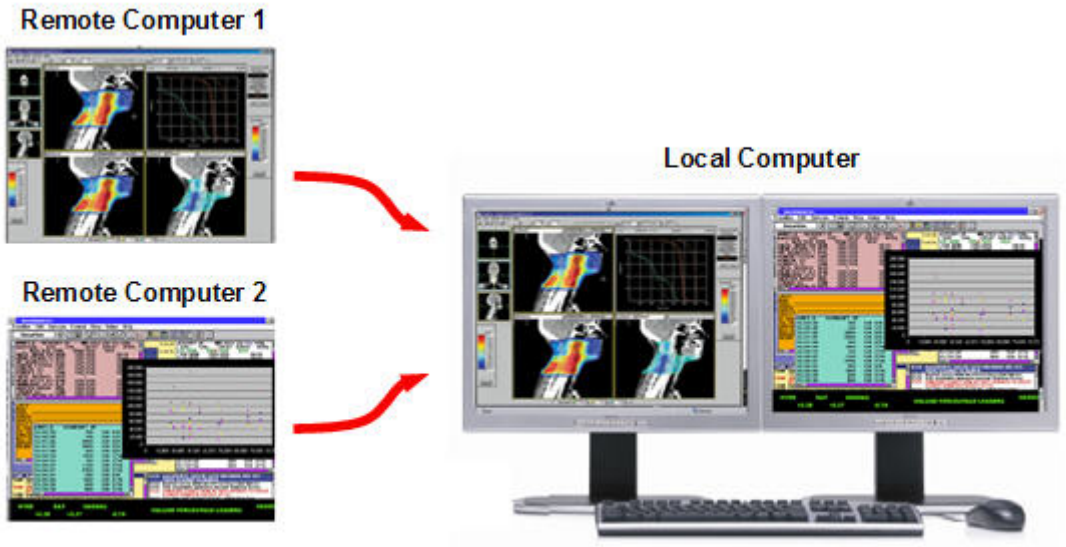


When a Local Computer establishes an RGS connection to the Remote Computer of Figure 2-11 Remote Computer frame buffer requires two monitors to view the Windows desktop on page 22, the Remote Computer will, as usual, transmit its complete frame buffer. In order for the local user to view the complete desktop of the Remote Computer, the Local Computer must have a comparably-sized frame buffer, which will typically require two monitors to view (see Figure 2-12 A Remote Display Window spanning two monitors on page 22).

Figure 2-12 A Remote Display Window spanning two monitors

Multiple monitors on the Local Computer are also useful in the configuration described in Many-to-one connection on page 17. If the Local Computer is connected to two Remote Computers, each Remote Computer frame buffer can be displayed on its own monitor if the Local Computer has two monitors (see Figure 2-13 Each Remote Display Window can be positioned to occupy a single monitor on page 23).

Figure 2-13 Each Remote Display Window can be positioned to occupy a single monitor



As always, each Remote Computer (Sender) frame buffer is displayed in its own Remote Display Window. In Figure 2-13 Each Remote Display Window can be positioned to occupy a single monitor on page 23, the user has positioned each Remote Display Window to occupy a single monitor, achieving the result that the left monitor is dedicated to Remote Computer 1 while the right monitor is dedicated to Remote Computer 2.

2.13 Remote Computer monitor blanking overview

New in RGS 5.0, this feature blanks the Remote Computer monitor (if one is connected) when the local user establishes an RGS connection to the Remote Computer and logs in—in other words, becomes the primary user. This feature is provided for security, to ensure that the primary user's desktop session on the Remote Computer is not visible on a monitor connected to the Remote Computer. For details on monitor blanking, see Remote Computer monitor blanking operation on page 92.

2.14 Video overlay surfaces

When the Windows Sender is installed on a computer, video overlay surfaces (also known as overlay planes) are disabled on the computer. Some media players that use video overlay surfaces will not display correctly. This can often be resolved by disabling the use of video overlay surfaces in the media player.

Most OpenGL applications will detect the disabling of overlay surfaces, and will work correctly. However, if your OpenGL application attempts to use the disabled overlay surfaces, it may display incorrectly. If this is the case, check to see if your OpenGL application provides a mechanism for the user to manually disable the use of overlay surfaces.

2.15 Image quality

RGS provides high-quality, high-performance image compression and decompression. Image compression is performed on the Remote Computer to reduce the network bandwidth requirements—

this enables RGS to be used on standard networks. Image decompression is performed on the Local Computer.

RGS supports setting of the Image quality on a per-Receiver basis. Image quality is adjusted using the slide bar in the Remote Display Window Toolbar (see Figure 2-14 Image quality slide bar in the Remote Display Window Toolbar on page 24). As the image quality is increased toward 100, the amount of compression decreases, and the required network bandwidth increases. If a Receiver is supporting multiple Remote Display Windows (see Many-to-one connection on page 17) the slide bar in any Remote Display Window Toolbar can be adjusted—the slide bars in the other Remote Display Windows will automatically track.

The Boost checkbox was added beginning with RGS 5.2.6, and requires that both the RGS Sender and Receiver be version 5.2.6 or later. Checking the Boost checkbox will improve (boost) image quality for certain types of images, primarily images containing significant amounts of text or lines. For further information, see Remote Display Window Toolbar on page 91 .

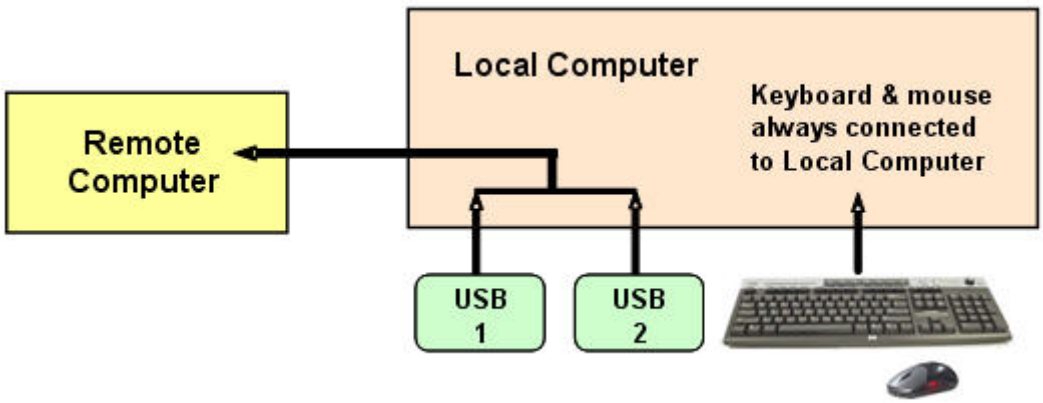
Figure 2-14 Image quality slide bar in the Remote Display Window Toolbar

NOTE: Even with an image quality of 100, RGS still performs some image compression to reduce the network bandwidth requirements. While the image quality on the Receiver will usually appear visually lossless to the user, the actual image data sent over the network will be "lossy" to a limited extent. The exception is the Sender codec JPEG-LS which is mathematically lossless. See Sender general properties on page 176 for more information.

2.16 Remote USB overview

RGS supports *remote USB*, which allows USB devices connected to the Local Computer (*local USB devices*) to be attached to a Remote Computer. Remote USB is supported on Remote Computers running Windows, and enables the Remote Computer to have direct access to the local USB devices as if they are connected directly to the Remote Computer (see Figure 2-15 Remote Computer can access the local USB devices on page 24). For details on remote USB, see Remote USB operation on page 115.

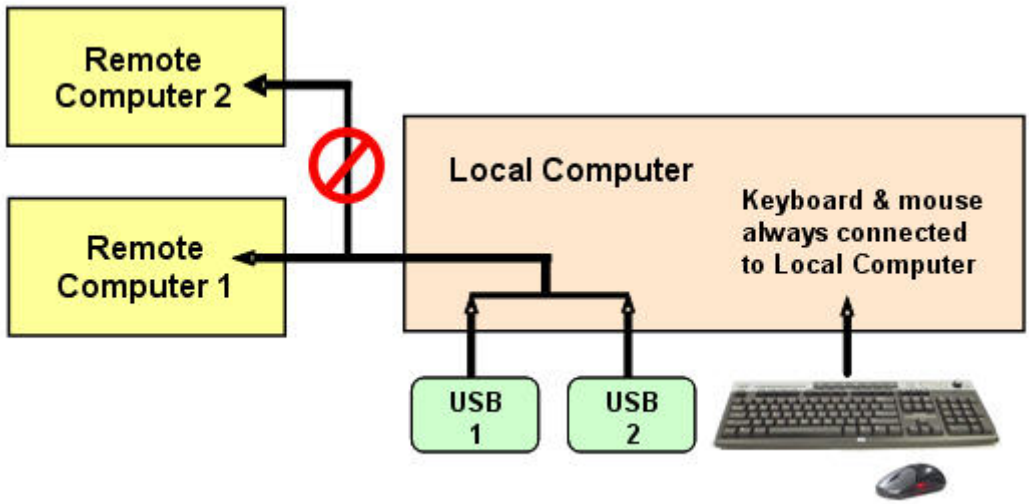
Figure 2-15 Remote Computer can access the local USB devices



In Figure 2-15 Remote Computer can access the local USB devices on page 24, two USB devices are connected to the Local Computer. Using RGS, the local USB devices can be attached to the Remote Computer. The keyboard and mouse always remain connected to the Local Computer, and cannot be attached to the Remote Computer.

The local USB devices can be collectively attached to a single Remote Computer (see Figure 2-16 The local USB devices can be attached to only one Remote Computer at a time. on page 25). The local USB devices cannot be split between multiple Remote Computers nor can they be collectively attached to multiple Remote Computers.

Figure 2-16 The local USB devices can be attached to only one Remote Computer at a time.



2.16.1 USB session switching

At RGS 5.1.3, the ability to dynamically move USB devices from one Remote Computer to another was added. Prior to RGS 5.1.3, it was necessary to first disconnect all RGS connections (sessions) to the Remote Computers, and then re-establish connections while specifying a new Remote Computer to attach the USB devices to. With RGS 5.1.3, USB devices can be detached from one Remote Computer, and made accessible by another Remote Computer without first needing to disconnect the RGS connections. For details on this, see Remote USB operation on page 115 .

2.16.2 Isochronous USB support

At RGS 5.2.0, support was added for the USB isochronous data type, which is commonly used for streaming data devices such as audio and video devices. See Appendix B: USB devices supported by RGS on page 218 for a list of supported isochronous USB devices. See Support of sound recording devices on Microsoft Windows on page 35 for an overview of the two ways USB microphones can now be used with RGS.

2.16.3 Install-time configuration of remote USB

This section provides an overview of install-time configuration of remote USB—see Installing RGS on page 45 for more details.

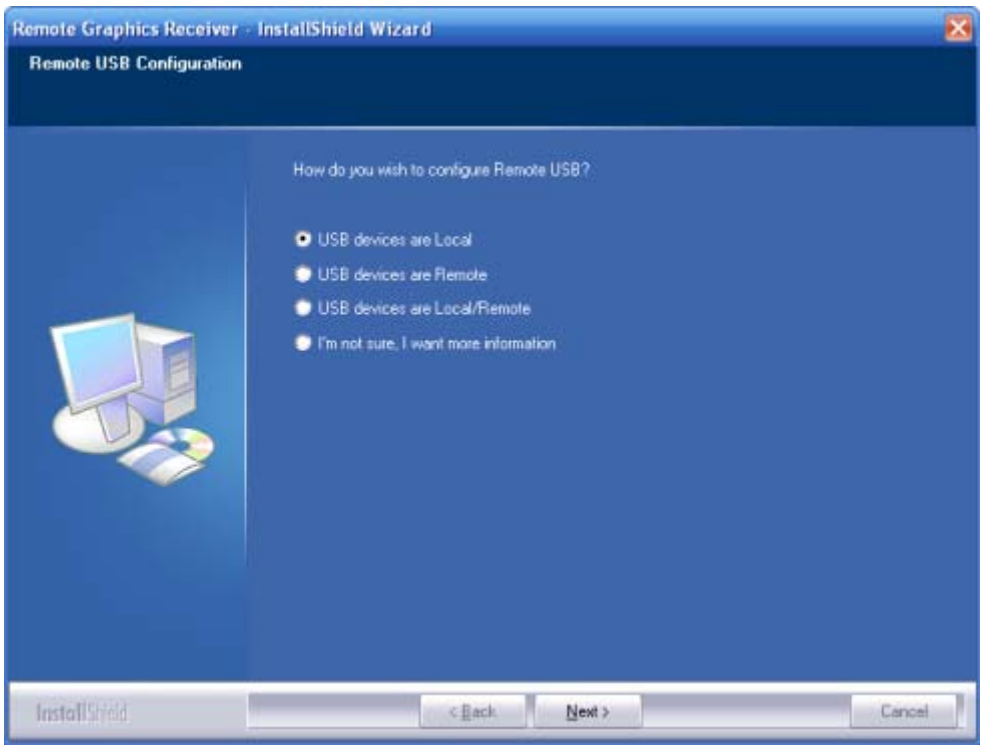
NOTE: The Remote USB configuration cannot be changed after installation of the Sender and Receiver—to select a different USB configuration option, the Sender or Receiver must be uninstalled and reinstalled.

During installation of the RGS Receiver, you can select one of three Remote USB Configuration options, local, remote or local then remote. This is referred to as legacy mode.

The local/remote in legacy mode does not re-enumerate. It supports what was called "captureOnConnect". If the device was plugged in before the Receiver was started it remained local. If the device was plugged in after the Receiver was started it would remain remote.

The "auto" option described in Local/Remote USB Device Management on page 118 alters this behavior. It will re-enumerate any device marked as auto on connect and disconnect. For instance, you have a USB key device that you have marked "auto". Until the Receiver is started it will be attached to the local system. Once the Receiver is started and makes a connection to a Sender it will then be taken away from the local system and remoted to the Sender system. Upon disconnect it will be given back to the local system.

Figure 2-17 Receiver installation dialog to specify the Remote USB Configuration



The three Remote USB Configuration options are:

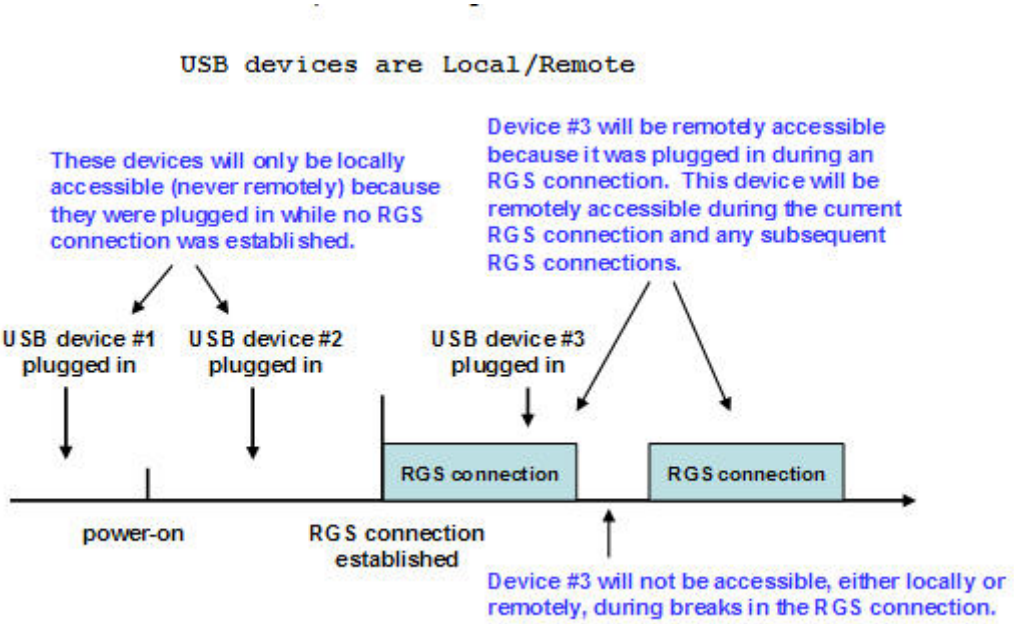
1. **USB devices are Local**—All USB devices will remain local, and will be accessible only by the Local Computer—none of the USB devices will be accessible by a Remote Computer.
2. **USB devices are Remote**—All USB devices can be accessed by the Remote Computer, and none of the USB devices can be accessed by the Local Computer.
3. **USB devices are Local/Remote**—Whether USB devices are locally or remotely accessible depends on when they are plugged into the Local Computer relative to establishment of an RGS connection (see Figure 2-18 USB device accessibility for the setting “USB devices are Local/Remote” (Legacy mode) on page 27).

NOTE: In addition to the general default settings for remote USB configurations, RGS 5.2.6 and higher releases support auto-remote and auto-return of user-specified USB devices when using Windows on both the Sender and Receiver platforms. RGS 5.4.0 introduced a new auto-remote configuration syntax for the Windows Registry entries. Auto-remote allows specified USB devices to be automatically attached to a remote Sender session at RGS connection and then returned to the local client at RGS disconnect.

△ **CAUTION:** Enabling auto-remoting of specific USB devices requires modifications to the Windows Registry. Registry modifications should only be made by experienced personnel. Because an incorrect Registry setting can cause serious problems, you should always make a backup of the Registry prior to making any changes.

For information on how to modify the Registry to support auto-remoting. (see Local/Remote USB Device Management on page 118

Figure 2-18 USB device accessibility for the setting "USB devices are Local/Remote" (Legacy mode)



As can be seen in Figure 2-18 USB device accessibility for the setting "USB devices are Local/Remote" (Legacy mode) on page 27, USB device accessibility depends on when the USB device is plugged into the Local Computer. If a USB device is inserted while no RGS connection is established, the device will be locally-accessible only. If a USB device is inserted while an RGS connection is established, the device will be remotely-accessible only.

Once a USB device is established as locally-accessible or remotely-accessible, its status can only be changed by removing and inserting the device while in the alternate RGS connection state (either connected or not connected). For example, to make a locally-accessible USB device remotely accessible, the USB device needs to be removed and inserted after an RGS connection is established.

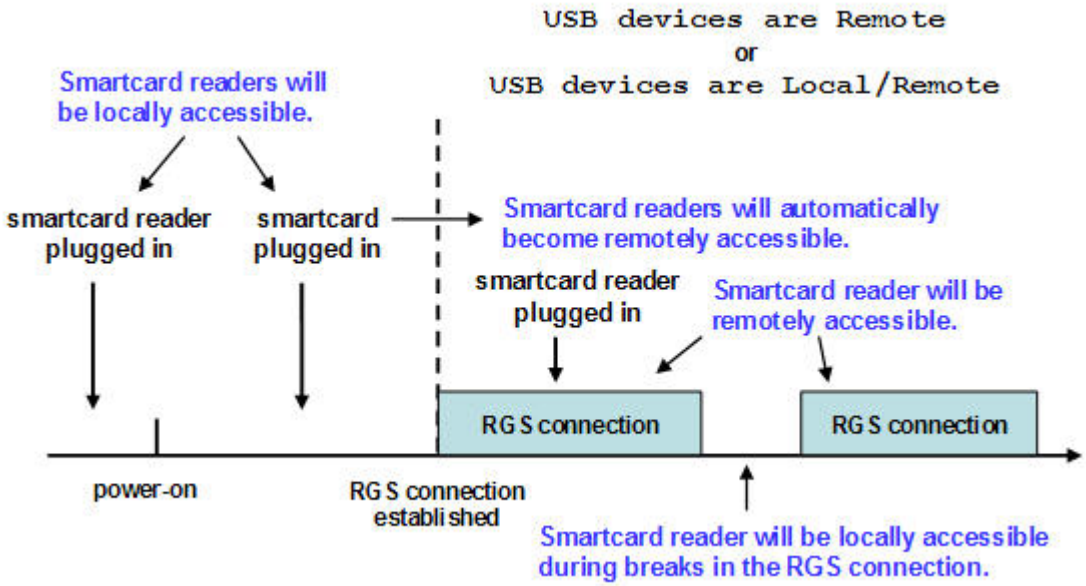
2.16.4 Unique smartcard handling

New with RGS 5.1.3 is unique handling of USB smartcard readers, including Common Access Card (CAC) readers. Prior to RGS 5.1.3, smartcard readers were handled in the same manner as other USB

devices, as described above. With RGS 5.3.0, smartcard readers are now handled in a unique manner, as follows:

- Unique smartcard handling requires, on the Sender, that Easy Login be enabled and that the chaining GINA module msgina.dll be utilized
- Unique smartcard handling also requires that the Local and Remote Computers both be running Windows.
- For USB configuration settings **USB devices are Remote** and **USB devices are Local/Remote,** smartcard readers will always be accessible by the Local Computer prior to establishing a connection to a Remote Computer. This is to allow the smartcard reader to be used by the Local Computer prior to using the smartcard to authenticate access to the Remote Computer.
- Figure 2-19 Smartcard reader accessibility pre- and post-RGS connection for settings "USB devices are Remote" or "USB devices are Local/Remote" on page 28 shows the local and remote accessibility of the smartcard reader for USB configuration settings USB devices are Remote and USB devices are Local/Remote. In both cases, smartcard readers will be locally accessible prior to establishing an RGS connection, and will be remotely accessible once an RGS connection is established.

Figure 2-19 Smartcard reader accessibility pre- and post-RGS connection for settings "USB devices are Remote" or "USB devices are Local/Remote"



- Figure 2-19 Smartcard reader accessibility pre- and post-RGS connection for settings "USB devices are Remote" or "USB devices are Local/Remote" on page 28 indicates that the **USB devices are Remote** and **USB devices are Local/Remote** settings are effectively ignored for smartcard readers. In particular, the USB devices are Remote setting is ignored as evidenced by the smartcard reader being locally accessible prior to establishment of an RGS connection. Similarly, the USB devices are Local/Remote setting is ignored as evidenced by the locally-accessible smartcard reader automatically becoming remotely accessible once an RGS connection is established.

- If a smartcard reader is plugged in after an RGS connection is established, it will be available remotely.
- If there is a break in the RGS connection, the smartcard reader will become locally accessible.

If Microsoft Remote Desktop Connection (RDC) is used to connect from the Local Computer to the Remote Computer, it's possible to get into a situation where the smartcard reader can't be used to log into the Remote Computer (for details on the interoperability of RGS and RDC, see Interoperability of RGS and Microsoft Remote Desktop Connection on page 41. This situation can arise as follows:

1. The user uses a smartcard reader to log into the Remote Computer with RDC. Assume that this login session is established from the user's home.
2. Assume further that the user inadvertently leaves the RDC login session established, and departs for work.
3. From work, the user attempts to log into the Remote Computer with RGS using an at-work smartcard reader in Easy Login mode (which is required for the smartcard reader, as noted previously). Because the home RDC login session is still active, RGS will require the user to authenticate the connection (which is not normally required with Easy Login).

   However, the user may not have a login name and password—the user may be totally relying on smartcard readers at home and at work to log into the Remote Computer. If the user is unable to authenticate the connection with a user name and password, the USB smartcard reader will not be remotely mounted to the Remote Computer, and the user will not be able to log into the Remote Computer.
4. To prevent this situation, the user should log out from the RDC session prior to leaving home.
5. To address this situation if it occurs, the user can do one of the following:
   - Contact IT, and have an administrator log into the Remote Computer with RGS, which will terminate the RDC connection. After the administrator disconnects the RGS connection, the user can establish an RGS connection using the smartcard reader.
   - Reboot the Remote Computer.
   - Return home, and log out from the RDC session.

NOTE: Unlike RDC, a user can leave a home RGS login session active, and then log in from work with RGS. The smartcard reader will operate correctly in both situations, and the work RGS login session will replace the home login session. However, before departing for work, the user *must disconnect* the RGS connection. If the home RGS connection is left active, Easy Login will not work from work, and the user will be required to perform steps similar to the steps in paragraph 5 to be able to log in from work.

2.16.5 Computers supporting remote USB

Remote USB connections are supported by the computers and operating systems shown in the tables below.

Table 2-3 Receiver Remote USB Support

Receiver Remote USB Support Matrix	Windows XPe/WES	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	Embedded Linux
Desktops				
Personal Workstations		X	X	
Mobile Workstations		X	X	
Desktop PCs		X	X	
Notebook PCs		X	X	
Performance Thin Clients				
HP GT7725				HP ThinPro GT
HP GT7720	XPe			
HP GT7720w	WES			
HP dc73 Blade WS Client				HP Blade WS Client
HP dc72 Blade WS Client				HP Blade WS Client
Mobile Thin Clients (may not be suitable for 720p and higher multi-media content)				
HP 4410t	WES			
HP 6720t	XPe			
HP 2533t	XPe			
Flexible and Mainstream Thin Clients (may not be suitable for 720p and higher multi-media content)				
HP t5730w	WES			
HP t5630w	WES			
HP t5730	XPe			
HP t5630	XPe			
HP t5720	XPe			
HP t5545				HP ThinPro

Table 2-4 Sender Remote USB Support

Sender Remote USB Support Matrix	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit
Blade Clients		
HP Blade Workstations	X	X
HP Blade PCs	32–bit only	32–bit non-aero only
VDI Servers	32–bit hosted desktop	32–bit non-aero only
Desktops		
Personal Workstations	X	X
Mobile Workstations	X	X
Desktop PCs	X	X
Notebook PCs	X	X

2.16.6 Supported USB devices

HP has tested a number of USB devices to verify they work correctly when attached to a Remote Computer from a Local Computer. See Appendix B: USB devices supported by RGS on page 218 for a list of supported USB devices.

2.17 Remote audio

This section describes RGS support of remote audio on Windows and Linux. Rather than describe all four combinations of Remote and Local Computers running Windows and Linux, the following sections describe remote audio when both computers are running Windows, followed by a remote audio description when both computers are running Linux.

2.17.1 Remote audio on Windows

RGS on Windows supports remote audio, allowing audio generated by the application on the Remote Computer to be captured and transmitted to the Local Computer for playback. In addition, microphone input on the Local Computer running Microsoft Windows XP can be sent to the application running on the Remote Computer also using Microsoft Windows XP. Remote microphone is not supported on Microsoft Windows Vista and Windows 7. Figure 2-20 RGS audio subsystem on Windows on page 32 shows the RGS audio subsystem (green boxes) for Windows, and the audio data paths —these data paths are described in Table 2-5 Windows RGS audio data paths on page 33.

Figure 2-20 RGS audio subsystem on Windows

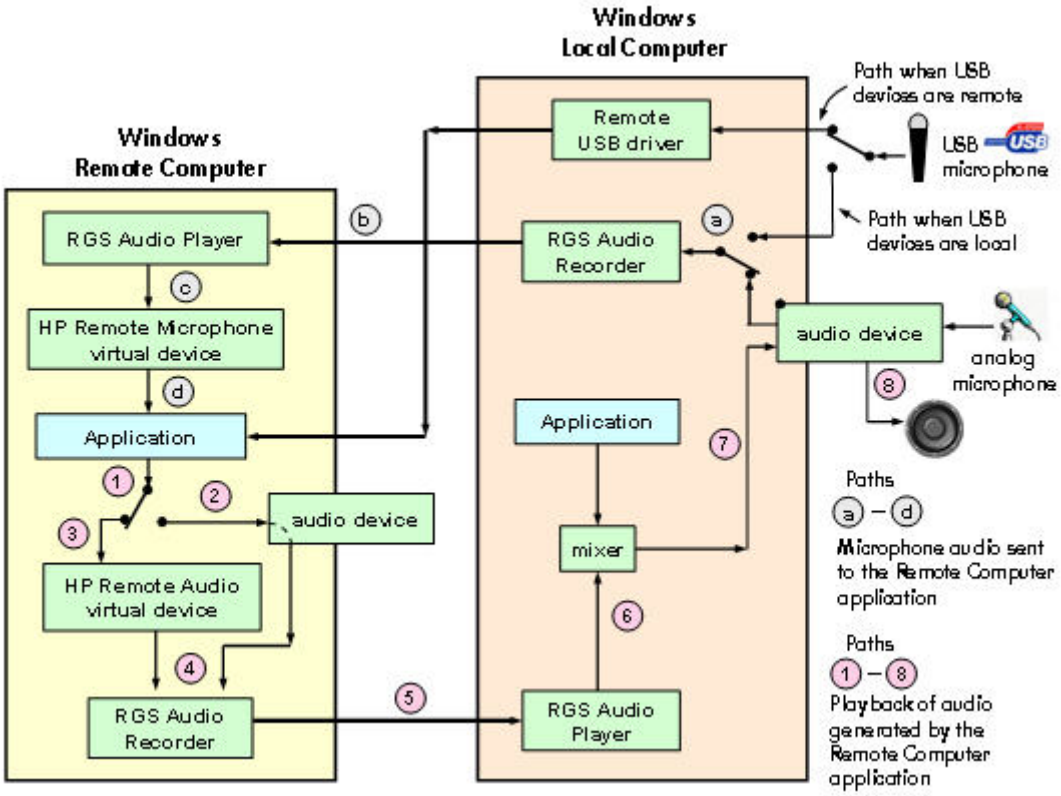


Table 2-5 Windows RGS audio data paths on page 33 describes each of the audio data paths. The numbering and lettering in the table correspond to the numbering and lettering in Figure 2-20 RGS audio subsystem on Windows on page 32.

Table 2-5 Windows RGS audio data paths

Audio Playback from the Remote Computer to the Local Computer	Sending of microphone audio from the Local Computer to the Remote Computer
1. The application-generated audio output. 2. If an audio device is installed, the application-generated audio is routed through it. 3. If there is no audio device (such as with a blade workstation), the HP Remote Audio virtual device is automatically installed, and the application-generated audio is routed to it. 4. Audio from either the audio device or the HP Remote Audio virtual device is sent to the RGS Audio Recorder. 5. The RGS Audio Recorder captures the audio, which is sent by RGS to the Local Computer. 6. The RGS Audio Player on the Local Computer decodes the received audio, and sends it to the audio mixer. 7. The output of the audio mixer is sent to the Local Computer audio device. 8. The audio device drives an audio output device, such as a speaker.	**USB devices are local:** 1. The user selects the microphone source, either a USB microphone or an analog microphone. The RGS Audio Recorder captures the selected microphone source. 2. The audio captured by the RGS Audio Recorder is sent by RGS to the RGS Audio Player on the Remote Computer. 3. The RGS Audio Player decodes the audio signal, and sends it to the HP Remote Microphone virtual device. 4. The HP Remote Microphone virtual device appears to the application as a local microphone, and sends the microphone audio to the application. **USB devices are Remote:** Beginning at RGS 5.2.0, certain USB microphones can be mounted to the Remote Computer using the remote USB driver—see Appendix B: USB devices supported by RGS on page 218 for the supported microphones. See the previous section for a description of Remote USB operation.

2.17.2 Remote audio on Linux

RGS on Linux also supports remote audio, allowing audio generated by the application on the Remote Computer to be captured and transmitted to the Local Computer for playback (presuming the Remote Computer has a physical audio device installed). In addition, microphone input on the Local Computer can be sent to the application running on the Remote Computer. However, unlike Windows, microphone input on Linux can be provided only via the remote USB driver. Figure 2-21 RGS audio subsystem on Linux on page 34 shows the RGS audio subsystem (green boxes), and the audio data paths for Linux—these data paths are described in Table 2-6 Linux RGS audio data paths on page 35. To simplify comparison with Windows, all audio components shown on the Windows diagram in Figure 2-20 RGS audio subsystem on Windows on page 32 are retained below, but partially obscured if not supported on Linux.

Figure 2-21 RGS audio subsystem on Linux

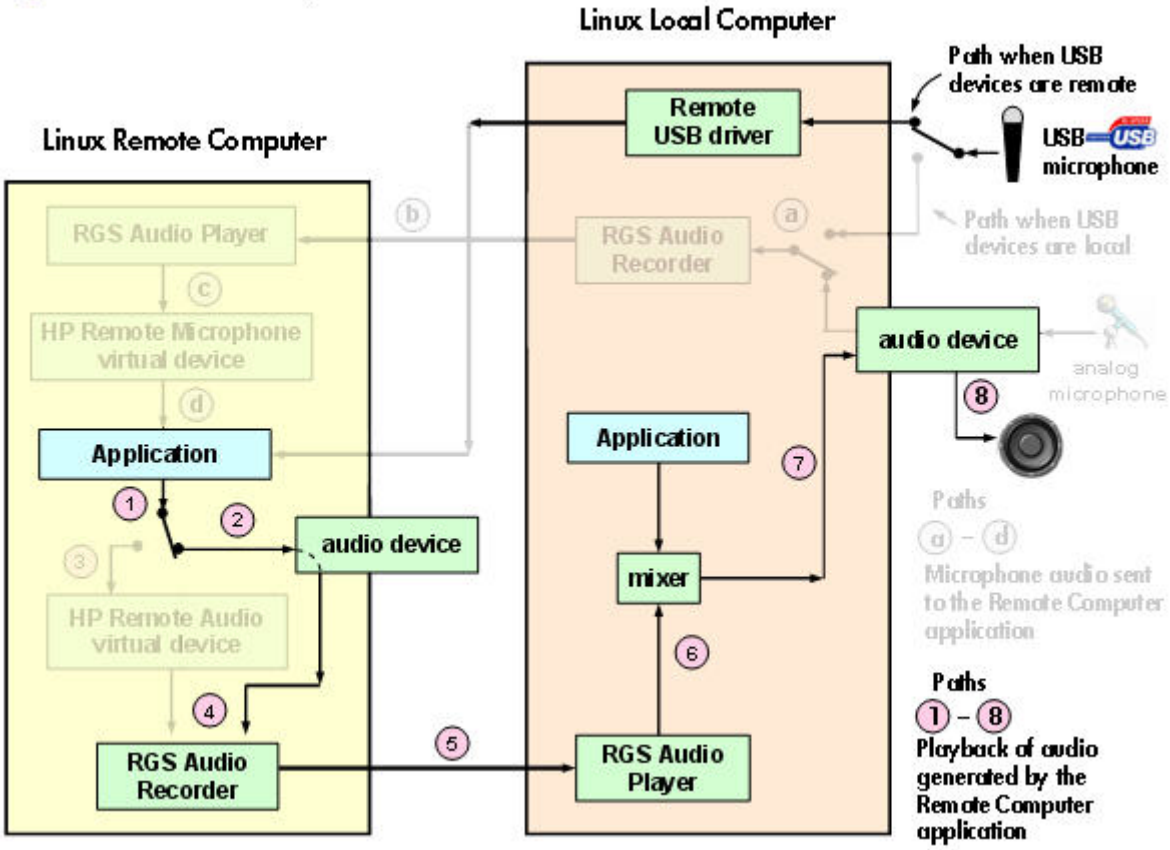


Table 2-6 Linux RGS audio data paths on page 35 describes each of the audio data paths. The numbering and lettering in the table correspond to the numbering and lettering in Figure 2-20 RGS audio subsystem on Windows on page 32. For a list of audio devices supported on Linux Remote Computers, see Appendix C: Linux remote audio device support on page 225 .

Table 2-6 Linux RGS audio data paths

Audio Playback from the Remote Computer to the Local Computer	Sending of microphone audio from the Local Computer to the Remote Computer
1. The application-generated audio output. 2. If an audio device is installed, the application-generated audio is routed through it. **NOTE:** HP Blade Workstations do not contain audio devices. Therefore, audio playback is not supported on blade workstations. 3. The HP Remote Audio virtual device is not supported on Linux. 4. Audio from either the audio device is sent to the RGS Audio Recorder. 5. The RGS Audio Recorder captures the audio, which is sent by RGS to the Local Computer. 6. The RGS Audio Player on the Local Computer decodes the received audio, and sends it to the audio mixer. 7. The output of the audio mixer is sent to the Local Computer audio device. 8. The audio device drives an audio output device, such as a speaker.	**USB devices are Local:** Linux does not support locally-mounted USB microphones. **USB devices are Remote:** Beginning at RGS 5.2.0, certain USB microphones can be mounted to the Remote Computer using the remote USB driver—see Appendix B: USB devices supported by RGS on page 218 for the supported microphones. See the previous section for a description of Remote USB operation.

2.17.3 Support of sound recording devices on Microsoft Windows

NOTE: The Windows **Sounds and Audio Devices Properties** dialog allows the user to select the "sound recording device". For simplicity, "microphone" is used below instead of "sound recording device". Remote microphone is not supported on Microsoft Windows Vista and Windows 7.

Prior to RGS 5.2.0, a Receiver-attached USB microphone couldn't be remotely connected to the Sender in the same manner as other remote USB devices (see Remote USB overview on page 24). Audio from a Receiver-attached USB microphone would need to be first processed by the Windows USB audio driver on the Receiver. The audio would then be sent to the RGS Audio Recorder (see Remote audio on Windows on page 32) for capture and transmission to the Sender.

In order for a USB microphone to be used in this manner, **USB devices are Local** must be selected in the Remote USB Configuration dialog during installation. This ensures the USB microphone is a local device, allowing its audio to be captured by the RGS Audio Recorder. This capability allows use of any USB microphone supported by Windows.

At RGS 5.2.0, the Remote USB driver (on the Local Computer) has been enhanced to support the USB isochronous data type, which is commonly used for streaming data such as that generated by audio and video devices. This enables certain isochronous USB microphones to be accessed directly by the Remote Computer in the same manner as other USB devices. See Appendix B: USB devices supported by RGS on page 218 for a list of supported USB microphones (listed under **Sound recording devices**).

To remotely attach USB microphones to the Remote Computer, either of these Remote USB Configuration settings can be selected:

- **USB devices are Remote**
- **USB devices are Local/Remote**

If **USB devices are Remote** is selected, a USB microphone can be accessed anytime by the Remote Computer. If **USB devices are Local/Remote** is selected, how the USB microphone can be accessed by the Remote Computer depends on when the microphone is connected to the Local Computer relative to establishment of the RGS connection. If the microphone is connected to the Local Computer prior to establishment of the RGS connection, the microphone will be a local device only, and will be accessible by the Remote Computer only via the Receiver RGS Audio Recorder. If the microphone is connected to the Local Computer after RGS connection establishment, the microphone will be a remote device only, and can be accessed directly by the Remote Computer. The figure in Remote audio on Windows on page 32 shows these two cases.

HP recommends using the audio access method introduced at RGS 5.2.0, whereby the Remote Computer can directly access the USB microphone, for the following reasons:

- The pre-RGS 5.2.0 audio access method continuously records and transmits audio independent of whether the application on the Remote Computer is requesting audio input. This can consume network bandwidth, especially when the level of background noise at the microphone is above the audio threshold used to detect valid audio.
- The RGS 5.2.0 audio access method allows audio parameters to be set by audio controls on the Remote Computer alone. The pre-RGS 5.2.0 audio access method requires setting audio parameters on both the Remote Computer and Local Computer.

2.17.4 Computers and operating systems which support RGS audio

The table below shows the computers and operating systems that support RGS audio. For further details on Remote Audio, see Remote audio operation on page 105.

Table 2-7 Computers and operating systems that support RGS audio

Receiver Audio Support Matrix	Windows XPe/ WES	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	Embedded Linux	RHEL V4 (update 5 or later) V5 (update 2 or later) 32-bit, 64-bit
Desktops					
Personal Workstations		X	X		HP xw and z series
Mobile Workstations		X	X		
Desktop PCs		X	X		

Table 2-7 Computers and operating systems that support RGS audio (continued)

Receiver Audio Support Matrix	Windows XPe/ WES	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	Embedded Linux	RHEL V4 (update 5 or later) V5 (update 2 or later) 32-bit, 64-bit
Notebook PCs		X	X		
Performance Thin Clients					
HP GT7725				HP ThinPro GT	
HP GT7720	XPe				
HP GT7720w	WES				
HP dc73 Blade WS Client				HP Blade WS Client	
HP dc72 Blade WS Client				HP Blade WS Client	
Mobile Thin Clients (may not be suitable for 720p and higher multi-media content)					
HP 4410t	WES				
HP 6720t	XPe				
HP 2533t	XPe				
Flexible and Mainstream Thin Clients (may not be suitable for 720p and higher multi-media content)					
HP t5730w	WES				
HP t5630w	WES				
HP t5730	XPe				
HP t5630	XPe				
HP t5720	XPe				
HP t5545				HP ThinPro	

Table 2-8 Computers and operating systems that support RGS 5.4.0

Sender Audio Support Matrix	Windows XP Professional SP1, SP2, SP3 32-bit, x64	Windows Vista Business, Ultimate and Enterprise 32-bit, 64-bit Windows 7 Professional and Enterprise 32 bit and 64 bit	RHEL V4 (update 5 or later) V5 (update 2 or later) 32-bit, 64-bit
Blade Clients			
HP Blade Workstations	X	X	
HP Blade PCs	32–bit only	32–bit non-aero only	
VDI Servers	32–bit hosted desktop	32–bit non-aero only	
Desktops			
Personal Workstations	X	X	HP only (customer configured)
Mobile Workstations	X	X	
Desktop PCs	X	X	
Notebook PCs	X	X	

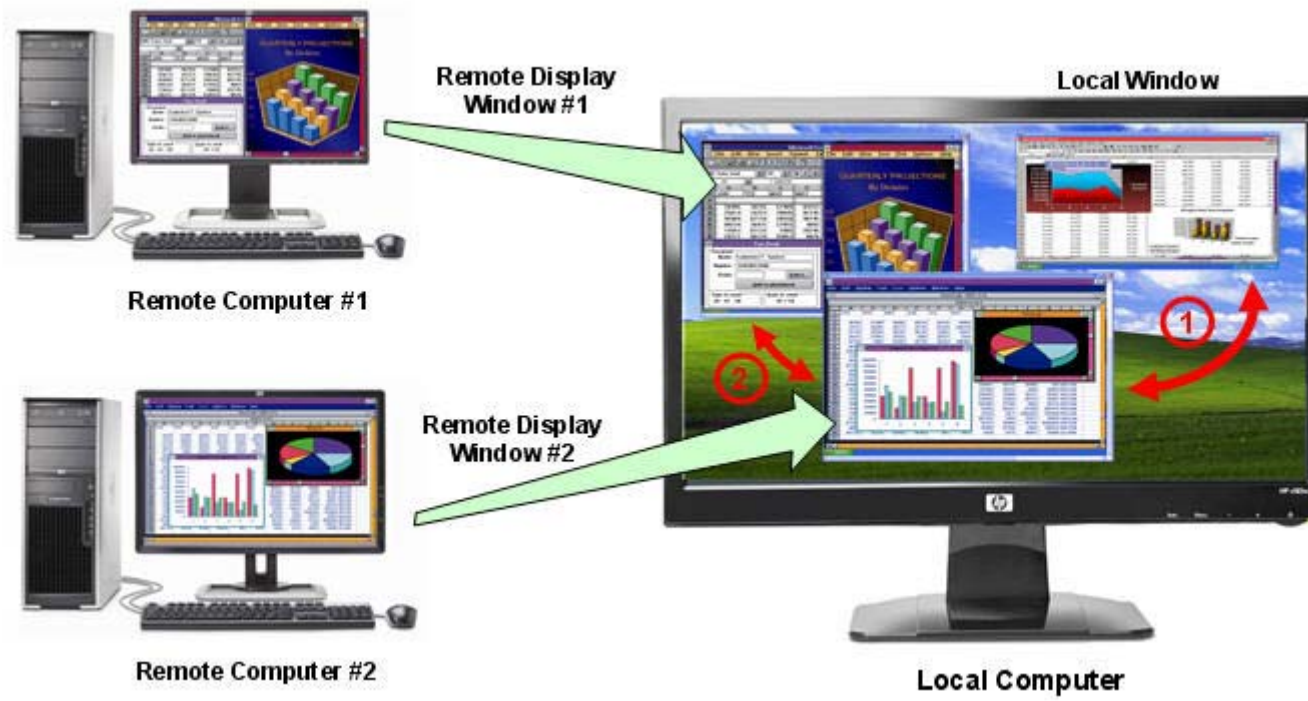
2.18 Remote Clipboard overview

Remote Clipboard was originally supported with RGS 5.1.3, enabling the user to cut or copy data between a window on the Local Computer (the Local Window) and a Remote Display Window (provided that both the Remote and Local Computers are running Windows, and the applications being used support cut and paste, and copy and paste. Beginning with RGS 5.3.0, Remote Clipboard cut and paste of ANSI text data is supported between Microsoft Windows Receiver systems and Linux Sender systems.

NOTE: For simplicity, the phrase “cut and paste” is used subsequently to refer to both cut and paste as well as copy and paste.

At RGS 5.2, support was added for cut and paste between two Remote Display Windows (see the graphic below).

Figure 2-22 Remote Clipboard operation



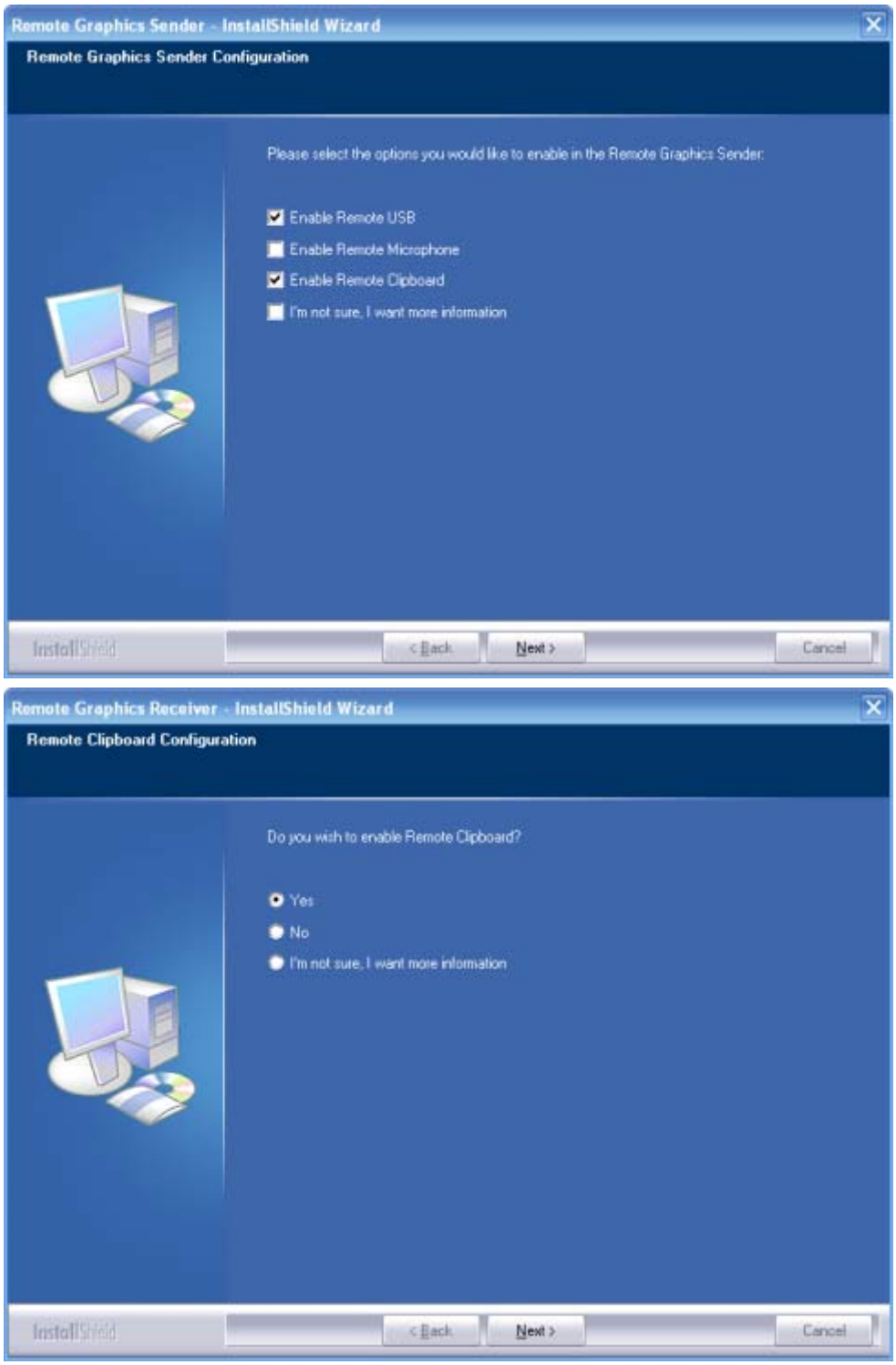
Cut and paste are supported in the following scenarios.

1. **Between a Local Window and a Remote Display Window (in both directions)**—The Remote Computer may be running Windows or Linux. The Local Computer must be running Windows.
2. **Between two Remote Display Windows (in both directions)**—In this case, the Local Computer can be running either Windows or Linux; the Remote Computers may be running Windows or Linux.

NOTE: Not all data formats can be transferred using cut and paste between Windows applications. See Remote Clipboard operation on page 137 for detailed information on the supported formats.

In order for Remote Clipboard to be usable, it must be enabled during *both* the Sender and Receiver installations on Microsoft Windows (see the Manual installation of the Receiver on Windows on page 45" and the Manual installation of the Sender on Windows on page 51) for further information on Remote Clipboard installation.

Figure 2-23 Enabling Remote Clipboard during Sender and Receiver installation on Microsoft Windows systems.



For details on using Remote Clipboard, see Remote Clipboard operation on page 137

Following installation, Remote Clipboard on Windows can be enabled or disabled via a toggle in the Receiver's controls.

2.19 Interoperability of RGS and Microsoft Remote Desktop Connection

This section discusses interoperability considerations for RGS and Microsoft Remote Desktop Connection (RDC). Because RGS and RDC both provide connection to a remote desktop, their interoperation is important to understand.

If a local user is connected to a Remote Computer using RDC, and then attempts to establish an RGS connection, the RGS connection only works if the local user credentials match for both connections. This implies that the same user wants access to transition from RDC to an RGS connection. If the credentials match, the current RDC session disconnects, and the RGS Receiver takes control of the Remote Computer Windows desktop session. The current user does not log off, and work continues with the new connection.

The reverse works as well. If a user is connected with RGS, and then connects with RDC (using the same credentials as the RGS connection), the RDC connection displaces the RGS connection. In this case, the RGS Sender will disconnect all Receivers (including all RGS collaborators). The Windows desktop session remains active during the switch.

If an RDC user disconnects from a Remote Computer using the RDC disconnect button, the session remains logged in, and all applications continue to run. The session, however, locks its screen. An RGS connection works only if the credentials match the currently logged-in user.

If a user logs out of their session while using RDC, the RGS Sender returns the system to its initial logged out state. Any authorized user can connect and log into this system using RGS.

An RDC connection made to a Sender already occupied with a RGS connection by a non-matching user prompts the new user to logout the current RGS user. Only administrators can log out other users. Non-administrators are refused with a warning message about permissions. If RDC logs out the current RGS user, then the Sender disconnects all of its receivers (including all RGS collaborators).

Under reverse circumstances for the above, RGS connections will not log out an existing RDC user, regardless of authority. RGS will report an authorization failure message concerning a different user owning the desktop

2.20 Using RGS with desktop virtualization

In addition to using RGS to capture, compress, and transmit the contents of the frame buffer, RGS can also be used in a desktop virtualization environment to capture, compress, and transmit the contents of a virtual frame buffer. A virtual frame buffer is a segment of system memory that is used to store the desktop image to be displayed. HP's Virtual Desktop Infrastructure (VDI) solution allows multiple user desktop sessions to run as separate virtual machines, while sharing the underlying physical hardware resources such as CPU, memory, networking, and storage. For information on VDI, visit http://www.hp.com/go/vdi.

For information on installing and using RGS in the VDI environment, see Appendix A: Using RGS with HP VDI on page 209.

2.21 Remote Computer power saving states

In order for a Local Computer to establish connection to a Remote Computer, the Remote Computer cannot be in a power saving state, such as Windows hibernate or standby. Furthermore, the Remote

Computer cannot utilize wake-on-LAN in an attempt to power-up in order to respond to a connection request from the Local Computer—the Remote Computer must be powered-up, and able to respond to an RGS connection request at all times.

2.22 Supported keyboard locales

The following keyboard localizations are supported when connected to a Linux Sender:

1. French
2. German
3. Japanese
4. Norwegian
5. Swedish
6. United Kingdom
7. U.S. English

The following keyboard localizations are supported when connected to a Windows Sender:

1. Belgian French
2. Canadian French
3. Chinese (Simplified) – US Keyboard
4. Chinese (Traditional) – US Keyboard
5. Czech
6. Czech (QWERTY)
7. Danish
8. Dutch
9. Finnish
10. French
11. German
12. Italian
13. Japanese
14. Korean
15. Latin American
16. Norwegian
17. Portuguese
18. Portuguese (Brazilian ABNT)
19. Russian
20. Spanish

21. Swedish
22. Swiss French
23. Swiss German
24. Turkish Q
25. United Kingdom
26. United Kingdom Extended
27. United States-International
28. US

2.23 RGS security features

Because of the distributed nature of an RGS connection, providing connection security is critically important. RGS implements many features to provide connection security, including:

- **Authentication**: When a local user attempts to connect to a Remote Computer, the user credentials are validated using the native authentication method on the Remote Computer. If the credentials are not authenticated, the connection is closed. On Windows, authentication uses NTLM or Kerberos. On Linux, authentication uses the Pluggable Authentication Module (PAM).
- **Authorization**: Multiple connections to the same Remote Computer are only allowed if the user logged into the desktop of the Remote Computer (primary user) allows the connection. When another user attempts to connect to the Remote Computer, an authorization dialog is displayed on the desktop of the Remote Computer that asks whether the new user should be allowed to connect.
- **Automatic desktop locking**: The desktop of the Sender system locks when the primary user disconnects. This prevents collaboration users from being able to interact with a remote session after the primary user has disconnected. This feature is supported on Windows. On Linux, this feature is supported on the Gnome, KDE, and CDE desktop environments.
- **Automatic disconnect**: On Linux, all Receivers will disconnect when the primary user disconnects. This prevents collaboration users from interaction with a remote session after the primary user disconnects.
- **Automatic disconnect of collaboration users on Login**: All collaboration users are disconnected when a login event occurs. Only the primary user remains connected when the desktop of the remote computer is logged in.
- **Automatic disconnect on log off**: All Receivers are disconnected when the primary user logs off of the remote desktop. This can be disabled by setting the IsDisconnectOnLogoutEnabled Sender property to "0". See the Sender properties for more information.
- **Connection status**: A desktop icon in the application tray animates when other users are connected.
- **Collaboration notification**: See Collaboration notification dialog on page 100.
- **Connections are not allowed when an iLO remote console is enabled**: If the iLO remote console is enabled on a HP Blade Workstation, connections to the blade using RGS are denied.

- **Disconnect Everyone**: All Receivers can be easily disconnected using the Sender GUI. This is useful when hosting a collaboration session, such as in a classroom environment, and the session ends. The Sender GUI is an icon in the system tray. Simply rightclick on the GUI and select **Disconnect->Everyone**.
- **Remote Keyboard/Mouse**: The Sender GUI can enable or disable mouse and keyboard input for all collaboration users.
- **Single user connection**: A user, identified by a username, is only allowed one connection to a RGS Sender. If the same username connects more than once to a Sender, the previous connection drops and the new connection continues on. If several users attempt to share a username, only one connection is active at a time.
- **SSL encryption**: SSL securely encrypts all data transmitted between a Receiver and Sender pair.

3 Installing RGS

This chapter describes the following aspects of installing RGS:

- Installing the RGS Receiver on Windows
- Installing the RGS Sender on Windows
- Installing the RGS Receiver on Linux
- Installing the RGS Sender on Linux

NOTE: RGS licensing applies to the RGS Sender only. The RGS Receiver is a free download and can be used on any number of computers. Licensing of the RGS Sender on Windows and Linux is described in the HP Remote Graphics Software Licensing Guide, available at http://www.hp.com/support/rgs_manuals. Note that Sender licensing is checked when an RGS connection is established; therefore, the licensing mechanism has no affect on downloading the RGS product, and installing the RGS Sender.

However, as described in RGS licensing on page 12 , installing the RGS Sender without a valid license will result in an error dialog being displayed in the Remote Display Window. Therefore, before downloading a new RGS version, and installing a new RGS Sender, ensure that your RGS license entitles you to use the new Sender version. Again, refer to the HP Remote Graphics Software Licensing Guide at http://www.hp.com/support/rgs_manuals for detailed information.

NOTE: The RGS Sender is configured to start when the Sender computer boots (or, in the case of Linux, also when the X server starts). The RGS Receiver can be started from a command line. However, because the Receiver can also be started from the start menu (on Windows), both methods of starting the Receiver (on a command line and using the start menu) are described together, in Using RGS in Normal Mode on page 86 .

3.1 Installing RGS on Windows

This section describes installation of the RGS Receiver and Sender on Windows. See Supported computers and operating systems on page 9 for a list of the Windows operating systems that support the RGS Receiver and Sender.

3.1.1 Installing the Receiver on Windows

This section describes manual and automatic installation of the RGS Receiver on Windows.

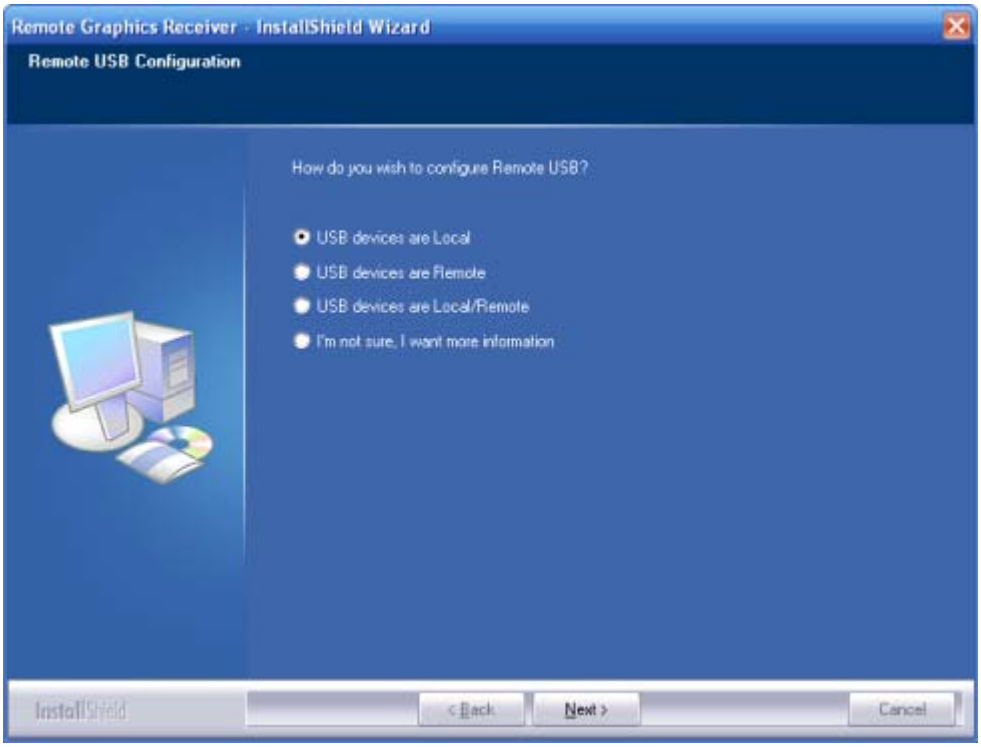
3.1.1.1 Manual installation of the Receiver on Windows

To install the Receiver on Windows, log into an account with administrator privileges, and perform the following steps:

1. Go to the directory where you downloaded RGS, and change to the directory WIN32\RECEIVER.
2. Double-click **Setup.exe** to start the Receiver installation, and follow the instructions on the screen.

3. During the installation, the Remote USB Configuration dialog is displayed (see Figure 3-1 Receiver Remote USB configuration dialog on page 46 and Remote USB overview on page 24). Additional information can be viewed by selecting **I'm not sure, I want more information** , and clicking **Next**. Select the USB configuration option that meets your needs, and click **Next**.

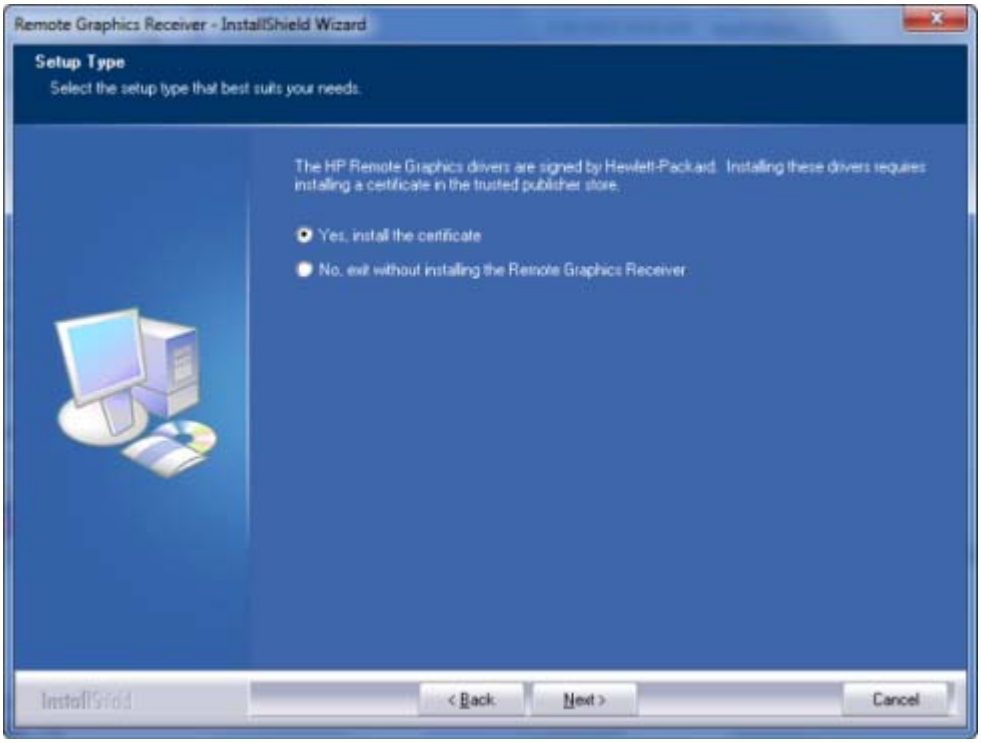
Figure 3-1 Receiver Remote USB configuration dialog



NOTE: For many USB devices, the Windows operating system provides default USB drivers. While these default drivers may, in fact, work with your USB devices, it is recommended that you install the manufacturer supplied USB drivers to optimize functionality and performance of your USB devices. The manufacturer supplied driver should be installed on the computer, Local or Remote, where the USB devices will be *logically* (not physically) attached.

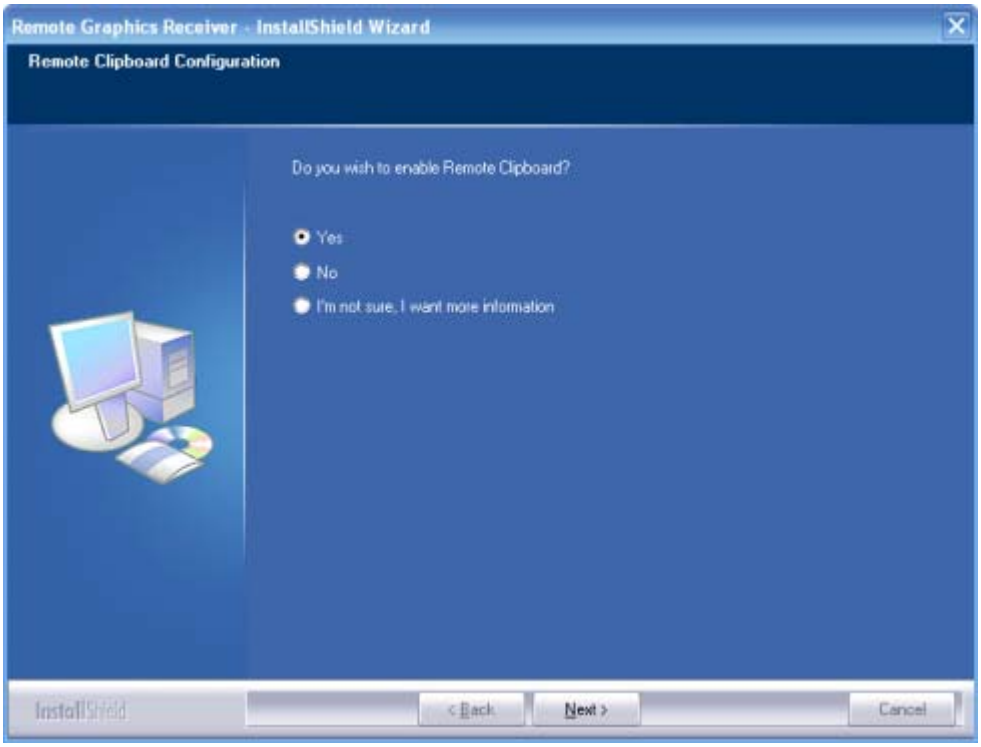
4. If **USB devices are Remote** or **USB devices are Local/Remote** is chosen on Windows Vista or Windows 7, the following certificate installation dialog will be presented. Installation of the certificate is required for installation of the RGS remote USB driver. Select **Yes, install the certificate** to continue installing the Receiver.

Figure 3-2 Receiver driver certificate dialog



5. The Remote Clipboard Configuration dialog is displayed next (seeFigure 3-3 Remote Clipboard Configuration dialog on page 48 and Remote Clipboard overview on page 38). Additional information can be viewed by selecting **I'm not sure, I want more information**, and clicking **Next**. Select the desired Remote Clipboard Configuration option, and click **Next**.

Figure 3-3 Remote Clipboard Configuration dialog



NOTE: Selecting "Yes" will cause the hprclipboard.dll library to be installed with the RGS Receiver. If you select "No", this DLL won't be installed and you won't be able to use Remote Clipboard. To enable Remote Clipboard later, you would need to reinstall the RGS Receiver, and select "Yes" in the above dialog.

6. The final installation step will normally prompt you to restart your computer.

3.1.1.2 Automatic installation of the RGS Receiver on Windows

The RGS Receiver can be installed or removed in automatic mode. Automatic mode allows the Receiver to be installed or removed without any user interaction. Automatic mode will also restart the computer, if required, after the installation process completes.

Should an illegal combination of command line options be specified, or if an error occurs during the install process, the install will abort and the error will be logged to the Receiver installation log file.

3.1.1.2.1 Usage

Setup.exe /autoinstall /agreetolicense	[/folder=<folder>] [/usb=local | /usb=remote | /usb=localRemote] [/clipboard] [/noreboot] [/removesettings]

Setup.exe /autoremove [/noreboot]

Setup.exe /viewlicense

Setup.exe /help

3.1.1.2.2 Command line options

/autoinstall	
	This option performs one of the following: • Installs the Receiver if it's not already installed. • Updates the Receiver if a prior version of the Receiver is already installed. • Repairs the Receiver if the version being installed is the same as the version that is already installed. The Receiver will not be reinstalled if the version of the Receiver being installed is older than the version of the Receiver already installed.

/agreetolicense	
	Use of this option indicates that the user agrees to the license for use of this software. This option is required when doing an install.

/autoremove	
	Remove the Receiver.

/folder=<folder>	
	Specifies the destination folder, default is C:\Program Files\Hewlett-Packard\Remote Graphics Receiver.

/usb=local	
	Install USB in Local Mode.

/usb=remote	
	Install USB in Remote Mode. The system will automatically restart after the install completes.

/usb=localRemote	
	Install USB in Local/Remote Mode. The system will automatically restart after the install completes. This is the default if none of /usb=local, /usb=remote, and /usb=localRemote are specified.

/clipboard	
	Enable remote clipboard.

/noreboot	
	Do not reboot the system when the setup requires a reboot to complete.

/removesettings	
	Removes the user specific Receiver settings from the registry.

/viewlicense	
	Displays the EULA (End User License Agreement) for use of this software.

/help	
	Display usage text.

3.1.1.3 Receiver installation log file

Installation of the Receiver creates an installation log file. This log file can be viewed by the user to obtain details about what operations were performed, and view any errors that occurred during the installation process. When Setup.exe for the RGS Receiver is run, the following log file is created:

%TEMP%\rgreceiverInstaller

The log file is especially useful for automatic installs because installer errors are not displayed on the screen, and are only viewable using the log file. If the log file already exists when the installer is run, the installer will remove the current contents of the log file before writing to it. This prevents the log file from growing without bounds.

3.1.1.4 Uninstalling the RGS Receiver on Windows

To uninstall the RGS Receiver, use the Windows Add or Remove Programs feature from the Control Panel. Select Remote Graphics Receiver, and click **Change/Remove**. A dialog box will open with choices for: **Repair** or **Remove**. Choose **Remove** to uninstall the RGS Receiver. On certain client computers simply re-run the setup.exe program that you used to originally install the Receiver in place of using the Windows Add or Remove Programs feature.

NOTE: After the Receiver is uninstalled, you may be prompted to restart your computer. This restart is very important—if it's not performed, installation of a later version of the RGS Receiver may not succeed.

3.1.2 Installing the Sender on Windows

NOTE: The Sender can only be installed on the computers and operating systems shown in Supported computers and operating systems on page 9. Installing the Sender on a non-supported computer will prevent an RGS connection from being established.

This section covers the following topics:

- Manual installation of the Sender on Windows
- The Sender diagnostics tool, rgdiag.exe
- Starting and stopping the Sender
- Sender command line options on Windows
- The Sender GUI
- Automatic installation of the RGS Sender on Windows

NOTE: Starting with RGS 5.1.3, installation of the Sender on Windows may be performed remotely using Microsoft Remote Desktop Connection.

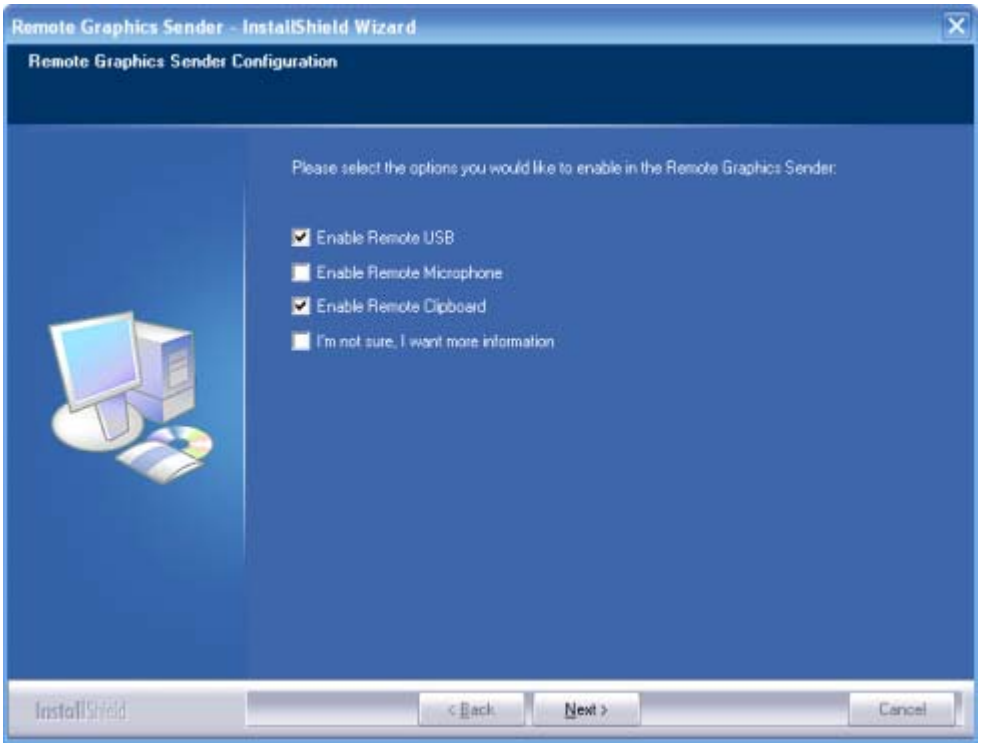
3.1.2.1 Manual installation of the Sender on Windows

To install the Sender on Windows, log into an account with administrator privileges, and perform the following steps:

1. Go to the directory where you downloaded RGS, and change to the directory win32\sender.
2. Double-click **Setup.exe** to start the Sender installation, and follow the instructions on the screen.
3. During the installation, the Remote Graphics Sender Configuration dialog is displayed (see Figure 3-4 Dialog to enable or disable Remote USB in the Sender on page 52). Check the boxes appropriate to your requirements, as follows:
   - **Enable Remote USB**—Check this box if USB devices attached to the Local Computer need to be accessible by the Remote Computer. For further information, see Remote USB overview on page 24.
   - **Enable Remote Microphone**—Check this box to enable remote microphone. Remote microphone is not supported on Microsoft Windows Vista and Windows 7 therefore; this option is not available on Windows Vista and Windows 7. (see Remote audio on page 31)

- **Enable Remote Clipboard**—Check this box if your Local Users will need Remote Clipboard capability. For further information, see Remote Clipboard overview on page 38
- **I'm not sure, I want more information**—For further information, check this box, and click **Next**.

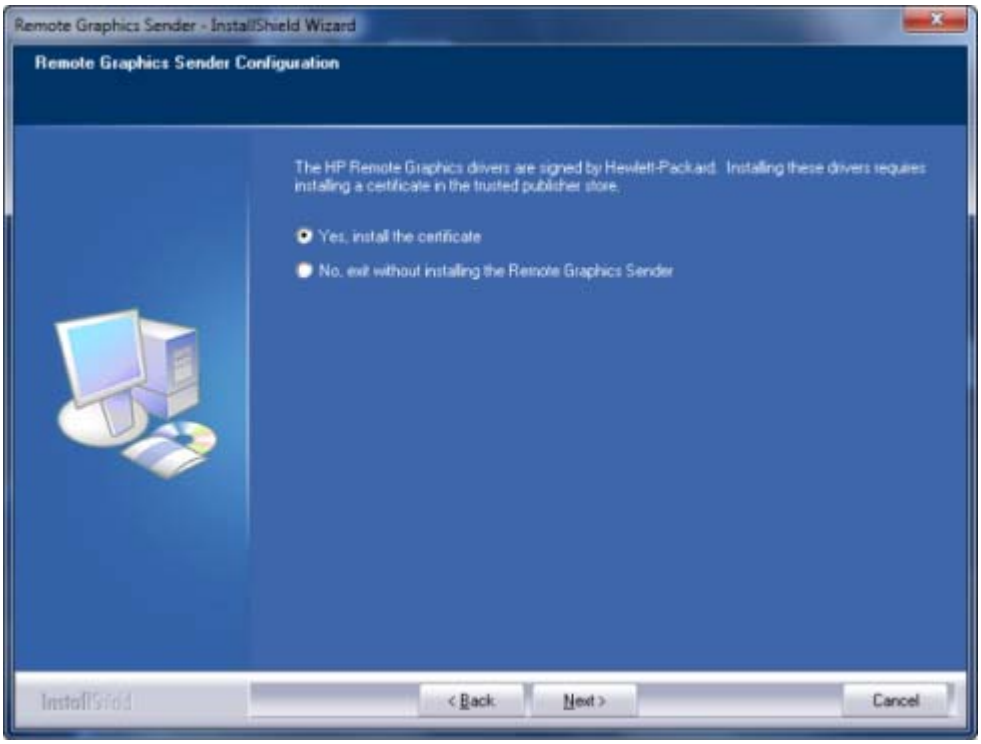
Figure 3-4 Dialog to enable or disable Remote USB in the Sender



NOTE: For many USB devices, the Windows operating system provides default USB drivers. While these default drivers may, in fact, work with your USB devices, it is recommended that you install the manufacturer supplied USB drivers to optimize functionality and performance of your USB devices. The manufacturer supplied USB driver should be installed on any computer, Local or Remote, where the USB devices will be logically (not necessarily physically) attached.

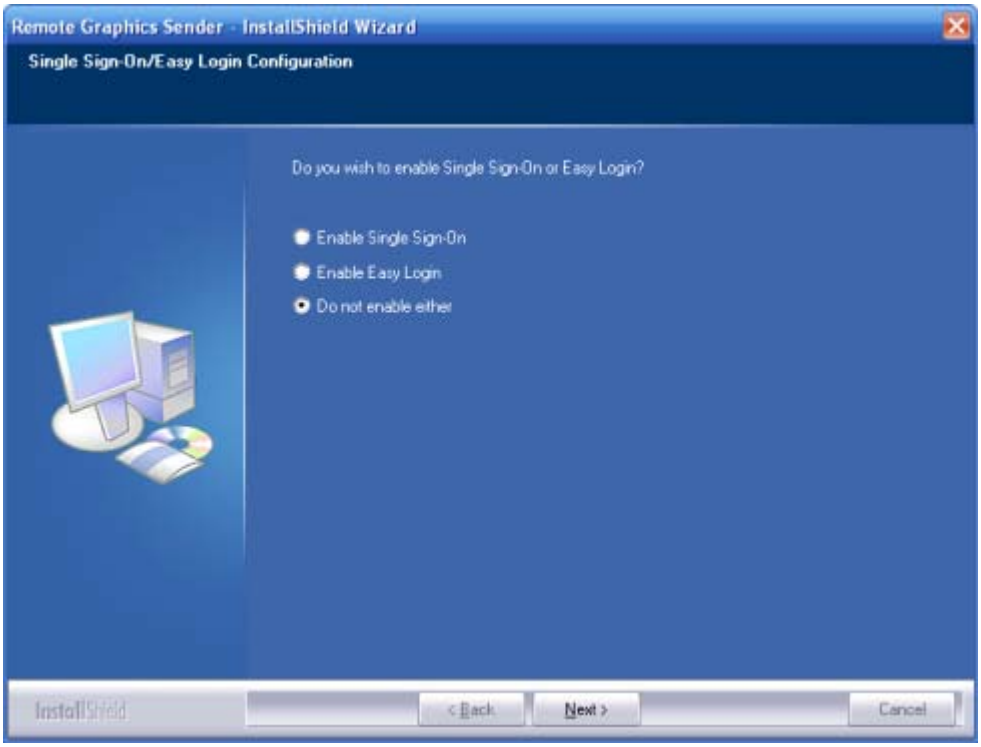
4. On Windows Vista and Windows 7, the following dialog for installing the RGS driver certificate is presented. Installation of the certificate is required to install the RGS Sender drivers. Select **Yes, install the certificate** to continue installing the Sender.

Figure 3-5 Sender driver certificate installation dialog



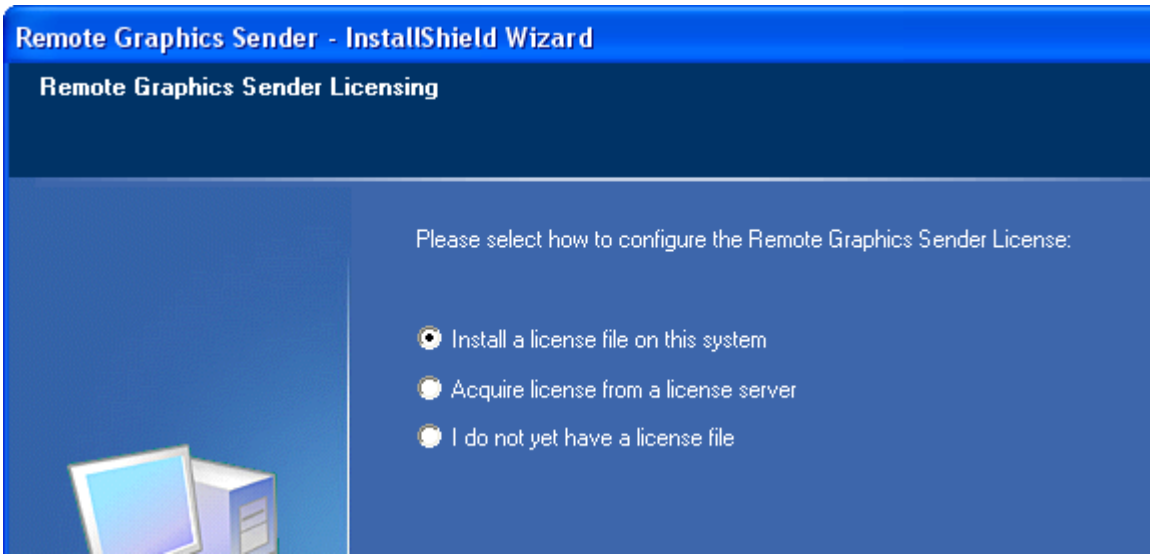
5. If you are installing the Sender on HP blade workstations or HP personal workstations running Windows XP Professional, you will be presented with a dialog to enable either Single Sign-On or Easy Login. If you're not sure, you will be able to configure them later using the rgadmin.exe tool.

Figure 3-6 Dialog to enable Single Sign-On or Easy Login



6. Next, the Sender installer will prompt you for the Sender license. If you have a Sender license file, click the appropriate radio button, click **Next**, and provide the requested information. If you don't yet have a license file, click I do not yet have a license file and click Next. You can install your license file later.

Figure 3-7 Configuration of the RGS Sender license



NOTE: Absent a license file, the RGS Sender will still function correctly, and you'll be able to establish a connection from the RGS Receiver. However, the dialog shown in RGS licensing on page 12 will be displayed in the Remote Display Window. Installation of the license file is described in detail in the HP Remote Graphics Software Licensing Guide, available at http://www.hp.com/support/rgs_manuals

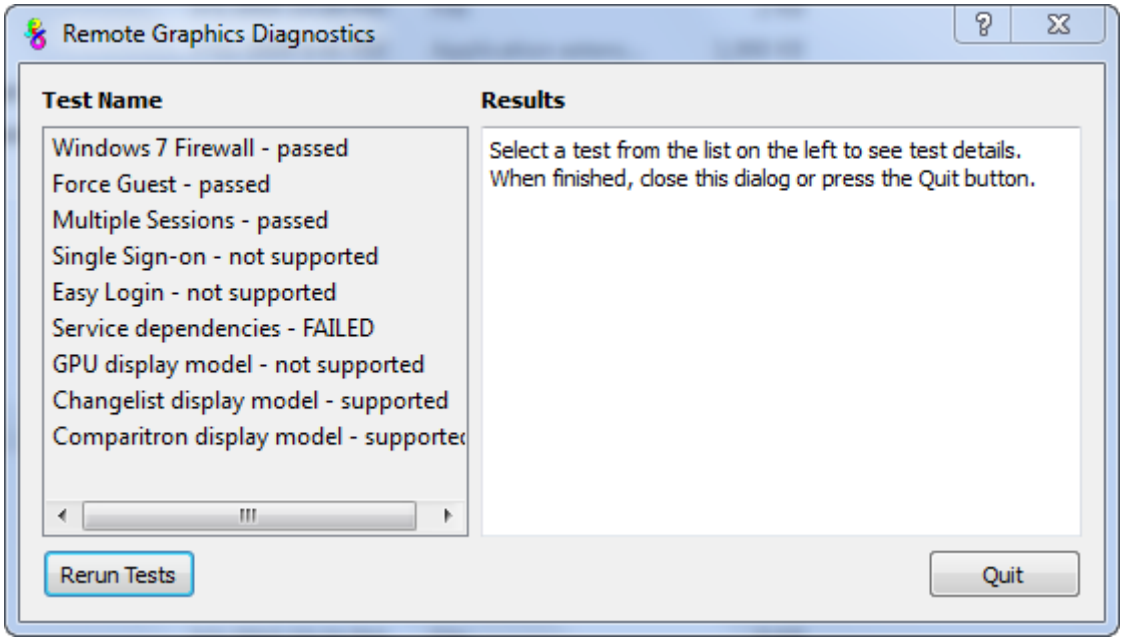
7. You will be prompted to restart your computer after the Sender installation is complete. Select **yes** when asked to restart the system.

3.1.2.2 Using the RGS Diagnostics Tool on Windows

During the installation of the Windows Sender, the RGS Diagnostics Tool (rgdiag.exe) is installed. The tool can be used to detect potential issues (such as Windows firewall settings, Guest Account security policies, RDP interoperability, and Easy Login settings) that might prevent a remote connection. The

dialog Figure 3-8 Output of the RGS Diagnostics Tool on page 56 shows the output generated by the tool.

Figure 3-8 Output of the RGS Diagnostics Tool



The **Test Name** left panel shows the list of tests that have been run. Selecting a test with the mouse will display additional information in the **Results** right panel. The **Rerun Tests** button on the bottom left reruns all tests. The example window shows that all tests have passed with the exception of the Service dependencies test. To determine what this test looked for, why it failed, whether this failure would prevent connections, and how to fix the problem, click on the Service dependencies test title to display its details in the **Results** panel.

The RGS Diagnostics Tool can be run any time after RGS Sender installation. To run the Diagnostics Tool, use Windows Explorer to display the RGS Sender installation folder, and locate the rgdiag.exe program with the RGS icon. On a 32-bit Windows system, this tool is normally located at:

C:\Program Files\Hewlett-Packard\Remote Graphics Sender\rgdiag.exe

3.1.2.3 Starting and stopping the Sender on Windows

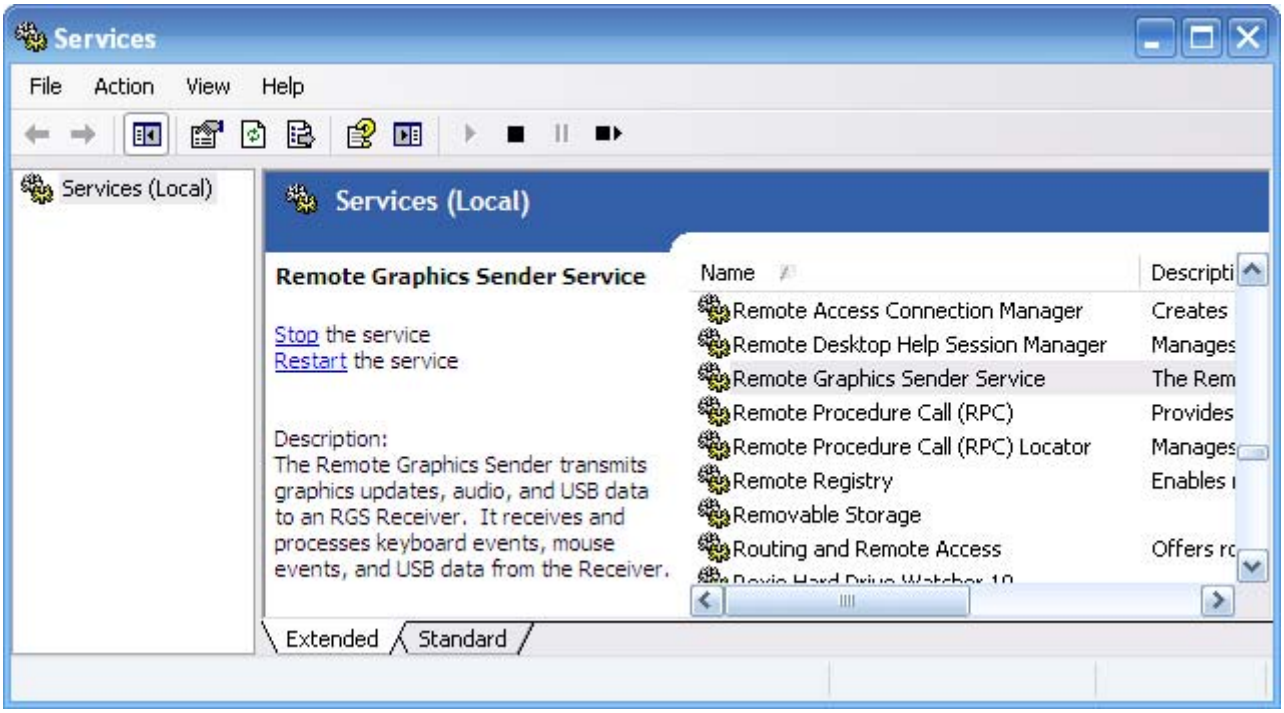
Following a successful installation, the Sender is automatically started each time Windows starts.

By default, the Sender installs one executable as a Windows Service. This is necessary to enable some features, such as the ability to send CTRL-ALT-DEL key sequences, and also view locked screens. Additionally, installing the Sender service executable as a service allows Windows to automatically start the Sender service process when the computer is started.

You can control Windows Services by accessing the "Services" panel. The "Services" panel can be accessed from the Windows **Control Panel** and selecting **Administrative Toolsl**. Figure 3-9 The Remote Graphics Sender service on page 57 shows the Administrative Tool for Services. The Remote Graphics Sender is highlighted. The status of the service is "Started", and the service is configured to start up automatically. By right clicking on the Remote Graphics Sender service, the service can be

stopped, started, or resumed. Additionally, the properties of the service can be controlled such as the start-up type, and the recovery mode.

Figure 3-9 The Remote Graphics Sender service



3.1.2.4 Sender command line options on Windows

The Windows Sender is comprised of two processes, one of which runs as a Windows Service. When the Remote Computer boots, the installed services are typically started. The service process, rgsendersvc.exe will then start the RGS Sender process rgsender.exe. When the RGS Sender is installed, an entry is added in the Windows Registry for the Remote Graphics Sender service.

rgsender.exe supports the following options passed to it via registry parameters to rgsendersvc.exe (see the registry editing instructions below):

[-nocollab]

[-timeout value]

[-authtimeout value]

[-l logSetupFile]

[-v | -ver | -version]

[-h | -help | -?]

[-belownormal | -normal | -abovenormal | -high]

[-Rgsender.propertyname=value]

The functionality of each option is as follows:

-nocollab—Disables collaboration. When specified, only the primary user can connect to the Sender.

-timeout value—The timeout in milliseconds used to detect and disconnect an inactive connection. This option sets the property Rgsender.Network.Timeout.Error. See Adjusting Network timeout settings on page 127 for more details.

-authtimeout value—The timeout in milliseconds used to detect and notify the user of a network disruption. This option sets the property Rgsender.Network.Timeout.Dialog. See Adjusting Network timeout settings on page 127 for more details.

-l logSetupFile—Specifies the "logSetupFile" file used to describe various logging parameters for Sender error and informational output. This file is used to determine where the output goes (to a file or to standard error) as well as the type of output logged (INFO or DEBUG). At installation, the Sender default is with "-l logSetup" turned on, where the logSetup file in the installation directory is set for output to a file named rg.log at INFO debug level.

[-v | -ver | -version] —Prints the Senders version information and is useful from a command window.

[-h | -help | -?] —Prints a listing of the various command line options, those that are listed on this page and is useful from a command window.

-belownormal —Sets the process priority of the Sender to below normal.

-normal —Sets the process priority of the Sender to normal. This is the default priority.

-abovenormal —Sets the process priority of the Sender to above normal.

-high —Sets the process priority of the Sender to high.

-Rgsender.propertyname=value—Can be used to specify one or more RGS Sender properties. See RGS properties on page 153 for general information on RGS properties. For information specifically on RGS Sender properties, see RGS Sender properties on page 174

regedit can be used to modify the parameters that are used for starting the Sender by the Sender service as follows:

1. Start regedit —This can be done by opening a Windows command prompt and executing the command “regedit” or using the "run" command line from the Start menu.
2. Using regedit, navigate to the key:

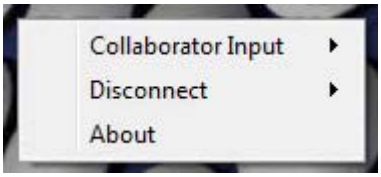
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\rgsender
3. 3. Add the desired process priority command-line option for starting the Remote Graphics Sender service. For example, to increase the process priority to high add the “-high” option to the key “ImagePath” as follows: "C:\Program Files\Hewlett-Packard\Remote Graphics Sender \rgsendersvc.exe":

   -l logSetup -high
4. Restart the Sender service and RGS Sender with the new option. This can be done using the Windows Service Control Manager (see Starting and stopping the Sender on Windows on page 56) or by re-starting the computer.

3.1.2.5 The Sender GUI on Windows

The Sender displays the HP Remote Graphics Software icon in the application tray. The icon animates when Receivers are connected to the Sender. Right click on the icon to display the Sender GUI (see Figure 3-10 Sender GUI on page 59).

Figure 3-10 Sender GUI



The following options are provided by the Sender GUI:

- **Collaborator Input> Enable or Disable**—If Disable is selected, all local users are in view-only mode—only the primary user can control the Remote Computer desktop using a keyboard and mouse. If Enable is selected, all local users (and the primary user) can interact with the Remote Computer desktop.
- **Disconnect > Collaboration Users or Everyone**—Disconnects Receiver sessions for either collaboration users or all users.
- **About**—Displays the RGS program information.

3.1.2.6 Setting the Windows Sender process priority

This section discusses adjusting the process priority of the Windows Sender. The default process priority of the Windows Sender is **normal**. In some cases, increasing the process priority of the Sender will improve interactivity— for example, when the Windows scheduling algorithms does not give the RGS Sender sufficient CPU time to maintain smooth interactivity. Networking performance can also contribute to reduced interactivity.

The Windows Sender on some laptops has exhibited inconsistent performance. Increasing the Sender priority to **high** usually improves interactivity in this case. This provides the Sender more frequent access to the CPU, and improves the update frequency to the Receiver.

Process priority for the Sender is command line accessible for the Windows Sender. Four command-line options are available:

- -belownormal
- -normal
- -abovenormal
- -high

Priorities low and realtime cannot be selected for the Windows Sender.

There are two ways to set the process priority of the Windows Sender:

- Use regedit to modify the rgsender service start up parameters in the Windows Registry. (see the regedit instructions in the Sender command line options on Windows on page 57 section)
- Use HP Performance Tuning Framework (PTF) to configure Windows Sender priority (available only on HP Workstations)

△ **CAUTION:** Adjusting the process priority of the Sender to a level higher than –normal can cause other normally privileged processes to receive fewer CPU cycles than normal. Therefore, caution should be observed in adjusting the priority of the Sender.

3.1.2.7 Setting the Sender process priority using PTF

The HP Performance Tuning Framework (PTF) can be used adjust the priority of the Sender without having to use regedit. PTF is available for HP Workstations only from this location: http://www.hp.com/workstations/software/framework/index.html

See the PTF help and documentation for further information.

3.1.2.8 Using the rgadmin tool

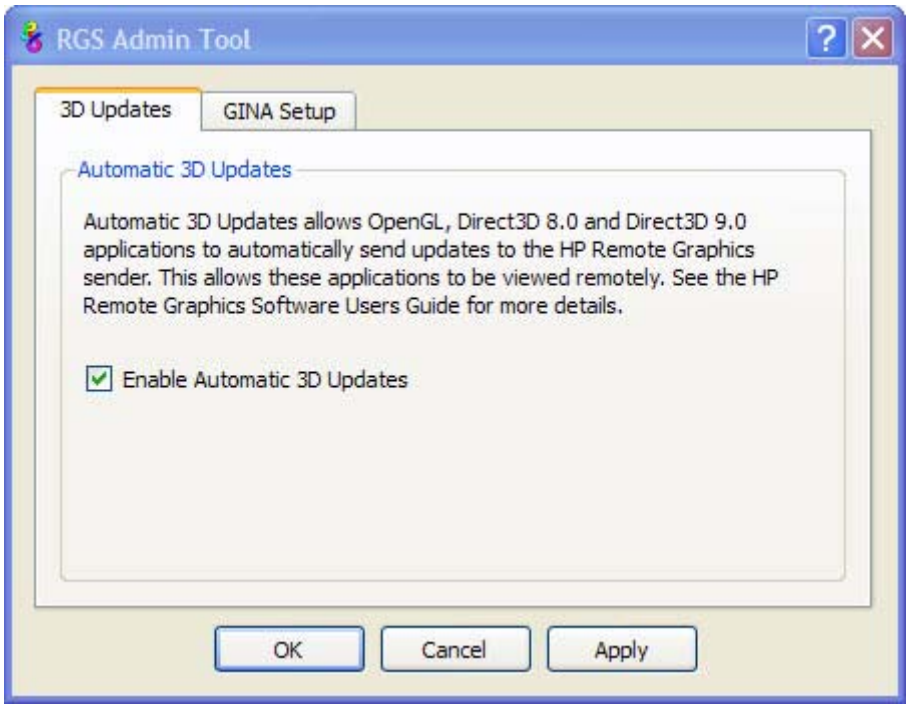
NOTE: The rgadmin tool is only installed and supported on Windows XP.

This section describes use of the Sender rgadmin.exe tool. For a normal Sender installation, this tool can be found at:

C:\Program Files\Hewlett-Packard\Remote Graphics Sender\rgadmin.exe

When run, the rgadmin.exe program displays two tabs. The **3D Updates** tab (see Figure 3-11 3D Updates tab on page 60) can be used to enable automatic 3D updates from the application to the Sender. These updates inform the Sender what screen rectangles have been changed by the 3D application.

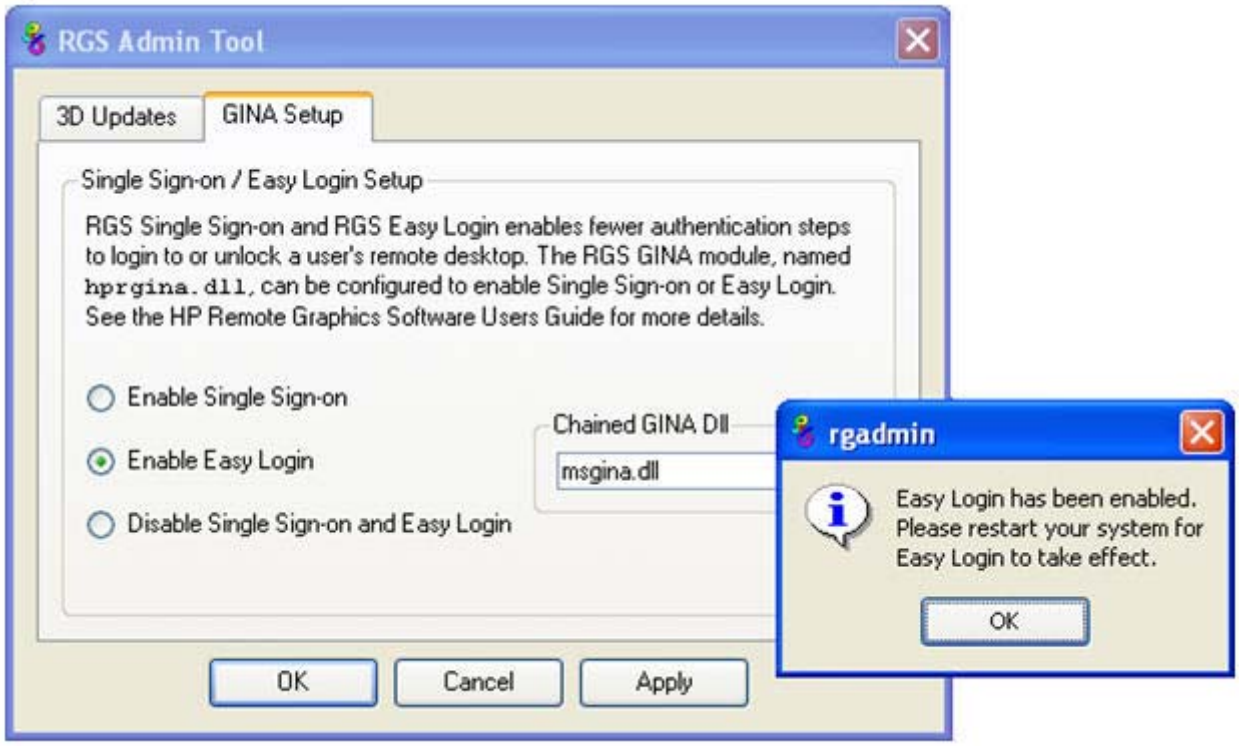
Figure 3-11 3D Updates tab



NOTE: RGS versions prior to RGS 4.0 required the manual placement of the RGS OpenGL32.dll library into the application directory for each application. For RGS 4.0 and later, this library may cause applications to fail on startup. Because automatic updates of OpenGL applications are now supported, the OpenGL32.dll library is no longer required, and should be removed from any application directories where it resides.

The **GINA Setup** tab on the rgadmin tool can be used to enable Single Sign-on and Easy Login (see Figure 3-12 Dialog to enable or disable Single Sign-on and Easy Login on page 61). When rgadmin is brought up, it reports the current status of Single Sign-on and Easy Login. To change the status, check the desired radio button. After clicking **Apply**, you'll be requested to restart your computer—this is required in order for the new setting to take affect.

Figure 3-12 Dialog to enable or disable Single Sign-on and Easy Login



3.1.2.9 Installing and enabling Single Sign-on

△ **CAUTION:** Installing RGS Single Sign-on is for experienced users and IT administrators only. Please read all directions completely before proceeding, and exercise caution when installing.

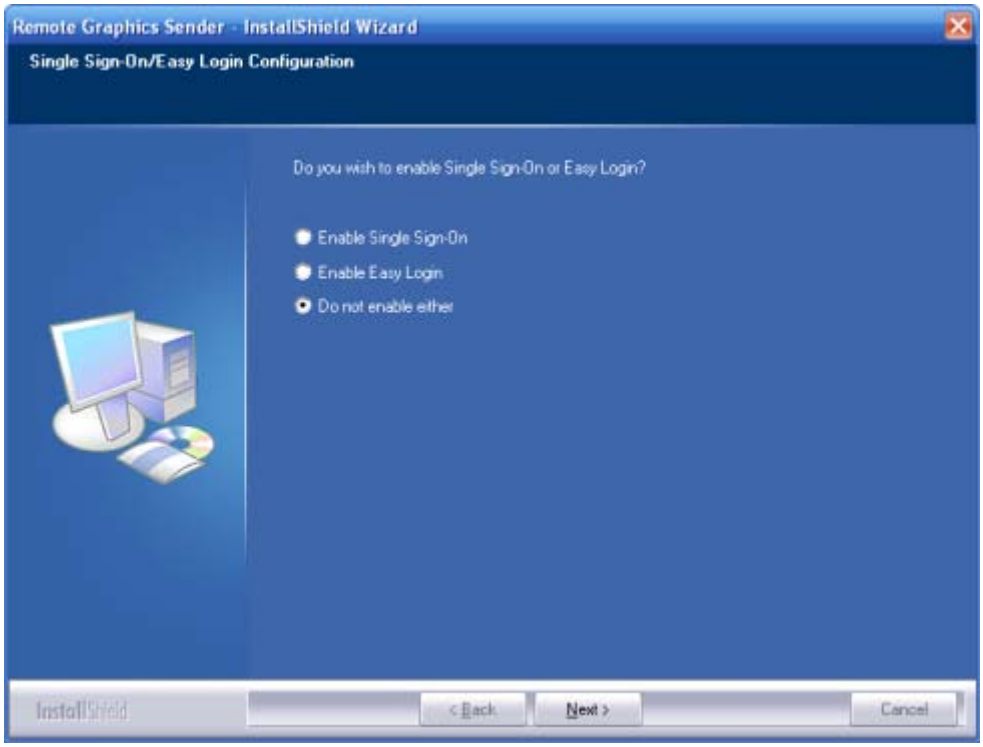
Single Sign-on is only supported on HP blade workstations running the RGS Sender. The RGS shared library, hprgina.dll, enables Single Sign-on. The file hprgina.dll is a GINA (Graphical Identification and Authentication) module that is loaded by the Windows WinLogon.exe process. There are three ways to install hprgina.dll, and therefore enable RGS Single Sign-on:

3.1.2.9.1 Enabling Single Sign-on during installation

Single Sign-on can be enabled during Figure 3-13 The dialog presented during Sender installation to enable Single Sign-on or Easy Login on page 62 installation—enabling Single Sign-on installs the hprgina.dll module. This is the preferred method to enable Single Sign-on. The default during installation is to not enable Single Sign-on. The administrator must answer two questions to enable Single Sign-on (see Figure 3-13 The dialog presented during Sender installation to enable Single Sign-

on or Easy Login on page 62). If Single Sign-on is enabled, the computer must be restarted before Single Sign-on is operational.

Figure 3-13 The dialog presented during Sender installation to enable Single Sign-on or Easy Login

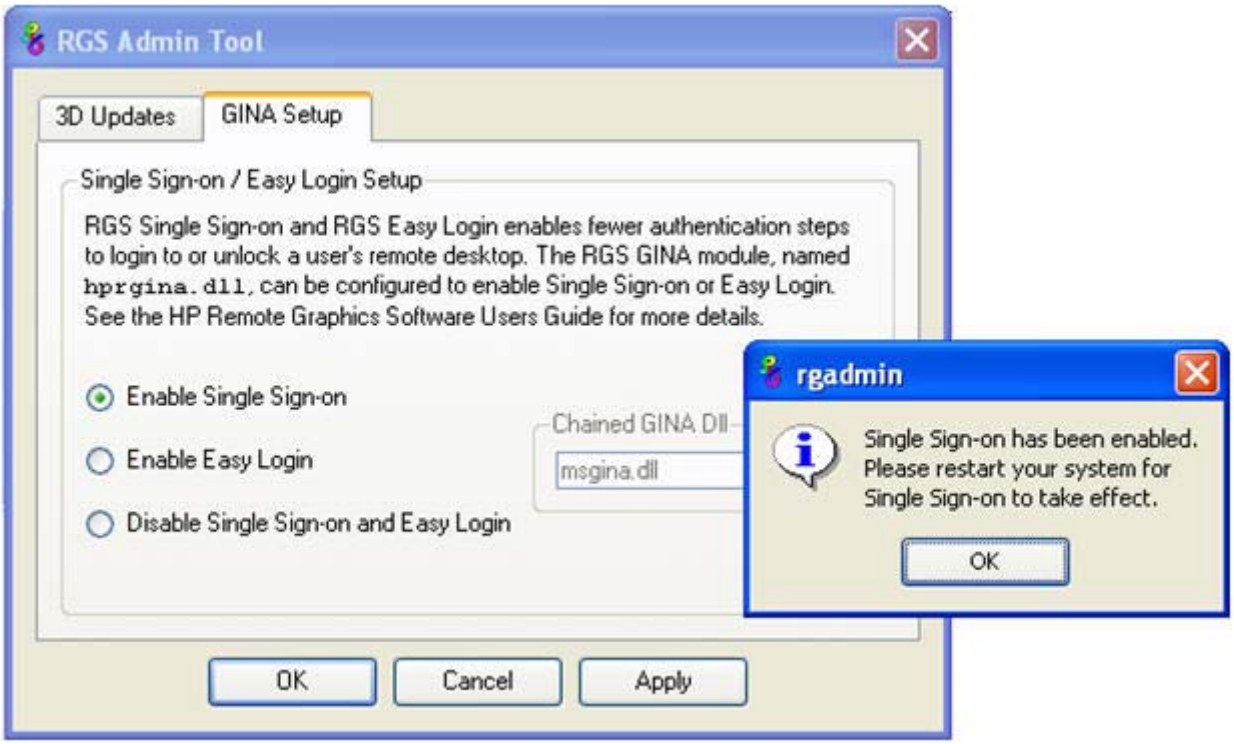


3.1.2.9.2 Using the rgadmin tool to enable Single Sign-on

NOTE: The rgadmin tool is only installed and supported on Windows XP.

The rgadmin tool can be used to enable Single Sign-on—check the Enable Single Sign-on radio button in Figure 3-14 Using the rgadmin tool to enable Single Sign-on on page 63, and click **Apply**. Enabling Single Sign-on installs the hprgina.dll module. Using the rgadmin tool to enable Single Sign-on is preferred over the manual method, described next.

Figure 3-14 Using the rgadmin tool to enable Single Sign-on



3.1.2.9.3 Manually enabling Single Sign-on

Although the manual method is not the preferred method to enable Single Sign-on, it is provided so that administrators will know exactly what parts of the operating system are being modified. To manually enable Single Sign-on, perform the following steps:

1. Install the Sender on the HP workstation. If the RGS Sender is not installed or installs with errors, *DO NOT* perform the remaining steps. Doing so will put the computer in a state that requires a complete re-installation of the operating system.
2. After the RGS Sender is installed, confirm that hprgina.dll exists in the C:\WINDOWS\system32 directory. The Sender installer copies hprgina.dll directly into the system32 directory.

△ **CAUTION:** If the hprgina.dll does not exist in C:\WINDOWS\system32, do not perform the remaining steps. Doing so will put the system in a state that requires a complete re-installation of the operating system.

3. Add the GinaDLL registry key if it does not already exist. If the GinaDLL key does not exist, Microsoft's default GINA DLL (msgina.dll) is loaded by WinLogon. Adding the GinaDLL registry key, and setting its value to hprgina.dll informs WinLogon to load hprgina.dll instead of the default msgina.dll.

   Adding the GinaDLL registry key is done using regedit, the Windows Registry Editor. Create the key as type REG_SZ (a string type). The full path of the key is:

   HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\GinaDll

4. Set the value of the GinaDLL key to the text "hprgina.dll". Confirm the spelling before closing. Figure 3-15 Addition of the GinaDLL key to the registry on page 64 shows the registry key contents.

Figure 3-15 Addition of the GinaDLL key to the registry

5. Add the GinaDllMode registry key if does not already exist. This can be done through the use of regedit as well. Create the key as type RGS_SZ (a string type). The full path of the key is:

   HKEY_LOCAL_MACHINE\Software\Hewlett-Packard\Remote Graphics Sender\GinaDllMode

6. To actually enable Single Sign-on, set the value of the GinaDllMode key to the text "HprSso". Confirm the spelling before closing. Figure 3-16 Addition of the GinaDllMode key to the registry on page 64 shows the registry key contents.

Figure 3-16 Addition of the GinaDllMode key to the registry

7. Restart the computer. The hprgina.dll module will be loaded by WinLogon when started.

Summary—If the GinaDLL key does not currently exist in the registry, Microsoft's default GINA DLL (msgina.dll) is loaded by WinLogon. Adding the GinaDLL registry key, and setting its value to hprgina.dll, informs WinLogon to load hprgina.dll instead of the default msgina.dll.

3.1.2.9.4 Setting the local security policy

The local security policy "*Interactive logon: Do not require CTRL-ALT-DEL*" must be disabled to support Single Sign-on. This can be set in the Windows "Local Security Settings" under "Security Options." The RGS Diagnostics Tool programmatically detects if this local security policy is set correctly. See Using the RGS Diagnostics Tool on Windows on page 55 for information on this tool.

NOTE: Creating the GinaDLL registry key disables Window's "Fast User Switching" and "Welcome Screen" features.

3.1.2.10 Disabling Single Sign-on

There are two methods to disable Single Sign-on:

1. **Using the rgadmin tool to disable Single Sign-on**

   The rgadmin tool shown in Figure 3-14 Using the rgadmin tool to enable Single Sign-on on page 63 can be used to disable Single Sign-on. Using the rgadmin tool to disable Single Sign-on is preferred over the manual method, described next.

2. **Manually disabling Single Sign-on**

   To disable Single Sign-on without using the rgadmin tool, delete or rename the value of the GinaDLL registry key. If there is no other custom GINA module on the computer, simply removing the GinaDLL key definition from the registry entry below disables Single Sign-on.

   HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\GinaDll

△ **CAUTION:** If the value of the GinaDLL key contains the name of a custom GINA DLL, and the file does not exist in C:\WINDOWS\system32, the computer will not start correctly after the next reboot. The computer will then require a complete re-installation of the operating system.

GinaDLL key is removed using regedit, the Windows Registry Editor. Be sure to actually remove the key by selecting the GinaDLL key in regedit, and select the Delete entry in the Edit menu. Once the key is CAUTION: If the value of the GinaDLL key contains the name of a custom GINA DLL, and the file does not exist in C:\WINDOWS\system32, the computer will not start correctly after the next reboot. The computer will then require a complete re-installation of the operating system. Installing RGS 61 deleted, it will no longer show up as a key in the WinLogon subkey. When the system reboots, the default GINA module, msgina.dll, will be loaded by the WinLogon.exe process.

If there is a custom GINA DLL module on the system, and if it replaces the default msgina.dll, change the value of the GinaDLL value from hprgina.dll to the name of the custom GINA module. To change the value of the GinaDLL key, select the GinaDLL key in regedit, and then select the Modify entry in the Edit menu. A dialog box appears allowing the value of the key to be changed. Type the name of the custom GINA module in the "Value data:" area. Confirm that the custom GINA module entered actually exists in C:\WINDOWS\system32. When the computer restarts, the custom GINA module will be loaded by the WinLogon.exe process.

3.1.2.11 Installing and Enabling Easy Login

△ **CAUTION:** Installing RGS Easy Login is for experienced users and IT administrators only. Please read all directions completely before proceeding, and exercise caution when installing.

Easy Login is only supported on HP blade workstations running the RGS Sender. The RGS shared library, hprgina.dll, enables Easy Login. The file hprgina.dll is a GINA (Graphical Identification and Authentication) module that is loaded by the Window WinLogon.exe process. There are three ways to install hprgina.dll, and therefore enable RGS Easy Login on the Sender:

3.1.2.11.1 1. Enabling Easy Login during installation

Easy Login can be enabled during RGS Sender installation—enabling Easy Login installs the hprgina.dll module. This is the preferred method to enable Easy Login. The default during installation is to *not* enable Easy Login. The user must answer two questions to enable Easy Login, as shown in Figure 3-13 The dialog presented during Sender installation to enable Single Sign-on or Easy Login on page 62. If Easy Login is enabled, the computer must be restarted before Easy Login is operational.

3.1.2.11.2 2. Using the rgadmin tool to enable Easy Login

The rgadmin tool can be used to enable Easy Login—check the **Enable Easy Login** radio button as shown in Figure 3-12 Dialog to enable or disable Single Sign-on and Easy Login on page 61, and click **Apply**. Enabling Easy Login installs the hprgina.dll module. Using the rgadmin tool to enable Easy Login is preferred over the manual method, described next.

3.1.2.11.3 3. Manually enabling Easy Login

Although the manual method is not the preferred method to enable Easy Login, it is provided so that administrators will know exactly what parts of the operating system are being modified. To manually enable WinLogon to load the hprgina.dll module, perform the following steps:

1. Install the Sender on the HP workstation. If the RGS Sender is not installed or installs with errors, do not perform the remaining steps. Doing so will put the computer in a state that requires a complete re-installation of the operating system.
2. After the RGS Sender is installed, confirm that hprgina.dll exists in the C:\WINDOWS\system32 directory. The Sender installer copies hprgina.dll directly into the system32 directory.

△ **CAUTION:** If the hprgina.dll does not exist in C:\WINDOWS\system32, do not perform the remaining steps. Doing so will put the system in a state that requires a complete re-installation of the operating system.

3. Add the GinaDLL registry key if it does not already exist. This can be done through the use of regedit, the Windows Registry Editor. Create the key as type REG_SZ (a string type). The full path of the key is:

   HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\GinaDLL

4. Set the value of the GinaDLL key to the text "hprgina.dll" as shown in Figure 3-15 Addition of the GinaDLL key to the registry on page 64. Confirm the spelling before closing.
5. Add the GinaDllMode registry key if does not already exist. This can be done through the use of regedit as well. Create the key as type RGS_SZ (a string type). The full path of the key is:

   HKEY_LOCAL_MACHINE\Software\Hewlett-Packard\Remote Graphics Sender\GinaDllMode

6. To actually enable Easy Login, set the value of the GinaDllMode key to the text "HprEasyLogin". Confirm the spelling before closing. Figure 3-17 Addition of the GinaDllMode key to the registry on page 66 shows the registry key contents:

   Figure 3-17 Addition of the GinaDllMode key to the registry

7. Restart the computer. The hprgina.dll module will be loaded by WinLogon when started.

Summary—If the GinaDLL key does not currently exist in the registry, Microsoft's default GINA DLL (msgina.dll) is loaded by WinLogon. Adding the GinaDLL registry key, and setting its value to hprgina.dll, informs WinLogon to load the hprgina.dll instead of the default msgina.dll.

The hprgina module is a chaining GINA DLL. When the RGS hprgina.dll is loaded by WinLogon, the hprgina module loads the msgina.dll shared library. The hprgina module chains (forwards) all GINA requests to the msgina.dll module.

3.1.2.12 Chaining custom GINA modules for Easy Login

If it is determined in step 3 above that the GinaDLL registry key does exist, and the value of the key is not msgina.dll, then a custom GINA module is currently loaded and being used by WinLogon. Custom GINA modules provide custom authentication dialogs or even custom user authentication methods. If it is determined that functionality of both the RGS Easy Login and a custom GINA module is required, the hprgina.dll needs further configuration. The hprgina.dll module needs to be set up to load the custom

GINA module rather than the default msgina.dll as described above. There are three ways to enable the hprgina.dll module to load a custom GINA module:

3.1.2.12.1 1. Install time specification of the custom GINA module

A custom GINA module can be chained by the hprgina.dll at install time. This is the preferred method. The installer will bring up a GUI that allows the Easy Login GINA module (hprgina.dll) to be enabled, as well as provides a text box to enter the name of the custom GINA module. The name of the custom module is all that is needed, provided it is installed in the C:\WINDOWS\system32 directory. If the custom module is installed elsewhere, the full file path needs to be entered.

3.1.2.12.2 2. Using the rgadmin tool to specify a custom GINA module

The rgadmin tool can be used to chain a custom GINA module. When **Enable Easy Login** is selected, the associated text entry box **Chained GINA Dll** is un-greyed out. Enter the name of the custom GINA module in the text box, and click **Apply**. Using the rgadmin tool to specify a custom GINA module is preferred over the manual method, described next.

3.1.2.12.3 3. Manually enabling hprgina.dll to load a custom GINA module

To manually enable the hprgina.dll module to load a custom GINA module, create a new registry key, ChainedGinaDLL, with the value of the key containing the name of the chained custom GINA module. Perform steps 1–6 shown above (the restart will be done below) plus the following three steps to chain custom modules:

1. Create the ChainedGinaDLL registry key. Create the key as type REG_SZ (a string type). The full path of the key is:

   HKEY_LOCAL_MACHINE\Software\Hewlett-Packard\Remote Graphics Sender\ChainedGinaDLL

2. Set the value of the new ChainedGinaDLL key to the name of the custom GINA module. For example, if the name of the custom GINA module is foogina.dll, then the value of the key should be foogina.dll. The value should match the string originally discovered in the registry key GinaDLL. Confirm the spelling before closing.

3. Restart the computer.

   When the RGS hprgina.dll is loaded by WinLogon, hprgina.dll will load the chained GINA module foogina.dll. The hprgina module then chains all GINA requests to the foogina.dll module.

   If the custom foogina.dll is also a chaining GINA module, foogina.dll, in turn, chains itself to the msgina.dll module. Three GINA DLLs will be loaded as part of the WinLogon.exe process: (1) hprgina.dll, (2) foogina.dll, and (3) msgina.dll.

3.1.2.12.4 Setting the Local Security Policy

The local security policy "*Interactive logon: Do not require CTRL-ALT-DEL*" must be *disabled* to support Easy Login. This can be set in the Windows "Local Security Settings" under "Security Options." The RGS Diagnostics Tool programmatically detects if this local security policy is set correctly. See Using the RGS Diagnostics Tool on Windows on page 55 for more information.

NOTE: Creating the GinaDLL registry key disables Window's "Fast User Switching" and "Welcome Screen" features.

3.1.2.13 Disabling Easy Login

There are two methods to disable Easy Login:

3.1.2.13.1 1. Using the rgadmin tool to disable Easy Login

The rgadmin tool shown in Figure 3-12 Dialog to enable or disable Single Sign-on and Easy Login on page 61 can be used to disable Easy Login. Using the rgadmin tool to disable Easy Login is preferred over the manual method, described next.

3.1.2.13.2 2. Manually disabling Easy Login

To disable Easy Login without using the rgadmin tool, delete or rename the value of the GinaDLL registry key. If there is no other custom GINA module on the system, simply removing the GinaDLL key definition from the registry entry below disables Easy Login.

HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\GinaDll

△ **CAUTION:** If the value of the GinaDLL key contains the name of a custom GINA DLL, and the file does not exist in C:\WINDOWS\system32, the system will not start correctly upon the next reboot. The system will then require a complete re-installation of the operating system.

The GinaDLL key is removed using regedit, the Windows Registry Editor. Be sure to actually remove the key by selecting the GinaDLL key in regedit, and select the Delete entry in the Edit menu. Once the key is deleted, it no longer shows up as a key in the WinLogon subkey. When the system reboots, the default GINA module, msgina.dll, will be loaded by the WinLogon.exe process.

If there is a custom GINA DLL module on the system and it replaces the default msgina.dll, change the value of the GinaDLL value from hprgina.dll to the name of the custom GINA module. To change the value of the GinaDLL key, select the GinaDLL key in regedit, and then select the Modify entry in the Edit menu. A dialog box appears allowing the value of the key to be changed. Type the name of the custom GINA module in the "Value data:" area. Confirm that the custom GINA module entered actually exists on the system in C:\WINDOWS\system32. When the system reboots the custom GINA module is loaded by the WinLogon.exe process.

3.1.3 Automatic installation of the RGS Sender on Windows

The RGS Sender can be installed or removed in automatic mode. Automatic mode allows the Sender to be installed or removed without any user interaction. Automatic mode will also restart the computer, if required, after the installation process completes.

Should an illegal combination of command line options be specified, or if an error occurs during the install process, the install will abort and the error will be logged to the Sender installation log file.

3.1.3.1 Usage

Setup.exe /autoinstall /agreetolicense	[/folder=<folder>] [/usb] [/remotemic] [/clipboard] [/sso | [/el [/gina=<filename>]]] [/rgslicenseserver=<port@host> | /rgslicensefile=<filename>] [/noreboot] [/removesettings]

Setup.exe /autoremove [/noreboot]

Setup.exe /viewlicense

Setup.exe /help

3.1.3.2 Command line options

/autoinstall	
	This option performs one of the following: • Installs the Sender if it's not already installed. • Updates the Sender if a prior version of the Sender is already installed. • Repairs the Sender if the version being installed is the same as the version that is already installed. The Sender will not be reinstalled if the version of the Sender being installed is older than the version of the Sender already installed.

/agreetolicense	
	Use of this option indicates that the user agrees to the license for use of this software. This option is required when doing an install.

/autoremove	
	Remove the Sender.

/folder=<folder>	
	Specifies the destination folder, default is C:\Program Files\Hewlett-Packard\Remote Graphics Sender.

/usb	
	Enable remote USB.

/remotemic	
	Enable remote microphone.

/clipboard	
	Enable remote clipboard.

/sso	
	Enable Single Sign-on, only one of /sso and /el can be used.

/el	
	Enable Easy Login, only one of /sso and /el can be used.

/gina=<filename>	
	Chaining GINA module to use, default is "msgina.dll", can only be specified if /el is used.

/rgslicenseserver=<port@host>	
	The license to run the RGS Sender is acquired from a license server listening on the specified port and host. The port/host must be in the form of port@host. The port and the trailing “@” are optional, in which case the default port is used for the given host. Only one of /rgslicenseserver= or /rgslicensefile= may be specified.

/rgslicensefile=<filename>	
	The license to run the RGS Sender is acquired from the specified file. The filename may be omitted by specifying the option as “/rgslicensefile=”, in which case the Sender will be installed without a license, and the license file can be manually copied to the install folder at a later time. Only one of /rgslicenseserver= or /rgslicensefile= may be specified. If neither /rgslicenseserver= or /rgslicensefile= are specified, the install will proceed as if this option was specified without a filename.

/noreboot
Do not reboot the system when the setup requires a reboot to complete.

/removesettings
Removes the user specific Sender settings from the registry.

/viewlicense
Displays the EULA (End User License Agreement) for use of this software.

/help
Display usage text.

3.1.4 Sender installation log file on Windows

As with installation of the Receiver, installation of the Sender also creates an installation log file. This log file can be viewed by the user to obtain details about what operations were performed, and view any errors that occurred during the installation process. When Setup.exe for the RGS Sender is run, the following log file is created:

%TEMP%\rgsenderInstaller

The log file is especially useful for automatic installs because installer errors are not displayed on the screen, and are only viewable using the log file. If the log file already exists when the installer is run, the installer will remove the current contents of the log file before writing to it. This prevents the log file from growing without bounds.

3.1.5 Uninstalling the RGS Sender on Windows

To uninstall the RGS Sender, use the Windows Add or Remove Programs feature from the Control Panel. Select Remote Graphics Sender, and click **Change/Remove** A dialog box will open with choices for: **Repair, Remove – Retain User Settings, Remove – Delete User Settings.** Retain User Settings will leave the user specific Sender settings in the registry while Delete User Settings removes the user specific Sender settings from the registry.

NOTE: After the Sender is uninstalled, you'll be prompted to restart your computer. This restart is very important—if it's not performed, installation of a later version of the RGS Sender may not succeed.

3.2 Installing RGS on Linux

This section describes how to:

- Install and uninstall the RGS Receiver on Linux
- Audio requirements for the Linux Receiver
- Install and uninstall the RGS Sender on Linux.

NOTE: The RGS Sender uses TCP/IP port 42966.

3.2.1 Installing the Receiver on Linux

NOTE: Beginning with RGS 5.1.3, the Linux RGS Receiver is available in both 32-bit and 64-bit versions.

To install the RGS Receiver on Linux, perform the following steps:

1. Login as root.
2. Go to the directory where you downloaded RGS, and change to the directory lin32/receiver (32-bit version) or lin64/receiver (64-bit version).
3. Execute the following command:

   ./install.sh
4. The Receiver will be installed into /opt/hpremote/rgreceiver. To start the Receiver, execute the following command:

   /opt/hpremote/rgreceiver/rgreceiver.sh

   To start the Receiver in directory mode, execute the following command:

   /opt/hpremote/rgreceiver/rgreceiver.sh -directory
5. Optionally, add the directory /opt/hpremote/rgreceiver to your PATH environment variable.

NOTE: Starting the Receiver on Linux is described further in Using RGS in Normal Mode on page 86.

3.2.2 Uninstalling the Receiver on Linux

To uninstall the RGS Receiver on Linux find the name of the RedHat RPM package for the Remote Graphics Receiver, by typing:

```
rpm -q -a | grep -i rgreceiver
```

If the Receiver is installed on the system, you will see rgreceiver_linux_32-5.1-0 or a similar Receiver package. To remove the Receiver's RPM package, become root and type:

```
rpm -e --allmatches rgreceiver_linux_32
```

3.2.3 Linux Receiver Audio Requirements

The RGS Receiver installer will install a version of JACK Audio Connection Kit if one is not already installed on the system. JACK is a low-latency sound server that works in conjunction with an ALSA sound driver to mix and direct audio on the Receiver system. The version of JACK provided with the

RGS Receiver installer is the version that is expected to be started by the script in /opt/hpremote/rgreceiver/hprgsaudio. A different version may require adjustments to this script to provide different options for the JACK daemon.

The JACK Audio Connection Kit is installed as an RPM package. The RGS Receiver will run on systems without audio hardware, but the Receiver will not run without the libraries provided by the JACK RPM package. If the RGS Receiver is being removed from the system, JACK can also be removed using the following command.

```
rpm -e jack-audio-connection-kit
```

3.2.4 Installing the Sender on Linux

NOTE: The Linux RGS Sender can only be installed on the computers and Linux operating systems shown in Supported computers and operating systems on page 9. Installing the Sender on a non-supported computer will prevent an RGS connection from being established.

Like the Windows RGS Sender, the Linux RGS Sender also requires a License Key in order to establish an RGS connection. For information on RGS Sender licensing on Linux, see the HP Remote Graphics Software Licensing Guide, available at http://www.hp.com/support/rgs_manuals

To install the Sender on Linux, perform the following steps:

1. Log in as root.
2. Go to the directory where you downloaded RGS, and change to the directory lin64/sender.
3. Execute the following command:

   ```
   ./install.sh
   ```

   This command will give you a choice of performing a manual installation or a partially automated installation (automating steps 5 and 6). The RGS Sender will be installed to /opt/hpremote/rgsender.
4. This last step of the install is optional, and will ask if you would like to automatically customize the following files to enable proper function of the Linux Sender:

   a. /etc/X11/XF86Config or /etc/X11/xorg.conf—The configuration file for the preferred X server will be modified to load the rge extension in the "Modules" section. If a different X server configuration is used, that file must be manually configured to load the rge module.

   b. /etc/pam.d/rgsender—This configuration file will be modified to allow the Sender to interact with the currently supported PAM authentication.

   c. /etc/pam.d/gdm*, /etc/pam.d/kdm*, /etc/pam.d/xdm*—These configuration files will be modified to ensure proper PAM authentication window manager support for the Sender process. If a different window manager is in use, that file must be manually configured.

   The rgsender_config_64-*.rpm provides an automated way to handle the standard customizations described below. This is especially useful for network or unattended installations requiring default PAM authentication settings. The rpm can also be run independently of the install script.

   NOTE: This automated step must be performed after any actions that install their own X server configuration files because, in step (a) above, these files are modified to load the rge module required for proper Sender functionality. If these files are replaced or modified later, the modules modifications described below must be correctly executed.

5. If you choose not to use the customization described in step 5, or have a different configuration file that needs to be updated, perform the following steps to update the respective configuration:

   a. Add the "rge" extension to the X Server configuration file. Edit the /etc/X11/XF86Config, /etc/X11/XF86Config-4 or the appropriate XF86Config file on your system for XFree86 X servers. Edit the xorg.conf file for X.Org X Servers. In the Modules section of this file, add the following line:

      Load "rge"

      The Module section should now read as follows:

      Section "Module"

      ...

      Load "rge"

      ...

      EndSection

      The Sender will be installed to /opt/hpremote/rgsender, and will be started automatically when the X Server or system is restarted, provided the appropriate XF86Config/xorg.conf file was correctly modified.

   b. The Linux Sender uses the **Pluggable Authentication Module (PAM)** for authentication. If you are using the GNOME Desktop Manager or KDE Desktop Manager, add the following line to the files listed below:

      session optional pam_rg.so

      Files (and all related derivatives):

      /etc/pam.d/gdm

      /etc/pam.d/kdm

      /etc/pam.d/xdm

   c. Some Linux distribution versions utilize newer or older PAM support modules and support conventions. The rgsender_config_64*-.rpm performs configuration analysis to determine types of pam_unix*.so, pam_env*.so, common-auth, and pam_stack.so may apply to your configuration for the /etc/pam.d/rgsender configuration file. If you choose to do all of your own customizations manually, please run the rgsender_config_64*-rpm at least once on a test system to determine an example of any customizations that you might need in your current environment.

6. If another desktop manager, such as Enlightenment, is being used, you will need to make similar changes to the PAM configuration file used by it. Consult your Linux and Desktop Manager documentation for further information.

7. If the PAM system has been configured to use custom PAM authentication modules then you may need to manually configure the PAM module that is used by the RGS Sender. You should consult your Linux documentation when configuring PAM. If you are using a custom PAM authentication module called “libpam_custom.1” you may need to edit the PAM configuration file "/etc/pam.d/rgsender” to specify the PAM authentication module to be used by the RGS Sender. For example, you may need to add the following line to the file "/etc/pam.d/rgsender”.

auth optional /lib/security/pam_custom.1

8. 8. The RGS Sender will not accept remote connections when a DNS name inquiry does not resolve to a valid/active IP address—the Sender expects to fully resolve the machine name to an active network connection IP. To test this, the command hostname -i should report an active IP address for the qualified hostname. Failure to resolve this address from a qualified hostname may result in remote connection errors. One way to address the hostname/IP name resolution is to edit the /etc/hosts file, and bind the machine name to its proper IP address as follows:

   127.0.0.1 localhost localhost.localdomain

   88.1.89.122 blade2 blade2.datacenter.com

9. If the Sender is being installed on the HP ProLiant xw460c Blade Workstation, the blade workstation needs to be rebooted into User Mode after Sender installation is complete. For information on selecting User Mode, refer to the document *Administrator's Guide for Linux on HP ProLiant Blade Workstations*, available at http://www.hp.com/support/xw460c_manuals.

3.2.4.1 Starting the Sender on Linux

The Linux Sender is started by the "rge" X server extension whose configuration is described in the previous section. The Sender cannot be started manually. Proper configuration and startup of the Sender can be verified by examining the X server log file (Xorg.0.log). The log file will show that the extension is loaded, and that the extension has started the Sender:

Log file content should be like:

(II) LoadModule: "rge"

(II) Loading /usr/lib64/xorg/modules/extensions/librge.so

.

.

.

(RG) 10:29:52.654 HP Remote Graphics extension. Build date : Jul 15 2009

(RG) 10:29:53.002 Listening for RG connections at /var/opt/hpremote/rgsender/sockets/rgsender-rge:0

(RG) 10:29:53.631 Started rgsender process PID = 5780

END of log file example.

The rgsender.sh command has two options that can be executed from the command line. The rgsender.sh command does not start the Sender if either of these options are used.

The functionality of each option is as follows:

[-v | -ver | -version] —Displays the Sender version information.

[-h | -help | -?] —Displays the rgsender.sh command line options that are listed on this page.

3.2.4.2 Uninstalling the Sender on Linux

To uninstall the RGS Sender on Linux, perform the following steps:

1. Log in as root.
2. If the default install.sh was used, then the following command should report some variation of the following packages:

   ```
   # rpm -qa | grep -i rgsender

   rgsender_linux_64-5.1.0-1

   rgsender_config_64-5.1.0-1
   ```

3. To remove the rgsender package (and corresponding configuration rpm if used), execute the command:

   ```
   rpm -e --allmatches rgsender_linux_64 rgsender_config_64
   ```

4. If the rgsender_config_64-*.rpm was installed, it must be removed first (or together as demonstrated above) before removing the rgsender_linux_64-*.rpm package. This resolves dependencies between the packages, and undoes the previous customizations performed by this rpm. If you are upgrading your system from a previous version of RGS, it is suggested that you remove both packages, and then apply the new software rpms for supported results.

4 Pre-connection checklist

Establishing an RGS connection from a Receiver to a Sender requires that the Local and Remote Computers be in the correct state. This chapter provides a checklist of items that should be verified before attempting an RGS connection.

NOTE: This chapter can also be used as a troubleshooting aid. If a connection attempt fails, the checklists below can be used to help diagnose the problem.

NOTE: The port used by the RGS Receiver is assigned by the Local Computer OS and can vary. The RGS Sender listens on TCP/IP port 42966. At RGS 5.2.5, the capability was added to specify the port number used by the RGS Sender. The default Sender port number is 42966, as noted above. The Sender port number can be changed using the Rgsender.Network.Port property. If this property is used to change the Sender port number from its default value of 42966, the Sender port number must then be specified in establishing an RGS connection from the Receiver to the Sender.

4.1 Local Computer (Receiver) checklist

Verify the following items on the Receiver computer before attempting to establish a connection.

1. **Verify the hostname or IP address of the Remote Computer**—Verify that you have the correct hostname or IP address of the Remote Computer. If the Remote Computer hostname fails to resolve to the correct IP address, address this problem before continuing.
2. **Verify that, from the Local Computer, you can ping the Remote Computer**—If you're unable to ping the Remote Computer, you won't be able to establish an RGS connection. Ping the Remote Computer using the same computer designator you'll be using to establish an RGS connection, either the hostname or the IP address of the Remote Computer. Open a Command window and execute either:

   ping hostname

   or

   ping <IP address>

   If no ping reply is received, the Sender computer is unreachable or is not running—resolve this problem before continuing. If a ping reply is received, the Sender computer is reachable by RGS.

NOTE: Ensure that firewall settings are not preventing the ping command from working.

4.2 Remote Computer (Sender) checklist

Modification and verification of the Sender state can be performed either by connecting a keyboard, mouse, and monitor directly to the Remote Computer, or by using Remote Desktop Protocol to log in remotely to the Remote Computer. In either case, verify each of the following items:

1. **OPTIONAL: Ensure RGS Sender licensing is set up**—Beginning at RGS 5.2.0, HP implemented licensing for the RGS Sender. For an overview of RGS licensing, see RGS licensing on page 12 . For detailed information on RGS licensing, see the HP Remote Graphics Software Licensing Guide, available at http://www.hp.com/support/rgs_manuals.

   NOTE: Step 1 is optional because you can establish a connection from the Receiver to the Sender without a Sender license. However, as shown in Figure 2-2 Dialog generated when the RGS Sender is unlicensed on page 13, an error dialog will be displayed in the Remote Display Window if the Sender license file is missing or invalid. If you don't set up RGS licensing now, you can do it after you've verified you can establish an RGS connection.

2. **OPTIONAL: Ensure you have a login account on the Remote Computer**—When establishing an RGS connection, the Remote Computer will prompt you for a user name and password. Ensure that you have a login account on the Remote Computer.

3. **Verify the Remote Computer login account does not have a blank password**—The Remote Computer will not allow a connection for any account with a blank or undefined password. Any accounts on the Remote Computer used for connection by the Local Computer must have password protection.

4. **OPTIONAL: Disable Guest login access**—By default, Windows allows any user who can access a computer over the network to login with Guest access. Because this is a potential security issue, HP recommends that you disable Guest logins on the Remote Computer. To disable this policy, open the "Control Panel", selecting "Administrative Tools", selecting "Local Security Policy", expanding the "Local Policies", expanding "Security Options", and setting "Network access: Sharing and security model for local accounts" to "Classic – local users authenticate as themselves". For more information on this topic, go to:

   http://support.microsoft.com/kb/103674

5. **Ensure that the RGS Sender is running on the Remote Computer**—This can be done on Windows as follows:

   a. Click on **Start**

   b. Right click on My Computer

   c. Select manage from the menu.

   d. In the Computer Management console, click the **+** sign to expand Services and Applications and select Services. The service Remote Graphics Sender should be listed as Started.

6. **Verify that the rgdiag.exe diagnostics tool passes all tests on the RGS Sender on Windows**—This tool may be run any time after Sender installation. Refer to Using the RGS Diagnostics Tool on Windows on page 55 for information on running this tool.

7. **Network Interface binding**—Beginning with RGS 5.4.0 the Sender defaults to listening to multiple network interfaces if the computer is so equipped. If the Remote Computer has multiple network interfaces, the Sender will dynamically add or remove network interfaces without

restarting the Sender. This topic is expanded considerably in Network Interface binding on the Sender on page 79 .

8. **Linux Sender machine name and IP address**—The default on Linux is to bind the machine name to the following loopback interface in the /etc/hosts file:

   127.0.0.1 blade2 localhost.localdomain

   The RGS Sender will not accept remote connections with this configuration. Edit the /etc/hosts file and bind the machine name to its proper IP address as follows:

   127.0.0.1 localhost localhost.localdomain

   88.1.89.122 blade2 blade2.datacenter.com

   For Linux systems with multiple network interfaces, each I.P. address must be listed in the /etc/hosts file for example:

   192.168.89.122 blade2 blade2.datacenter.com

   192.168.90.111 blade2b blade2b.datacenter.com

9. **User-started X environments do not reliably support outside connections**—Users who manually start X desktops (such as with startx) from the console command line will find that outside access attempts may not properly connect or be authenticated. This stems primarily from incomplete PAM session management and permissions to the console. Users should avoid this condition, and achieve login management through the display manager launched in init-level 5 of the system.

10. **Microsoft Windows APIPA (Automatic Private IP Addressing)**—APIPA can cause the RGS Sender to open sockets on private IP addresses. This can occur, for example, if the Sender computer is unable to connect to a DHCP server. Because the private IP addresses are not visible to the RGS Receiver, RGS connections will not work. You can verify if the Sender is using private IP addresses by typing the following in a command window:

    netstat -n -a

    If the IP address associated with the Sender port (listening port 42966) is private, APIPA is the likely cause. For more information on this topic, go to:

    http://support.microsoft.com/kb/220874

11. **Log out**—If you do log into the Remote Computer to verify any of the above items, ensure that you log out when you're done.

4.3 Network Interface binding on the Sender

If the Remote Computer has multiple network interfaces, beginning with RGS 5.4.0 the Sender defaults to "listening" on all network interfaces. If this is undesirable, the previous behavior can be restored by manually configuring the network interface binding properties.

There are four methods to deal with multiple network interfaces:

1. Allow the Sender to listen on all network interfaces and dynamically add and remove network interfaces, the default behavior of RGS 5.4.0 and beyond. See the Networking support on page 15 section for more detail.
2. Manually reconfigure which of the two network interfaces RGS binds to—see Manual Network Interface reconfiguration on page 80.
3. Use the RGS Sender network interface binding properties (introduced at RGS 5.1) to explicitly specify which network interface RGS binds to—see Network Interface reconfiguration using the Sender network interface binding properties on page 83.
4. Disable one of the network interfaces and restart the Sender—the Sender will then bind to the enabled network interface. The disadvantage of this method, of course, is that one of the network interfaces will no longer be usable.

   Methods 2 and 3 are described in the next two sections.

4.3.1 Manual Network Interface reconfiguration

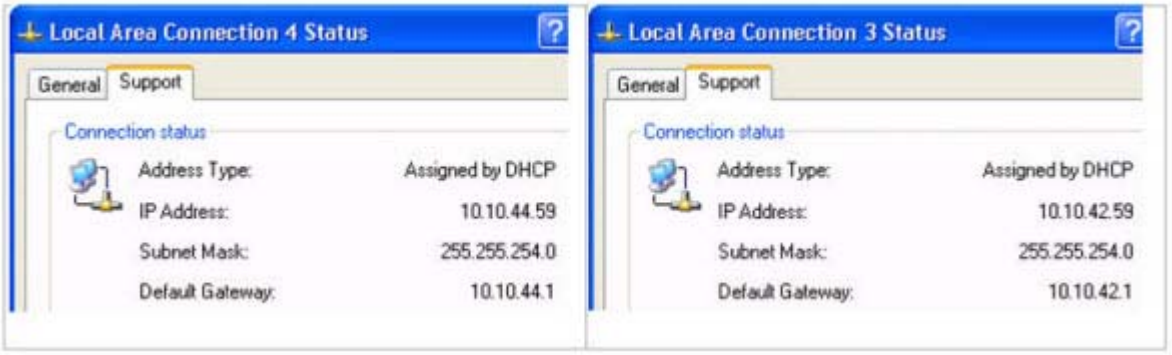
To manually configure which network interface the Sender binds to, set the Sender property Rgsender.Network.IsListenOnAllInterfacesEnabled=0 overriding the default which is to listen on all interfaces. See Network Interface binding properties on page 179, for more detail. If the Sender property Rgsender.Network.IsListenOnAllInterfacesEnabled=0 then the RGS Sender binds to the first network interface detected during booting. To determine the IP address of the first network interface, perform the following steps on the Remote Computer:

1. To view both network interfaces, click **Start> Control Panel > Network Connections** (see Figure 4-1 Viewing network interfaces on page 80).

   Figure 4-1 Viewing network interfaces

2. Double-click each LAN icon and the Support tab, which displays the network interface IP address (see Figure 4-2 Network Interface IP addresses on page 81). While this provides the IP address of each network interface, it does not indicate which network interface is considered the “first network interface”.

Figure 4-2 Network Interface IP addresses



3. To determine which is the first network interface, click Advanced > Advanced Setting (see Figure 4-3 Determining the first network interface on page 81). The Advanced Settings dialog is displayed (see Figure 4-4 Advanced Settings dialog on page 82). The “first network interface” is listed at the top in the Connections box. In Figure 4-4 Advanced Settings dialog on page 82, the first network interface is Local Area Connection 3, which (from Figure 4-2 Network Interface IP addresses on page 81) has an IP address of 10.10.42.59.

Figure 4-3 Determining the first network interface

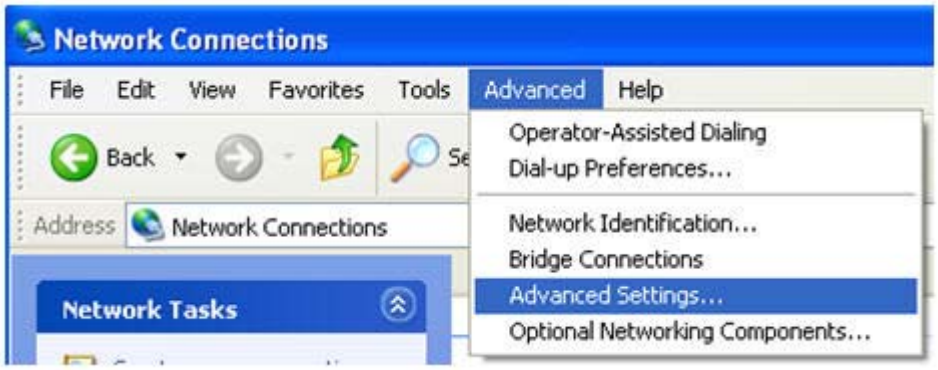
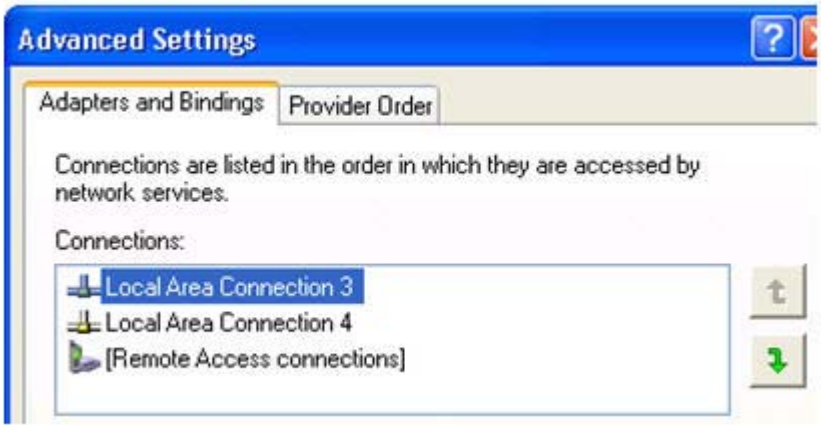


Figure 4-4 Advanced Settings dialog



The arrows to the right of the Connections box in Figure 4-4 Advanced Settings dialog on page 82 can be used to change the order of the network interfaces and, therefore, which network interface will be used by the RGS Sender. In the above example, the RGS Sender will use Local Area Connection 3 with an IP address of 10.10.42.59.

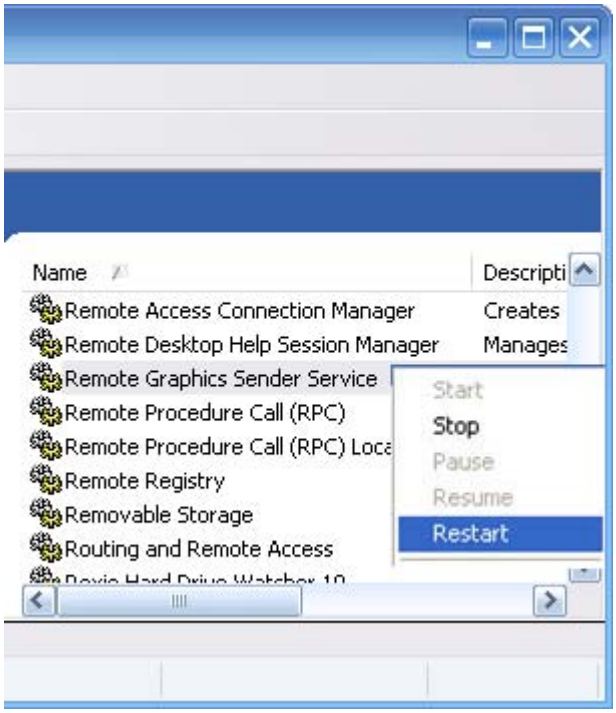
To establish a connection from the RGS Receiver to the blade workstation, enter a hostname or IP address in the HP Remote Graphics Receiver box. If you enter a hostname instead of an IP address, it is possible the hostname will resolve to the IP address of an incorrect network interface. This could be caused by a number of factors, including how your DHCP and DNS servers are configured.

If the hostname resolves to the IP address of an incorrect network interface, you can either:

- Enter the network interface IP address (instead of hostname) in the HP Remote Graphics Receiver box.
- Reconfigure your DHCP and DNS servers so that the hostname resolves to the IP address of the correct (first) network interface.

- Use the Nslookup command to determine the IP address that the hostname resolves to. Then, using the arrow buttons to the right of the Connections box on the Advanced Settings screen (see Figure 4-4 Advanced Settings dialog on page 82) change the first network interface to correspond with the IP address returned by Nslookup. After performing this step, you must either reboot the computer, or restart the RGS Sender (see Figure 4-5 Restarting the RGS Sender on page 83).

Figure 4-5 Restarting the RGS Sender



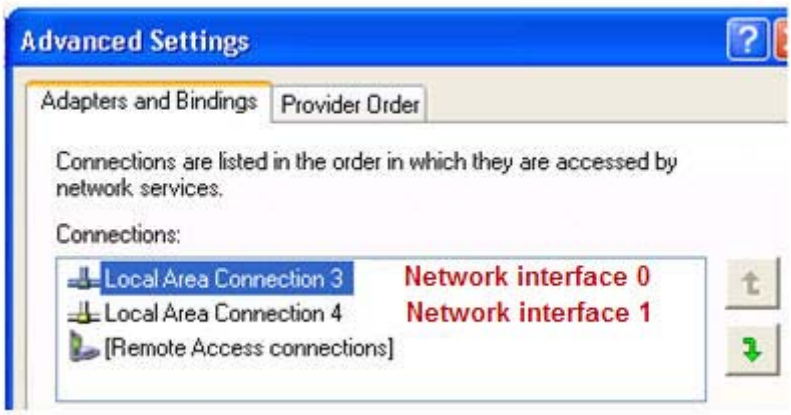
4.3.2 Network Interface reconfiguration using the Sender network interface binding properties

At RGS 5.1, several new Sender properties were added to allow the administrator to configure which network interface(s) the RGS Sender will listen to for connection requests. For a description of these properties, refer to Network Interface binding properties on page 179.

Figure 4-6 Network Interface binding order numerical sequence on page 84 shows how the two network interfaces can be referenced in numerical sequence in their binding order. The network interface binding properties permit specification of which network interface (either 0 or 1) the RGS Sender will listen to for connection requests. For example, using the Rgsender.Network.Interface.1.IsEnabled property, an administrator can specify that the RGS Sender will listen for connection

requests on network interface 1 (corresponding to Local Area Connection 4), even though network interface 1 is the second network interface in binding order.

Figure 4-6 Network Interface binding order numerical sequence

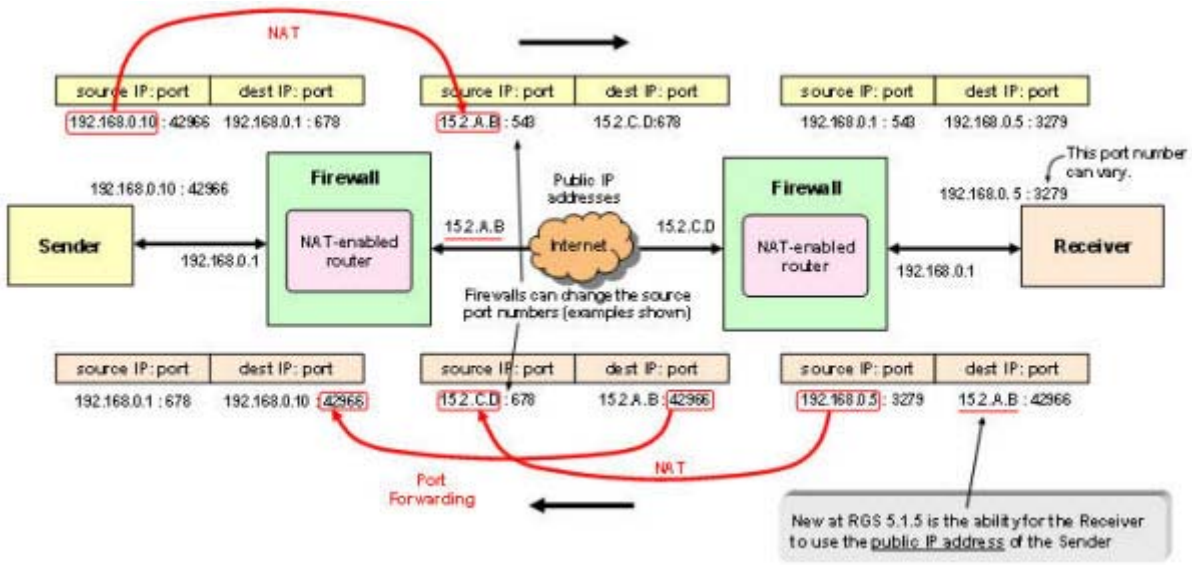


Again, refer to Network Interface binding properties on page 179 for a description of these properties.

4.4 Using RGS through a firewall

New at RGS 5.1.5 is the ability for the Receiver to use the public IP address of the Sender. This feature has been added to allow RGS to be used through a firewall. To take advantage of this feature, the Sender and Receiver firewalls must both support NAT (Network Address Translation). In addition, the Sender firewall must support port forwarding (see Figure 4-7 RGS operation through a firewall on page 84).

Figure 4-7 RGS operation through a firewall



NOTE: The port used by the RGS Receiver is assigned by the Local Computer OS and can vary. The RGS Sender listens on TCP/IP port 42966. At RGS 5.2.5, the capability was added to specify the port number used by the RGS Sender. The default Sender port number is 42966, as noted above. The Sender port number can be changed using the Rgsender.Network.Port property as described in Network Interface binding properties on page 179. If this property is used to change the Sender port number from its default value of 42966, the Sender port number must then be specified in establishing an RGS connection from the Receiver to the Sender.

5 Using RGS

This chapter describes how to use RGS to establish a connection from a Local Computer to a Remote Computer, including:

- Using RGS in Normal Mode
- Functionality and use of the Receiver Control Panel
- Setup Mode
- Remote Display Window Toolbar
- Remote Computer monitor blanking
- Linux connection considerations
- RGS login methods
- Receiver command line options
- Collaborating

5.1 Using RGS in Normal Mode

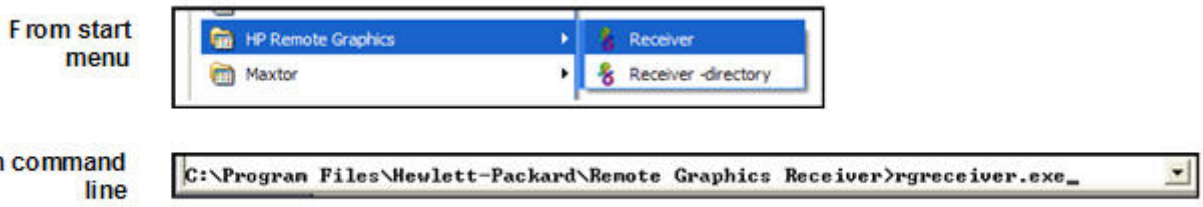
Normal Mode is one of the two RGS operating modes—see RGS operating modes on page 21. Normal Mode is the simplest means of establishing a connection—you enter the IP address or hostname of the Remote Computer in the Local Computer Receiver Control Panel, and click **Connect**.

NOTE: The second RGS operating mode, Directory Mode, is described in Using Directory Mode on page 149 .

NOTE: The RGS Sender listens on TCP/IP port 42966. The port used by the RGS Receiver is assigned by the Local Computer OS and can vary.

Before attempting to connect to a particular Remote Computer for the first time, HP recommends that you verify that the Remote and Local Computers satisfy the Pre-connection checklist on page 77 . The Pre-connection checklist on page 77 can also be used as a troubleshooting aid if a connection attempt fails. After verifying the preconnection checklist, start the Receiver on the Local Computer. This can be done from the start menu or from the command line (see Figure 5-1 Starting the Receiver on Windows on page 86).

Figure 5-1 Starting the Receiver on Windows



The RGS Receiver supports the following command line options for the Windows executable, rgreceiver.exe, and the Linux executable, rgreceiver.sh:

[-config [filename]]

[-directory [file]]

[-nosplash]

[-v | -ver | -version]

[-h | -help | -?]

-Rgreceiver.propertyname=value

-config filename—Specifies the name of a RGS Receiver configuration file to use.

-directory [file]—Starts the Receiver in Directory Mode. If the optional file path is specified, the file is opened and used to look up the Remote Computers assigned to the user. If a file is not specified, the user is prompted to enter a path to the directory file. For information on Directory Mode, see Using Directory Mode on page 149.

-nosplash—Disables display of the splash screen when the Receiver starts.

[-v | -ver | -version]—Displays the Receiver version information.

[-h | -help | -?]—Displays the Receiver command line options that are listed on this page

-Rgreceiver.propertyname=value—Can be used to specify one or more RGS Receiver properties. See RGS properties on page 153 for general information on RGS properties. For information specifically on RGS Receiver properties, see RGS Receiver properties on page 155.

After the Receiver starts, you'll see the Receiver Control Panel (see Figure 5-2 Receiver Control Panel on page 87).

Figure 5-2 Receiver Control Panel

To create an RGS connection, enter the hostname or IP address of the Remote Computer in the **Hostname** dialog box, and then press Enter or click **Connect**.

NOTE: At RGS 5.2.5, the capability was added to specify the port number used by the RGS Sender. The default Sender port number is 42966. The Sender port number can be changed using the Rgsender.Network.Port property. If this property is used to change the Sender port number from its default value of 42966, the Sender port number must then be specified in the above Hostname dialog box, in either of the following formats:

hostname:port number

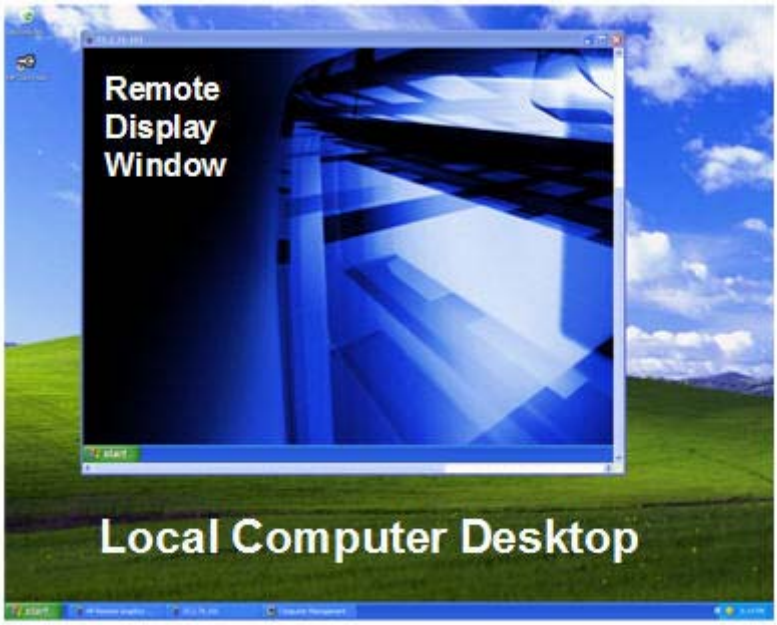
IP address:port number

For example, if the Rgsender.Network.Port property is used to change the Sender port to 42970, the Sender IP address in the figure above would need to be modified to include the port number, as follows:

15.2.76.29:42970

Provide a username and password, as prompted. If the connection succeeds, the Remote Display Window will be displayed on the Local Computer, showing the desktop session of the Remote Computer (see Figure 5-3 Remote Display Window on page 88).

Figure 5-3 Remote Display Window



NOTE: If the connection attempt fails, refer to the Pre-connection checklist on page 77 , for a list of conditions which must be met in order for a connection to be established.

NOTE: If your RGS Sender is not yet licensed, the error dialog in Section RGS licensing on page 12 will be displayed in the Remote Display Window. For information on Sender licensing, see the *HP Remote Graphics Software Licensing Guide*, available at http://www.hp.com/support/rgs_manuals.

NOTE: On Linux, The Receiver Control Panel will not stay on top of other windows in the desktop, and can therefore get lost. Also, for session managers that support multiple desktops, the Receiver control panel will not, by default, show up in all desktops. Refer to Setup Mode on page 89 to understand how to raise the Receiver Control Panel to the top of the window stack.

In Normal Mode, the Local Computer can connect to only one Remote Computer at a time, as described in One-to-one connection on page 16 If an attempt is made to connect to a second Remote Computer using the Receiver Control Panel, the connection to the first Remote Computer is terminated.

5.1.1 Receiver Control Panel

Now that a connection has been established, the Receiver Control Panel is described in more detail. The Receiver Control Panel is used to perform the following tasks:

- **Establish a connection:** To establish a connection to a Remote Computer, enter the hostname or IP address of the computer in the Hostname field. Press Enter, or click the **Connect** button to connect to the Remote Computer. The selector on the right side of the text box displays a history of previously connected computers that can be selected.
- **Close a connection:** To close a connection, press the **Disconnect** button.
- **Enter Setup Mode:** To enter Setup Mode, press the Setup Mode button. In Setup Mode, the Receiver suspends mouse and keyboard input to the Remote Computer, allowing the user to use the mouse and keyboard to interact with local Remote Display Windows. See Setup Mode on page 89 for more information.
- **View advanced operations:** Click **Advanced>>>** to view the tabs which provide access to many of the advanced capabilities of RGS.
- **Display help:** Click **Help** to display the online help. On Linux, the online help is displayed separately in a web browser, such as Mozilla. On Windows, the online help is displayed using the CHM file viewer hh.exe.
- **Display program information:** Click **About** to display RGS program and copyright information.

The Receiver Control Panel contains a status bar at the bottom of the window. The status bar provides information that describes the current state of the RGS Receiver. For example, it displays the messages “connection in progress”, “connection succeeded”, and “connection failed.” The status bar can be useful in diagnosing connection problems because it also displays the general reason for a connection failure, such as “Authorization Failed” or “Authentication Failed”.

5.1.2 Setup Mode

Depending on how you configure RGS on the Local Computer, the Remote Display Window may cover the entire Local Computer monitor. Furthermore, the Remote Display Window may be set to borderless —therefore, the window won’t have the title bar and borders that normally allow the window to be moved, minimized, and resized. Such a configuration raises a number of questions, including:

- How do you move or resize the window absent a title bar and borders?
- If multiple Remote Display Windows are covering each other, how do you select a particular Remote Display Window to view?

Complicating the situation is that all keyboard and mouse events in the Remote Display Window are sent to the Remote Computer for processing. Therefore, the keyboard and mouse cannot be readily used to interact with the locally-displayed Remote Display Window.

To address this situation, RGS provides Setup Mode. In Setup Mode, transmission of keyboard and mouse events to the Remote Computer is suspended—instead, the keyboard and mouse can be used to

interact with the Remote Display Window on the Local Computer. In Setup Mode, you can perform a number of operations, including:

- Move a borderless Remote Display Window
- Raise a particular Remote Display Windows that is being obscured by another Remote Display Window

NOTE: In Normal Mode, only a single Remote Display Window can be displayed on the Local Computer. Displaying Multiple Remote Display Windows on the Local Computer requires using Directory Mode (see Using Directory Mode on page 149).

Setup Mode can be activated in two ways:

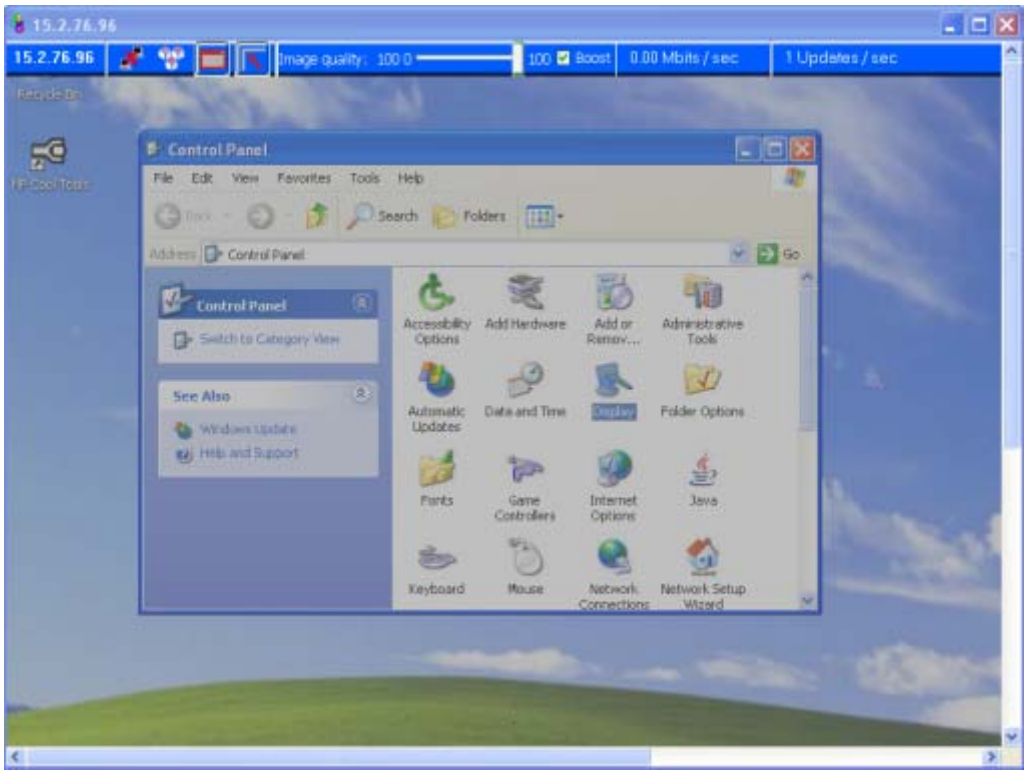
1. By clicking the **Setup Mode** button on the Receiver Control Panel (see Figure 5-2 Receiver Control Panel on page 87). This presumes, of course, that the Receiver Control Panel is visible.
2. By typing a special key sequence on the keyboard, called a *hotkey sequence*.

The hotkey sequence method of activating Setup Mode is required in situations where, for example, the Remote Display Window is borderless, and is covering the entire Local Computer monitor, including the Receiver Control Panel. Because the Receiver Control Panel is obscured, its **Setup Mode** button is inaccessible. The default hotkey sequence to enter Setup Mode is:

Shift press, space press, space release

When the Receiver detects this key sequence, it does not send the key sequence to the Remote Computer—instead, the Receiver activates Setup Mode on the Local Computer, as denoted by dimming of the Remote Display Window (see Figure 5-4 Dimming of the Remote Display Window in Setup Mode on page 90).

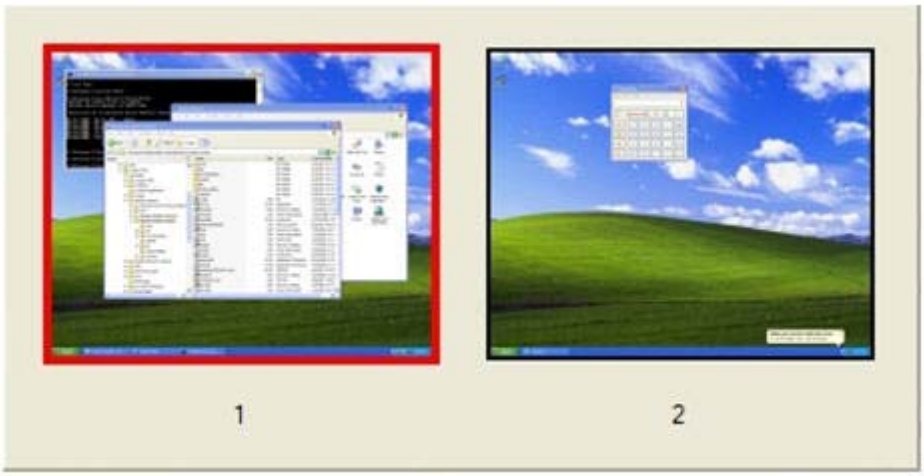
Figure 5-4 Dimming of the Remote Display Window in Setup Mode



The default hotkey sequence can be changed using the **Hotkeys** tab in the Receiver Control Panel (see Hotkeys on page 135). As long as the Shift key is held down (following the Shift press, space press, and space release hotkey sequence used to enter Setup Mode), Setup Mode remains active. When the Shift key is released, Setup Mode exits. In contrast, the **Setup Mode** button on the Receiver Control Panel toggles the state of Setup Mode each time the user clicks on the button.

If Setup Mode is activated by the hotkey sequence (as opposed to the **Setup Mode** button), and you have multiple Remote Display Windows on your computer, you can bring up the Remote Display Window selection dialog to view a thumbnail image of each Remote Display Window (see Starting the Receiver in Directory Mode on page 150)

Figure 5-5 Remote Display Window selection dialog

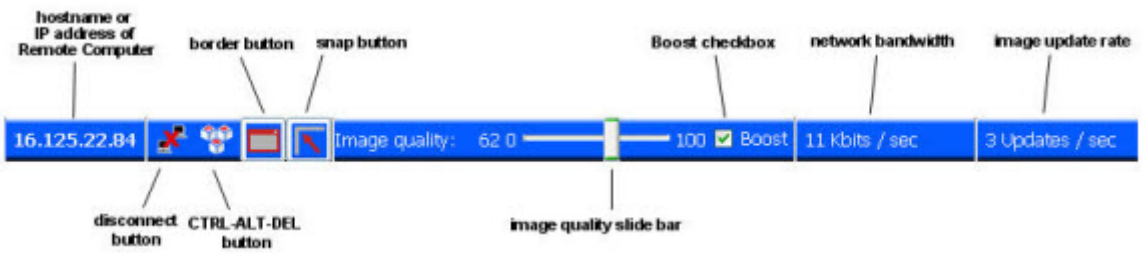


The Remote Display Window selection dialog is only displayed in Directory Mode—this is the mode that supports multiple Remote Display Windows.

5.1.3 Remote Display Window Toolbar

The Remote Display Window Toolbar provides information on the RGS connection, and allows several RGS parameters to be controlled. The toolbar is positioned at the top of the Remote Display Window (see Figure 5-6 Remote Display Window Toolbar on page 91) and is toggled on and off by pressing the H key while in Setup Mode. In this particular case, Setup Mode can be entered by either method—the **Setup Mode** button or the hotkey sequence—and the H key can be used to display the toolbar.

Figure 5-6 Remote Display Window Toolbar



The Remote Display Window Toolbar provides the following:

- **hostname**—The hostname or IP address of the Remote Computer
- **disconnect button**—Disconnects the current RGS session

- **CTRL-ALT-DEL button**—Sends the CTRL-ALT-DEL key sequence to the Remote Computer. Some key sequences, such as CTRL-ALT-DEL, are trapped by the Local Computer, and therefore are not forwarded to the Remote Computer. This button allows the user to send a CTRL-ALT-DEL sequence to the Remote Computer without using the keyboard.
- **Borders button**—Adds or removes window borders and decorations on the Remote Display Window.
- **Snap button**—When selected, this option causes the Remote Display Window to snap to the edges of the monitor whenever the boundaries of the window are within 30 pixels of any edge of the monitor.
- **Image quality slide bar**—Sets the image quality and, therefore, the amount of compression. Higher image quality reduces the amount of compression, and therefore consumes greater network bandwidth.
- **Boost checkbox**—When checked, will improve (boost) image quality for certain types of images, namely those images containing significant amounts of text or lines. Because of the high contrast ratio between adjacent pixels, such images often don't compress well. When the Boost checkbox is checked, such high contrast cases will be compressed in a manner to better preserve their visual quality, but at the possible expense of higher network bandwidth and/or lower image update rates. HP recommends that you experiment with different settings of the image quality slide bar and the Boost checkbox to find the optimal settings for your environment.

  The Boost checkbox was added beginning with RGS 5.2.6, and requires that both the RGS Sender and Receiver be version 5.2.6 or later. . The Boost setting can also be controlled by the Rgreceiver.ImageCodec.IsBoostEnabled Receiver property.
- **Network bandwidth**—Displays the current network bandwidth consumed by this connection.
- **Image update rate**—Displays the number of image updates per second for this connection.

5.1.4 Remote Computer monitor blanking operation

For an overview of Remote Computer monitor blanking, see Remote Computer monitor blanking operation on page 92. Monitor blanking on the Remote Computer is provided for security, so that the primary user's desktop session on the Remote Computer is not visible if a monitor is connected to the Remote Computer.

Monitor blanking is supported on all Windows computers that support gamma. On these computers, the default behavior is that the Remote Computer monitor will blank to black when the user connects and logs in. The Remote Computer monitor will unblank when the user disconnects or logs out. Below are several additional details on monitor blanking on HP xw Personal Workstations:

- The one element on the monitor that does not go blank is the cursor.
- Blanking can take up to two seconds from the time the primary user logs in or reconnects until the time that the monitor is actually blanked.
- The HP xw Personal Workstations also block input from a directly-connected keyboard and mouse when monitor blanking is occurring. When keyboard or mouse input is received by the Remote Computer, the monitor will enter the display powersave mode, and the cursor will be blanked as a result.
- An exception to input blocking is the CTRL-ALT-DEL key sequence. When this sequence is received by the Remote Computer from a directly-connected keyboard, the Remote Computer desktop will

display the login dialog on the Local Computer. The Remote Computer monitor will remain blank while this occurs but the monitor will exit its powersave mode, and keyboard input will become unblocked until this dialog is dismissed.

If monitor blanking is enabled but the Remote Computer is unable to blank the display (because, for example, the computer is not one of the supported computers listed previously), a warning dialog is displayed on the Local Computer (see Figure 5-7 Local Computer warning dialog if the Remote Computer is unable to blank its monitor on page 93).

Figure 5-7 Local Computer warning dialog if the Remote Computer is unable to blank its monitor

Click on **Warning: Sender Monitor is Viewable** to view the associated message dialog (see Figure 5-8 Message Dialog on page 93).

Figure 5-8 Message Dialog

The Remote Computer monitor blanking feature can be disabled by setting the following Sender property to 0 (false).

Rgsender.IsBlankScreenAndBlockInputEnabled

If this property is set to 0, monitor blanking will be disabled, meaning that a monitor connected to the Remote Computer will display the user's desktop session. Furthermore, because monitor blanking is disabled, the warning dialog will not be displayed. For more details on this property, see Sender general properties on page 176.

5.2 Linux connection considerations

5.2.1 Full-screen crosshair cursors

Certain applications that use large crosshair cursors (for example, PTC ICEM Surf uses a full-screen crosshair cursor) will not display correctly on the Receiver. Full-screen crosshair cursors can be disabled by typing the following in a terminal window:

/usr/contrib/bin/X11xprop -root -remove _SGI_CROSSHAIR_CURSOR

/usr/contrib/bin/X11xprop -root -remove _HP_CROSSHAIR_CURSOR

This will force the application to use an X cursor, which will display correctly on the Receiver.

5.2.2 Gamma correction on the Receiver

The color on a 3D application on the Sender can look incorrect when displayed on a Receiver. This is because the gamma of the Local Computer monitor may not match the gamma of the Remote Computer monitor. To correct this, any tool that will adjust the gamma for a display can be used. Some tools will adjust the gamma for the entire monitor, while others will adjust the gamma on a per-window basis. Per-window tools that can be used to adjust only the Receiver window will provide the best results.

5.2.3 Black or blank connection session with the Linux Sender

Connection to an X server that is configured with less than 24-bit or 32-bit default visuals (depending on the graphics device) will cause the Linux Sender to generate a black or blank connection screen. For example, some default installations may configure a 16-bit visual in /etc/X11/XF86Config after the installation. Reconfiguring the X server to serve 24-bit (or 32-bit) default visuals, and restarting the X server will usually fix the black or blank connection situation.

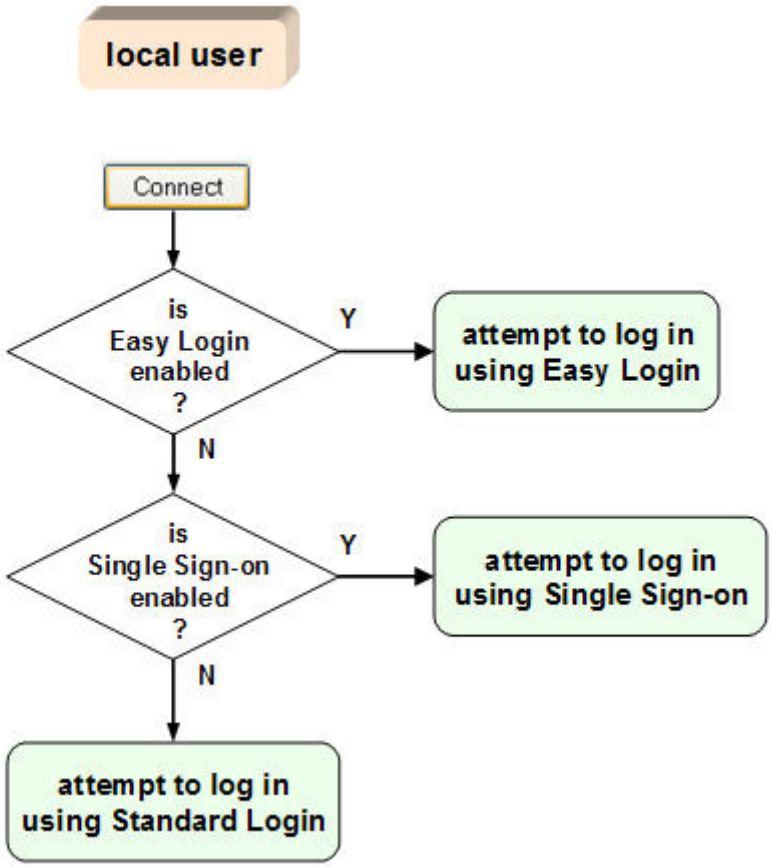
5.3 RGS login methods

RGS provides three methods for the local user to log into a Remote Computer:

- **Standard Login**—supported on Windows and Linux Senders. For an overview of Standard Login Establishing an RGS connection using Standard Login on page 19.
- **Easy Login**—supported on Windows XP Professional Senders on HP blade workstations.
- **Single Sign-on**—supported on Windows XP Professional Senders on HP blade workstations and HP personal workstations. For an overview of Single Sign-on and Easy Login, see Single Sign-on and Easy Login on page 20.

The log in method that is used is dependent on how the Sender was installed—see Figure 3-6 Dialog to enable Single Sign-On or Easy Login on page 54. If neither Easy Login nor Single Sign-on was enabled during installation, Standard Login is used (see Figure 5-9 Log in selection flowchart on page 95).

Figure 5-9 Log in selection flowchart



Each method is described below.

5.3.1 Standard Login

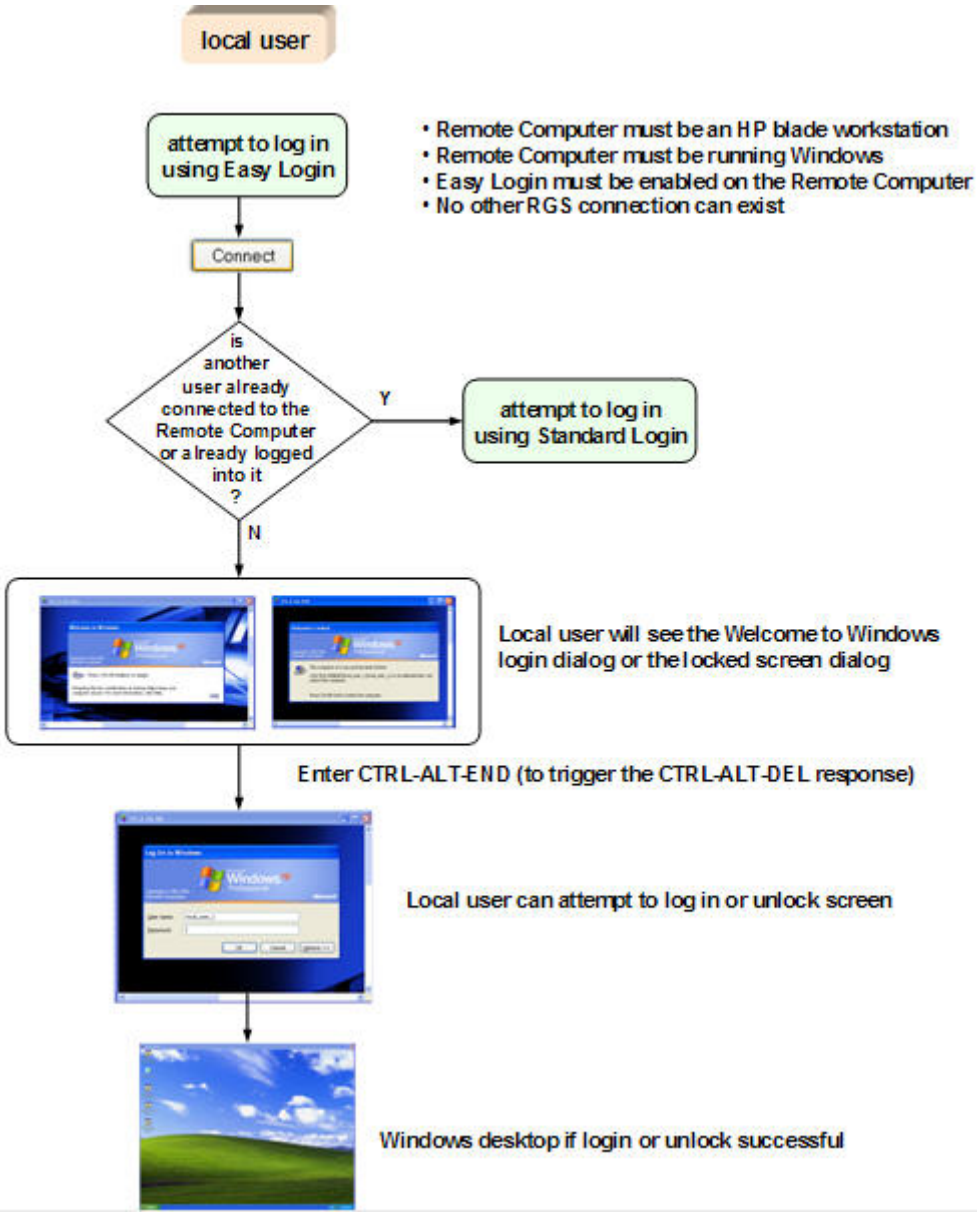
Standard Login is the process by which a local user attempts to connect to a Remote Computer that has neither Single Sign-on nor Easy Login enabled.

See the tabloid page (the last page of the PDF version) of this guide for a diagram of the Standard login process.

5.3.2 Easy Login

The Easy Login flowchart is shown in Figure 5-10 Easy Login process on page 96. If the Easy Login conditions are met, the RGS connection authentication step is skipped, and the local user is presented either with the Welcome to Windows login dialog or the locked screen dialog.

Figure 5-10 Easy Login process

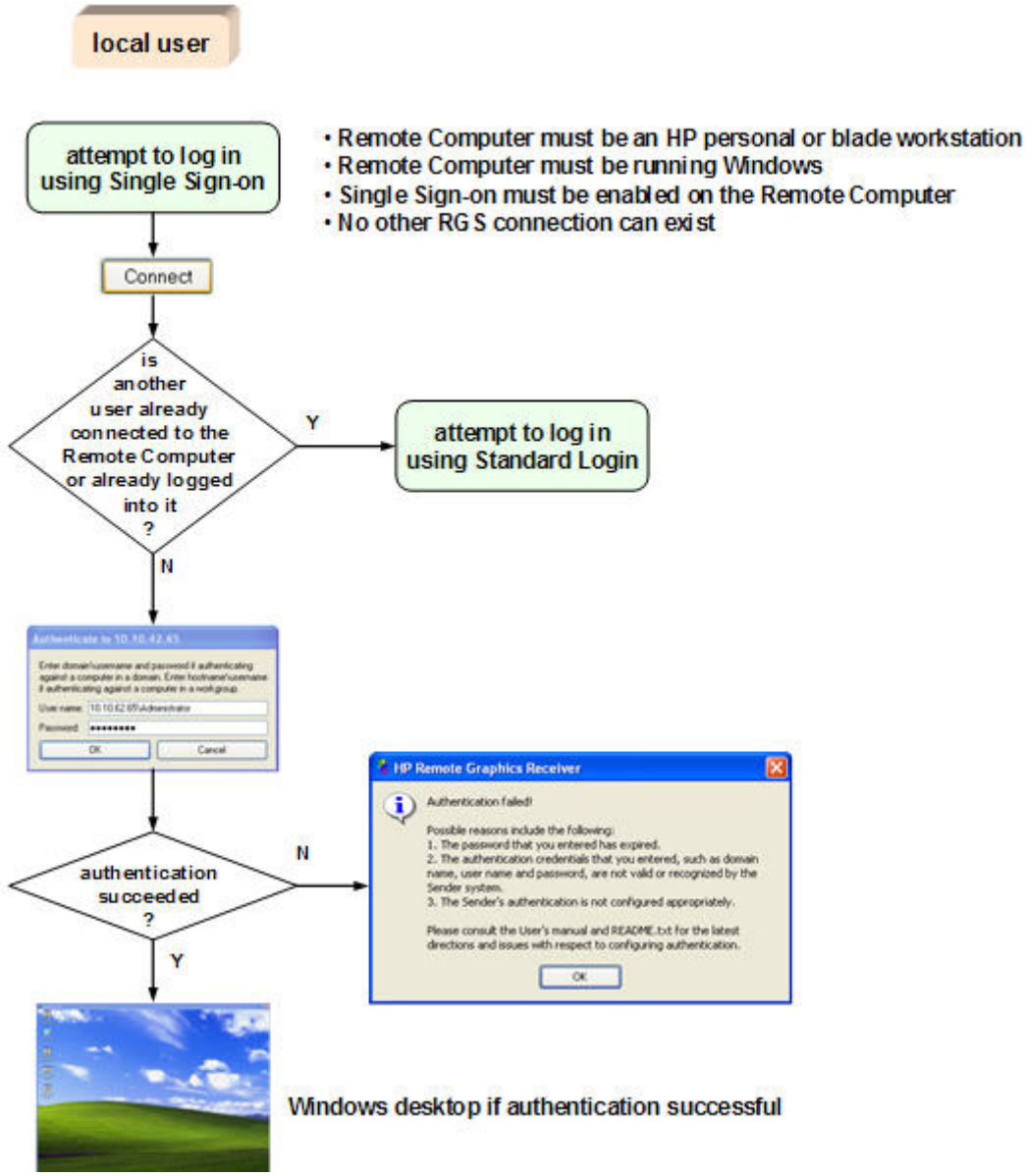


NOTE: There are several Sender setup issues that can prevent an Easy Login connection to the RGS Sender. The RGS Diagnostics Tool programmatically detects several of these issues, and suggests possible solutions. See Using the RGS Diagnostics Tool on Windows on page 55 for more details.

5.3.3 Single Sign-on

The Single Sign-on flowchart is shown in Figure 5-11 Single Sign-on process on page 97. If the Single Sign-on conditions are met, the user authenticates the RGS connection, and the Windows log in or unlock step is skipped. The user is presented with the Windows desktop following RGS connection authentication.

Figure 5-11 Single Sign-on process



5.4 Changing your password

In RGS 5.0 and earlier, attempting to make a connection with an expired password would generate an Authentication failed! error message. In this situation, the user would either need direct access to the Remote Computer to change the password, or would need to call IT to have the password changed.

Starting at RGS 5.1, you can change an expired password from the RGS Receiver. If you enter an expired password, you will see a dialog stating that the password must be changed (see Figure 5-12 Dialog indicating that the password must be changed on page 98).

Figure 5-12 Dialog indicating that the password must be changed

After clicking **OK**, you'll see the Change Password dialog (see Figure 5-13 Change Password dialog on page 98).

Figure 5-13 Change Password dialog

Enter the requested information to change your password.

5.5 Collaborating

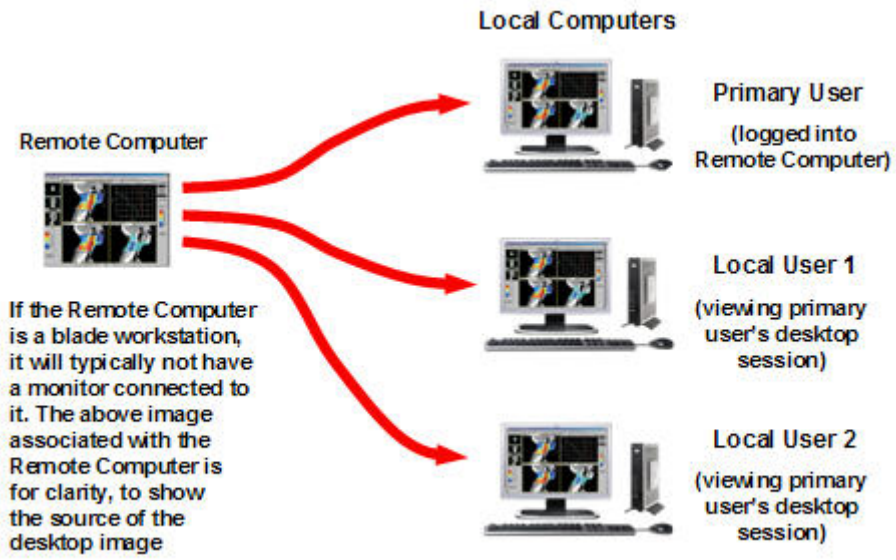
RGS enables the primary user to share his or her desktop session with several local users simultaneously (see One-to-many connection on page 18 This feature can be used in a variety of collaborative scenarios including classroom instruction, design reviews, and technical support.

5.5.1 Creating a collaboration session

A collaboration session is created when one or more local users are authorized by the primary user to connect to the primary user's desktop session. This allows all users, primary and local, to view and

interact with the primary user's desktop (see Figure 5-14 Multiple local users can view and interact with the primary user's desktop on page 99).

Figure 5-14 Multiple local users can view and interact with the primary user's desktop

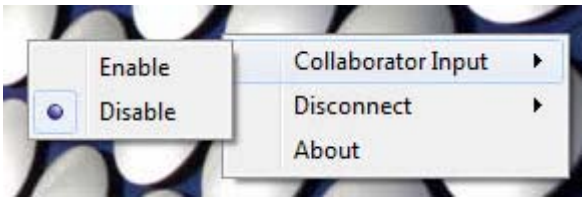


The user currently controlling the mouse and keyboard is called the *floor owner*. Only one user, the floor owner, can interact with the desktop at a time. To transition the floor owner, the current floor owner must cease using the keyboard or mouse for a short period of time (0.5 seconds). If another user uses the mouse or keyboard while the current floor owner is inactive during this .5 second period, floor ownership transfers to the new user.

In a collaboration session, the shape of the local cursor is modified for the floor owner. For the other remote users, the local cursor is left unchanged, and a remote cursor is displayed in the Remote Display Window.

Use of the mouse and keyboard by collaboration users can be disabled by the primary user using the Sender GUI (see Figure 5-15 Disabling of the local users' mice and keyboards by the primary user on page 99). Authorized local users will still be able to view the primary user's desktop, but will be unable to interact with it.

Figure 5-15 Disabling of the local users' mice and keyboards by the primary user



Connection between a Local Computer and a Remote Computer is permitted only if the primary user allows the connection. A question dialog, stating the domain and user name of the local user attempting a connection, is displayed on the Remote Computer desktop when a local user attempts to connect (see Figure 5-16 Primary user dialog to authorize a local user to connect to the primary user's desktop on page 100). All currently connected local users will also see this dialog because they are currently viewing the Remote Computer desktop.

Figure 5-16 Primary user dialog to authorize a local user to connect to the primary user's desktop

The different cases for establishing a collaborative session are:

- If no one is logged into the Remote Computer desktop (in other words, there is no primary user), all authenticated users are connected, and can view the Windows login desktop. However, when any one user logs into the Remote Computer desktop (and, therefore, becomes the primary user), all other authenticated users (who are viewing the Windows login desktop) will be disconnected as a security precaution.
- If the primary user authorizes a connection from a local user, the new user connects to the Remote Computer and can view its desktop.
- If the primary user does not allow the connection, the new user will be unable to connect.
- On Windows, if the primary user disconnects, the desktop is locked, but the Receivers will remain connected.
- On Linux, if the primary user disconnects, the desktop is locked, and all users are disconnected.
- If the local user connecting to the primary user's computer is the same user as the primary user, the collaboration dialog is not displayed, and the connection is allowed.

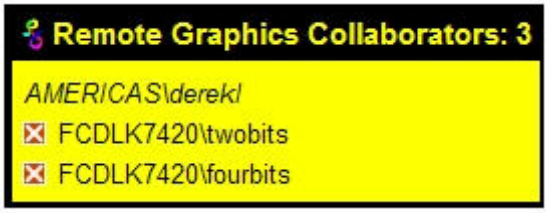
The Sender desktop icon in the system application tray displays the status of connections. The icon animates when Receivers are connected.

All Receivers can be easily disconnected from the HP Remote Graphics icon located in the system tray or from the Sender GUI by right-clicking on the icon or GUI. This is useful when hosting collaborative session, such as in a classroom environment, and the session ends.

5.5.2 Collaboration notification dialog

The Windows Sender displays a collaboration notification dialog when collaboration users are connected. This Sender-created dialog appears in each Remote Display Window that is connected to the Sender. The dialog displays a list of domain\usernames for each user connected to the Remote Computer (see Figure 5-17 Collaboration notification dialog displayed on the Sender and in each Remote Display Window on page 100).

Figure 5-17 Collaboration notification dialog displayed on the Sender and in each Remote Display Window



When the collaboration notification dialog is displayed, it indicates there are multiple connections to the Remote Computer desktop. Primary and collaboration users are identified using different fonts in the notification dialog. The primary user is italicized and listed first. Collaboration usernames follow, and are displayed using a normal font. The figure above shows three active connections, one a primary user and the other two collaboration users. A small button with an "X" is displayed next to all collaboration usernames. Pressing this button disconnects the corresponding collaboration user.

All collaboration users can be disconnected using the Sender GUI. Figure 5-18 Windows Sender GUI to disconnect collaboration users on page 101 shows the Windows Sender GUI selection that can be used to disconnect collaboration users.

Figure 5-18 Windows Sender GUI to disconnect collaboration users

Prior to RGS 5.2.0, the collaboration notification dialog could not be hidden (although it could be moved elsewhere on the desktop by clicking in the dialog and dragging it). Beginning at RGS 5.2.0, a new Sender property has been added—the Rgsender.IsCollaborationNotificationEnabled property (see Sender general properties on page 176). This property allows the user to enable or disable display of the collaboration notification dialog.

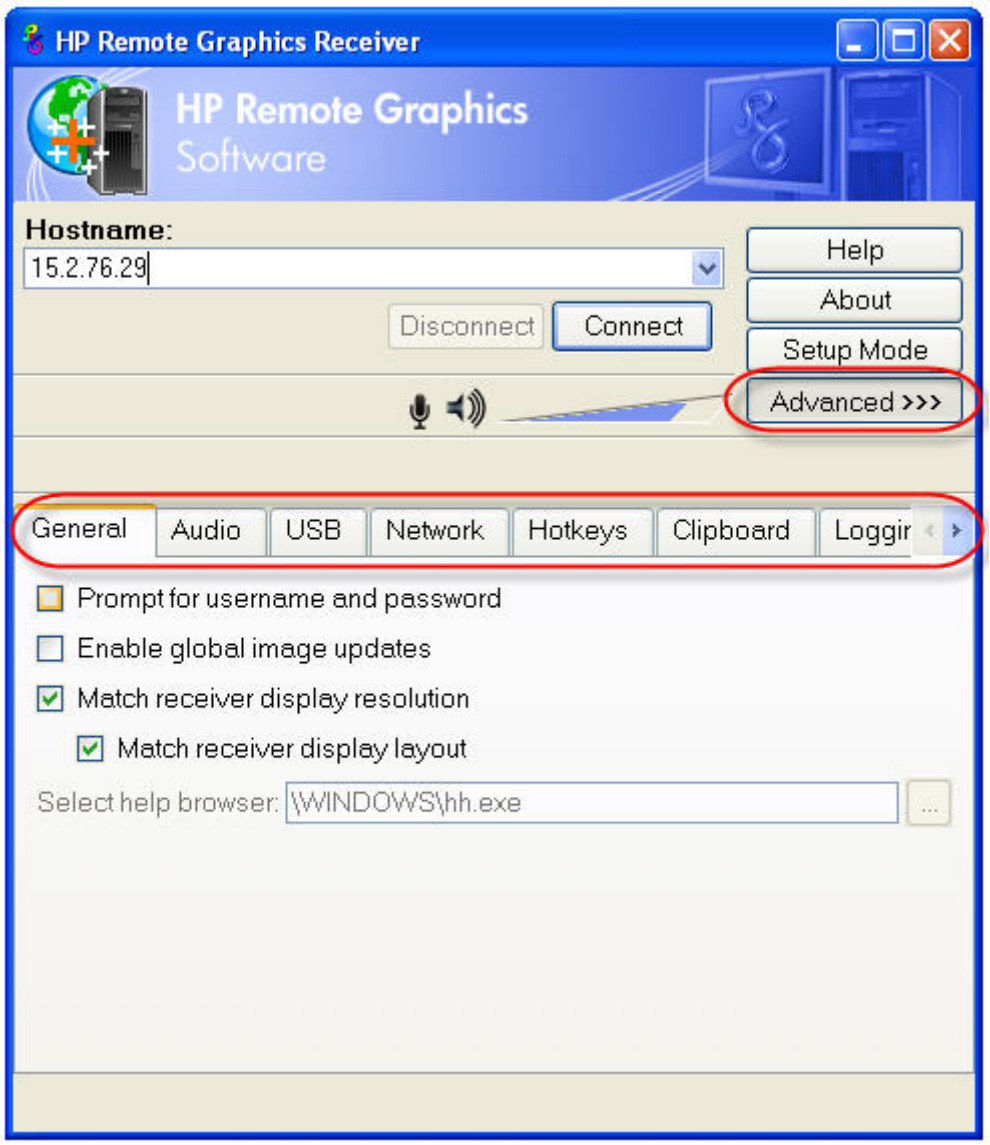
△ **CAUTION:** Caution is advised in disabling the collaboration notification dialog because neither the Remote User (if present) or the Local Users will be notified who is participating in a collaboration session. Furthermore, if display of the collaboration notification dialog is disabled, the warning dialog in Figure 5-7 Local Computer warning dialog if the Remote Computer is unable to blank its monitor on page 93 (which is displayed when the Remote Computer is unable to blank its monitor) will also be prevented from being displayed.

If the collaboration notification dialog is being displayed, the Sender will remove it when all collaboration connections terminate.

6 Advanced capabilities

This chapter discusses the many advanced capabilities of RGS. Click on the **Advanced>>>** button in the Receiver Control Panel to display the tabs shown in Figure 6-1 Tabs used to access advanced RGS capabilities on page 102.

Figure 6-1 Tabs used to access advanced RGS capabilities



The capabilities available under each of these tabs will be described in detail. Unless required for clarity, the portion of the Receiver Control Panel above the tabs will not be shown.

6.1 General options

The options available under the General tab are shown in Figure 6-2 General tab options on page 103.

Figure 6-2 General tab options

The options available under the General tab are:

- **Prompt for username and password**—In certain scenarios (such as silent authentication as described in Standard Login on page 95) the Receiver will not prompt the local user for a domain, username, and password. If the local user desires a prompt in order to enter an alternate domain, username, and password, the user can check this box. If checked, the authentication dialog is always displayed when the **Connect** button is clicked. This is advantageous on Sender/Receiver pairs running Windows and Directory Mode with different connection needs for each session.
- **Enable global image updates**—When checked (enabled), all of the individual regions of the Remote Computer Sender frame buffer that have changed since the last update of the Remote Display Window are combined into a single update that encloses all of the regions that have changed. The advantage of this approach is that there is no perceptible painting of the individual regions as can sometimes be observed when this option is disabled. However, the single rectangle can include a large number of pixels that have not changed since the last update, and thus can significantly reduce the update rate. Enabling this option may improve visual quality at the expense of performance.
- **Match receiver display resolution**—When checked, the Receiver will negotiate with the Remote Computer Sender to have the Sender adjust its display resolution to match the Receiver display resolution. If the Sender is unable to match the resolution of the Receiver, a warning dialog is issued to the local user.
- **Match receiver display layout**—This checkbox is new with RGS 5.1.3. When checked, the Receiver (Local Computer) will try to set the layout of the Remote Computer physical displays to have the same display layout and resolution as the Receiver displays. If the Sender is unable to match the layout and resolution of the Receiver physical displays, the Sender will try to just match the Receiver display resolution. For example, if the Receiver has two physical displays in a 1x2 layout and a overall virtual display resolution of 2560x1024 (1280x1024x2), the Receiver will try to set the Sender to the same layout and resolution. If that fails, the Receiver will try to set a

single Sender physical display resolution of 2560x1024. If that fails, an error is reported to the local user.

For information on the properties associated with the above two checkboxes, see Receiver general properties on page 159—specifically, see the Rgreceiver.IsMatchReceiverResolutionEnabled and Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled properties.

- **Select help browser**—Enables the user to specify a web browser, such as mozilla, to display online help. This option is not available on Windows (grayed out) because the default web browser is automatically read from the Windows Registry.

6.2 Auto Launch

On Microsoft Windows beginning with RGS 5.4.0, the RGS Receiver supports file association. The user can create property files with the extension ".rgreceiver" using the same format as the RGS Receiver configuration file. See Setting property values in a configuration file on page 153 for more details. For example, the file "hostname.rgreceiver" could be used for creating a property configuration file for connecting to the system with name "hostname". If the user double clicks or opens a file with the ".rgreceiver" extension, the RGS Receiver will be automatically started and the property file read and applied. Create a folder in the user's home folder to safely store Auto Launch configuration files. See Auto Launch session properties on page 172 for property details.

6.3 Game Mode

Game Mode is a toggle feature accessed via Hotkeys on page 135 introduced in RGS 5.4.0.

When operating in normal cursor mode, RGS synchronizes the cursor movements of a Sender to a controlling Receiver by placing the senders cursor at the same absolute coordinates of the receivers cursor. Some applications rely on a relative movement of the cursor to interact with a 3D environment. These applications may programmatically readjust the cursor position after a movement is detected. In the default mode of operation where RGS is moving the cursor to an absolute position, these applications may have erratic behavior or cause a loss of cursor control. Game Mode is an attempt to provide better cursor control for such applications.

Game Mode is a toggle on the Receiver to supply the Sender with relative cursor movements. This will enable applications that rely on relative movements to be controlled with RGS. Game Mode is enabled and disabled by pressing the hot key followed by the 'G' key. By default, the key sequence is 'Shift Down, Space Down, Space up, G'.

When Game Mode is enabled, the cursor will be locked to the receivers Remote Display Window. The Remote Display Window Toolbar can be enabled, but interacting with the Remote Display Window Toolbar is not possible when Game Mode is enabled. The Receiver is dependent on the Sender for updating the cursor position. Network connections with a high latency may not be suitable for use with Game Mode. The Remote Display Window can be repositioned without leaving Game Mode. When a connection is terminated, Game Mode will be disabled.

RGS may not be suitable for full screen games. The techniques used by games to quickly draw to the screen will often prevent RGS from being able to extract the contents of the remote frame buffer for display. This is often seen as partially rendered scene or a completely scrambled scene. A game that works in a windowed mode may be able to be controlled when Game Mode is enabled. However, the extremely high frame rates and low latencies required to successfully operate some games are not

possible with the current RGS protocol. See Application support on page 14 for the official description of supported applications.

6.4 Remote audio operation

For an overview of remote audio, see Remote audio on page 31. Before describing the RGS audio capabilities available under the Receiver Control Panel **Audio** tab, Sender audio configuration and calibration are described.

6.4.1 Configuring audio on the Microsoft Windows XP Professional Sender

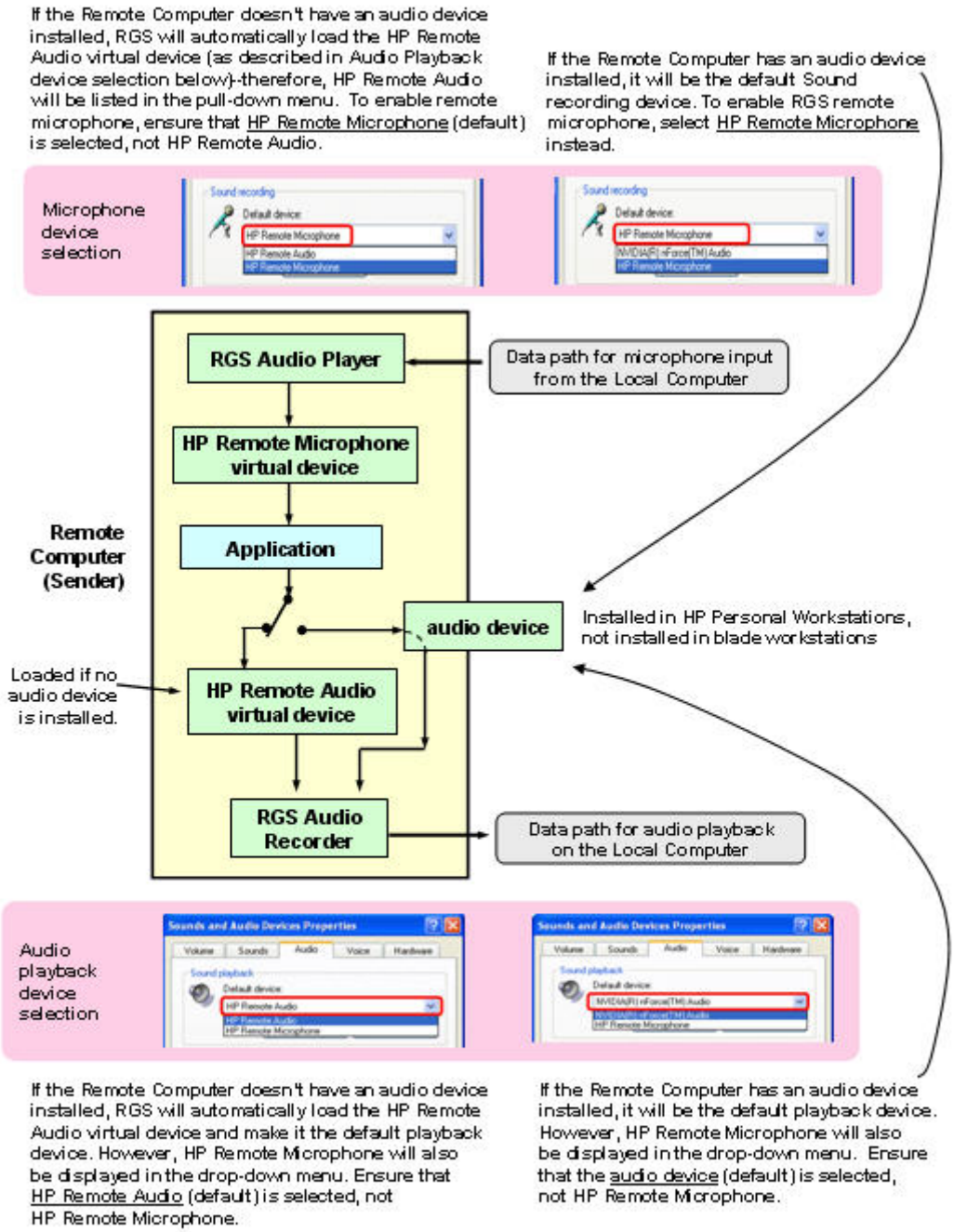
NOTE: It is critical that a mixer control such as "Wave Out Mix", "Stereo Mix", or some variation on "Mixer" is available. The Creative Audigy driver calls this the "What U Hear" control. See Figure 6-7 Recording Control dialog on page 108 for a mixer example. If a mixer control is not available, see Potential audio issues on page 114 for troubleshooting suggestions.

To configure audio on the Microsoft Windows XP Professional Sender, open the Sound and Audio Devices Properties dialog in the Windows Control Panel, and select the Audio tab (see Figure 6-3 Sound and Audio Devices Properties dialog on page 105).

Figure 6-3 Sound and Audio Devices Properties dialog

The first step is to configure the Sound playback device (if used) and the Sound recording device (if used). As shown in Figure 2-20 RGS audio subsystem on Windows on page 32, the Sender contains audio components for both Sound playback and Sound Recording (microphone input). Figure 6-4 Microphone device selection and audio playback device selection on the Sender on page 106 on the next page repeats the Sender portion of the diagram from Figure 2-20 RGS audio subsystem on Windows on page 32, and describes how to select the Sound playback and Sound recording devices on your Remote Computer.

Figure 6-4 Microphone device selection and audio playback device selection on the Sender

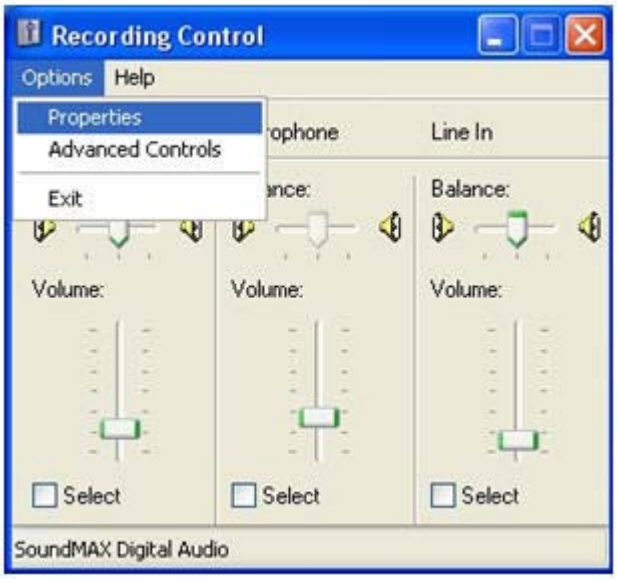


NOTE: Remote Microphone can be enabled/disabled using the Rgsender.Mic.IsEnabled property, as described in the section Microphone property group on page 178.

The HP Remote Audio device has only the mixer available in the recording control panel and the volume level for this line cannot be adjusted. If an audio device is detected during installation, an attempt is made to select the mixer as the recorder input. Due to wide variations in naming and volume levels, it is likely that the mixer line will need to be selected by hand.

To select the mixer as the input line, click the **Volume** button in the Sound recording section of Figure 6-3 Sound and Audio Devices Properties dialog on page 105. This brings up the Recording Control window (see Figure 6-5 Select Recording Control Properties on page 107). Many audio device drivers do not show all available inputs by default. The mixer line is often one of the control lines that is not visible by default. To make it visible, click on the **Options** item in the menu, and then click on **Properties** as shown.

Figure 6-5 Select Recording Control Properties

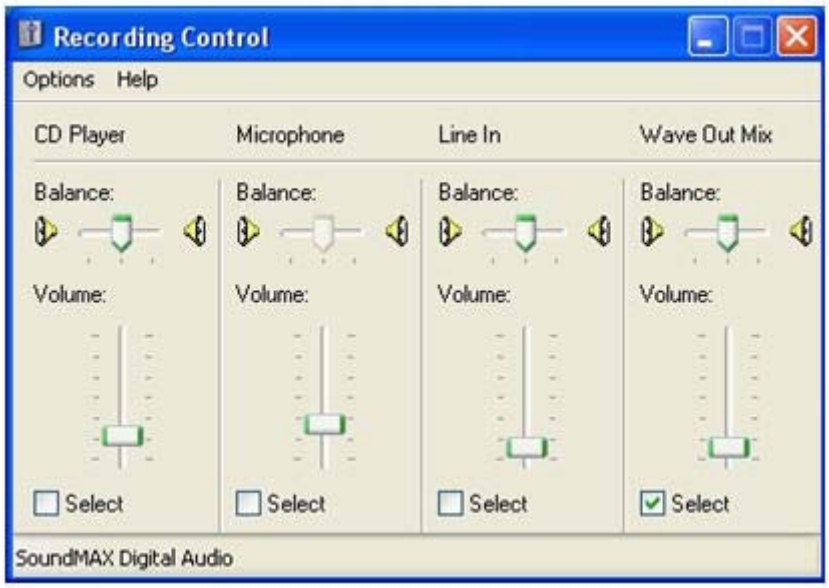


This brings up another window showing all available volume controls. The control associated with the mixer is often called “Wave Out Mix”, “Stereo Mix”, or some variation on “Mixer”. The Creative Audigy driver calls this the “What U Hear” control. Make sure this control is enabled in a similar manner to Figure 6-6 Recording Control Properties dialog on page 108.

Figure 6-6 Recording Control Properties dialog

Press the **OK** button and the Recording Control window should now have the mixer line as one of the controls (see Figure 6-7 Recording Control dialog on page 108). Make sure this item is selected, and the volume level is not at the lowest setting.

Figure 6-7 Recording Control dialog



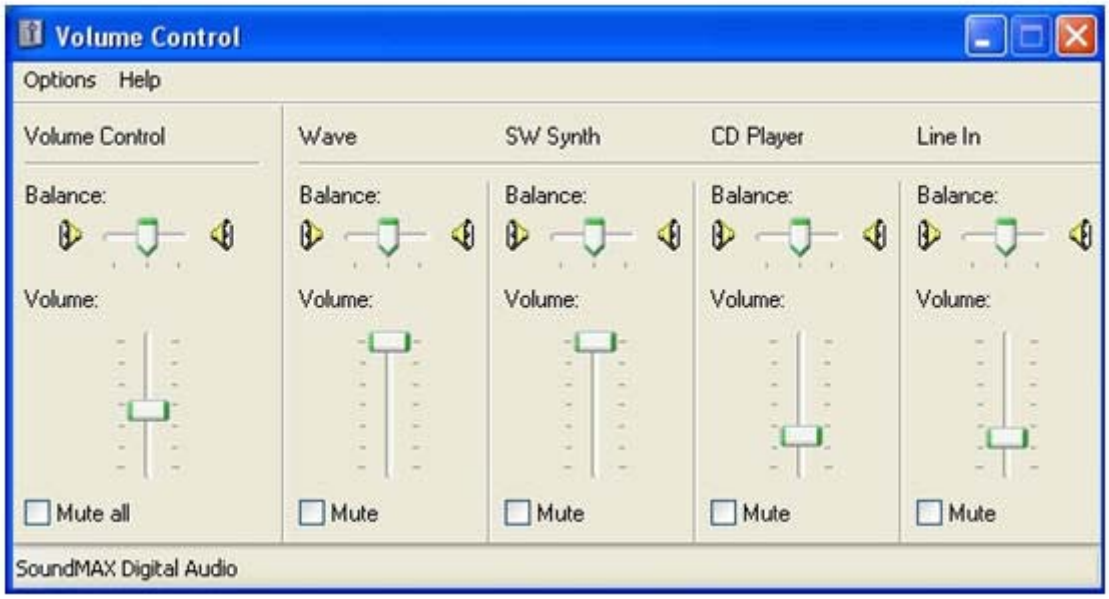
After selecting the mixer, the Sender should record audio information and send it to the Receiver. See the following section to improve the audio quality. If you are not receiving an audio signal, refer to Potential audio issues on page 114.

6.4.2 Calibrating audio on the Microsoft Windows XP Professional Sender

The audio signal captured by the Sender is modified by two different device driver volume controls, and then the master volume level is artificially inserted into the signal. If these volume controls are too low, you might not hear the audio signal. If they are too high, the signal might be distorted. This section describes a technique to hand tune the volume controls to reduce the amount of distortion. These operations should be performed while connected to the Sender through the Receiver.

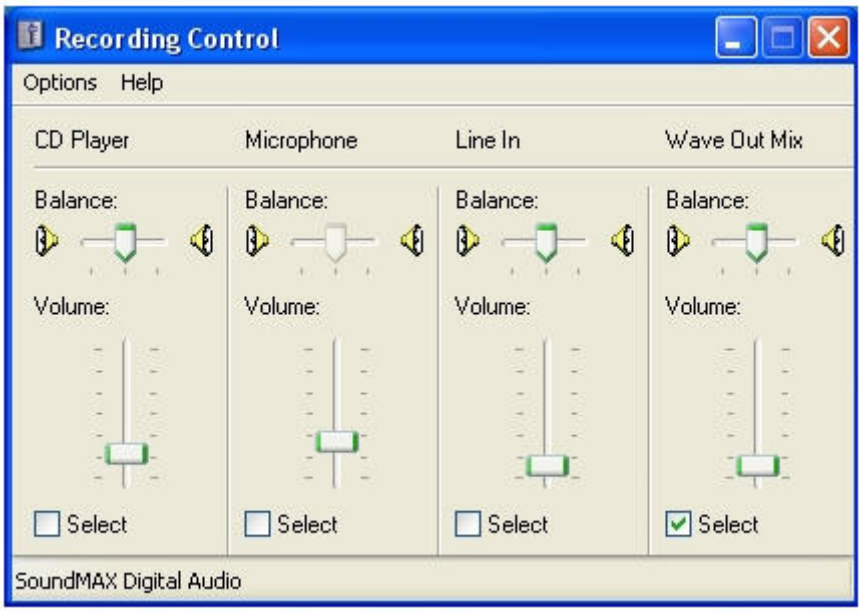
The Wave line of the volume control is the first volume control to affect the audio signal outside of the application that generates the signal. Setting this value to the maximum level gives you the most resolution in your audio signal. Figure 6-8 Volume Control dialog on page 109 shows the Wave volume control at its maximum level.

Figure 6-8 Volume Control dialog



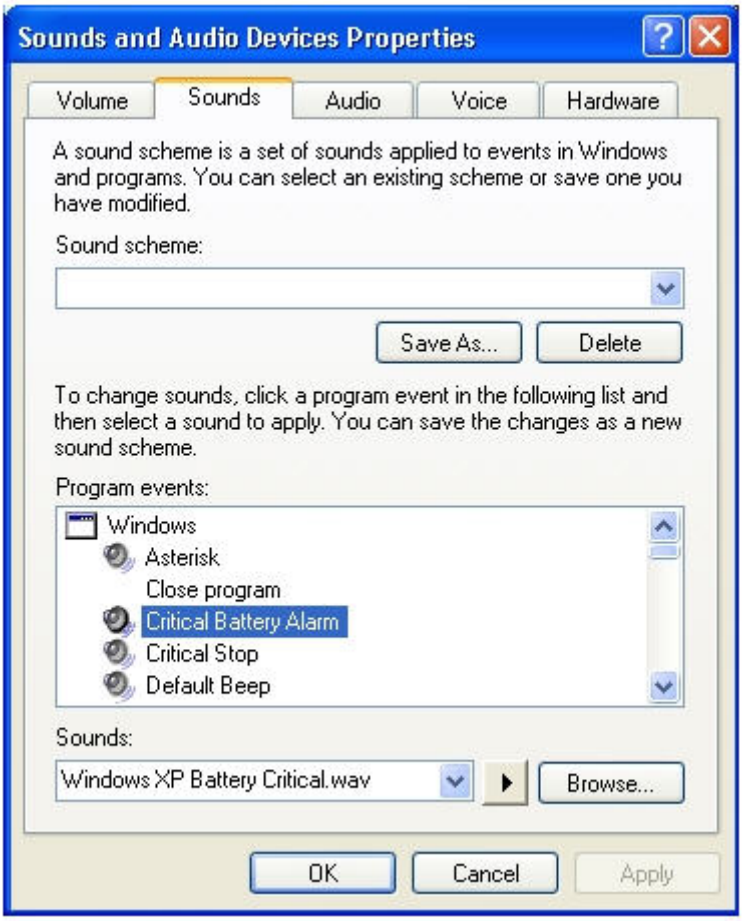
The next volume control to adjust is the mixer line in the Recording Control window. The name of this line varies with different audio devices. See Configuring audio on the Microsoft Windows XP Professional Sender on page 105 for information on how to determine the name of this control. For our example, the control is called Wave Out Mix. Adjust this volume control while playing a sound. At higher levels, the audio signal gets clamped and the signal becomes distorted. Decrease the level until the sound becomes clear. On some devices, the mixer volume control does not go to zero. In this case, the Wave line of the Volume Control will need to be reduced. Figure 6-9 Recording Control dialog on page 110 demonstrates the Wave Out Mix level needed to eliminate distortion.

Figure 6-9 Recording Control dialog



The best sound to play to calibrate your audio device is a low frequency sound with high amplitude. By default, Windows has a program event that meets these requirements. To play this sound, open up the Sound and Audio Devices window, and click on the **Sounds** tab as shown in Figure 6-10 Sound and Audio Devices Properties dialog on page 111.

Figure 6-10 Sound and Audio Devices Properties dialog

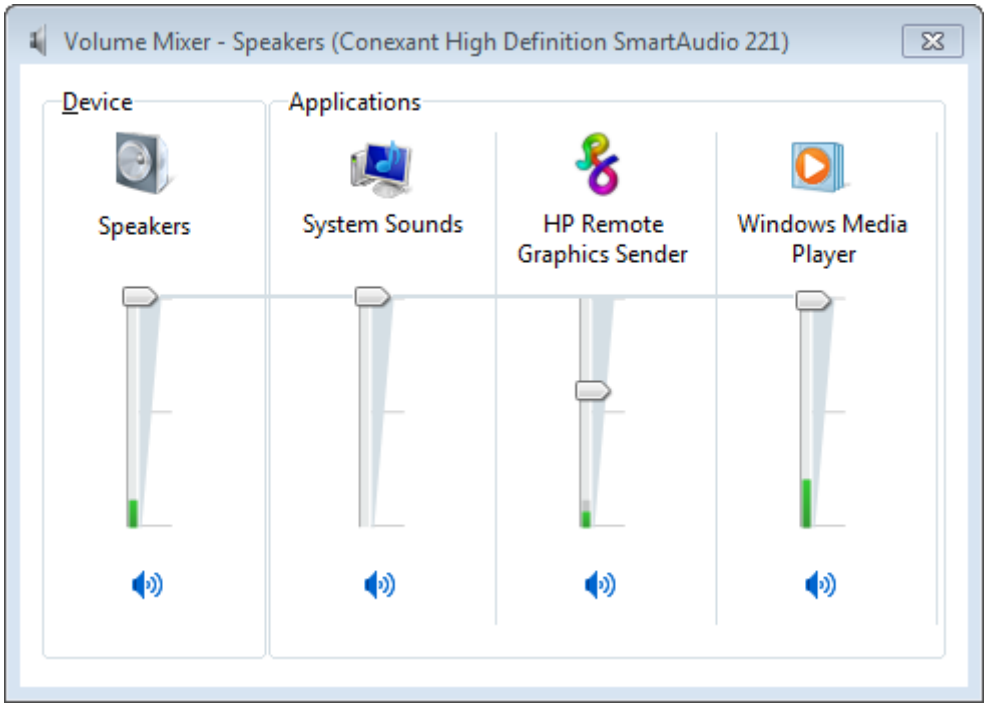


Select the Critical Battery Alarm program event, and press the play button (the triangle located next to the Browse button). The wav file associated with this event is recorded near maximum intensity. If you can play this sound without distortion, most sounds should play without distortion. Some media applications modify their audio signal prior to sending it to the audio device. The Windows Media Player may appear to distort some audio files. This is due to signal modification by some type of enhancement, such as an equalizer.

6.4.3 Configuring audio on Microsoft Windows Vista and Windows 7 Sender

When a connection is established between a Receiver and Sender, an audio session is created on the Sender. When audio is enabled in the Receiver GUI, audio will be captured from the default playback device. The master volume level on the Sender should have the expected impact on the remote audio volume level. Windows Vista and Windows 7 also allow application specific volume controls through the Volume Mixer. This can be opened through the volume control in the taskbar. This control will allow the Sender volume to be adjusted relative to the master volume as shown in Figure 6-11 Volume Mixer for Windows Vista and Windows 7 on page 112

Figure 6-11 Volume Mixer for Windows Vista and Windows 7



6.4.4 Disabling audio on the Sender

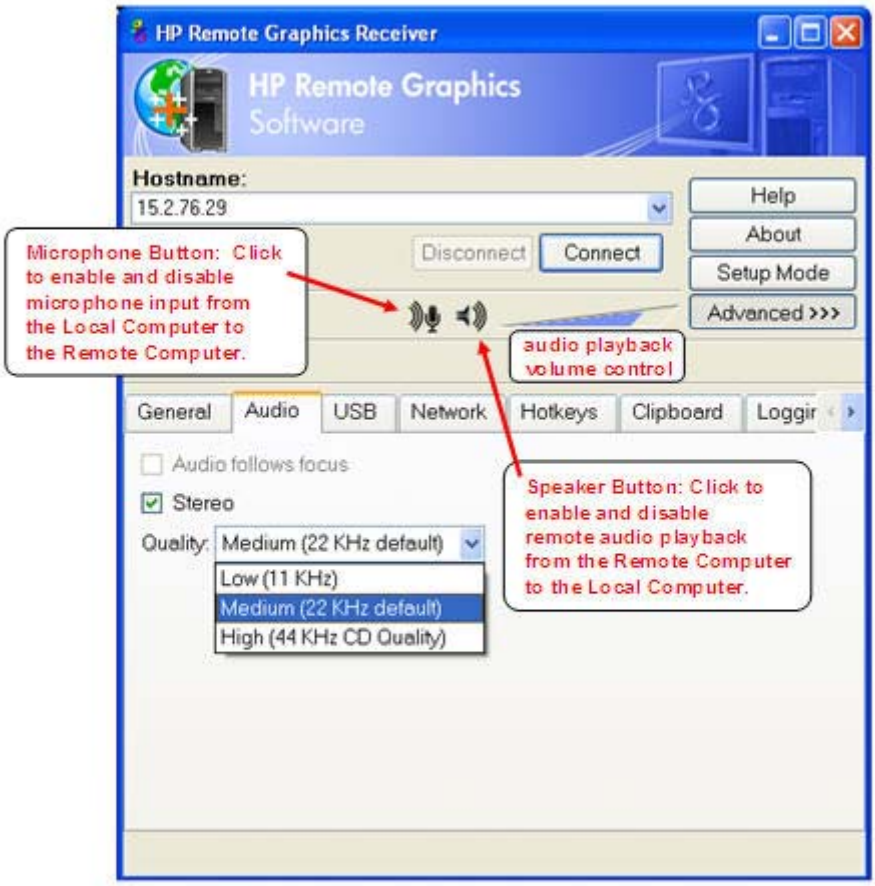
Most audio devices will allow the Sender speakers (if present) to be disabled while still allowing audio to be sent to the Receiver. This is done by enabling the mute for the master volume control through the Sounds and Audio Devices control panel or through the Volume icon in the taskbar. The Volume icon in the taskbar will change when mute is enabled.

Enabling mute on some devices will prevent audio from arriving at the Receiver. The Realtek audio device used in the HP xw4300 has this issue. One possible solution when running the 32 bit version of Windows is to disable the audio device prior to installing the Sender. This will cause the HP Remote Audio device driver to be installed. The real audio device and the HP Remote Audio device should not be enabled at the same time. The Sender will connect to the first audio device it detects, which may not be the device that is selected by the user.

6.4.5 Using audio

The audio controls in the Receiver Control Panel are shown in Figure 6-12 Audio controls on page 113.

Figure 6-12 Audio controls



The Speaker Button on the Receiver Control Panel enables and disables remote audio playback. When remote audio playback is enabled, the Sender records and transmits audio to the Receiver for playback. Audio controls in the Receiver Control Panel allow you set the audio volume, quality, and stereo/mono format. Note that audio quality and stereo settings will affect your overall network usage —higher quality audio and stereo usage will increase the network traffic.

The Microphone Button on the Receiver Control Panel enables and disables remote microphone. When remote microphone is enabled, microphone input from the Local Computer is sent to the Remote Computer for capture by the Remote Computer application.

NOTE: The audio controls in the Receiver Control Panel can be set by using Receiver audio properties. See Receiver audio properties on page 166.

The options available under the **Audio** tab are:

- **Audio follows focus**—This checkbox determines how audio is handled when the Receiver is connected to multiple Remote Computers. Checking this box enables playback of the audio stream from the Remote Computer whose Remote Display Window currently has the keyboard focus. When unchecked, the Receiver combines the audio from all Remote Computers into a single audio stream. If multiple Receivers are executing, the audio is combined from all Receivers into a single audio stream.
- **Stereo**—This checkbox enables or disables stereo audio. Stereo audio sends independent audio streams for the left and right channels but at the expense of greater network bandwidth utilization. If this box is unchecked, monaural audio is sent by the Remote Computer.
- **Quality**—This pull-down menu allows the local user to select one of three different audio quality settings:
  - **Low**—Specifies a sampling rate of 11 kHz.
  - **Medium**—Specifies a sampling rate of 22 kHz.
  - **High**—Specifies a sampling rate of 44 kHz, which is equivalent to CD quality audio.

    Higher quality audio (and its higher sampling rate) requires more network bandwidth, and can impact the performance of RGS, especially over bandwidth-constrained networks.

6.4.6 Potential audio issues

Several potential audio issues are described below along with their potential causes.

- No mixer control available on Windows XP — If a mixer control such as “Wave Out Mix”, “Stereo Mix”, “What U Hear”, or an equivalent control is not available, remote audio will not work. Either disable the audio device and reinstall the RGS Sender to get the virtual audio driver, update the audio driver, or use a different audio device.
- No audio on Windows Receiver—Verify that your Local Computer audio device is working. The volume control slider on the Receiver should play the default beep when released. Ensure that the Speaker Button on the Receiver Control Panel is not in the mute position. Refer to Configuring audio on the Microsoft Windows XP Professional Sender on page 105 for information on selecting the mixer as the input line. Refer to Calibrating audio on the Microsoft Windows XP Professional Sender on page 109 for information on how to ensure the volume levels are not too low. Make sure that mute is not enabled on the Wave line of the Sender or Receiver Volume Control.
- No audio on Windows Vista or Windows 7 after connecting or disconnecting an audio device—Reconfiguring an audio device while an application is using that device can cause the application to stop working. If an audio device is reconfigured, the Sender may stop transmitting audio. Disconnecting the Receiver and reconnecting will cause the Sender to use the new audio configuration.

  Some audio device drivers have the ability to detect when a speaker jack is in use. Plugging in headphones to these devices may cause the device to reconfigure. This can result in temporary loss of remote audio. Reconnecting the Receiver may be necessary to restore audio.

  If all of the audio devices on a system are configured as not plugged in, the audio device cannot be opened. Some programs, such as Windows Media Player, will display an error indicating that an audio device is not available. Something will need to be plugged into one of the unplugged devices to allow audio to work on these devices.

- Audio not continuous—Low bandwidth connections can cause discontinuities in the audio stream. Reducing the quality and turning off stereo may improve the audio quality. Some high priority CPU intensive tasks may disrupt the audio stream. The Windows Task Manager may help you identify such a task. Another possible problem may be a bad network setup.
- PC speaker sounds not working—The Sender captures all audio information sent through the mixer. This includes most audio alerts, MIDI, Direct Sound and Direct Music. Sounds generated by the PC speaker are not captured by the Sender and will not be transmitted.
- Audible pops and glitches in sound—This is most likely because the network bandwidth or system resources are starving the audio streaming from continuous play.
  - Try a lower audio quality setting to reduce network bandwidth usage.
  - Be sure you system is not doing something so computationally intensive that it is starving RGS from keeping up with graphics and audio processing.
- Enabling audio causes continuous network traffic—When the Sender detects an audio signal, that signal is sent to the Receiver. If the audio device on the Sender is silent, there should not be any network traffic due to audio. If the audio device is generating a large amount of noise, that noise may be interpreted as an audio signal, and be sent to the Receiver. This may occur when something is connected to the "Line In" port of the audio device. Reducing volume levels or disconnecting any external devices may help reduce the interference.
- ToggleKeys sound not working—The Accessibility control in Windows will play a sound when some control keys are pressed. This sound is not heard on the Receiver because it is played through the PC Speaker. See the section “PC speaker sounds not working” above.
- No audio with multiple audio devices—The Sender will open up the device that is registered as the default audio device. The Sender is a service that is running in a different context. If you have multiple audio devices, it may choose a different device than you have selected as the default. Disable the extra audio device to ensure the Sender uses the correct device. See Configuring audio on the Microsoft Windows XP Professional Sender on page 105 to set up the audio device after disabling the extra audio device.

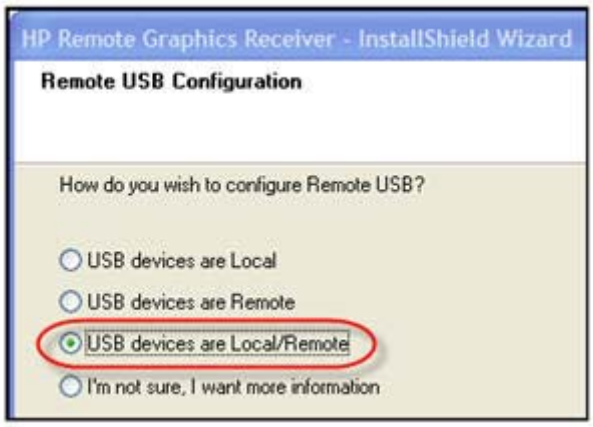
6.5 Remote USB operation

For an overview of remote USB, see Remote USB overview on page 24.

This section provides an example of using remote USB. A USB drive key is plugged into the Local Computer, and remote USB is used to attach the drive key to a Remote Computer. This example assumes the Receiver was installed with the remote USB configuration option shown in Figure 6-13 USB

configuration during Receiver installation —USB devices are Local or Remote on page 116. For a discussion of the USB installation options, see Installing the Receiver on Windows on page 45.

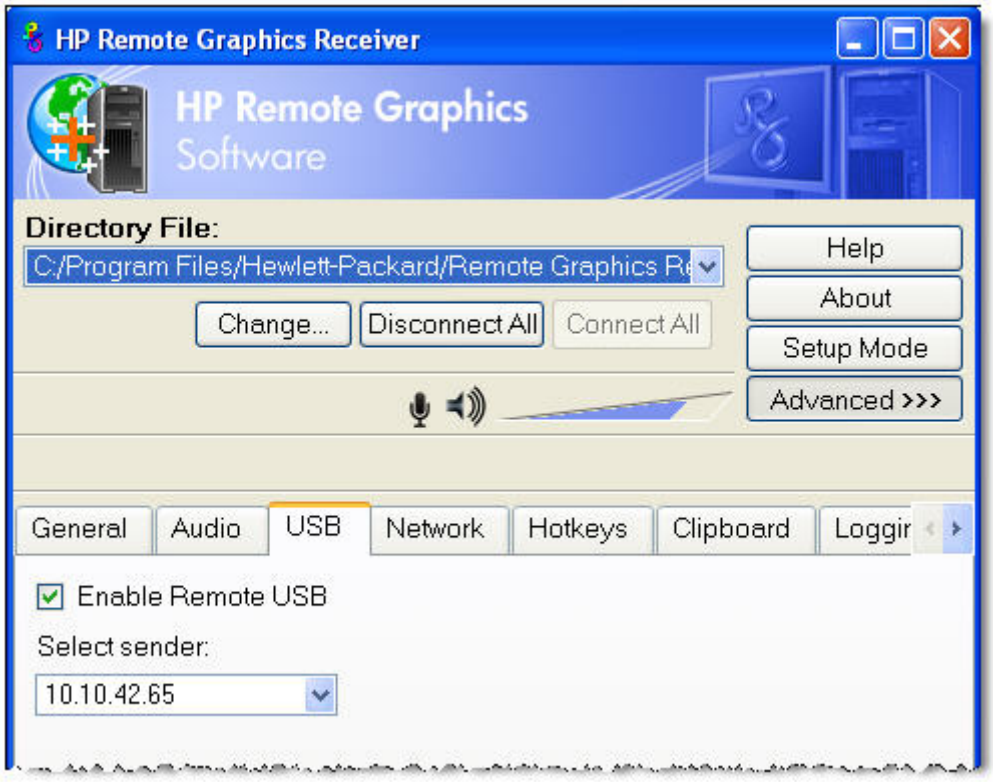
Figure 6-13 USB configuration during Receiver installation —USB devices are Local or Remote



6.5.1 Attaching a local USB device to a Remote Computer

The options available under the **USB** tab in the Receiver Control Panel are shown in Figure 6-14 USB tab options on page 116.

Figure 6-14 USB tab options



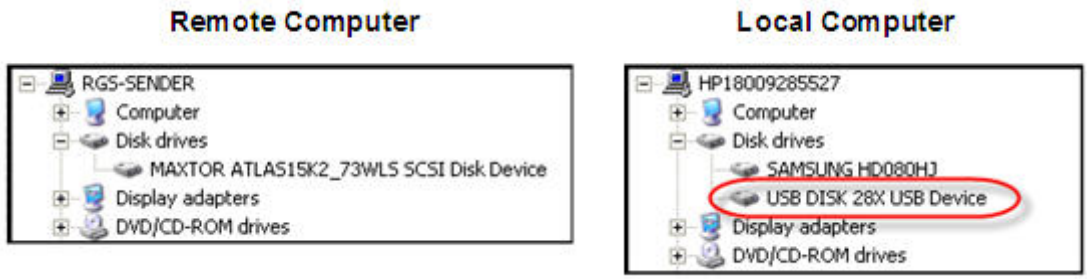
The USB options are:

- **Enable Remote USB**—This checkbox can be used to dynamically (during an active RGS connection) enable or disable USB connections to the Remote Computer. When enabled, USB devices plugged into the Local Computer appear to the Remote Computer as locally attached devices. Because remote USB supports hot plug connections, it is not necessary to disable remote USB before plugging or unplugging USB devices on the Local Computer.
- **Select sender**—If multiple Remote Computers are specified in Directory Mode, the Select sender drop down menu is used to select which Remote Computer (Sender) receives the remote USB connection. In Figure 6-13 USB configuration during Receiver installation —USB devices are Local or Remote on page 116, the RGS Receiver is operating in Directory Mode and the Remote Computer at IP address 10.10.42.65 is selected to receive the remote USB connection.

NOTE: Directory Mode operation is discussed in Using Directory Mode on page 149.

Figure 6-15 Prior to remote attachment of the USB drive key on page 117 shows the presence of the USB drive key on the Local Computer before the remote USB attachment is made.

Figure 6-15 Prior to remote attachment of the USB drive key



To connect the USB drive key to a Remote Computer in Directory Mode, perform the following steps:

1. Click the **USB** tab on the Receiver Control Panel.
2. Click the **Enable Remote USB** checkbox to enable the remote USB connection.
3. Select the IP address (or hostname) of the Remote Computer, and click **Connect**.
4. Once connection has been established, remove and re-insert the USB drive key—this step is required to initiate the remote USB attachment.

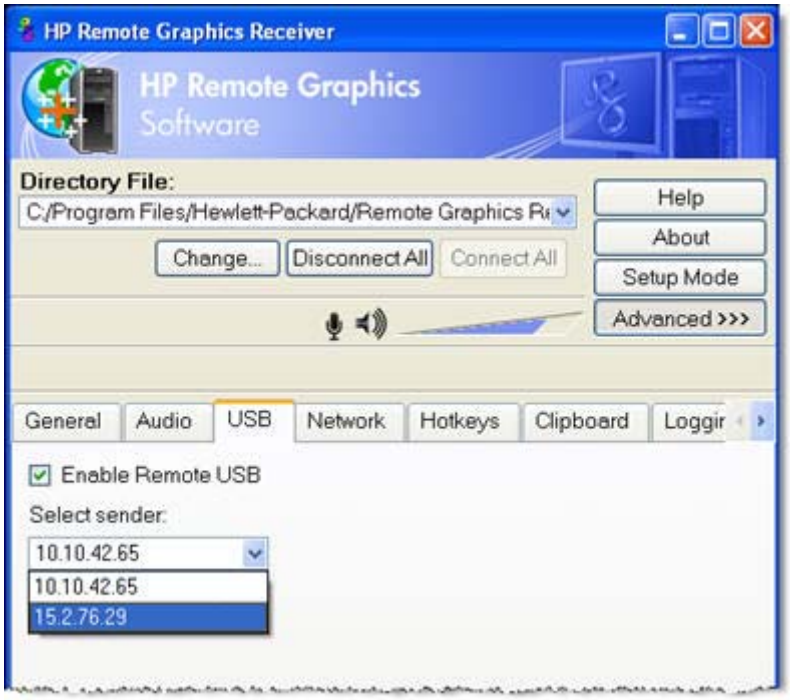
As shown in Figure 6-16 After remote attachment of the USB drive key on page 117, the USB drive key is now attached to the Remote Computer, and is no longer available to the Local Computer.

Figure 6-16 After remote attachment of the USB drive key

6.5.2 USB session switching

New with RGS 5.1.3 is the ability to dynamically move USB devices from one Remote Computer to another. This enables USB devices to be detached from one Remote Computer, and made accessible by another Remote Computer without first needing to disconnect the RGS connections. To move USB devices to a different Remote Computer in Directory Mode, simply specify the new Remote Computer (Sender) in the **Select sender**: dropdown menu (see Figure 6-17 Dynamically moving USB devices to another Remote Computer on page 118). The USB devices will be detached from the current computer and attached to the selected computer.

Figure 6-17 Dynamically moving USB devices to another Remote Computer



6.5.3 Local/Remote USB Device Management

In addition to the general default settings for remote USB configurations, RGS 5.2.6 and higher releases support auto-remote and auto-return of user-specified USB devices when using Windows on both the Sender and Receiver platforms. RGS 5.4.0 introduced a new auto-remote configuration syntax for the Windows Registry entries. Auto-remote allows specified USB devices to be automatically attached to a remote Sender session at RGS connection and then returned to the local client at RGS disconnect.

△ **CAUTION:** Enabling auto-remoting of specific USB devices requires modifications to the Windows Registry. Registry modifications should only be made by experienced personnel. Because an incorrect Registry setting can cause serious problems, you should always make a backup of the Registry prior to making any changes.

To specify auto-remoting of a particular USB device, perform the following steps:

1. Get the vendor id and device id for your usb device using the following steps. For this example assume that you found the vendor id is 0x1234 and device id is 0x5678.
   a. Open Device Manager and find the USB device to be auto-remoted.
   b. Right click the USB device and select Properties.
   c. Select the Details tab and select Hardware Ids in the dropdown menu. The Hardware Ids format will be:

      USB\Vid_xxxx&Pid yyyy

      where xxxx is the VendorID and yyyy is the ProductID

      The VendorID and ProductID are reported in hexadecimal format, and should be entered in hexadecimal format in the new key created below.
2. Create the following Registry key:

   HKLM\System\CurrentControlSet\Services\hprpusbh\Parameters\Device
3. Create the following Registry key, where the new key at the end of the Device key is the vendor and device IDs like Vid_1234&Pid_5678:

   HKLM\System\CurrentControlSet\Services\hprpusbh\Parameters\Device\Vid_1234&Pid_5678
4. In the key created in Step 3, create a string value (REG_SZ) named "Mode" :

   HKLM\System\CurrentControlSet\Services\hprpusbh\Parameters\Device
   \Vid_1234&Pid_5678\Mode
5. Set the Mode Data value to one of the following :

   default – Allow the device to work in legacy mode.

   local – Allow the device to be used on the local system only.

   remote – Allow the device to be used on a remote system only.

   auto – Allow the device to be used on the local system until there is a connection to a Sender system. Once the connection has been made the device will be removed from the local system and remoted to the Sender system.

6.5.4 Supported remote USB devices

HP has tested a number of USB devices to verify they work correctly when attached to a Remote Computer from a Local Computer. See Appendix B: USB devices supported by RGS on page 218 for a list of supported USB devices.

6.5.5 Remote USB Access Control List

RGS supports a per-Remote Computer access control list (ACL) file that specifies which USB devices are allowed to be remotely attached to the Remote Computer from a Local Computer, and which USB

devices are denied attachment. The ACL file, which resides on the Remote Computer, supports allowing/denying USB device attachments based on the following nine USB descriptor fields:

1. Device Class
2. Device Subclass
3. Device Protocol
4. Vendor ID
5. Product ID
6. Device BCD
7. Manufacturer
8. Product Type
9. Serial Number

   USB device mounting can also be allowed/denied based on the following two parameters:

10. IP address of the Local Computer
11. The domain group of the local user

The ACL file supports two rule types: “allow” and “deny”. The rules are evaluated by the Remote Computer for each USB connection request from a Local Computer as follows:

- If any rule indicates the USB connection should be denied, the connection is denied, regardless of any other rule.
- If any rule indicates the USB connection should be allowed, and if there are no rules that deny the connection, the connection is allowed.
- If no rules match at all, the connection is denied.

Therefore, a deny rule takes precedence over an allow rule. The ACL file is implemented as an XML (Extensible Markup Language) file. The ACL schema file is located at:

C:\Program Files\Hewlett-Packard\Remote Graphics Sender\hprUsbAcl.xsd

For backwards compatibility, the following default ACL file(installed during Sender installation) allows all USB connections to be made:

C:\Program Files\Hewlett-Packard\Remote Graphics Sender\hprDefaultUsbAcl.xml

The names for these files can be changed using the properties described in Sender USB access control list properties on page 178. The default ACL file contains the following contents, which allows all USB connections to be made:

<?xml version="1.0" encoding="ISO-8859-1" standalone="no"?> <hprUsbAcl> rule type="allow"> <name>Allow all USB devices (HP default)</name> </rule> </ruleset> </hprUsbAcl>

The following example ACL file denies all remote USB attachment requests:

<hprUsbAcl> <ruleset> <rule type="deny"/> </ruleset> </hprUsbAcl>

Rules may contain filters based on the 11 parameters listed previously. These parameters are repeated below along with the name of the filter element.

1. Device Class— bDeviceClass
2. Device Subclass— bDeviceSubclass
3. Device Protocol— bDeviceProtocol
4. Vendor ID— idVendor
5. Product ID— idProduct
6. Device BCD— bcdDevice
7. Manufacturer— manufacturer
8. Product Type— product
9. Serial Number— serialNumber

△ **CAUTION:** Filtering on device strings (manufacturer, product, and serial number) may not be reliable. Device vendors are not required to add data to these fields, and many do not. Before deploying a solution that depends on a string-based filter, ensure that the devices you wish to use implement the appropriate device strings.

10. IP address of the Local Computer—peerAddress
11. The domain group of the local user—group

The following ACL file allows only USB devices with a Device Class (bDeviceClass) of 7 to be remotely attached while denying everything else:

<hprUsbAcl> <ruleset> <rule type="allow"> <name>Allow printing devices</name> <filter bDeviceClass="07"/> </rule> </ruleset> </hprUsbAcl>

The following ACL file denies USB devices for a specific range of Local Computer IP addresses while allowing all other Local Computers to use remote USB:

<hprUsbAcl> <ruleset> <rule type="allow"> <name>Allow all devices</name> </rule> <rule type="deny"> <name>Deny 192.168.9.0 subnet</name> <filter peerAddress="192.168.9.0/20"/> </rule> </ruleset> </hprUsbAcl>

The following ACL file allows USB connections for members of the DEFAULT-DOMAIN\administrators group while denying all other USB connections:

<hprUsbAcl> <ruleset> <rule type="allow"> <name>Allow members of DEFAULT-DOMAIN \administrators</name> <filter group="DEFAULT-DOMAIN\administrators"/> </rule> </ruleset> </hprUsbAcl>

6.5.6 Determining USB device information

This section describes how to obtain several of the most-used USB device parameters.

6.5.6.1 Determining USB device information for Windows

To obtain the Vendor ID and the Product ID for a USB device on Windows, perform the following steps:

1. Open the device manager.
   - Go to the Control Panel and run "System"
   - Select the "Hardware" tab
   - Select the "Device Manager" button, this runs the device manager program.
2. Double click on the **Universal Serial Bus Controllers**
3. Double click on the specific device, which brings up a separate window.
4. Select the **Details** tab and select one of the following properties from the pull down menu:
   - "Hardware Ids" property—This property shows the Vendor ID, Product ID and Revision for the device. The Vendor ID is the 4 hex digits after "Vid_". The Product ID is the 4 hex digits after "Pid_". The Revision is the 4 hex digits after "Rev_". For example, an iPod has a "Hardware Ids" property that looks like this:

     USB\Vid_05ac&Pid_120a&Rev_0001

     This gives us the following values:

     iPod Vendor ID： 0x05AC

     iPod Product ID： 0x120A

     iPod Revision： 0x0001

   - "Compatible Ids" property—This property shows the class code, subclass code and protocol code for the device. The class code is the 2 hex digits after "Class_". The subclass code is the 2 hex digits after the "SubClass_". The protocol code is the 2 hex digits after the "Prot_". For example, an iPod has a "Compatible Ids" property that looks like this:

     USB\Class_08&SubClass_06&Prot_50

     This gives us the following values:

     iPod Class Code：08（Mass Storage Device）

     iPod Subclass Code：06（SCSI transparent command set）

     iPod Protocol Code：50（Bulk-only transport）

6.5.6.2 Determining USB device information for Linux

An open source program called "usbview" is available on the SourceForge web site. There are three different programs called "usbview". The one to use is the "original" version. This is the plain usbview that was registered on "1999-12-20" and is administered by "kroah". Do not use "usbview2" or "usbview-1.8". The URL for this software is:

http://sourceforge.net/projects/usbview

6.5.6.3 Verifying the USB data

Once a device has been identified using one of the previous methods, you should verify that the correct device was used. This can be done by consulting one of the many USB ID lists. There are documents

that contain most of the registered Vendor IDs and Device IDs. There are different documents that contain the different registered classes and subclasses. By comparing the values of the device to these documents, the user can verify that they are looking at the correct device and not some other device that is also plugged into the system.

The linux-usb group keeps an up-to-date list of registered USB Vendor IDs and Device IDs. This document resides on the http://www.linux-usb.org site at:

http://www.linux-usb.org/usb.ids

The registered classes and subclasses are documented by the USB Device Working Group. The DWG's latest document for 1.0 defined class codes is hosted at:

http://www.usb.org/developers/defined_class

6.5.6.4 Troubleshooting remote USB

If you have problems connecting a remote USB device from a Local Computer to a Remote Computer, the following checklist may help identify the problem.

6.5.6.4.1 Computers supporting remote USB

Ensure that both the Remote Computer and the Local Computer support remote USB— see Computers supporting remote USB on page 29.

6.5.6.4.2 Supported USB devices

Verify that the USB device you're using is supported. HP has tested a number of USB devices to verify they work correctly when attached to a Remote Computer from a Local Computer. See Appendix B: USB devices supported by RGS on page 218 for a list of supported USB devices.

6.5.6.4.3 Check USB cable connections

Verify that the USB device is physically connected to the Local Computer. Check to see that it has power and is turned on. Some devices may require that the user initiate an action before it connects. For example, Palm PDA devices require starting a HotSync operation for the device to connect and appear on the remote Sender system.

To further verify your connections, recognized devices on the Receiver system appear in the Proc file system under the /proc/devices/usb_remote directory. At least two files appear in this directory for a single connected device:

- /proc/devices/usb_remote/devices — File contains a list of recognized devices by the Receiver system.
- /proc/devices/usb_remote/# — If only one USB device is recognized, the "devices" file will have a single entry, 192. The file descriptor named 192 is the Remote USB device. Dumping this file with 'cat 192', for example, displays specific data about device 192. This should reflect the connected USB device. If multiple devices are connected, then each will have a file descriptor numbered consecutively starting at 192.

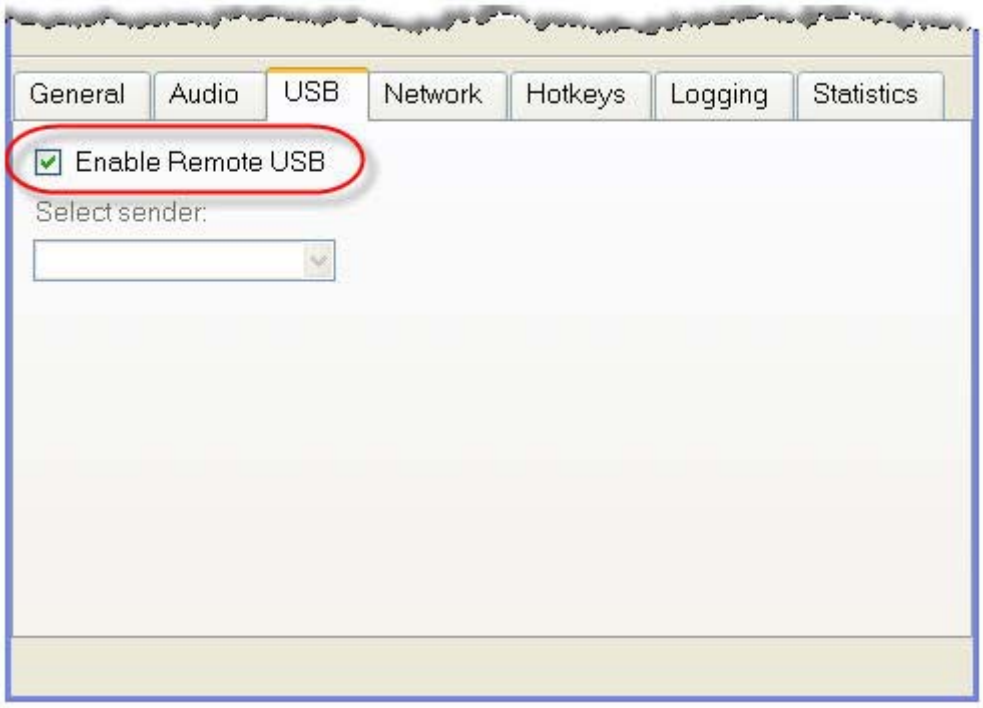
6.5.6.4.4 Reset the USB device

If the USB device has a reset button, press the button. If the device is in an incorrect state, it may fail to connect. Pressing the reset button may allow the device to connect.

6.5.6.4.5 Enable Remote USB

Verify that Remote USB is enabled under the USB option tab of the Receiver Control Panel (see Figure 6-18 Checkbox to enable Remote USB on page 124).

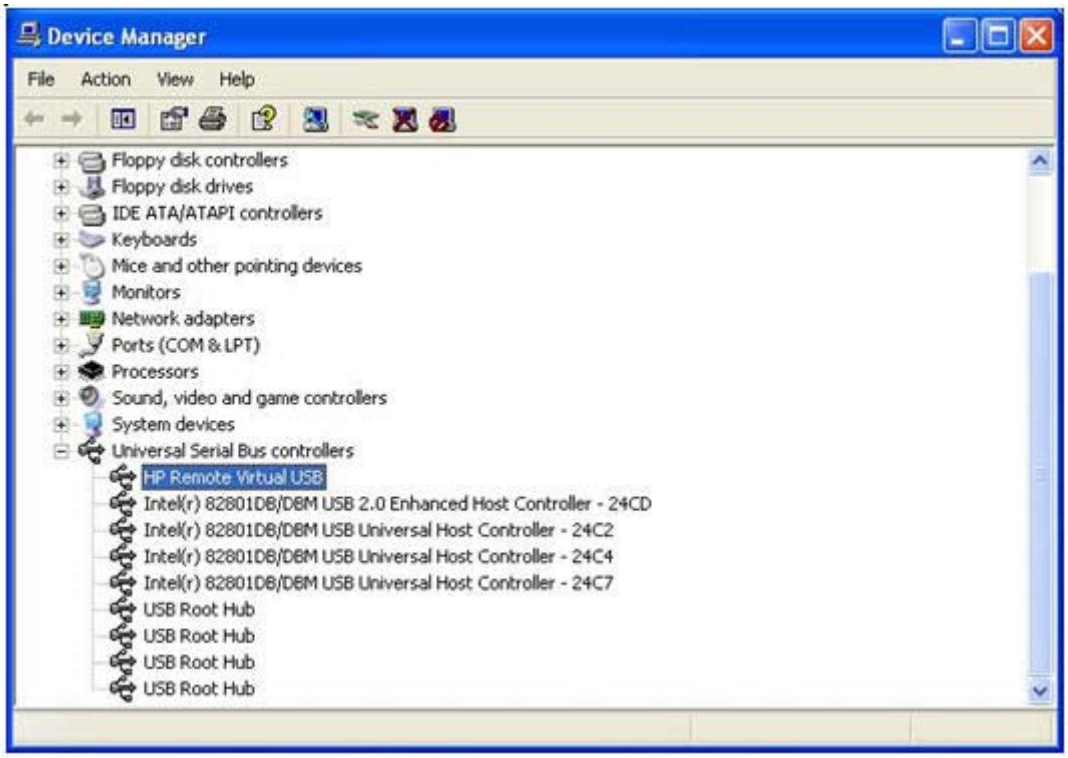
Figure 6-18 Checkbox to enable Remote USB



6.5.6.4.6 HP Remote Virtual USB Driver

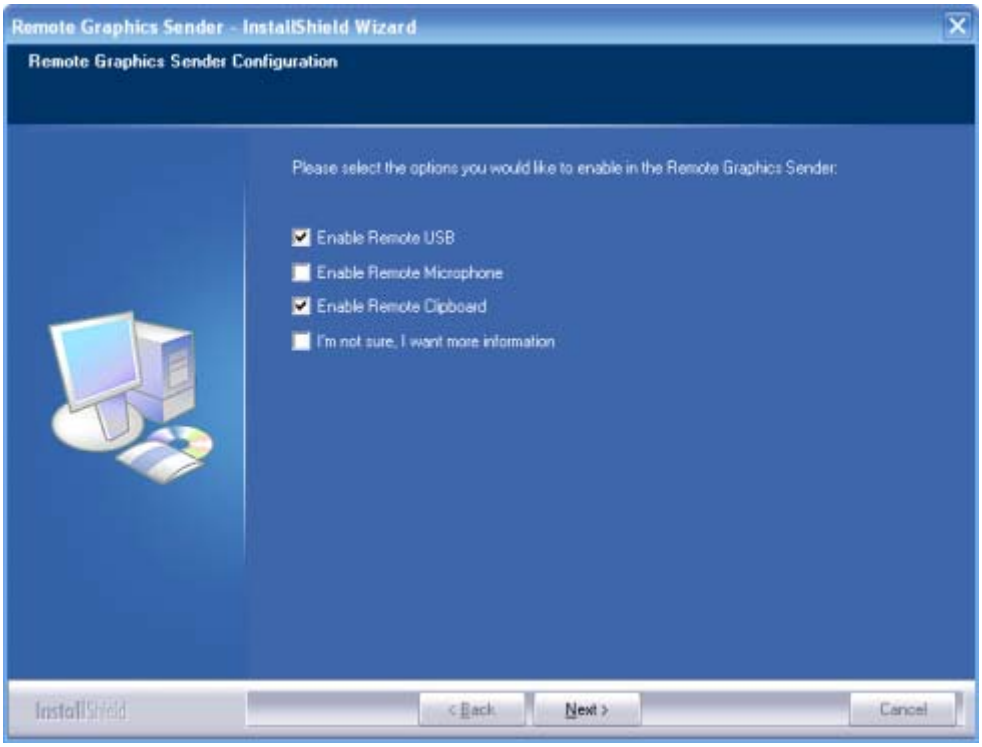
Verify that the HP Remote Virtual USB driver is installed and active on the Remote Computer. Open the Windows Device Manager, and verify that HP Remote Virtual USB is listed under Universal Serial Bus Controllers (see Figure 6-19 HP Remote Virtual USB driver on page 125).

Figure 6-19 HP Remote Virtual USB driver



If the HP Remote Virtual USB driver is not reported, reinstall the RGS Sender software. During installation, verify that the Remote USB box is checked in the Configuration window (see Figure 6-20 Enable installation of remote USB on page 126).

Figure 6-20 Enable installation of remote USB



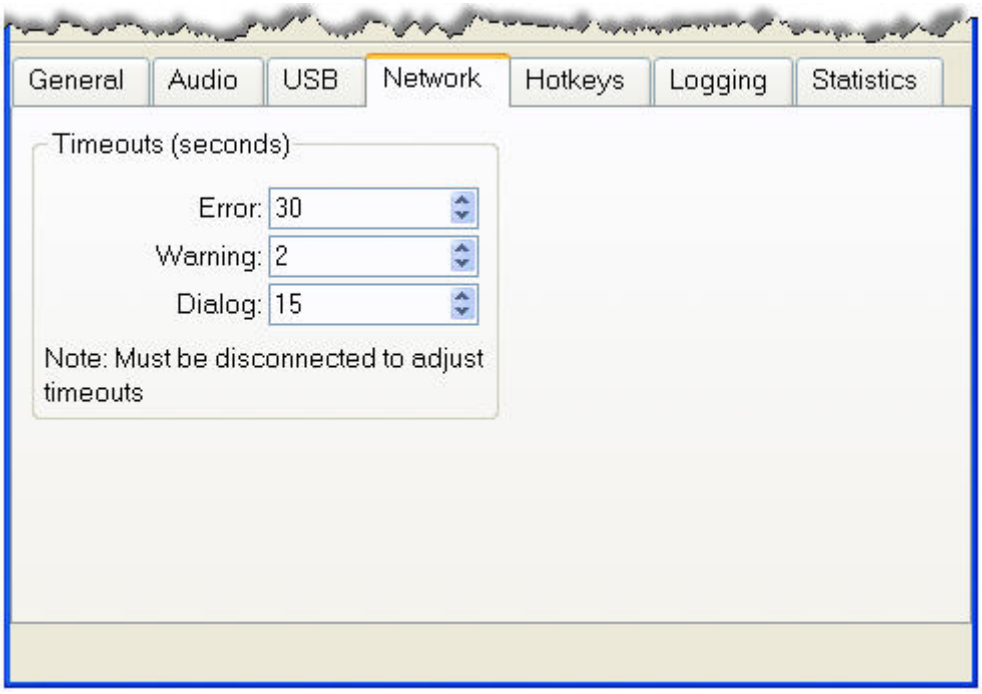
6.5.6.4.7 USB device drivers and program support

Verify that the device drivers and programs required by the device are installed and available on the Sender system. Many USB devices require manufacturer-supplied software to work on a system. This software must often be installed before the USB device is connected to the system.

6.6 Adjusting Network timeout settings

The options available under the **Network** tab in the Receiver Control Panel are shown in Figure 6-21 Options available under the Network tab on page 127.

Figure 6-21 Options available under the Network tab



RGS supports three classes of user-settable timeouts:

1. **Receiver network timeout properties**—After the Receiver has established a connection to the Sender, the Sender transmits sync pulses (consisting of network messages) to the Receiver every second to permit the Receiver to determine connection integrity. If the Receiver fails to detect the sync pulses, the Receiver compares the time since the last sync pulse was received to two user-settable Receiver network timeout properties:
   - Receiver warning timeout property
   - Receiver error timeout property
2. **Sender network timeout property**—After the Receiver has established a connection to the Sender, the Receiver likewise transmits sync pulses to the Sender every second to permit the Sender to also determine connection integrity. If the Sender fails to detect the sync pulses, the Sender compares the time since the last sync pulse was received to the user-settable Sender network timeout property.
3. **Dialog timeouts**—Dialog timeouts control how long user interactions between the Sender and Receiver are allowed to take.

The Receiver and Sender network timeout properties are discussed in the next section. Dialog timeouts are discussed in Dialog timeouts on page 133.

6.6.1 Network timeouts

RGS uses TCP/IP over a standard computer network to transmit data. Although TCP/IP is a reliable transport mechanism, it does not guarantee network packet delivery. The TCP/IP network stack performs well on a relatively stable network. However, network issues beyond RGS can affect the probability and timing of network packet delivery. Possible network issues include:

- Network over-subscription, resulting in congestion and packet loss
- CPU utilization by other processes and tasks, starving the TCP/IP network stack
- Incorrectly configured or malfunctioning network switches, routers, and network interfaces
- A disconnected network cable

To deal with such network issues, the Receiver and Sender support network timeout mechanisms to provide notification to the user of network issues.

6.6.1.1 Receiver network timeouts

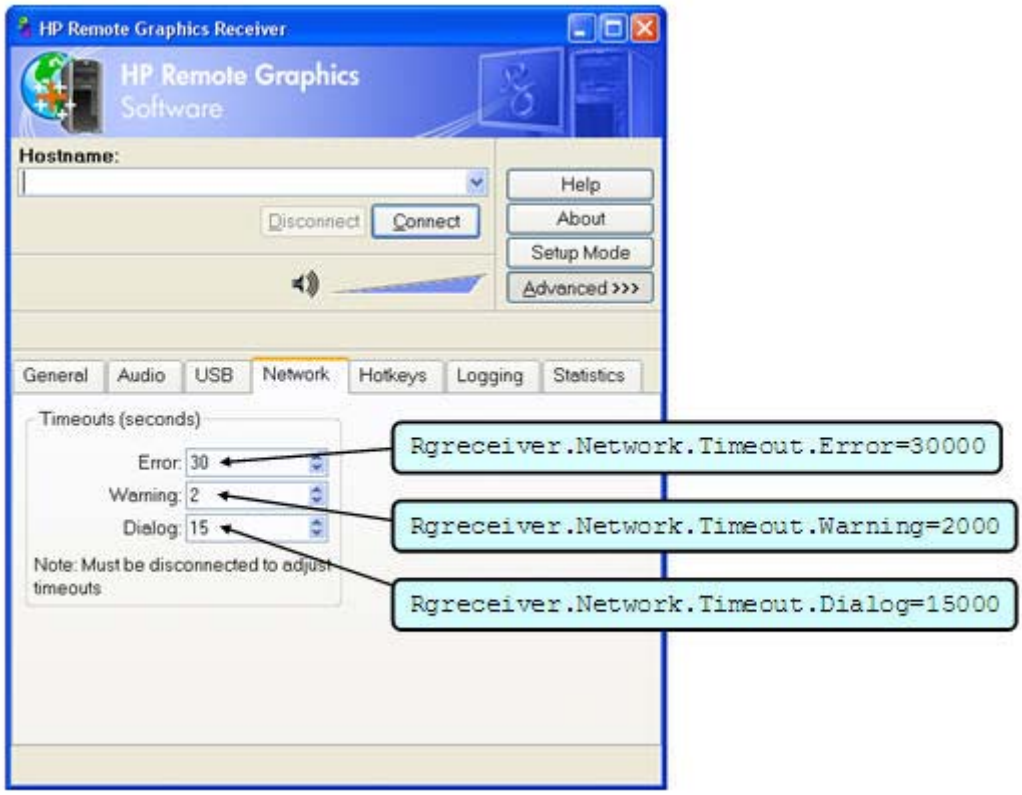
RGS provides two user-settable Receiver timeout properties to allow you to optimize RGS for your particular network conditions (such as low-bandwidth or high-latency conditions). These properties allow you to specify timeout values that, if exceeded, will cause the RGS Receiver to take specific actions, such as displaying a warning dialog or closing the RGS connection. The two Receiver timeout properties are:

- **Receiver warning timeout property**—If this value is exceeded, the Receiver displays a network connection warning.
- **Receiver error timeout property**—If this value is exceeded, the Receiver closes the connection.

The Receiver error and warning timeout properties can be set in the Receiver Control Panel (see Figure 6-22 Receiver Control Panel on page 129) and are specified in seconds. The Receiver timeout properties can also be set in the rgreceiverconfig file or on a command line—in both of these cases, the

timeout properties are specified in milliseconds. Figure 6-22 Receiver Control Panel on page 129 shows the default Receiver timeout periods and the corresponding timeout properties.

Figure 6-22 Receiver Control Panel

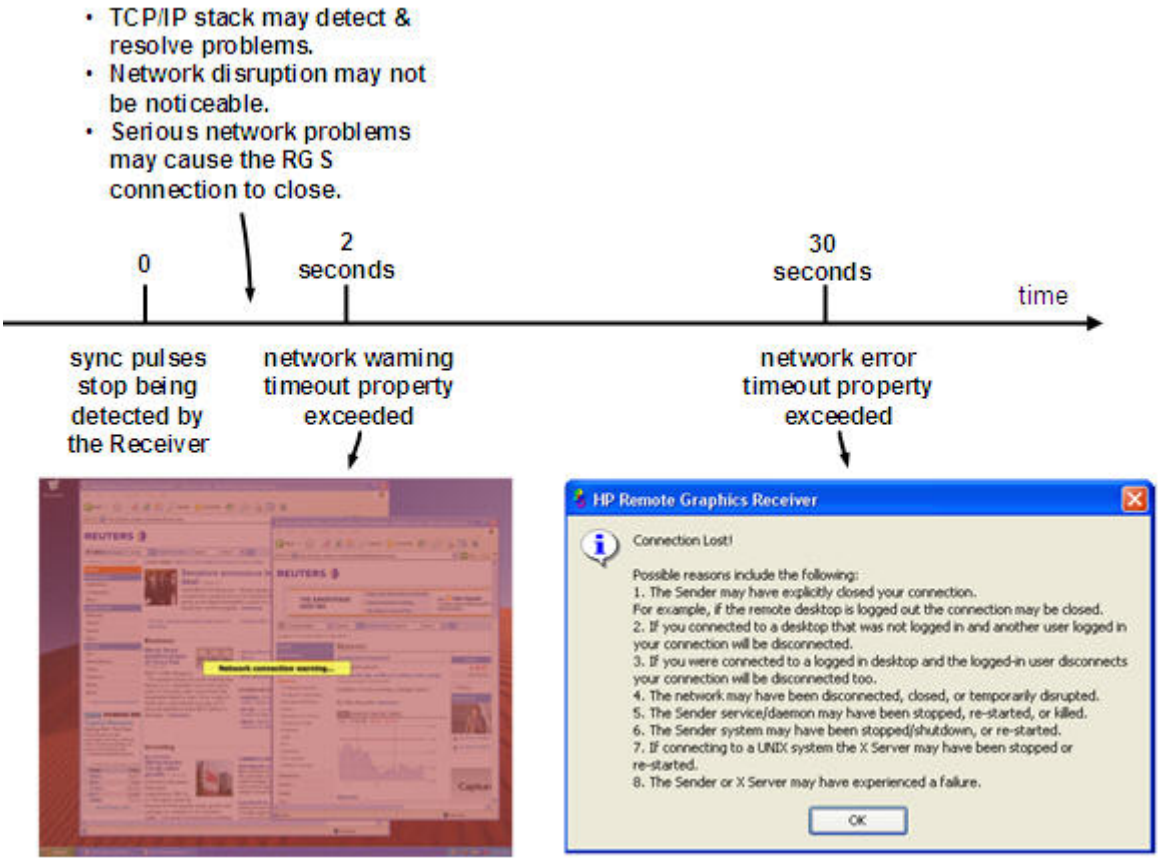


If a temporary network disruption occurs for less time than the Receiver warning timeout property, the Receiver will not display a warning, and the user will experience only a brief drop in Remote Display Window interactivity. This means, for example, that a user moving or scrolling a window might see a momentary decrease in interactivity. If the user is not interacting with the Remote Display Window during a temporary network disruption, the network disruption may not even be noticeable (unless dynamic content such as video fails to update at an appropriate rate).

NOTE: In many cases, the TCP/IP network stack is able to detect and resolve network errors, such as a transmitted packet not being acknowledged. However, if a more serious problem occurs, such as a network cable being unplugged from the Local Computer, the TCP/IP stack will notify the RGS Receiver of a network exception. In this case, the RGS connection will be closed immediately, independent of whether a network timeout property has been exceeded.

Figure 6-23 Receiver timeout sequence on page 130 shows the sequence of events commencing when sync pulses cease being detected by the Receiver.

Figure 6-23 Receiver timeout sequence



After the Receiver warning timeout property has been exceeded (two seconds, in this case), the Receiver Remote Display Window will dim and display a warning message to the user. The dimmed window and warning message notify the user of the potentially stale contents in the Remote Display Window. During this time, the Remote Display Window will appear unresponsive to the user. If connectivity returns, the Remote Display Window will return to its normal appearance and interactivity.

If the connection loss extends beyond the Receiver error timeout property (30 seconds, in this case), the Remote Display Window and the Receiver connection will be closed, and the "Connection Lost!" error dialog will be displayed.

The recommended Receiver timeout strategy is to set a short warning timeout property and a longer error timeout property. With these settings, the user is notified of potential network disruptions relatively quickly while allowing sufficient time for the network to possibly recover. For networks with potential disruptions greater than two seconds, a higher Receiver warning timeout property may be appropriate to lessen distraction of the user.

Experience has demonstrated that 30 seconds is a reasonable Receiver error timeout property, although some users adjust this property lower to force connections to close sooner. Higher settings, such as 60 seconds, are often impractical because they force the user to wait an inordinate amount of time before RGS closes the connection.

6.6.1.2 Sender network timeout

The RGS Sender supports the Sender error timeout property, Rgsender.Network.Timeout.Error. This property can be set only by using the rgsenderconfig file or on a command line—the Sender doesn't

have a dialog to set this property. The Sender error timeout property is independent of the Receiver timeout properties. For legacy reasons, the Sender begins by using the maximum of the Rgsender.Network.Timeout.Error property and the Rgsender.Network.Timeout.Dialog property (see Dialog timeouts on page 133).

When the Receiver negotiates its connection to the Sender, it notifies the Sender of its error timeout property. For sync pulse timeout purposes, the Sender adopts the minimum of:

Rgreceiver.Network.Timeout.Error

and the maximum of

{ Rgsender.Network.Timeout.Error AND Rgsender.Network.Timeout.Dialog }

For example, if the Sender error timeout property is 30 seconds and the Receiver error timeout property is 20 seconds, the Sender will use 20 seconds for its sync pulse timeout because 20 seconds is the minimum of both. If the user adjusts the Receiver error timeout property to 60 seconds, the Sender will use a value of 30 seconds for sync pulse timeout because, again, 30 seconds is the minimum of both error timeouts.

If a Sender sync pulse timeout occurs, the Sender will terminate its connection to the Receiver. Unlike the Receiver, which displays warning and error messages, the Sender does not display a message prior to terminating the connection. The user must initiate a reconnection from the Receiver to the Sender to restore connectivity.

A relatively small Sender error timeout property is recommended. If the Receiver and Sender connectivity is impacted by a network disruption, the Sender could take as long as its error timeout property to determine the connectivity loss, and fully terminate the connection. During the time from the actual network disruption until the Sender error timeout expires, the Sender will not send image updates to other Receivers (if the Server is serving multiple Receiver connections). This will impact the interactivity of other users for no apparent reason. After the Sender error timeout expires, the Sender will terminate the faulty connection, and continue updating the other Receivers.

6.6.1.3 Network timeout issues

Listed below are several timeout-related issues and their potential causes.

- **Remote Display Window repeatedly dims, and displays a connection warning message**—This is likely caused by frequent network disruptions between the Receiver and Sender. The dimming of the display serves as a notification to the user that the Remote Display Window may contain stale information. If frequent notifications are annoying, and the network issues do not improve, see the section Adjusting Network timeout settings on page 127 and adjust the Receiver's warning timeout value found on the Receiver Control Panel or the property Rgreceiver.Network.Timeout.Warning.
- **The Remote Display Window dims, the Receiver disconnects, and displays a "Connection closed" error dialog, but the user can often immediately connect again**—Most likely the network connectivity between the Receiver and Sender was temporarily lost. Other possible problems include:
  - The Sender unexpectedly terminated.
  - The Remote Computer experienced a failure

- The Remote Computer CPU utilization prevented the Sender from making progress,
- The length of this connectivity loss exceeds the Receiver's error timeout value, controlled by the Receiver's Rgreceiver.Network.Timeout.Error property so the Receiver disconnected.

If this condition persists, it is possible that network disruptions are exceeding the Receiver error timeout value. If this is a network issue and is not resolvable, consider adjusting the error timeout of the Receiver to reduce Receiver disconnection. Additionally, the Sender timeout might need to be increased too. Please refer to Adjusting Network timeout settings on page 127 for further details.

- **When connecting to a Linux Remote Computer, the PAM authentication dialog displayed by the Receiver does not appear long enough to enter the user's credentials such as username and password**—This is likely caused by the Receiver dialog timeout value being too small. See the section Dialog timeouts on page 133 for further details on setting timeouts. The user should first check the Receiver Control Panel to determine the Network dialog timeout setting and adjust as appropriate.
- **When connecting to the Remote Computer, the authorization dialog is not displayed long enough for the user to respond to it**—This is likely caused by too small of a Sender's dialog timeout value. Please refer to Sender network timeout properties on page 178 for further details on the property Rgsender.Network.Timeout.Dialog. The default value for this property is 15 seconds.
- **When connecting to a Linux Remote Computer, the PAM authentication often fails**—There are several reasons why this might occur:
  - PAM may be configured incorrectly
  - The user could be entering incorrect credentials
  - The timeouts are too short.

  See Installing the Sender on Linux on page 73 to determine if PAM is correctly configured. See Adjusting Network timeout settings on page 127 for further details on setting timeouts. The user could try increasing the Receiver's network dialog timeout as well as the Sender's error and dialog timeouts to see if this helps. If this does not help and the user is convinced that the timeouts are not being exceeded, then it is likely a PAM authentication configuration problem.
- **The Remote Display Window is not updating and appears to be hung**—This is most likely caused by a network disruption. You can adjust the warning timeout to get notification when this occurs. You can also adjust the error timeout to disconnect and dismiss the Remote Display Window sooner. The default warning timeout is two seconds. The default error timeout is 30 seconds. See Adjusting Network timeout settings on page 127 for further details on setting the Receiver timeouts.
- **Increasing the Receiver error dialog timeout doesn't appear to have an effect and the Receiver still disconnects**—This is likely caused by either:
  - A network failure resulting in detecting lost connectivity by the Receiver (resulting in a disconnected connection)
  - The Sender timeouts are shorter than the Receiver's timeouts, and the Sender disconnects the Receiver.

  It is not always the case that network error timeouts are honored. A network error timeout only establishes an upper bound on the duration of retries before returning with an error. If the

computer determines that network connectivity is lost and an error returns by the network stack to the Receiver, then the connection will disconnect sooner than the error timeout setting. If the Sender's timeout values are shorter than the Advanced capabilities Receiver's, the Sender may close the connection sooner than the Receiver, disconnecting the Receiver. If the issue continues, consider increasing the Sender's error timeout value. See Adjusting Network timeout settings on page 127 for further details on setting timeouts.

6.6.2 Dialog timeouts

RGS supports dialog timeouts, which specify how long user interactions between the Local Computer and Remote Computer are allowed to take. The two dialog timeout properties are:

- **Receiver dialog timeout property**—This property specifies the maximum time that the Receiver (Local Computer) will wait for a dialog response from the Remote Computer in response to a message sent to the Remote Computer. It also specifies how long dialogs initiated by the Remote Computer will be displayed to the user on the Local Computer.
- **Sender dialog timeout property**—This property specifies the maximum time that a message, originating from the Receiver, will be displayed on the Remote Computer. It also specifies how long the Remote Computer Sender will wait for a dialog response from the Receiver.

For example, assume that a local user is attempting to connect to a Remote Computer. Assume, furthermore, that another user is already logged into the Remote Computer (this person is therefore the primary user). The Sender will prompt the primary user for authorization to connect the local user to the Remote Computer. The duration of this prompt is set by the Rgsender.Network.Timeout.Dialog property. The Receiver property Rgreceiver.Network.Timeout.Dialog limits how long the Receiver will wait for a response from the Remote Computer before returning failure.

If the Rgsender.Network.Timeout.Dialog timeout expires without action by the primary user, the Sender dialog exits, and connection is denied by default. If the Sender times out, the Receiver will also time out (based on its Rgreceiver.Network.Timeout.Dialog property) because no authorization reply will be returned by the Sender.

In the previous example, the dialog was displayed on the Remote Computer. An example of a dialog being displayed on the Local Computer follows. When a Receiver connects to a Sender running Linux, the Pluggable Authentication Module (PAM) on the Sender attempts to authenticate the connection. In this case, the PAM subsystem invokes a PAM conversation/callback function to the Receiver, causing the Local Computer to prompt the user with a PAM message dialog. The dialog typically requests a username and password. The timeout for the dialog on the Receiver is controlled by the Rgreceiver.Network.Timeout.Dialog property. If this timeout expires without the local user entering a username and password, the Receiver will remove the dialog.

NOTE: The property Rgreceiver.Network.Timeout.Dialog does not control the duration of all dialogs displayed by the Receiver. For example, the authentication dialog for a Windows Sender connection displayed by the Receiver for username and password does not have an associated timeout since it is not an incoming message from the Sender to the Receiver. This dialog will be displayed indefinitely until the user responds "OK" or "Cancel" to its requests

The Receiver dialog timeout property, Rgreceiver.Network.Timeout.Dialog, can be set using the Receiver Control Panel as shown in Figure 6-22 Receiver Control Panel on page 129, and has a default value of 15 seconds (15,000 milliseconds). This property can also be set using the rgreceiverconfig file and from a command line.

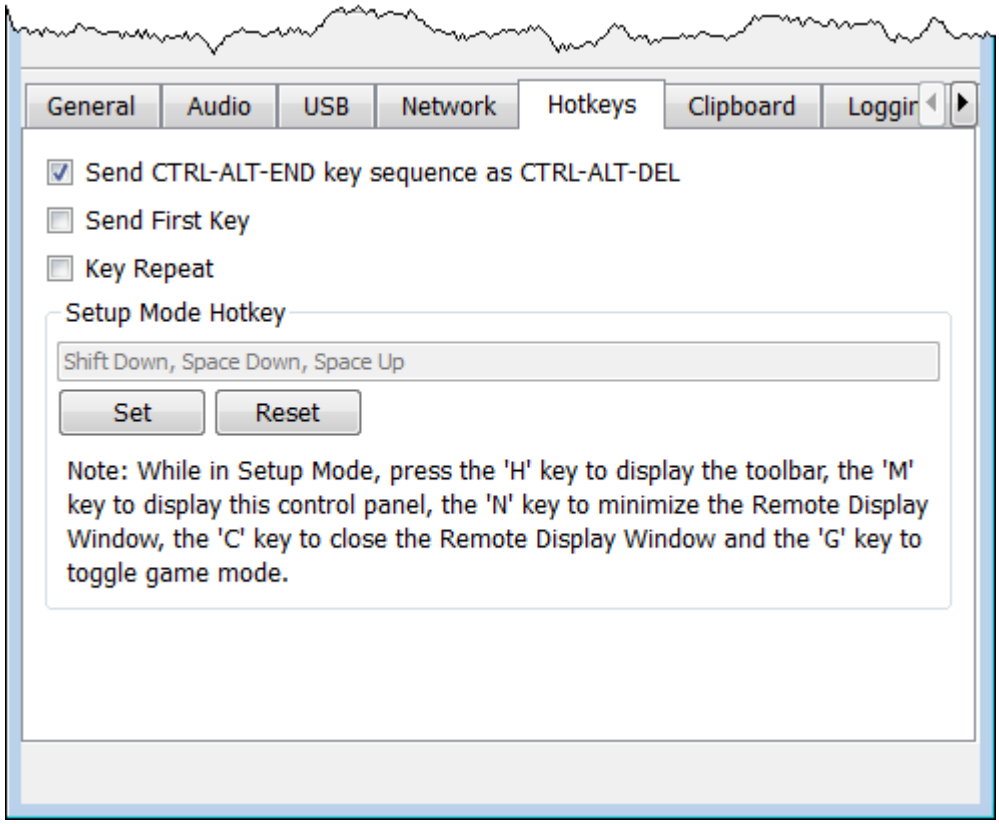
The Sender dialog timeout property, Rgsender.Network.Timeout.Dialog, can only be set using the rgsenderconfig file and from a command line—there is no dialog on the Sender for setting this property. The default value of this property is also 15 seconds.

The 15 second Receiver and Sender dialog timeouts should support most authorization and authentication scenarios. For more complex scenarios requiring additional time, the user should adjust both the Receiver and Sender dialog timeouts appropriately.

6.7 Hotkeys

Hotkeys are key sequences that cause special action to be taken by the Receiver. Such key sequences are processed by the Receiver, and are not sent to the Remote Computer. However, a hotkey sequence may initiate some type of interaction with the Remote Computer. The Receiver Control Panel provides a number of options under the Hotkeys tab (see Figure 6-24 The Hotkeys tab options on page 135).

Figure 6-24 The Hotkeys tab options



The options available under the Hotkeys tab are:

- **Send CTRL-ALT-END key sequence as CTRL-ALT-DEL:** On some computers, the operating system will intercept the CTRL-ALT-DELETE key sequence, and will not forward it to the Receiver. For example, assume that the Local Computer is running Windows, and that the local user enters the key sequence CTRL-ALT-DELETE in a Remote Display Window for the purpose of logging into the Remote Computer. However, instead of forwarding this key sequence to the Remote Computer, Windows on the Local Computer will respond to these keys, and bring up the Windows Security dialog on the Local Computer.

  This checkbox can be used to circumvent this behavior. When checked, the local user can enter the key sequence CTRL-ALT-END in a Remote Display Window. The Receiver recognizes CTRL-ALT-END as a signal to send a CTRL-ALT-DELETE sequence directly to the Remote Computer. The CTRL-ALT-DELETE sequence can also be sent using the Remote Display Window Toolbar.

- **Send First Key:** This checkbox controls how the Receiver responds to a key sequence. For example, the default Setup Mode hotkey consists of a shift press, space press, and space release. When the Receiver sees a shift key press, this key event is not immediately sent to the Remote Computer. Instead, the Receiver retains the event to determine if the next keystroke forms a hotkey sequence. If the next key pressed is not space, the Receiver immediately forwards all key events to the Remote Computer.

  Some user applications, in order to function correctly, require that the first key press event arrive separately from subsequent key events. If this is the case, check the Send First Key checkbox to enable the immediate transmission of the first key in a hotkey sequence to the Remote Computer. Note that, in addition to sending the first key to the Remote Computer, the key sequence is still processed by the Local Computer.

- **Key Repeat:** When using a hotkey sequence such as Shift Down, Space Down, Space Up, Windows injects repeating shift down events in response to the Shift key being held down. By default, the Receiver ignores these key repeats. Processing of key repeats can be enabled by checking this box if it's required for your applications. Note that, if Key Repeat is enabled, the sequence shift down, shift down, space down, space up will not trigger Setup Mode, so the sequence must be typed faster if this setting is enabled.

- **Setup Mode Hotkey:** The text dialog and the Set and Reset buttons allow you to redefine the Setup Mode hotkey sequence from its default value. As shown in the Receiver Control Panel of Figure 6-24 The Hotkeys tab options on page 135, the default hotkey sequence to activate Setup Mode is:

  - Press and hold down the Shift key.
  - At the same time, press then release the space bar—this activates Setup Mode. You will remain in Setup Mode until you release the Shift key.

- **Additional hotkeys**—The following hotkeys are also supported; these hotkeys can be entered as either upper case or lower case:

  - "H"—Toggles the Remote Display Window Toolbar on and off (see Remote Display Window Toolbar on page 91)
  - "M"—Restores the Receiver Control Panel if it has been minimized (iconified). Also brings the Receiver Control Panel to the front if it is obscured by other windows.
  - "N"—Minimizes (iconifies) the Remote Display Window

- "C"—Closes the Remote Display Window, which terminates the RGS connection
- "G"—Toggles "Game Mode." Game Mode enables relative cursor movements instead of absolute cursor movements. See Game Mode on page 104 for more details.

If Setup Mode is activated by the hotkey sequence (as opposed to the **Setup Mode** button), and you have multiple Remote Display Windows on your computer, you can bring up the Remote Display Window selection dialog to view a thumbnail image of each Remote Display Window (see Starting the Receiver in Directory Mode on page 150)

6.7.1 Changing the Setup Mode hotkey sequence

RGS allows you to change the Setup Mode hotkey sequence from its default value of:

Shift Down, Space Down, Space Up

In defining a new Setup Mode hotkey sequence, the following keys can be used:

- LCtrl, RCtrl, Ctrl— Specifies a left, right or side-insensitive Ctrl key, respectively.
- LAlt, RAlt, Alt— Specifies a left, right or side-insensitive Alt key, respectively.
- Shift
- Space

Every sequence must begin with Ctrl, Alt, or Shift. Two actions are associated with each key:

- Down: Specifies a key press.
- Up: Specifies a key release.

To change the hotkey sequence, first press the **Set** button under the **Hotkeys** tab. Then press and release the keys that you want to form the Setup Mode hotkey sequence. The first key that you enter must be held down until you are done entering the other key(s). This is identical to the process of actually activating Setup Mode, where the first key is likewise held down while the other key(s) are pressed and released, followed by releasing of the first key.

As you press and release the keys, the key sequence is displayed in the dialog box.

To define a sequence that is side-insensitive, you'll need to modify the property value from outside of the GUI while RGS is not running. See Receiver hotkey properties on page 168 for information on modifying the sequence from outside of the GUI.

Pressing the **Reset** button on the Receiver Control Panel restores the Setup Mode hotkey sequence to its original default values.

6.8 Remote Clipboard operation

For an overview of Remote Clipboard, see Remote Clipboard overview on page 38. Remote Clipboard enables you to cut or copy data between a window on the Local Computer and a Remote Window (provided that the applications being used support cut/copy/paste functionality). Beginning with RGS 5.3.0, Remote Clipboard cut and paste of ANSI text data is supported between Microsoft Windows Receiver systems and Linux Sender systems. Successful operation of the clipboard on Linux systems in RGS will depend on how the application interacts with the graphical desktop's clipboard. Some application's use of the clipboard may not work as expected with RGS Remote Clipboard. With most

applications, you will need to perform cut or copy actions by Highlighting the text of interest and selecting the Cut or Copy action normally found in the application's "Edit" menu.

Following installation, Remote Clipboard on Windows can be enabled or disabled via a toggle in the Receiver's controls.

Remote Clipboard on Linux is installed by default and is enabled or disabled via a toggle in the Receiver's controls.

Both cut and paste, and copy and paste, are supported in the following scenarios at RGS 5.3.0:

- Between a Local Window and a Remote Display Window (in both directions) — The Remote Computer may be running Windows or Linux. The Local Computer must be running Windows.
- Between two Remote Display Windows (in both directions) — In this case, the Local Computer can be running either Windows or Linux; the Remote Computers may be running Windows or Linux.

NOTE: For simplicity, the phrase “cut and paste” is used hereafter to refer to both cut and paste, as well as copy and paste.

The **Enable remote clipboard** checkbox under the **Clipboard** tab in the Receiver Control Panel allows the user to enable or disable Remote Clipboard (see Figure 6-25 Enable remote clipboard checkbox on page 138).

Figure 6-25 Enable remote clipboard checkbox

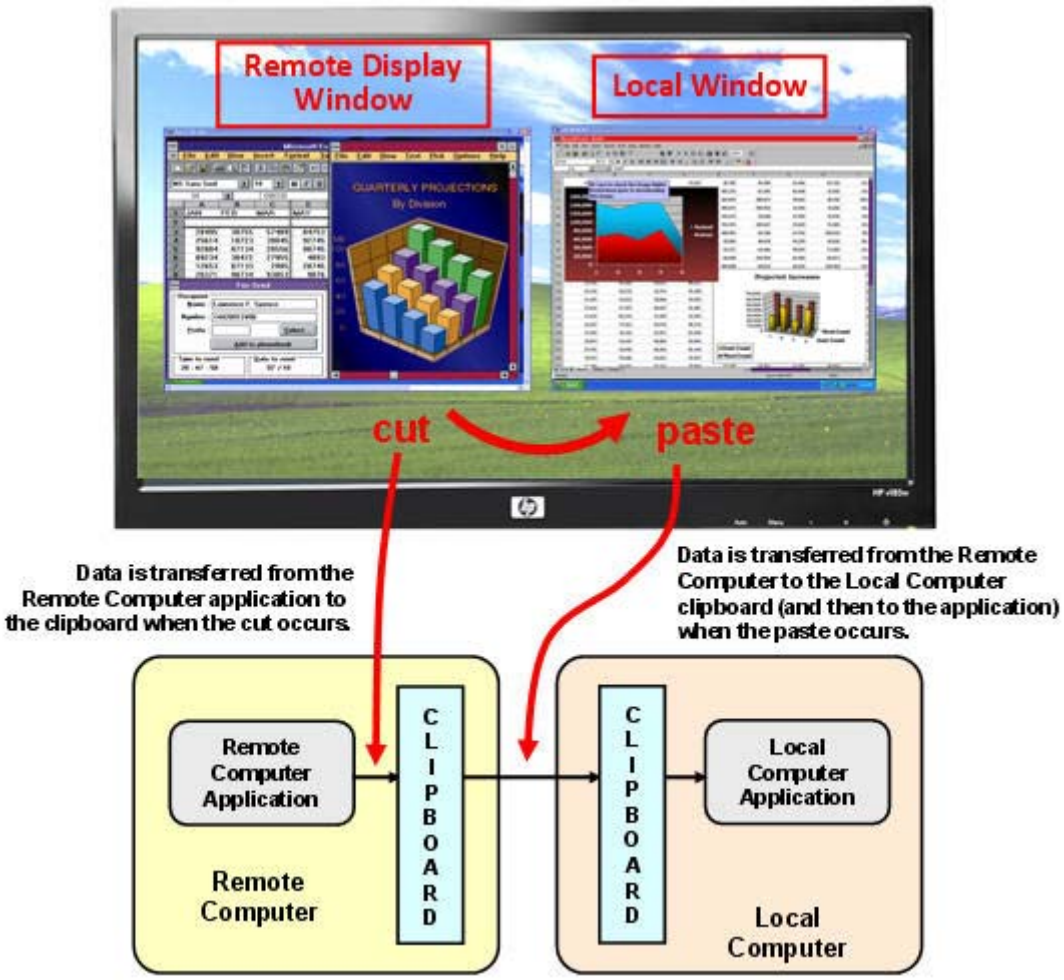
See Receiver Remote Clipboard properties on page 169 and Sender clipboard property on page 180, for information on the Remote Clipboard properties.

6.8.1 Remote Clipboard data transfers

Figure 6-26 Transfer of data when a cut and paste is performed from a Remote Display Window to a Local Window on page 139 shows the data transfer that occurs when a cut and paste is performed using Remote Clipboard. In this example, the cut occurs from within the Remote Computer application (as initiated from the Remote Display Window), and the paste occurs into the Local Computer application (via the Local Window). When the cut is performed, the data that is cut from the Remote Computer application is transferred to the clipboard on the Remote Computer. When the paste occurs,

the clipboard data is transferred from the Remote Computer clipboard to the Local Computer clipboard, and then pasted into the Local Computer application.

Figure 6-26 Transfer of data when a cut and paste is performed from a Remote Display Window to a Local Window



The above demonstrates *delayed rendering*. Instead of transferring data from the Remote Computer to the Local Computer when the cut occurs, the data transfer is delayed until the paste occurs. This reduces network traffic by eliminating unnecessary data transfers.

Doing a cut and paste in the other direction (from the Local Window to the Remote Display Windows) works in the same manner—the data that is cut is held in the clipboard on the Local Computer until the paste occurs on the Remote Computer, at which time the clipboard data is transferred to the Remote Computer.

As we've seen, the terms "Remote Computer" and "Local Computer" have very specific meanings in the context of RGS. In the context of Remote Clipboard, however, we use terms that are centric to each computer involved in a Remote Clipboard operation. If a cut and paste is being performed from Computer A to Computer B, Computer A will refer to itself (for example, in the DEBUG LOG) as the *local computer*, while referring to Computer B as the *remote computer*. This is independent of which computer is the actual Local Computer or Remote Computer from an RGS connection perspective.

Continuing with the example of a cut and paste from Computer A to Computer B, Computer A is also referred to as the *sending computer* or *cut computer*, while computer B is referred to as the receiving

computer or paste computer. Figure 6-27 Cut and paste computer nomenclature on page 140 shows this nomenclature. When discussing Remote Clipboard operation, we'll generally use this nomenclature because it is independent of which computers are the Remote or Local Computers.

Figure 6-27 Cut and paste computer nomenclature

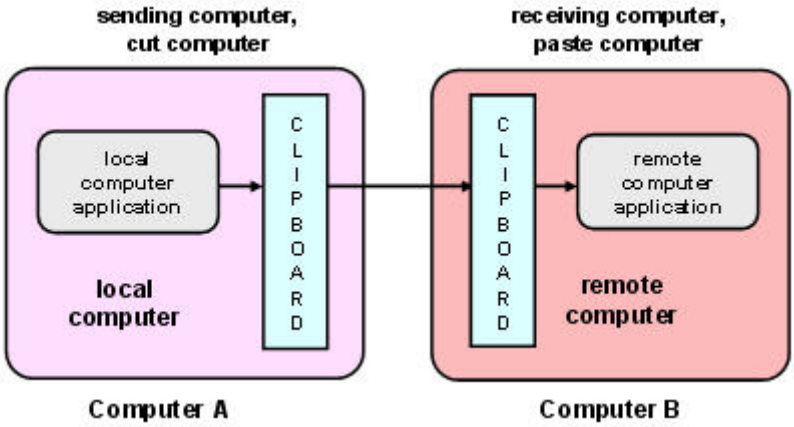
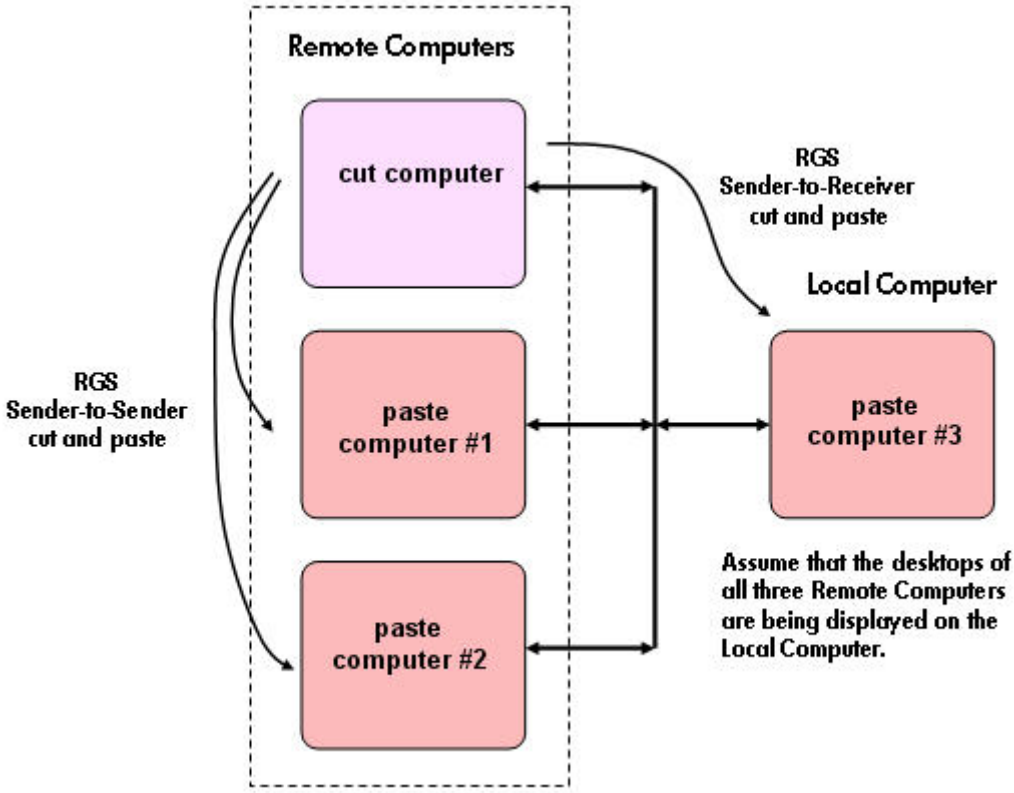


Figure 6-28 Cutting and pasting between Remote and Local Computers on page 141 show a system consisting of three Remote Computers connected by RGS to the Local Computer. The three desktops of the Remote Computers are displayed in three Remote Display Windows on the Local Computer. In this system, assume the Local Computer user has just performed a cut operation on the cut computer (via one of the Remote Display Windows). At this point, the user can do a paste to any (or all) of the paste computers. If a paste is done to paste computer #1 or paste computer #2, this will constitute a Remote Computer-to-Remote Computer (RGS Sender-to-Sender) paste because both the cut computer and the paste computer are Remote Computers.

If the user does a paste to paste computer #3, this will constitute a Remote Computer-to-Local Computer (RGS Sender-to-Receiver) paste because the paste computer is the Local Computer.

Figure 6-28 Cutting and pasting between Remote and Local Computers



6.8.2 Remote Clipboard filtering

When a cut is performed, applications typically store their data in the clipboard in multiple formats. For a word processing application, the application might store data in the clipboard as both ASCII text and Rich Text Format. This increases the likelihood that, when the paste occurs, there will be a format recognized by the receiving application. For example, when a cut is performed within Microsoft Word, one of the clipboard formats supported by Word is ASCII text. This allows a paste into, for example, Microsoft Notepad, which accepts ASCII text.

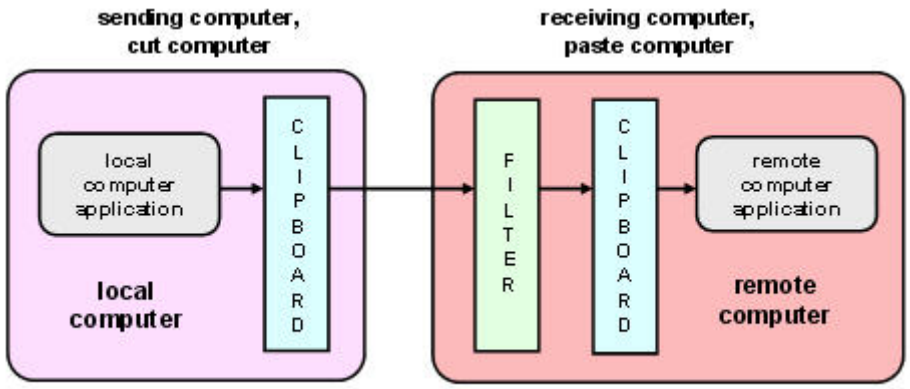
Some data formats, like HTML, may present problems when pasted into a remote computer. HTML, for example, does not store images in the clipboard, but instead stores *links* to where the images reside (on the local computer). When the HTML is pasted into the remote computer, the pasted links will no longer point to a valid location.

There are other potential problems, such as links to websites. Consider the act of cutting and pasting from Microsoft Excel on a local computer to Excel on a remote computer. When pasted on the remote computer, Excel clipboard data that contains links will attempt to access websites referenced by the links. If the remote computer is not connected to the Internet, Excel may hang trying to access the websites.

To provide the ability to handle such problems, Remote Clipboard implements user-settable filtering to allow control of which clipboard formats can be used in cut and paste operations. Filtering of clipboard formats is performed on the computer *receiving* the cut and paste data. See Figure 6-29 Receiving-side

filtering of cut and paste data on page 142, which expands on Figure 6-27 Cut and paste computer nomenclature on page 140 to show receiving-side filtering.

Figure 6-29 Receiving-side filtering of cut and paste data



The filter parameter is specified by this RGS Receiver Remote Clipboard property:

Rgreceiver.Clipboard.FilterString

NOTE: This property is for advanced users only. The property string should be changed from its default value only if Remote Clipboard doesn't support the clipboard format required by your application. For more information on clipboard formats, see the Microsoft Developer Network article *Clipboard Formats* at http://msdn2.microsoft.com/en-us/library/ms649013.aspx.

This property contains a list of clipboard formats allowed to be transferred using Remote Clipboard. Therefore, this property is a *keep filter*, not a *reject filter*. The string is a regular expression, and is used by the receiving computer to specify the clipboard formats that it will accept. The rgreceiverconfig file contains the following commented-out entry for this property, which indicates the default clipboard formats supported by RGS:

Rgreceiver.Clipboard.FilterString="|1|2|7|8|13|16|17|Ole Private Data|

Object Descriptor |Link Source Descriptor|HTML Format|Rich Text Format|XML Spreadsheet|"

The default clipboard formats are:

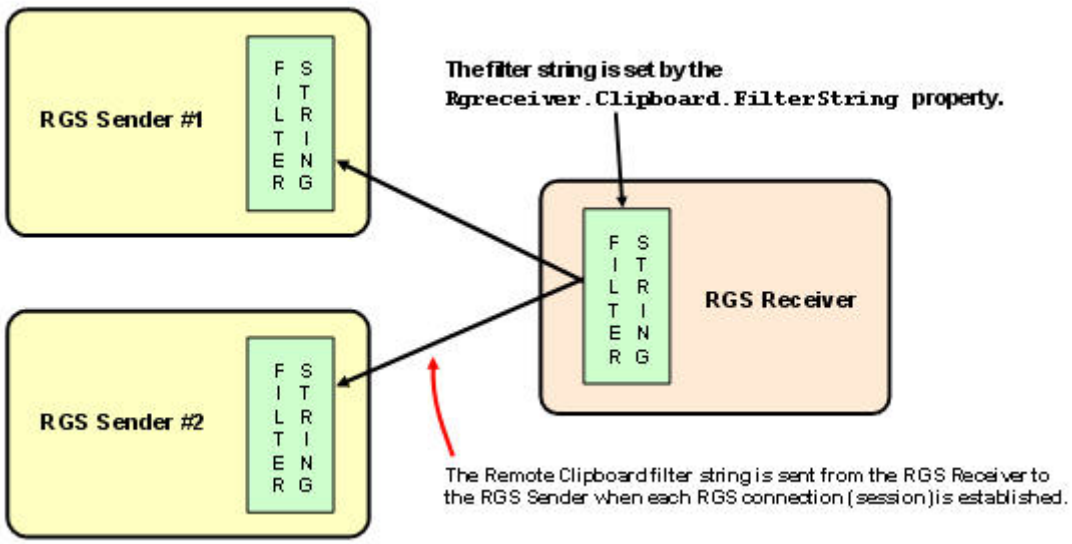
- 1 (CF_TEXT)—Text format. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data. Use this format for ANSI text.
- 2 (CF_BITMAP)—Bitmap format.
- 7 (CF_OEMTEXT)—Text format containing characters in the OEM character set. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data.
- 8 (CF_DIB)—A memory object containing a BITMAPINFO structure followed by the bitmap bits.
- 13 (CF_UNICODETEXT)—Unicode text format. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data.
- 16 (CF_LOCALE)—Locale identifier associated with text in the clipboard
- 17 (DIBV5)—Bitmap color space and bitmap data
- Ole Private Data—A private application format understood only by the application offering the format.

- Object Descriptor—OLE2 object descriptor
- Link Source Descriptor—Link to OLE2 object
- HTML Format—Text is in Hypertext Markup Language format
- Rich Text Format—A text format that includes special formatting features, such as bold, italics, and centering.
- XML Spreadsheet—A format created by Microsoft to allow Excel spreadsheets to be saved in XML (Extensible Markup Language) format. This format is supported by other applications as well.

The Remote Clipboard system uses the filter string to avoid transmission of unneeded clipboard formats across the network—only formats specified by the filter string are passed over the network from the cut computer to the paste (receiving) computer.

Because the filter string is an RGS Receiver-specified property, and because the paste computer can be any computer (RGS Sender or Receiver), RGS communicates the filter string from the RGS Receiver to each RGS Sender whenever a Receiver/Sender connection is established (see Figure 6-30 Transmission of the filter string property from the RGS Receiver to the RGS Sender on page 143).

Figure 6-30 Transmission of the filter string property from the RGS Receiver to the RGS Sender



6.8.3 Using the RGS log to detect clipboard problems

As described in the next section, Receiver and Sender logging on page 145, both the RGS Receiver and the RGS Sender have the ability to log various types of information to log files during their operation. If the logging level is set to DEBUG on the Receiver and Sender, Remote Clipboard information will be stored in the Receiver and Sender log files. These log files can then be used to detect and resolve Remote Clipboard problems.

Remote Clipboard entries in the log files have the text below preceding the Remote Clipboard information. In particular, the string "(format filter)" identifies each log file entry that contains Remote Clipboard information. In this section, the text preceding the Remote Clipboard information will not be shown.

11-08-08 00:26:14 DEBUG - (format filter) ...Remote Clipboard information...

To demonstrate use of the RGS logs to view Remote Clipboard information on the Receiver and Sender computers, an example is presented in which a copy and paste is performed from a Sender computer to a Receiver computer. The steps in this example are:

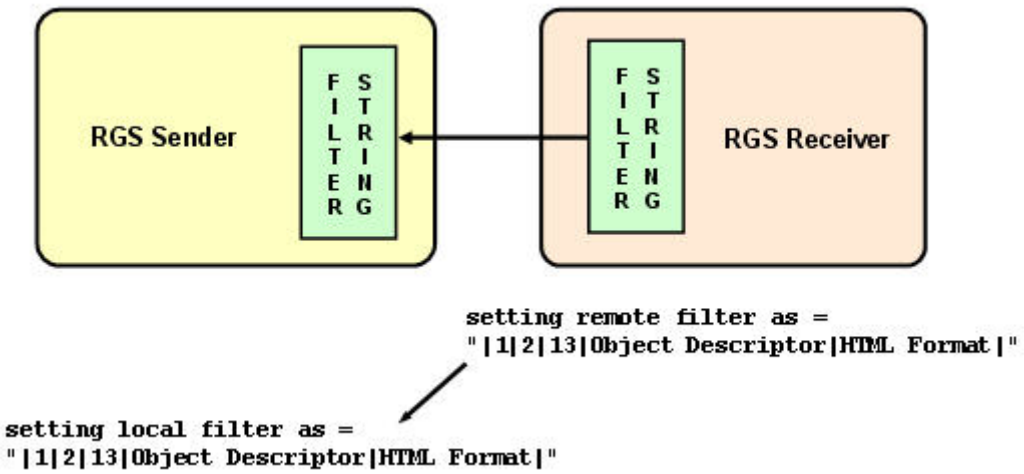
1. Set the Rgreceiver.Clipboard.FilterString="|1|2|13|Object Descriptor|HTML Format|"
2. Establish an RGS connection from the Receiver to the Sender.
3. Open Notepad on the Receiver computer.
4. Open Notepad on the Sender computer (via the Remote Display Window) and enter some text.
5. Highlight the text in the Sender Notepad window, and then select Copy.
6. Do a Paste of the text into the Notepad window on the Receiver computer.

To set the Rgreceiver.Clipboard.FilterString as shown above, the rgreceiverconfig configuration file is modified to specify the property:

```
Rgreceiver.Clipboard.FilterString="|1|2|13|Object Descriptor|HTML Format|"
```

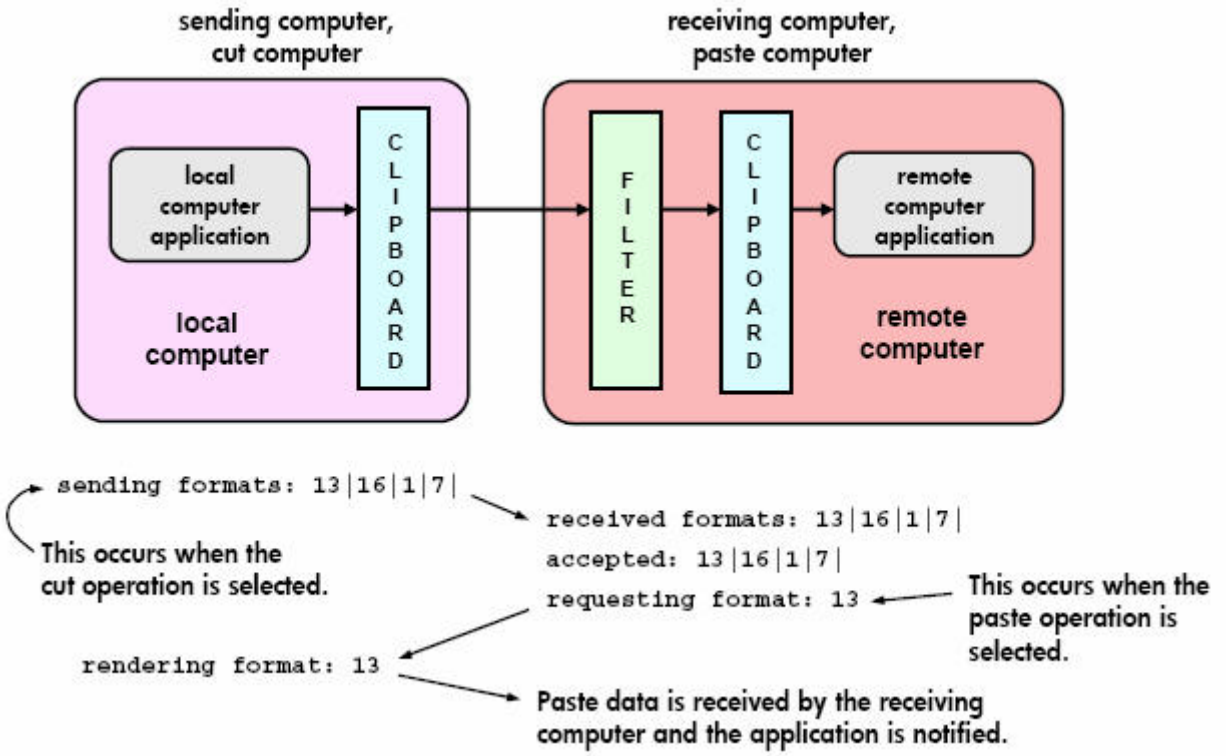
The RGS Receiver is stopped, and then restarted to ensure this property is used. When an RGS connection is established, the RGS Receiver sends this filter string to the RGS Sender. The log file entries generated by this activity are shown in Figure 6-31 Transmission of the filter string property from the RGS Receiver to the RGS Sender on page 144. From the RGS Receiver's perspective, it's setting a "remote filter" (on the Sender). From the Sender's perspective, it's setting its local filter string when it receives the filter string from the Receiver.

Figure 6-31 Transmission of the filter string property from the RGS Receiver to the RGS Sender



Now that the filter string has been sent from the Receiver to the Sender, we'll switch to the Remote Clipboard nomenclature of Figure 6-29 Receiving-side filtering of cut and paste data on page 142. Figure 6-32 Remote Clipboard log entries for cut and paste on page 145 shows the Remote Clipboard log entries as the cut and paste is performed.

Figure 6-32 Remote Clipboard log entries for cut and paste



NOTE: If the clipboard on either the Local or Remote Computer already contains content at the time the RGS connection is established, a sending formats entry will appear in the log file of that computer preceding the setting filter log entry. The sending formats log entry is due to the clipboard contents being sent to the Remote Computer when the RGS connection is first established.

6.9 Receiver and Sender logging

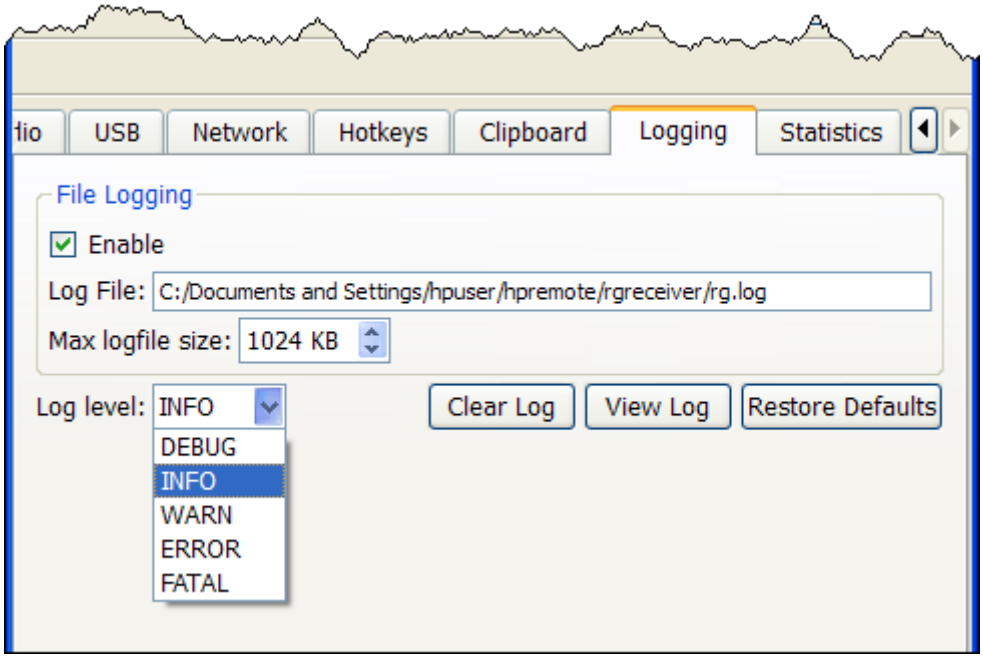
Both the RGS Receiver and the RGS Sender have the ability to log various types of information to files during their operation. Receiver logging can be enabled from the Receiver Control Panel, while Sender logging is controlled by a file on the RGS Sender. Both types of logging are described below.

6.9.1 Receiver logging

The RGS Receiver logs various types of information during its operation. The Receiver Control Panel **Logging** tab allows you to set a number of the logging parameters, such as whether logging is

enabled and the location/name of the log file(see Figure 6-33 Options available under the Logging tab on page 146).

Figure 6-33 Options available under the Logging tab



The options available under the **Logging** tab are:

- **File logging**—Enables logging to the specified Log File. The spinbox for Max logfile size limits the maximum logfile size.
- **Log level**—Determines the level of information that is logged. For example, if WARN is selected, the log file will contain information of type WARN and below, that is, WARN, ERROR, and FATAL. To log all information generated by the Receiver, select DEBUG.

NOTE: In order to log Remote Clipboard activities on the Receiver, DEBUG-level logging must be selected.

- **Clear Log**—Clears the contents of the log file.
- **View Log**—Displays the contents of the log file in a window.
- **Restore Defaults**—Resets all logging settings to default values.

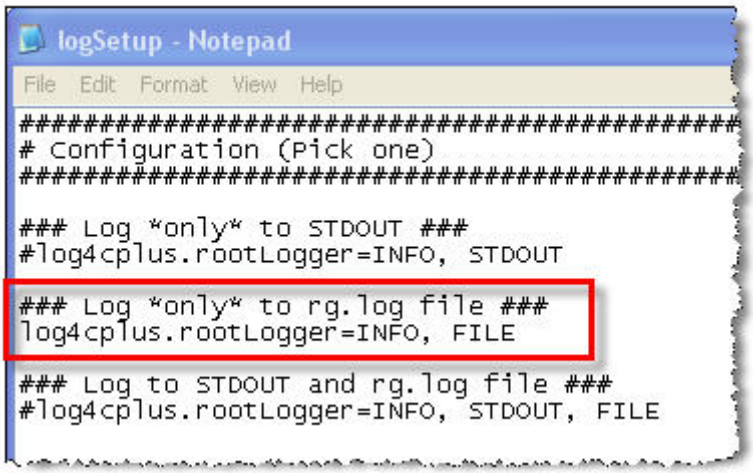
6.9.2 Sender logging

RGS Sender logging is not controlled by a GUI—instead, Sender logging is controlled by a particular file on the RGS Sender. In Installing the Sender on Windows on page 51, the following command line option for Rgsender.exe is described:

-l logSetupFile—Specifies the "logSetupFile" file used to describe various logging parameters for Sender error and informational output. This file is used to determine where the output goes (to a file or to standard error) as well as the type of output logged (INFO or DEBUG). At installation, the Sender default is with "-l logSetup" turned on, where the logSetup file in the installation directory is set for output to a file named rg.log at INFO debug level.

Unless this command line option is used to change the logSetup file, the default logSetup file in the Sender installation folder (C:\Program Files\Hewlett-Packard\Remote Graphics Sender) is used. The first few lines of logSetup are shown in Figure 6-32 Remote Clipboard log entries for cut and paste on page 145.

Figure 6-34 logSetup file



The highlighted, uncommented line specifies that INFO-level logging is used. If another logging level is required, edit the file to replace INFO with any of the following: DEBUG, WARN, ERROR, or FATAL.

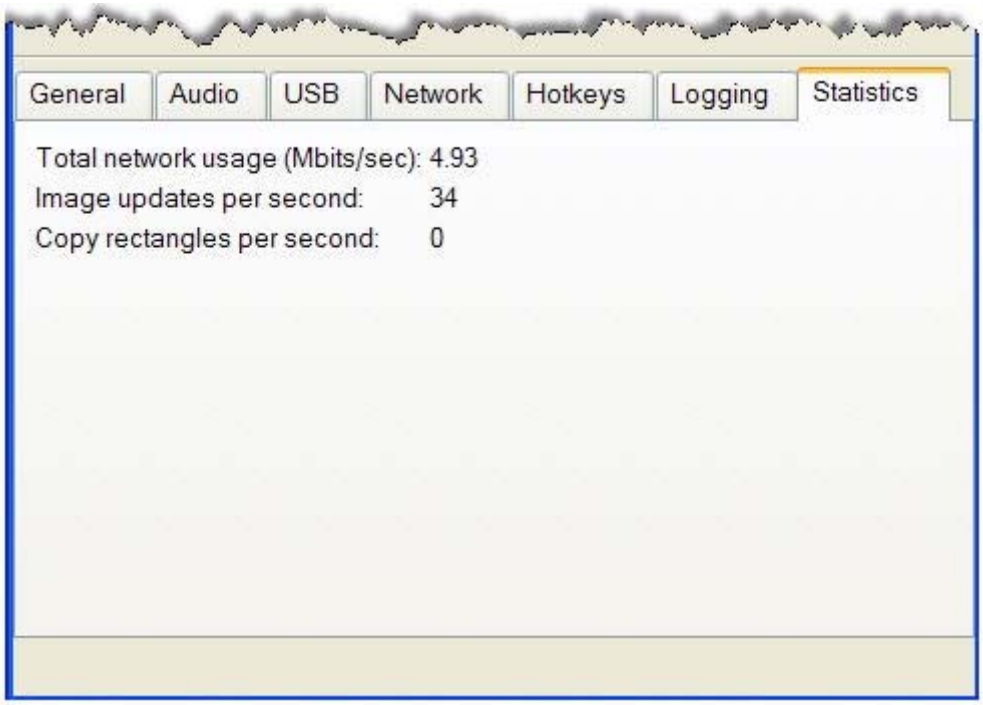
NOTE: The logSetup file is set to read-only during Sender installation, so you'll need to uncheck the **Read-only** property to edit the file.

NOTE: In order to log Remote Clipboard activities on the Sender, DEBUG-level logging (not the default INFOlevel logging) must be specified in the logSetup file.

6.10 Statistics

The options available under the **Statistics** tab in the Receiver Control Panel are shown in Figure 6-35 Options available under the Statistics tab on page 148.

Figure 6-35 Options available under the Statistics tab



The Statistics tab displays aggregate data for all connected sessions.

- **Total network usage (Mbits/sec)**—The combined network traffic received from all Remote Computers.
- **Image updates per second**—The combined number of image updates per second received from all connections.
- **Copy rectangles per second**—The combined number of copy updates per second received from all connections.

7 Using Directory Mode

Directory Mode enables the local user to automatically open connections to multiple Remote Computers based on the computers assigned to each user. When the user starts the Receiver in Directory Mode, the Receiver looks for a directory file containing user names and their assigned Remote Computers. The Receiver reads this file to identify the Remote Computers assigned to the current user, and then attempts to automatically connect to each specified Remote Computer. The directory file may contain multiple users with a list of Remote Computers assigned to each user. The default directory file used by the Receiver is:

C:\Program Files\Hewlett-Packard\Remote Graphics Receiver\directory.txt

After the directory file name is determined, the Receiver automatically connects to the Remote Computers specified in this file for the named user.

7.1 Directory file format

Often, the directory file is a common file for a group, department, organization, or an entire company. The directory file can manage and administer the Remote Computer assignments for any number of users. HP recommends that you save the directory file on a readily-accessible network file share or mapped drive so that each RGS Receiver can read the file at start-up.

The directory file is a text file with the following format for each local user:

domainName localuser remotecomputer1 remotecomputer2 ... remotecomputerN

where:

- The domainName on a Windows computer depends upon the environment the computer is operating within. If the user is logged onto their domain account, this means they have logging onto an account specified by Microsoft's Active Directory directory services. If the domain account is worldwide\sally, the name of the Windows domain is "worldwide" and will be used as the domainName for directory mode.

  If the user is logged onto the computer with a "local" account, sally_computer\sally for instance, the domainName used for directory mode is "sally_computer." This typically will be a computer that is either standalone or part of a WORKGROUP not using Microsoft's Active Directory directory services. The computer name such as sally_computer can be found by executing the command hostname in a "command window."

  For Linux users, use "UNIX" as the domainName.

- localuser is the name of the local user
- remotecomputer1, remotecomputer2,...remotecomputerN are the Remote Computers assigned to the local user, as specified by either a hostname or an IP address.

For example, the following directory file specifies the Remote Computers for users Sally and Joe in a Microsoft Active Directory, directory services environment:

worldwide sally RC_1 RC_2 RC_3

worldwide joe RC_4 RC_5 RC_6

In the next example, the directory file specifies the Remote Computers for users Sally and Joe in a standalone or WORKGROUP environment.

sally_computer sally RC_1 RC_2 RC_3

joe_computer joe RC_4 RC_5 RC_6

In the above examples:

- Local user sally is assigned Remote Computers RC_1, RC_2, and RC_3
- Local user joe is assigned Remote Computers RC_4 RC_5, and RC_6

If the domain name, user name, or Remote Computer contains white-space characters, the name can be enclosed in double-quotes, as follows:

"domain 1" "sally user" "RC 1" "RC 2" "RC 3"

"domain 1" "joe user" "RC 4" "RC 5" "RC 6"

The domain name does not apply when using the directory file for Linux users. Instead, use the keyword "UNIX" in place of the domain name. For example:

UNIX sally RC_1 RC_2 RC_3

Comment lines in the directory file are preceded by the "#" character in the first column.

7.2 Starting the Receiver in Directory Mode

Before attempting a connection in Directory Mode for the first time, HP recommends that you verify that RGS can connect to each computer individually in Normal Mode (see Using RGS in Normal Mode on page 86). The Pre-connection checklist on page 77 can be used to verify that the computer and network parameters are set correctly. After Normal Mode connectivity is verified, start the Receiver in Directory Mode (see Figure 7-1 Starting the Receiver in Directory Mode on page 150).

Figure 7-1 Starting the Receiver in Directory Mode

Alternately, the Receiver can be started in Directory Mode from a command line, using either of the following:

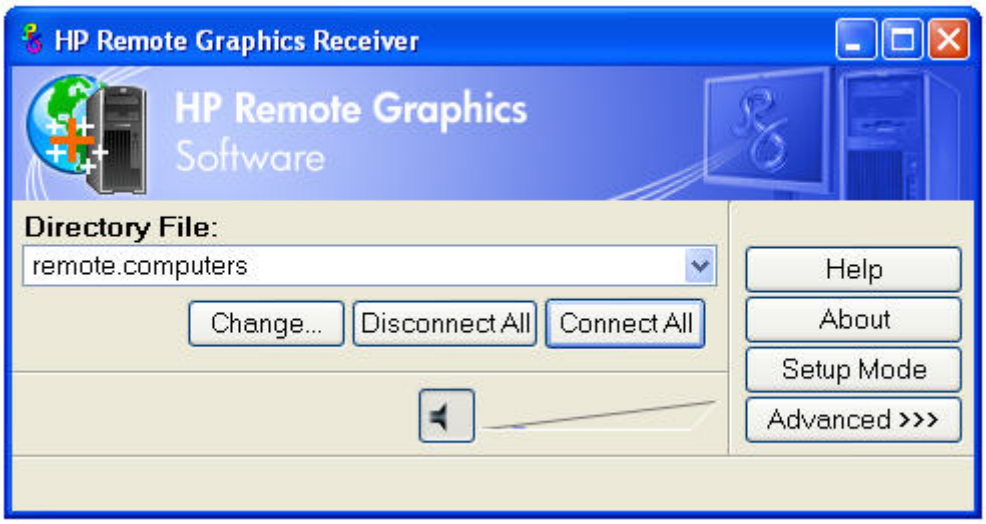
C:\Program Files\Hewlett-Packard\Remote Graphics Receiver\rgreceiver.exe -directory "file"

C:\Program Files\Hewlett-Packard\Remote Graphics Receiver\rgreceiver.exe -directory

If a file name is specified after -directory, the Receiver will use that file as the directory file. If no file name is specified, the user is prompted by RGS to specify the path and name of the directory file.

In Directory Mode, the Receiver Control Panel displays the name of the directory file (see Figure 7-2 The Receiver Control Panel in Directory Mode on page 151). The **Change** button enables you to specify a different directory file. The **Connect All** button is used to establish a connection to the Remote Computers listed in the directory file.

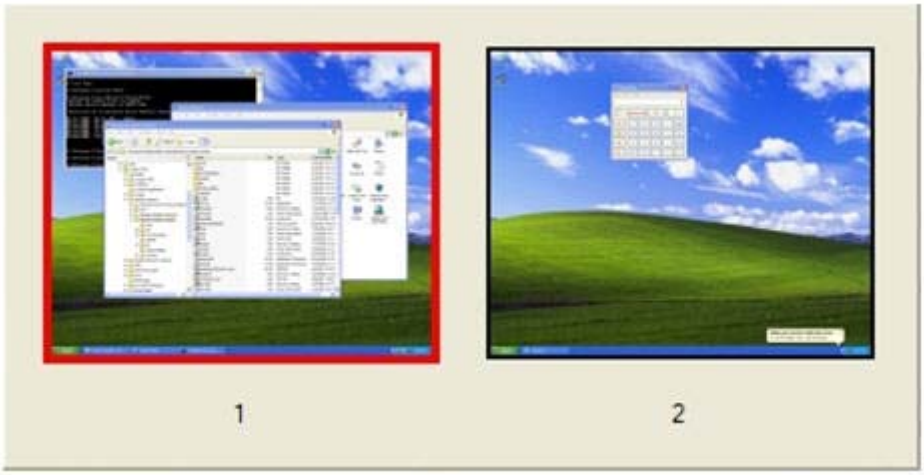
Figure 7-2 The Receiver Control Panel in Directory Mode



After clicking **Connect All**, you'll need to independently authenticate and log into each Remote Computer.

If Setup Mode is activated by the hotkey sequence (as opposed to the **Setup Mode** button), and you have multiple Remote Display Windows on your computer, you can bring up the Remote Display Window selection dialog to view a thumbnail image of each Remote Display Window.

Figure 7-3 Remote Display Window selection dialog



To display the selection dialog, press the TAB key while in Setup Mode—again, Setup Mode must have been previously activated by the hotkey sequence. The selection dialog is displayed as long as the initial Setup Mode hotkey (normally the Shift key) remains pressed. The currently-selected Remote Display Window is highlighted with a red border.

The Remote Display Window selection dialog is only displayed in Directory Mode—this is the mode that supports multiple Remote Display Windows. While the Remote Display Window selection dialog is active, navigate between windows (thumbnails) by:

- Pressing TAB to select the next window.
- Clicking on the number displayed beneath the thumbnail.

- Clicking directly on a thumbnail.
- Double clicking the mouse on a thumbnail (this will also immediately close the selection dialog).

  When the initial Setup Mode hotkey is released, the selected Remote Display Window is brought to the forefront and displayed.

8 RGS properties

RGS allows the user to specify many properties of the RGS connection, both on the Sender and Receiver. By specifying properties, the user can modify RGS characteristics such as:

- Display of borders on the Remote Display Window
- Codec quality
- Audio quality
- Connection timeouts

This chapter describes each of the RGS properties, their default values, and how they can be changed.

8.1 Property syntax

Properties are name/value pairs, and can contain any non-whitespace characters except "=" and "#". The property name and property value are separated by an "=". For example:

Rgreceiver.Network.Timeout.Warning=10000

In this example, the name of this property is Rgreceiver.Network.Timeout.Warning, and the value of the property is 10000.

All RGS Receiver properties begin with "Rgreceiver" and all RGS Sender properties begin with "Rgsender". Properties can contain values of the following types: string, int, bool, and int vector. Properties of type bool are set to 1 or 0, representing true or false, respectively. A property can be set to an empty value, such as:

Rgreceiver.Browser.Name=

Properties with empty values initialize as follows:

- If the value of the property is of type string, the value will be set to an empty string.
- If the value of the property is of type int vector or bool, the value will be set to 0.

8.2 Setting property values in a configuration file

RGS property values can be set in a configuration file. The RGS Receiver uses the rgreceiverconfig file for its properties while the RGS Sender uses the file rgsenderconfig file for its properties. On Windows, these files are located in the directory where the RGS Receiver and Sender are installed, typically:

Receiver: C:\Program Files\Hewlett-Packard\Remote Graphics Receiver\rgreceiverconfig

Sender: C:\Program Files\Hewlett-Packard\Remote Graphics Sender\rgsenderconfig

On Linux, these files are located as follows:

Receiver: /etc/opt/hpremote/rgreceiver/rgreceiverconfig

Sender: /etc/opt/hpremote/rgsender/rgsenderconfig

The configuration files contain property name/value pairs, with only one property per line. Empty lines (containing only whitespace characters) are ignored. The "#" character begins a comment on the line, extending to the end of the line. If a property is listed more than once, the value of the last entry is used.

NOTE: All properties in the configuration files are initially commented out with the “#” character. To set a property in a configuration file, first delete the “#” character preceding the property name, and then set the property to the desired value.

NOTE: RGS properties set in a configuration file do not take affect until the associated program is restarted. For example, if the rgreceiverconfig file is changed, the Receiver should be restarted. Likewise, if the rgsenderconfig file is changed, the Sender should be restarted.

8.3 Setting properties on the command line

Properties can also be set on the command line when the Receiver and Sender are started. Property values entered on the command line override any properties set with other methods. All properties must begin with a "-" on the command line to be recognized as a valid property. For example (on Linux):

rgreceiver.sh -Rgreceiver.Network.Timeout.Warning=10000

This command will start the RGS Receiver with the Rgreceiver.Network.Timeout.Warning property set to 10,000 milliseconds (10 seconds). If any property is set more than once on the command line, the value of the last entry is used. No whitespace characters are allowed between the property name, the "=" character, and the property value. For example:

rgreceiver.sh -Rgreceiver.IsSnap = 1

This property declaration is invalid because of the whitespace on both sides of the "=" character. Properties of type int vector cannot be set on the command line.

△ **CAUTION:** If a property name is misspelled, no user notification is provided, and the misspelled property will not take effect. If you specify a property in a configuration file or on a command line, and it does not appear to take effect, first verify that the property name is spelled correctly and that upper/lower case usage is correct.

8.4 Authenticator properties

The following Sender and Receiver properties affect how the user authenticates an RGS connection:

Rgsender.LoggedInAuthenticators

Rgsender.LoggedOutAuthenticators

Rgreceiver.AuthenticatorId

Rgreceiver.AuthenticatorId.IsMutable

△ **CAUTION:** The authenticator properties are typically set by 3rd party software modules integrated with RGS, and should not be changed. Changing these properties can have unexpected consequences, including preventing you from establishing an RGS connection from the Receiver to the Sender. Therefore, these properties are not listed nor described in the next two sections on user-settable RGS Receiver and Sender properties.

8.5 RGS Receiver properties

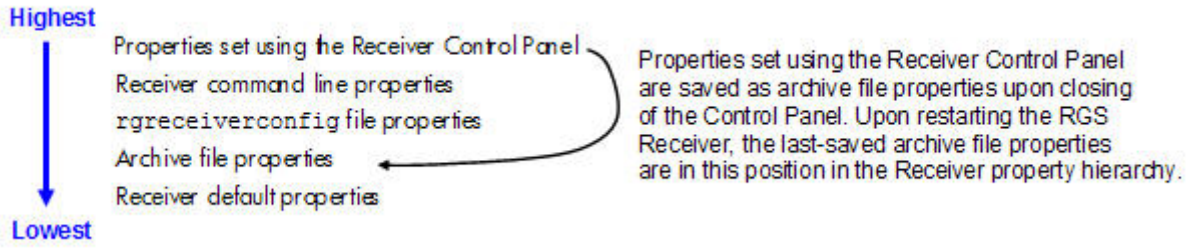
This section describes the Receiver properties. RGS supports two types of Receiver properties:

- **Per-Receiver properties**—The per-Receiver properties affect all Remote Display Windows generated by the Receiver. As noted in Many-to-one connection on page 17 a Receiver can connect to multiple Remote Computers (and therefore generate multiple Remote Display Windows).
- **Per-session properties**—New in RGS 5.0, the per-session properties (also known as per-connection properties) allow the user to specify the property values of each RGS connection. For example, in a many-to-one configuration, per-session properties can be specified for each Remote Display Window displayed by the Receiver.

8.5.1 Receiver property hierarchy

RGS supports the following hierarchy of methods to set the Receiver properties (see Figure 8-1 Receiver property hierarchy on page 155).

Figure 8-1 Receiver property hierarchy



Properties set by methods higher on the list override properties set by methods lower on the list. For example, a Receiver command line property can override a property specified in the rgreceiverconfig file. Similarly, an archive file property (saved from the previous Receiver Control Panel session) can override a Receiver default property.

8.5.1.1 Properties set using the Receiver Control Panel

The Receiver Control Panel enables the user to modify the values of many Receiver properties. For example, as described in Remote Clipboard operation on page 137, the user can enable/disable Remote Clipboard using the Receiver Control Panel. This affects the Rgreceiver.Clipboard.IsEnabled property, as described in Receiver Remote Clipboard properties on page 169.

8.5.1.2 Receiver command line properties

See Setting properties on the command line on page 154.

8.5.1.3 rgreceiverconfig file properties

See Setting property values in a configuration file on page 153.

8.5.1.4 Archive file properties

When the Receiver is run, the user can change a number of properties using menus on the Receiver Control Panel and the Remote Display Window. When the Receiver exits, it saves the state of any properties that were changed by the user—these are known as *archive file properties*.

8.5.1.5 Receiver default properties

The Receiver has a set of default properties that are built into the Receiver. These are identical to the property values in the Receiver configuration file (rgreceiverconfig) that is installed with the RGS Receiver. However, as noted previously, the properties in both the Receiver and Sender configuration files are initially commented out.

8.5.2 Receiver property groups

RGS supports the following groups of Receiver properties:

Per-receiver properties

- General properties group
  - Rgreceiver.IsBordersEnabled
  - Rgreceiver.IsSnapEnabled
  - Rgreceiver.IsAlwaysPromptCredentialsEnabled
  - Rgreceiver.Directory
  - Rgreceiver.MaxSenderListSize
  - Rgreceiver.IsMatchReceiverResolutionEnabled
  - Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled
  - Rgreceiver.RecentWindowPositions(deprecated)
  - Rgreceiver.ConnectionWarningColor
  - Rgreceiver.IsGlobalImageUpdateMutable (deprecated)
  - Rgreceiver.IsGlobalImageUpdateEnabled
  - Rgreceiver.MaxImageUpdateRequests
  - Rgreceiver.IsMouseSyncEnabled
  - Rgreceiver.IsMenubar.Enabled
- Browser properties group
  - Rgreceiver.Browser.IsMutable
  - Rgreceiver.Browser.Name
- Audio properties group
  - Rgreceiver.Audio.IsMutable
  - Rgreceiver.Audio.IsEnabled
  - Rgreceiver.Audio.Quality
  - Rgreceiver.Audio.IsFollowsFocusEnabled
  - Rgreceiver.Audio.IsInStereo

- Microphone property group
  - Rgreceiver.Mic.IsEnabled
- USB properties group
  - Rgreceiver.Usb.IsMutable
  - Rgreceiver.Usb.ActiveSession
  - Rgreceiver.Usb.IsEnabled
- Network properties group
  - Rgreceiver.Network.Timeout.IsMutable
  - Rgreceiver.Network.Timeout.IsGuiEnabled
  - Rgreceiver.Network.Timeout.Warning
  - Rgreceiver.Network.Timeout.Error
  - Rgreceiver.Network.Timeout.Dialog
- Hotkey properties group
  - Rgreceiver.Hotkeys.IsMutable
  - Rgreceiver.Hotkeys.IsSetupModeEnabled
  - Rgreceiver.Hotkeys.SetupModeSequence
  - Rgreceiver.Hotkeys.IsSendCtrlAltEndAsCtrlAltDeleteEnabled
  - Rgreceiver.Hotkeys.IsSendFirstKeyInSequenceEnabled
  - Rgreceiver.Hotkeys.IsKeyRepeatEnabled
  - Rgreceiver.Hotkeys.IsCtrlAltDeletePassThroughEnabled
  - Rgreceiver.Hotkeys.IsGameModeEnabled
- Remote Clipboard properties group (see below for the per-session Remote Clipboard property)
  - Rgreceiver.Clipboard.IsMutable
  - Rgreceiver.Clipboard.IsEnabled
  - Rgreceiver.Clipboard.FilterString
- Logging properties group
  - Rgreceiver.Log.IsMutable
  - Rgreceiver.Log.IsFileLoggerEnabled
  - Rgreceiver.Log.IsConsoleLoggerEnabled
  - Rgreceiver.Log.Filename
  - Rgreceiver.Log.Level

- Rgreceiver.Log.MaxFileSize
- Rgreceiver.Log.NumBackupFiles

- Image codec properties group
  - Rgreceiver.ImageCodec.IsMutable
  - Rgreceiver.ImageCodec.Quality
  - Rgreceiver.ImageCodec.IsBoostEnabled

Per-session properties

- Auto Launch property set. (Microsoft Windows only) See Auto Launch on page 104 for general details.
  - Rgreceiver.Session.<N>.IsConnectOnStartup
  - Rgreceiver.Session.<N>.Hostname
  - Rgreceiver.Session.<N>.Username
  - Rgreceiver.Session.<N>.Password
  - Rgreceiver.Session.<N>.PasswordFormat
- Remote Clipboard per-session property (see above for the per-Receiver Remote Clipboard properties)
  - Rgreceiver.Session.<N>.Clipboard.IsEnabled
- Window placement and size group
  - Rgreceiver.Session.<N>.RemoteDisplayWindow.X
  - Rgreceiver.Session.<N>.RemoteDisplayWindow.Y
  - Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled
  - Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionHeight
  - Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionWidth

With the exception of the general properties and the microphone property, all Receiver property groups have an .IsMutable property (the group IsMutable property). The IsMutable property is always of type bool. For example:

Rgreceiver.Audio.IsMutable=1

When the group IsMutable property is 1 (true), the user is allowed to interactively change the other properties in the audio group—by using, for example, the Receiver Control Panel. When the group IsMutable property is 0 (false), the user is prevented from interactively changing the other properties in the group. All group IsMutuable properties have a default value of 1, which allows the user to interactively change the other properties in the group.

With RGS 5.0, a new IsMutable feature was added. Each of the *individual properties* now has an associated IsMutable Boolean property to control whether each *individual* property can be interactively changed by the user—this is the *individual IsMutable property*. For example, the Rgreceiver.Network.Timeout.Error property now has the individual Rgreceiver.Network.Timeout.Error.IsMutable property. If this RGS properties individual IsMutable

property is true, the user is allowed to interactively change the associated property, that is, the Rgreceiver.Network.Timeout.Error property.

NOTE: For clarity, the individual IsMutable properties are not shown in the previous list; however, they are included in the following detailed description of each property.

NOTE: In order for the user to be able to interactively change a property, the group IsMutable property and the individual IsMutable property must both be 1 (true). If either IsMutable property is 0 (false), the user will not be able to interactively change the associated property.

In Figure 8-2 The Receiver timeout error IsMutable property is set to 0 on page 159, the Receiver is started with the command line option –Rgreceiver.Network.Timeout.Error.IsMutable=0, which prevents the user from changing the value of the network timeout error property.

Figure 8-2 The Receiver timeout error IsMutable property is set to 0

Because the Receiver timeout error property IsMutable property is 0, the Receiver timeout error property cannot be changed by the user in the Receiver Control Panel (see Figure 8-3 The Receiver timeout error property menu is grayed out on page 159).

Figure 8-3 The Receiver timeout error property menu is grayed out

8.5.3 Receiver general properties

The general properties are listed below. After each property, the default value is listed in parenthesis.

Rgreceiver.IsBordersEnabled=bool （default=1）

Rgreceiver.IsBordersEnabled.IsMutable=bool （default=1）

If set to 1, the borders on the Remote Display Window will be enabled (displayed). If set to 0, the borders will be removed creating a borderless windows to display the Remote Computer desktop. The default value is 1— the borders are enabled.

Rgreceiver.IsSnapEnabled=bool （1）

Rgreceiver.IsSnapEnabled.IsMutable=bool （1）

If set to 1, as the Remote Display Window is being positioned on the display, the window will snap to the edge of the screen when the top edge of the window moves within 10 pixels of the top of the display, or when the left edge of the window moves within 10 pixels of the left edge of the display. The default value is 1—snap is enabled.

Rgreceiver.IsAlwaysPromptCredentialsEnabled=bool （0）

Rgreceiver.IsAlwaysPromptCredentialsEnabled.IsMutable=bool （1）

If set to 1, when connecting to an RGS Sender, the user will always be prompted for the domain, username and password. There will be no attempt to automatically verify the user credentials. The default value is 0—prompting for credentials is off.

Rgreceiver.Directory=string （directory.txt）

Rgreceiver.Directory.IsMutable=bool （1）

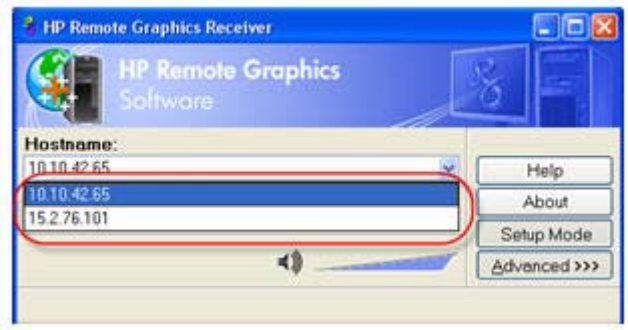
Used in Directory Mode to set the name and location of the file that lists the Remote Computers assigned to the current user. The default value is "directory.txt".

Rgreceiver.MaxSenderListSize=int （5）

Rgreceiver.MaxSenderListSize.IsMutable=bool （1）

In Normal Mode, the Receiver keeps a list of the Senders that it has most recently connected to. Figure 8-4 The Receiver maintains a list of the most recently connected Senders. on page 160 shows the Receiver Control Panel dialog that this property applies to. This property specifies the maximum number of Remote Computers the Receiver will keep on its list—in Figure 8-4 The Receiver maintains a list of the most recently connected Senders. on page 160, two Remote Computers (Senders) are on the list. The Receiver will keep the most recently connected Remote Computers on its list, up to the maximum number specified by this property. Minimum useful value is 1.

Figure 8-4 The Receiver maintains a list of the most recently connected Senders.



Rgreceiver.IsMatchReceiverResolutionEnabled=bool （0）

Rgreceiver.IsMatchReceiverResolutionEnabled.IsMutable=bool （1）

If this property is enabled, the Local Computer (Receiver) will attempt to set the resolution of the Remote Computer to the same full-screen resolution of the Local Computer. If the Local Computer display resolution is not supported by the Remote Computer, the connection occurs at the existing Remote Computer (Sender) resolution, and a warning dialog is issued to the user. The original (pre-modification) Remote Computer display resolution is restored when the RGS connection is terminated.

Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled=bool （0）

Rgreceiver.IsMatchReceiverPhysicalDisplaysEnabled.IsMutable=bool （1）

If the following conditions are met:

1. This property is enabled.
2. Rgreceiver.IsMatchReceiverResolutionEnabled is enabled (see above property).
3. Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled is disabled.

Then the Receiver will try to set the layout of the Remote Computer (Sender) physical displays to have the same display layout and resolution as the Receiver displays. If the Sender is unable to match the layout and resolution of the Receiver physical displays, the Receiver will try to just match the Receiver display resolution.

For example, if the Receiver has two physical displays in a 1x2 layout and a overall virtual display resolution of 2560x1024 (1280x1024x2), the Receiver will try to set the Sender to the same layout and resolution. If that fails, the Receiver will try to set a single physical display resolution of 2560x1024. If that fails, an error is reported.

If the following conditions are met:

1. This property is enabled.
2. Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled is enabled.

NOTE: As noted earlier, Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled takes precedence over Rgreceiver.IsMatchReceiverResolutionEnabled. Therefore, if the former property is enabled (as listed in paragraph 2 above), the latter property is a “don’t care”, and its setting is ignored.

If the above conditions are met, the Receiver will determine the physical displays that are contained within the Receiver Remote Display Window specified by these properties:

- Rgreceiver.Session.<N>.RemoteDisplayWindow.X
- Rgreceiver.Session.<N>.RemoteDisplayWindow.Y
- Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionWidth
- Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionHeight.

The Receiver will try to set the layout of the Remote Computer (Sender) physical displays to match the physical displays contained in this window. For example, if the Receiver has the following:

- Two physical displays in a 1x2 layout
- An overall virtual display resolution of 2560x1024 (1280x1024x2)
- Rgreceiver.Session.<N>.RemoteDisplayWindow.X = 1280

- Rgreceiver.Session.<N>.RemoteDisplayWindow.Y = 0
- Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionWidth = 1280
- Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionHeight = 1024

Then the Receiver will determine that one physical display with a resolution of 1280x1024 is contained within the window. The Receiver will try to set the layout of the Remote Computer Sender to a single physical display and a resolution of 1280x1024.

If the following conditions are met:

1. This property is enabled.
2. Rgreceiver.IsMatchReceiverResolutionEnabled is disabled.
3. Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled is disabled.

Then this property has no affect.

NOTE: The following property, while supported, has been deprecated. HP recommends using the per-session Remote Display Window X and Y positioning properties described in Window placement and size properties on page 173.

Rgreceiver.RecentWindowPositions=int vector （10 10）

Rgreceiver.RecentWindowPositions.IsMutable=bool （1）

This property can be used to set the positions of the Remote Display Windows. The position of each Remote Display Window is controlled by an (xpos,ypox) 2-tuple. The following example contains two 2-tuples, one for each of two Remote Display Windows:

Rgreceiver.RecentWindowPositions=0 0 1280 0

This property will set the coordinates (upper left corner) of the first Remote Display Window to (0, 0) and the second Remote Display Window to (1280, 0). In this example, if each Remote Display Window is 1280x1024, the first window will be positioned on the left of the Local Computer display, and the second window will be placed immediately adjacent, and to the right, of the first window, making them appear as one large 2560x1024 display.

Rgreceiver.ConnectionWarningColor=string （0x80b40000）

Rgreceiver.ConnectionWarningColor.IsMutable=bool （1）

The ConnectionWarningColor property sets the warning color that overlays the Remote Display Window when the RGS Receiver detects a network disruption. The warning color is a four byte number, with each byte providing the following information:

- **alpha byte**—specifies the transparency value of the warning color that overlays the Remote Display Window
- **red byte**—specifies the red component of the warning color
- **green byte**—specifies the green component of the warning color
- **blue byte**—specifies the blue component of the warning color

An alpha value of 0x00 will be totally transparent, meaning that no warning color will be visible to the user. An alpha value of 0xFF will be totally opaque, completely covering the image in the Remote Display Window with the warning color.

The default value of the warning color is 0x80b40000, representing the following:

- The alpha component is 0x80 (128 decimal. This is 50% transparent.
- The red component is 0xb4 (180 decimal). This is about 70% of full red (0xFF).
- The green component is 0x00. There is no green component.
- The blue component is 0x00. There is no blue component.

NOTE: The following property, while supported, has been deprecated. HP recommends that the subsequent properties, Rgreceiver.IsGlobalImageUpdateEnabled and its associated IsMutable property, be used instead.

Rgreceiver.IsGlobalImageUpdateMutable=bool （1）

If set to 1, the user will be able to modify the **Enable global image updates** checkbox in the Receiver Control Panel. If set to 0, the user will be unable to modify the checkbox. This property can be used to permanently enable or disable global image updates in the Receiver. The default value is 1—global image updates can be configured by the user.

Rgreceiver.IsGlobalImageUpdateEnabled=bool （0）

Rgreceiver.IsGlobalImageUpdateEnabled.IsMutable=bool （1）

If set to 1, the Receiver updates the area of the screen with the **extents** of all the areas of the screen that have changed. If set to 0, the Receiver limits updates of the screen to just the areas that have changed, using individual update rectangles.

If image updates in the Remote Display Window show image tearing, setting the value to 1 (enabling global image updates) may reduce the tearing. Tearing usually occurs on large images that are updated quite frequently, such as a 3D object being rotated in a large window. Setting the property value to 0 (disabling global image updates) is usually best for large Remote Display Windows (5120 x 1024 resolution) that display mostly text based applications. The default value is 0—global image updates are disabled.

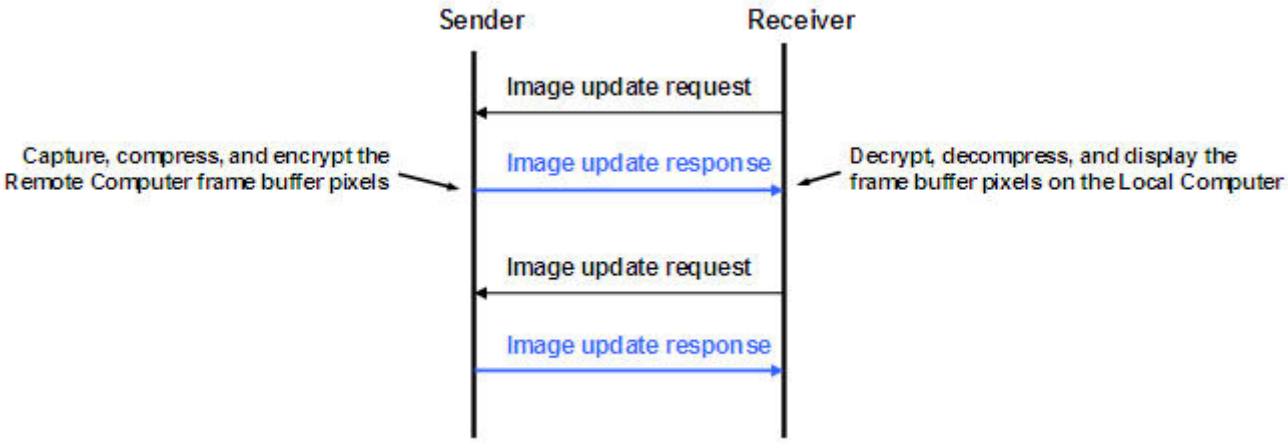
NOTE: The following property was added in the RGS 5.1.3 release to enable RGS performance optimization in high-latency network environments.

Rgreceiver.MaxImageUpdateRequests=int （4）

Rgreceiver.MaxImageUpdateRequests.IsMutable=bool （1）

This property controls the maximum number of outstanding image update requests between the RGS Receiver (requestor) and the RGS Sender (responder). Prior to RGS 5.1.3, the number of outstanding image update requests was preset to 1. This meant that the Receiver, after issuing an image update request, would wait for the image update response to be completed before issuing another request. Figure 8-5 Prior to RGS 5.1.3, only one image update would be in-process at any time on page 164 shows the sequence chart for this.

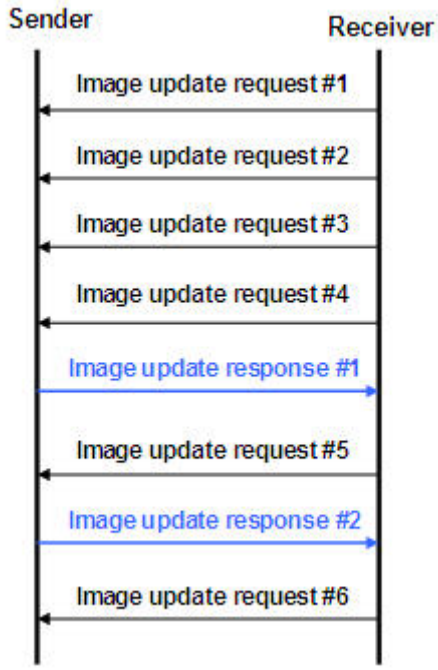
Figure 8-5 Prior to RGS 5.1.3, only one image update would be in-process at any time



The **Rgreceiver.MaxImageUpdateRequests** property was added to enable performance optimization in high-latency network environments. For example, setting this property to 2 will allow the Receiver to issue a second image update request to the Sender prior to receiving the previous image update response. This allows the Sender and Receiver to operate more in parallel—but at the potential expense of increased network bandwidth consumption.

The sequence chart in Figure 8-6 Sequence chart for the default property value of 4 on page 164 shows operation for the default property value of 4. In this case, the Receiver can have up to 4 image update requests outstanding at any given time. When image update response #1 is received (meaning that there are now 3 outstanding image update requests), the Receiver can issue image update request #5 (again, up to a maximum of 4 outstanding image update requests at any given time).

Figure 8-6 Sequence chart for the default property value of 4



The sequence can vary considerably from that shown in Figure 8-6 Sequence chart for the default property value of 4 on page 164. For example, image update response #1 might be received prior to

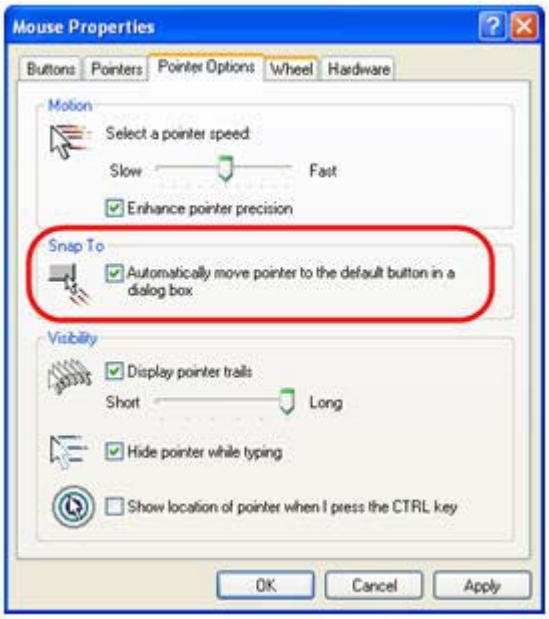
issuance of image update request #4. Also, TCP will temporarily block the Sender from sending further data if the Receiver network buffer becomes full. Nonetheless, the sequence shown in Figure 8-6 Sequence chart for the default property value of 4 on page 164 serves to parallelize local display updates that otherwise would occur serially.

The default property value of 4 was determined empirically as a good compromise for both low and high-latency network environments. Larger numbers of outstanding requests may be beneficial in some cases depending on the number and types of updates occurring. In high-latency network environments, HP recommends that you characterize RGS performance for different values of the **Rgreceiver.MaxImageUpdateRequests** property.

Rgreceiver.IsMouseSyncEnabled=bool （1）**Rgreceiver.IsMouseSyncEnabled.IsMutable**=bool （1）

This property was added with RGS 5.2.5, and allows the RGS Receiver to track a certain type of mouse movement on the RGS Sender when the Sender computer is running Windows. The Sender mouse movement of interest is enabled when the Snap To box is checked in the Mouse Properties Pointer Options dialog on the Sender computer (see Figure 8-7 Pointer Options tab in the Sender Mouse Properties dialog on page 165). Checking of the Snap To box causes the Sender mouse pointer to be automatically moved to the default button in a dialog box.

Figure 8-7 Pointer Options tab in the Sender Mouse Properties dialog



When the Rgreceiver.IsMouseSyncEnabled property is set to 1 on the Receiver and when an automatic snap to action occurs on the Sender, the snap to action will be communicated from the Sender to the Receiver; the RGS Receiver will then move the mouse cursor to reflect the cursor position in the Sender dialog box where the snap to action occurred. If this property is set to 0, snap to actions on the Sender will not be reflected on the Receiver.

This features requires that both the RGS Sender and Receiver be version 5.2.5 or later. This feature is supported only on Sender computers running Windows, while the Receiver computer can be running either Windows or Linux.

Rgreceiver.IsMenubarEnabled=bool (1)

This property was added with RGS 5.4.0 and allows the user to disable the Remote Display Window Toolbar functionality. When the Rgreceiver.IsMenubarEnabled property is set to 1 the user will be able to display the Remote Display Window Toolbar by pressing the Hotkey-H. When the Rgreceiver.IsMenubarEnabled property is set to 0 the user will be unable to access the Remote Display Window Toolbar by pressing Hotkey-H. In other words, when the property is disabled the Hotkey-H command is turned off. See the Remote Display Window Toolbar on page 91 section for more details.

8.5.4 Receiver browser properties

Rgreceiver.Browser.IsMutable=bool （1）

This property only applies to the Linux RGS Receiver. If set to 1, the name of the browser used to display online help can be changed by the user in the Receiver Control panel. If set to 0, the name of the browser cannot be changed by the user.

Rgreceiver.Browser.Name=string （mozilla）

Rgreceiver.Browser.Name.IsMutable=bool （1）

This property only applies to the Linux RGS Receiver, and can be used to set the name of the browser to display online help. For example, setting Rgreceiver.Browser.Name=mozilla will start the Mozilla browser when the **Help** button is clicked in the Receiver Control Panel.

For the Windows Receiver, the Help system is based on a CHM file.

8.5.5 Receiver audio properties

Rgreceiver.Audio.IsMutable=bool （1）

If set to 1, the user will be able to modify all audio controls in the RGS Receiver. If set to 0, none of the audio controls can be modified by the user. The default value is 1—the audio controls can be modified by the user.

Rgreceiver.Audio.IsEnabled=bool （1）

Rgreceiver.Audio.IsEnabled.IsMutable=bool （1）

If set to 1, the RGS audio subsystem will be enabled. If set to 0, RGS audio will be disabled and no network bandwidth will be consumed for remote audio. The default value is 1—audio is enabled.

Rgreceiver.Audio.Quality=int （1）

Rgreceiver.Audio.Quality.IsMutable=bool （1）

The audio quality property can be set to low (0), medium (1), or high (2) quality. This property is used to adjust the sample rate of the streaming audio. Less information is sent over the network if the sample rate is lower—and, therefore, the less network bandwidth that is consumed. The default value is 1—medium audio quality.

Rgreceiver.Audio.IsFollowsFocusEnabled=bool （0）

Rgreceiver.Audio.IsFollowsFocusEnabled.IsMutable=bool （1）

If set to 1, enables only the audio stream associated with the Remote Display Window that currently has the keyboard focus. The audio stream from all other active connections is disabled. Setting the property to 0 combines the audio from all active connections into a single stream. The default value is 0—combine audio from all active connections, and play in a single stream.

Rgreceiver.Audio.IsInStereo=bool （1）

Rgreceiver.Audio.IsInStereo.IsMutable=bool （1）

If set to 1, stereo is enabled, and both the left and right channels are transmitted. The highest quality audio (2) with stereo enabled is equivalent to CD quality audio but consumes more network bandwidth. The default value is 1—stereo is enabled.

8.5.6 Receiver microphone property

Rgreceiver.Mic.IsEnabled=bool （0）

Rgreceiver.Mic.IsEnabled.IsMutable=bool （1）

This property is new with the RGS 5.1.3 release. If set to 1, remote microphone is enabled (on/unmuted). The default value is 0—remote microphone is disabled (off/muted).

8.5.7 Receiver USB properties

Rgreceiver.Usb.IsMutable=bool （1）

If set to 1, the user can modify all USB controls in the Receiver Control Panel. If set to 0, none of the USB controls can be changed by the user. This property can be used to permanently enable or disable remote USB before the RGS Receiver is started. The default value is 1—the user can modify all USB controls.

Rgreceiver.Usb.IsEnabled=bool （1）

Rgreceiver.Usb.IsEnabled.IsMutable=bool （1）

If set to 1, remote USB will be enabled. If set to 0, remote USB will be disabled. The default value is 1—remote USB is enabled.

Rgreceiver.Usb.ActiveSession=int （0）

Rgreceiver.Usb.ActiveSession.IsMutable=bool （1）

When the Receiver is in Directory Mode, the Local Computer can connect to one or more Remote Computers. This property specifies the Remote Computer that the local USB devices are attached to. To have all local USB devices attached to the first Remote Computer, use value zero. To have all local USB devices attached to the second Remote Computer, use value one, and so on. The default value is 0—the local USB devices are attached to the first Remote Computer.

The local USB devices can only be attached to one Remote Computer at a time. To change which Remote Computer the local USB devices are attached to, all Remote Computers must be disconnected. Then enter a new value for this property, and reconnect to all Remote Computers.

8.5.8 Receiver network properties

Rgreceiver.Network.Timeout.IsMutable=bool

If set to 1, the user can modify all network timeout values in the RGS Receiver Control Panel. If set to 0, the user cannot modify the values. This property can be used to permanently set network timeouts before the RGS Receiver is started. The default value is 1—timeout values are changeable by the user.

Rgreceiver.Network.Timeout.IsGuiEnabled=bool (1)

This property was added with RGS 5.4.0 and allows the user to disable a visual notification when the network has timed out. When the Rgreceiver.Network.Timeout.IsGuiEnabled property is set to 1 the network timeout is shown. When the Rgreceiver.Network.Timeout.IsGuiEnabled property is set to 0 the visual network timeout notification is not shown. See Receiver network timeouts on page 128 for more details.

Rgreceiver.Network.Timeout.Warning=int （2000）

Rgreceiver.Network.Timeout.Warning.IsMutable=int （1）

The timeout in milliseconds used to detect and notify the user of a network disruption. The default value is 2,000 milliseconds (2 seconds).

Rgreceiver.Network.Timeout.Error=int （30000）

Rgreceiver.Network.Timeout.Error.IsMutable=int （1）

The timeout in milliseconds used to detect and disconnect an inactive connection. The default value is 30,000 milliseconds (30 seconds).

Rgreceiver.Network.Timeout.Dialog=int （15000）

Rgreceiver.Network.Timeout.Dialog.IsMutable=bool （1）

This property specifies the timeout in milliseconds used to display, and wait on responses from, input dialogs, such as the authorization dialog and the PAM authentication dialog. The default value is 15,000 milliseconds (15 seconds).

8.5.9 Receiver hotkey properties

Rgreceiver.Hotkeys.IsMutable=bool （1）

If set to 1, all Hotkey settings in the Receiver Control Panel can be changed by the user. If set to 0, none of the hotkey settings can be changed by the user. This property can be used to permanently enable or disable hotkey settings before the RGS Receiver is started. The default value is 1—hotkeys can be changed by the user.

Rgreceiver.Hotkeys.IsSetupModeEnabled=bool (1)

This property was added with RGS 5.4.0 and allows the user to completely disable all hotkeys. When the Rgreceiver.Hotkeys.IsSetupModeEnabled property is set to 1 the hotkeys will work as normal. When the Rgreceiver.Hotkeys.IsSetupModeEnabled property is set to 0 all hotkeys are disabled. In other words pressing the hotkey sequence will not do anything. See Hotkeys on page 135 for more details.

Rgreceiver.Hotkeys.SetupModeSequence=string （“Shift Down, Space Down, Space up”）

Rgreceiver.Hotkeys.SetupModeSequence.IsMutable=bool （1）

Defines the Setup Mode hotkey sequence. The sequence may only consist of Ctrl, Alt, Shift and Space keys. The sequence must also start with either a Ctrl, Alt or Shift key. The first key must also be held down through the entire hotkey sequence. The default value is "Shift Down, Space Down, Space Up".

Rgreceiver.Hotkeys.IsSendCtrlAltEndAsCtrlAltDeleteEnabled=bool （1）

Rgreceiver.Hotkeys.IsSendCtrlAltEndAsCtrlAltDeleteEnabled.IsMutable=bool （1）

When enabled a Ctrl-Alt-End key sequence in the Remote Display Window is sent to the Remote Computer as a Ctrl-Alt-Del key sequence. The default value is 1—send a Ctrl-Alt-Del when the user enters Ctrl-Alt-End.

Rgreceiver.Hotkeys.IsSendFirstKeyInSequenceEnabled=bool (0)

Rgreceiver.Hotkeys.IsSendFirstKeyInSequenceEnabled.IsMutable=bool (1)

When enabled, the first key in the hotkey sequence is sent to the Remote Computer. The default value is 0—don't send the first key in the hotkey sequence.

Rgreceiver.Hotkeys.IsKeyRepeatEnabled=bool (0)

Rgreceiver.Hotkeys.IsKeyRepeatEnabled.IsMutable=bool (1)

The hotkey sequence is very particular (for example, shift down, space down, space up). The Windows operating system injects key repeats as repeating down events, for example, shift down, shift down, …, shift up. By default, the Receiver ignores these key repeats in the hotkey state machine. The Local Computer may be set up to process key repeats in the hotkey state machine, which may be necessary for certain types of applications. Note that, if this setting is enabled, the sequence shift down, shift down, space down, space up will not trigger setup mode, so the sequence must be typed faster if this setting is enabled.

Rgreceiver.Hotkeys.IsCtrlAltDeletePassThroughEnabled=bool (0)

Rgreceiver.Hotkeys.IsCtrlAltDeletePassThroughEnabled.IsMutable=bool (1)

When a Windows Local Computer detects a Ctrl-Alt-Delete key sequence, it does not send the sequence to the Remote Computer—only the Local Computer processes the key sequence. Setting this property to 1 will result in both the Remote and Local Computers processing the key sequence. Note that some third party software tools or OS configurations may be available to disable the Ctrl-Alt-Delete sequence on the Local Computer.

Rgreceiver.Hotkeys.IsGameModeEnabled=bool (1)

This property was added with RGS 5.4.0 and allows the user to disable the Game Mode functionality. When the Rgreceiver.Hotkeys.IsGameModeEnabled property is set to 1 the Game Mode functionality is available. When the Rgreceiver.Hotkeys.IsGameModeEnabled property is set to 0 the Game Mode functionality is disabled. In other words, pressing Hotkey-G has no affect. See Game Mode on page 104 for more details.

8.5.10 Receiver Remote Clipboard properties

NOTE: The Remote Clipboard functionality and properties were added with the RGS 5.1.3 release. At the RGS 5.2.0 release, the properties Rgreceiver.Session.<N>.Clipboard.IsEnabled and Rgreceiver.Clipboard.FilterString were added.

Rgreceiver.Clipboard.IsMutable=bool (1)

If set to 1, the Remote Clipboard setting in the Receiver Control Panel can be changed by the user. If set to 0, the user cannot change the Remote Clipboard settings. The default value is 1—the Remote Clipboard setting can be changed by the user.

Rgreceiver.Clipboard.IsEnabled=bool (1)

Rgreceiver.Clipboard.IsEnabled.IsMutable=bool (1)

This is a per-receiver property. If set to 1, the local user can use Remote Clipboard. If set to 0, the local user cannot use Remote Clipboard. The default value is 1—Remote Clipboard is enabled.

Rgreceiver.Session.<N>.Clipboard.IsEnabled=bool (1)

This is a per-session property. If set to 1, Remote Clipboard is enabled for the session N Remote Display Window. In order for Remote Clipboard operation to be enabled for session N, the per-receiver property Rgreceiver.Clipboard.IsEnabled must also be 1. The default value for both properties (per-receiver and per-session) is 1—Remote Clipboard is enabled.

Rgreceiver.Clipboard.FilterString=string (see below for the default value)

NOTE: This property is for advanced users only. The property string should be changed from its default value only if Remote Clipboard doesn't support the clipboard format required by your application. For more information on clipboard formats, see the Microsoft Developer Network article Clipboard Formats at http://msdn2.microsoft.com/en-us/library/ms649013.aspx.

This property contains a list of clipboard formats allowed to be transferred using Remote Clipboard. Therefore, this property is a *keep filter*, not a *reject filter*. The string is a regular expression, and is used by both the Remote and Local Computers. The rgreceiverconfig file contains the following entry for this property, which indicates the default clipboard formats supported by RGS:

Rgreceiver.Clipboard.FilterString="|1|2|7|8|13|16|17|Ole Private Data| Object Descriptor |Link Source Descriptor|HTML Format|Rich Text Format|XML Spreadsheet|"

The default clipboard formats are:

- 1 (CF_TEXT)—Text format. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data. Use this format for ANSI text.
- 2 (CF_BITMAP)—Bitmap format.
- 7 (CF_OEMTEXT)—Text format containing characters in the OEM character set. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data.
- 8 (CF_DIB)—A memory object containing a BITMAPINFO structure followed by the bitmap bits.
- 13 (CF_UNICODETEXT)—Unicode text format. Each line ends with a carriage return/linefeed (CR-LF) combination. A null character signals the end of the data.
- 16 (CF_LOCALE)—Locale identifier associated with text in the clipboard
- 17 (DIBV5)—Bitmap color space and bitmap data
- Ole Private Data—A private application format understood only by the application offering the format.
- Object Descriptor—OLE2 object descriptor
- Link Source Descriptor—Link to OLE2 object
- HTML Format—Text is in Hypertext Markup Language format
- Rich Text Format—A text format that includes special formatting features, such as bold, italics, and centering.
- XML Spreadsheet—A format created by Microsoft to allow Excel spreadsheets to be saved in XML (Extensible Markup Language) format. This format is supported by other applications as well.

8.5.11 Receiver logging properties

Rgreceiver.Log.IsMutable=bool (1)

If set to 1, the logging settings in the Receiver Control Panel can be changed by the user. If set to 0, the user will not be able to change any of the logging settings. This property can be used to permanently enable or disable logging settings before the RGS Receiver is started. The default value is 1—logging settings can be changed.

Rgreceiver.Log.IsFileLoggerEnabled=bool （1）

Rgreceiver.Log.IsFileLoggerEnabled.IsMutable=bool （1）

If set to 1, logging output from the RGS Receiver will be sent to a file. The default value is 1 —log to a file.

Rgreceiver.Log.IsConsoleLoggerEnabled=bool （1）

Rgreceiver.Log.IsConsoleLoggerEnabled.IsMutable=bool （1）

This property only applies to the Linux RGS Receiver. If set to 1, logging output from the RGS Receiver will be sent to a console window. The RGS Receiver must be started in a console window to see the logging output. The default value is 1—log to the console.

Rgreceiver.Log.Filename=string （rg.log）

Rgreceiver.Log.Filename.IsMutable=bool （1）

This property specifies the path to the log file, and is only used if RgReceiver.Log.IsFileLoggerEnabled is set to 1. The default path on Windows is located in the directory where the RGS Receiver is installed, normally C:/Program Files/Hewlett-Packard/Remote Graphics Receiver/rg.log. The default path on Linux is $HOME/.hpremote/rgreceiver/rg.log.

Rgreceiver.Log.Level=string （"INFO"）

Rgreceiver.Log.Level.IsMutable=bool （1）

RGS supports five logging levels: DEBUG, INFO, WARN, ERROR, and FATAL. If DEBUG is chosen, all level of output from DEBUG to FATAL will be output to the log file. If WARN level is chosen, all levels from WARN to FATAL will be output. The default value is INFO—all DEBUG output is turned off.

Rgreceiver.Log.MaxFileSize=int （1024）

Rgreceiver.Log.MaxFileSize.IsMutable=bool （1）

This sets the maximum size of the log file in kilobytes (Kbytes). The default maximum size is 1,024 Kbytes.

Rgreceiver.Log.NumBackupFiles=int （5）

Rgreceiver.Log.NumBackupFiles.IsMutable=bool （1）

If the log file exceeds its maximum size, the log file will be saved, and a new log file will be created. This property sets the number of extra files that will be saved. The default number of saved files is five.

8.5.12 Receiver image codec properties

Rgreceiver.ImageCodec.IsMutable=bool （1）

If set to 1, the local user can adjust the image quality using the Remote Display Window Toolbar. If set to 0, the user cannot change the image quality. This property and the following property can be used to permanently set the image quality before the Receiver is started. The default value is 1—the image quality can be adjusted by user.

Rgreceiver.ImageCodec.Quality=int （65）

Rgreceiver.ImageCodec.Quality.IsMutable=bool （1）

This property sets the image quality in the Remote Display Window, and can be set to a value from 0 to 100. A value of 100 is the highest image while 0 is the lowest image quality. Under most circumstances, the default value of 65 will be sufficient. Lower values of Rgreceiver.ImageCodec.Quality will typically reduce RGS bandwidth requirements on the network. If the Sender property, Rgsender.ImageCodec.Preferred, is set to Rgsender.ImageCodec.Preferred=JPEG-LS, the Rgreceiver.ImageCodec.Quality property is ignored.

NOTE: Even with an image quality of 100, RGS still performs image compression to reduce the network bandwidth requirements. While the image on the Receiver will usually appear visually lossless to the user at an image quality of 100, the actual image data sent over the network from the Sender to the Receiver will be "lossy" to a limited extent. The exception is the Sender codec JPEG-LS which is mathematically lossless. See Sender general properties on page 176 for more information.

Rgreceiver.ImageCodec.IsBoostEnabled=bool （1）

Rgreceiver.ImageCodec.IsBoostEnabled.IsMutable=bool （1）

This property was added beginning with RGS 5.2.6, and requires that both the RGS Sender and Receiver be version 5.2.6 or later. Setting the property to 1 will improve (boost) image quality for certain types of images, namely those images containing significant amounts of text or lines. Because of the high contrast ratio between adjacent pixels, such images often don't compress well. When this property is set to 1, such high contrast cases will be compressed in a manner to better preserve their visual quality, but at the possible expense of higher network bandwidth and/or lower image update rates. The default value is 1—image quality will be improved.

This property affects the setting of the Boost checkbox as described in Remote Display Window Toolbar on page 91.

8.5.13 Auto Launch session properties

These properties are per-session (per-connection) properties. If, for example, the user wants to auto connect to various Remote Computers, these properties can be used to specify the properties of each of the various Remote Display Windows on the Local Computer. A .rgreceiver file is required for each Remote Computer. These properties contain the parameter <N> which currently must be set to 0 in the .rgreceiver file. The .rgreceiver file may also contain Window size and placement properties. For example, the name of the Sender system is specified by the property Rgreceiver.Session.0.Hostname. See Auto Launch on page 104 for general details. Only a single instance of the RGS Receiver is currently supported. Any existing connection to a Remote Computer must be closed prior to Auto Launching another connection. To connect to multiple Remote Computers simultaneously, see Using Directory Mode on page 149 .

NOTE: These properties are used only on Microsoft Windows, control automatic connection to the Remote Computer and do not have default settings.

Rgreceiver.Session.<N>.IsConnectOnStartup=bool

This property specifies whether the Receiver should automatically try to connect on start-up via an associated file event.

Rgreceiver.Session.<N>.Hostname=string

The hostname or IP address as a utf8 encoded string, to use if automatically connecting on start-up.

Rgreceiver.Session.<N>.Username=string

The username as a utf8 encoded string, to use if automatically connecting on start-up.

Rgreceiver.Session.<N>.Password=string

The password as a utf8 encoded string, to use if automatically connecting on start-up.

Rgreceiver.Session.<N>.PasswordFormat=Encrypted | Clear | XOR

The format of the password. RGS supports three formats Encrypted, Clear or XOR. Encrypted is only supported on Windows and is the hexadecimal string representation of a password encrypted using the Windows command CryptProtectData. Clear is the password as clear text. XOR is the hexadecimal string representation of a password XOR'd against the value 129. See http://msdn.microsoft.com/en-us/library/aa380261(VS.85).aspx for more information on implementing the Windows API function CryptProtectData.

8.5.14 Window placement and size properties

As described previously, these properties are per-session (per-connection) properties. If, for example, the Receiver connects to two Remote Computers, these properties can be used to specify the properties of each of the two Remote Display Windows on the Local Computer. These properties contain the parameter <N> which ranges from 0 to N-1 for the creation of N sessions (connections). For example, for the first session, the X position of the Remote Display Window is specified by the property Rgreceiver.Session.0.RemoteDisplayWindow.X.

Note that these properties do not take affect until a connection is actually established to a Remote Computer.

Rgreceiver.Session.<N>.RemoteDisplayWindow.X=int （0）

Rgreceiver.Session.<N>.RemoteDisplayWindow.X.IsMutable=bool （1）

This property specifies the X position of the session N Remote Display Window, as measured from the left side of the Local Computer display.

Rgreceiver.Session.<N>.RemoteDisplayWindow.Y=int （0）

Rgreceiver.Session.<N>.RemoteDisplayWindow.Y.IsMutable=bool （1）

This property specifies the Y position of the session N Remote Display Window, as measured from the top of the Local Computer display.

Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled=bool （0）

Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled.IsMutable=bool（1）

This property, if set true (1), enables the following preferred resolution property values to be communicated to the Remote Computer. The default value is 0—do not enable the preferred resolution property to be communicated to the Remote Computer.

Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionHeight=int （0）

Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionHeight.IsMutable=bool （1）

See the description of the following property.

Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionWidth=int （0）

Rgreceiver.Session.<N>.VirtualDisplay.PreferredResolutionWidth.IsMutable=bool （1）

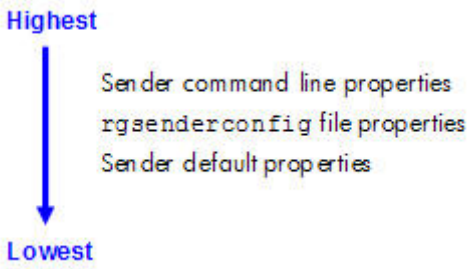
This property and the above property specify the preferred resolution of the Remote Display Window (in pixels). This resolution is communicated to the Remote Computer Sender, which will attempt to adapt its resolution to match the resolution preference of the Local Computer. If the Remote Computer is unable to match the resolution preference of the Local Computer

NOTE: The per-session property Rgreceiver.Session.<N>.VirtualDisplay.IsPreferredResolutionEnabled takes precedence over the per-Receiver property Rgreceiver.IsMatchReceiverResolutionEnabled. This allows individual sessions to override the global property.

8.6 RGS Sender properties

RGS supports the following hierarchy of methods to set the Sender properties (see Figure 8-8 Sender properties hierarchy on page 174).

Figure 8-8 Sender properties hierarchy



Properties set by methods higher on the list override properties set by methods lower on the list. For example, a Sender command line property can override a property specified in the rgsenderconfig file. Similarly, an rgsenderconfig file property can override a Sender default property.

The Sender, unlike the Receiver, does not support archive file properties because the Sender does not provide a user interface that allows its properties to be modified.

Sender command line properties

See Setting properties on the command line on page 154.

rgsenderconfig file properties

See Setting property values in a configuration file on page 153.

Sender default properties

The Sender has a set of default properties that are built into the Sender. These are identical to the property values in the Sender configuration file (rgsenderconfig) that is installed with the RGS Sender. However, as noted previously, the properties in both the Receiver and Sender configuration files are initially commented out.

8.6.1 Sender property groups

RGS supports the following groups of Sender properties:

- General properties group
  - Rgsender.IsRdpLogoutDetectionEnabled
  - Rgsender.IsCopyRegionEnabled
  - Rgsender.IsRegionLimitEnabled
  - Rgsender.IsDisconnectOnLogoutEnabled
  - Rgsender.MaxImageUpdateRate
  - Rgsender.ImageCodec.Preferred
  - Rgsender.IsBlankScreenAndBlockInputEnabled
  - Rgsender.IsIloRemoteConsoleEnabled
  - Rgsender.IsAnonymousConnectionForceEnabled
  - Rgsender.PreferredDisplayMethods
  - Rgsender.IsCollaborationNotificationEnabled
  - Rgsender.IsReconnectOnConsoleDisconnectEnabled
- Microphone properties group
  - Rgsender.Mic.IsEnabled
- Network timeout property group
  - Rgsender.Network.Timeout.Error
  - Rgsender.Network.Timeout.Dialog
- USB access control list properties
  - Rgsender.Usb.Acl.RulesetPath
  - Rgsender.Usb.Acl.SchemaPath
  - Rgsender.Usb.Acl.RulesetErrorTimeout
- Network Interface binding properties
  - Rgsender.Network.IsListenOnAllInterfacesEnabled
  - Rgsender.Network.Interface.n.IsEnabled
  - Rgsender.Network.AllowIpAddressSubnet
  - Rgsender.Network.Port
- Clipboard property group
  - Rgsender.Clipboard.IsEnabled

8.6.2 Sender general properties

Rgsender.IsRdpLogoutDetectionEnabled=bool （1）

This property only applies to the Windows versions of the RGS Sender.

When a user disconnects from a Remote Desktop Protocol (RDP) session, the Windows desktop on the Remote Computer is immediately available for an RGS connection. However, if the user logs out of the RDP session, the RGS Sender will be unable to access the desktop for about 60 seconds. If this property is set to 1, the desktop will be available to RGS almost immediately. The RGS Sender will monitor the RDP session for a logout, and begin the process of making the desktop available as soon as the logout is detected. If set to 0, the RGS Sender will not monitor the RDP session for a logout. The default is 1—allow quick access to the Windows desktop after Remote Desktop logout.

Rgsender.IsCopyRegionEnabled=bool （1）

If set to 1, RGS Copy Regions are sent from the Sender to the Receiver. If set to 0, RGS Copy Regions are turned off and will be sent to the Receiver as Image Update Regions. This is for advanced use and should not be set. The default value is 1—send RGS Copy Regions.

Rgsender.IsRegionLimitEnabled=bool （0）

This property is used to limit the number of update rectangles in a update region. This is for advanced use and should not be set. The default value is 0— don't limit regions.

Rgsender.IsDisconnectOnLogoutEnabled=bool （1）

If set to 1, the RGS connection will be disconnected when the user logs out. If set to 0, the RGS connection will remain connected to the Sender when the user logs out. The default value is 1—always disconnect when the user logs out.

Rgsender.ImageCodec.Preferred=string （NC HP2 JPEG-LS）

Available CODECs are:

- NC (HP3) The default since release 5.0
- HP2 The default prior to release 5.0
- JPEG-LS Lossless, available since 5.3.2

Introduced at RGS 5.3.2. Sets the preferred CODEC for encoding and decoding all image data sent from the Sender to the Receiver. Both the Sender and Receiver must support the specified CODEC, otherwise the connection will fall back to the lowest common CODEC. The system will automatically select the best CODEC for normal use. For situations requiring a mathematically lossless CODEC, select JPEG-LS. Note the JPEG-LS codec ignores the Rgreceiver.ImageCodec.Quality property.

Rgsender.MaxImageUpdateRate=int （30）

This property limits the number of image updates per second transmitted from the Remote Computer to the Local Computer. The value is the maximum number of updates per second. If the image update rate is too high, and using too much network bandwidth, the MaxImageUpdateRate can be set to limit the number of image updates per second. The default value is 30. To specify no limit on the number of image updates per second, set the property to 0—this is interpreted to mean that the image update rate should not be limited.

NOTE: Beginning at RGS 5.2.5, the default value of the preceding property was changed from 0 to 30.

Rgsender.IsBlankScreenAndBlockInputEnabled=bool （1）

If set to 1, this property enables monitor blanking on certain Remote Computers when a primary user logs in from a Local Computer. This property also enables blocking of input from a keyboard and mouse that are directly connected to the Remote Computer. If set to 0, monitor blanking is disabled. The default value is 1— monitor blanking is enabled. For details on monitor blanking, see Remote Computer monitor blanking operation on page 92.

Rgsender.IsIloRemoteConsoleEnabled=bool （0）

This property is supported only on Linux. If set to 0, the iLO (integrated Lights-Out) console is disabled when an RGS connection is made. This prevents the user's desktop session from being visible through the iLo remote console. When set to one, the user's desktop session will be viewable through the iLO remote console. The default is 0—disable viewing of the user's desktop session through iLO.

Rgsender.IsAnonymousConnectionForceEnabled=bool （0）

By default, Easy Login is only enabled on a blade workstation. To enable Easy Login functionality on a standalone workstation, this property value can be changed from 0 to 1.

△ **CAUTION:** Enabling the above property on a standalone workstation Remote Computer may allow a Local Computer user unauthorized access to the Remote Computer. If Easy Login is enabled via this property, a Local Computer user can connect to the logged out or locked desktop of the Remote Computer without providing a username or password. If a user at the Remote Computer console logs in or unlocks the desktop, the anonymous Local Computer user will be promoted to a primary user.

This will result in the Remote Computer monitor being blanked, and the Remote Computer input disabled. At this point, the unauthorized Local Computer user will have full control of the Remote Computer, possibly requiring the Remote Computer user to cycle power on the computer to regain control.

Rgsender.PreferredDisplayMethods=string（GPU ChangeList Comparitron）

Introduced at RGS 5.3.0, this property controls the order of and use of the three methods the RGS Sender may use to process the video stream prior to sending it to the Receiver. This property should not normally be changed from the default built into the RGS Sender. Enter the methods in priority order of usage. If a method is not currently supported in the system, the next method in the list will be tried. The rgdiag tool will report which methods are supported on Microsoft Windows. (see Using the RGS Diagnostics Tool on Windows on page 55)

- "GPU" uses the Graphics Processing Unit (GPU) hardware to quickly compare one full screen to a previous full screen. A specific graphics card and driver are required. The RGS Sender will test for the availability of the graphics card and driver. This method is supported only on Microsoft Windows Vista and later.
- "ChangeList" method uses, in Microsoft Windows, the RGS mirror-driver, and on Linux, the "Remote Graphics" X server extension to detect display changes. Microsoft Vista and later is forced to Basic mode. Aero mode is not supported.
- "Comparitron" method uses the system's CPU to compare one full screen to a previous full screen. This method is supported only on Microsoft Windows. Animated cursors are displayed as a static cursor.

Rgsender.IsCollaborationNotificationEnabled=bool （1）

Introduced at RGS 5.2.0, this property allows the user to enable or disable display of the collaboration notification dialog (see Collaboration notification dialog on page 100). If set to 1, the collaboration notification dialog is displayed. If set to 0, the collaboration notification dialog is not displayed. The default value is 1—display the collaboration notification dialog.

△ **CAUTION:** Caution is advised in disabling the collaboration notification dialog because neither the Remote User (if present) or the Local Users will be notified who is participating in a collaboration session. Furthermore, if display of the collaboration notification dialog is disabled, the warning dialog in Figure 5-7 Local Computer warning dialog if the Remote Computer is unable to blank its monitor on page 93 (which is displayed when the Remote Computer is unable to blank its monitor) will also be prevented from being displayed.

Rgsender.IsReconnectOnConsoleDisconnectEnabled=bool （1）

Introduced at RGS 5.3.0, this property allows the user to enable or disable session reconnection during session logout or Fast User Switching. Supported on Windows Vista and later. The default value is 1. See Sender and Receiver interoperability on page 14 for more details.

8.6.3 Microphone property group

Rgsender.Mic.IsEnabled=bool （1）

This property is new with RGS 5.1.3, and is only supported on the Windows Sender. If set to 1, remote microphone is enabled (on/unmuted). If set to 0, remote microphone is disabled (off/muted). The default value is 1—remote microphone is enabled (on/unmuted).

8.6.4 Sender network timeout properties

Rgsender.Network.Timeout.Error=int （30000）

The timeout in milliseconds used to detect and disconnect an inactive connection. The default value is 30,000 milliseconds (30 seconds). See Adjusting Network timeout settings on page 127 for more details.

Rgsender.Network.Timeout.Dialog=int （15000）

The timeout in milliseconds used to display and wait on responses from input dialogs, such as the authorization dialog and PAM authentication dialog. The default value is 15,000 milliseconds (15 seconds). See Adjusting Network timeout settings on page 127 for more details.

8.6.5 Sender USB access control list properties

The following properties provide information on the access control list (ACL) file used to control the attachment of USB devices to a Remote Computer. See Remote USB Access Control List on page 119 for information on the ACL file.

Rgsender.Usb.Acl.RulesetPath=string （hprDefaultUsbAcl.xml）

This property specifies the name of the XML file that implements the remote USB Access Control List (ACL).

Rgsender.Usb.Acl.SchemaPath=string （hprUsbAcl.xsd）

This property specifies the name of the schema file that accompanies the remote USB XML file.

Rgsender.Usb.Acl.RulesetErrorTimeout=int （5000）

This property is used by the Sender remote USB code while monitoring the ACL file (hprDefaultUsbAcl.xml). If this file disappears or otherwise becomes inaccessible while the Sender is running, this property controls how long the Sender waits for the file to be restored. If the timeout expires, all currently connected USB devices are disconnected. If the file is restored prior to expiration of the timeout period, the USB devices remain connected. The default timeout value is 5,000 milliseconds (5 seconds).

8.6.6 Network Interface binding properties

The following properties permit control of which network interface the RGS Sender binds to. Use of the network interface binding properties is described in Network Interface reconfiguration using the Sender network interface binding properties on page 83.

Rgsender.Network.IsListenOnAllInterfacesEnabled=bool（1）

This property can be used to force the Sender to listen for RGS connections on all network interfaces. As of RGS 5.4.0 the default value is 1— force the Sender to listen for RGS connections on all available network interfaces.

Rgsender.Network.Interface.n.IsEnabled=int（see below for default values）

This property can be used to specify the network interface that the Sender will listen on. The “n” in the property name specifies the index of the network interface, beginning at 0 for the first network interface, 1 for the second network interface, and so on. If this property value is 1 (enabled), the Sender will listen on the network interface of index “n”. If the property is 0, the Sender will not listen on that network interface.

If Rgsender.Network.IsListenOnAllInterfacesEnabled=1, this property is ignored, and the Sender will listen for RGS connections on all network interfaces.

If Rgsender.Network.IsListenOnAllInterfacesEnabled=0, the Sender will listen on any network interface “n” where Rgsender.Network.Interface.n.IsEnabled=1.

The default values for this property are as follows:

- For n=0, the default is 0— The default changed from 1 to 0 beginning with RGS 5.4.0, do not listen on this network interface (See Networking support on page 15 for details of new behavior in RGS 5.4.0).
- For n>1, the default value is 0—do not listen on these network interfaces

Rgsender.Network.AllowIpAddressSubnet=string (all IP addresses)

This property is used to specify the range of IP addresses that the Sender will listen on for an RGS connection request from the Receiver. A network interface must be enabled, and its IP address must be in the range specified by this property, in order for the Sender to listen on the network interface. The format for this property is:

xx.xx.xx.xx/yy — IP address and netmask in CIDR notation

If Rgsender.Network.IsListenOnAllInterfacesEnabled=1, this property is ignored, and the Sender will listen for RGS connections on all network interfaces.

If Rgsender.Network.IsListenOnAllInterfacesEnabled=0, the Sender will listen on any network interface “n” where Rgsender.Network.Interface.n.IsEnabled=1, and the Receiver IP address is in the range specified by this property.

Rgsender.Network.Port=int (42966)

This property controls the port used for communications with the RGS Sender. If this property is not specified, the Sender will listen on port 42966, which is the default port used by the Receiver in establishing a connection to the Sender. If this property is used to modify the Sender port number, the user will need to specify the same port number on the Receiver to establish a connection with the Sender, as described in Using RGS in Normal Mode on page 86.

8.6.7 Sender clipboard property

Rgsender.Clipboard.IsEnabled=bool （1）

If set to 1, Remote Clipboard is enabled—specifically, the copy and cut functionality in the Remote Display Window is enabled. If set to 0, the copy and cut functionality is disabled. The default value is 1 —Remote Clipboard is enabled.

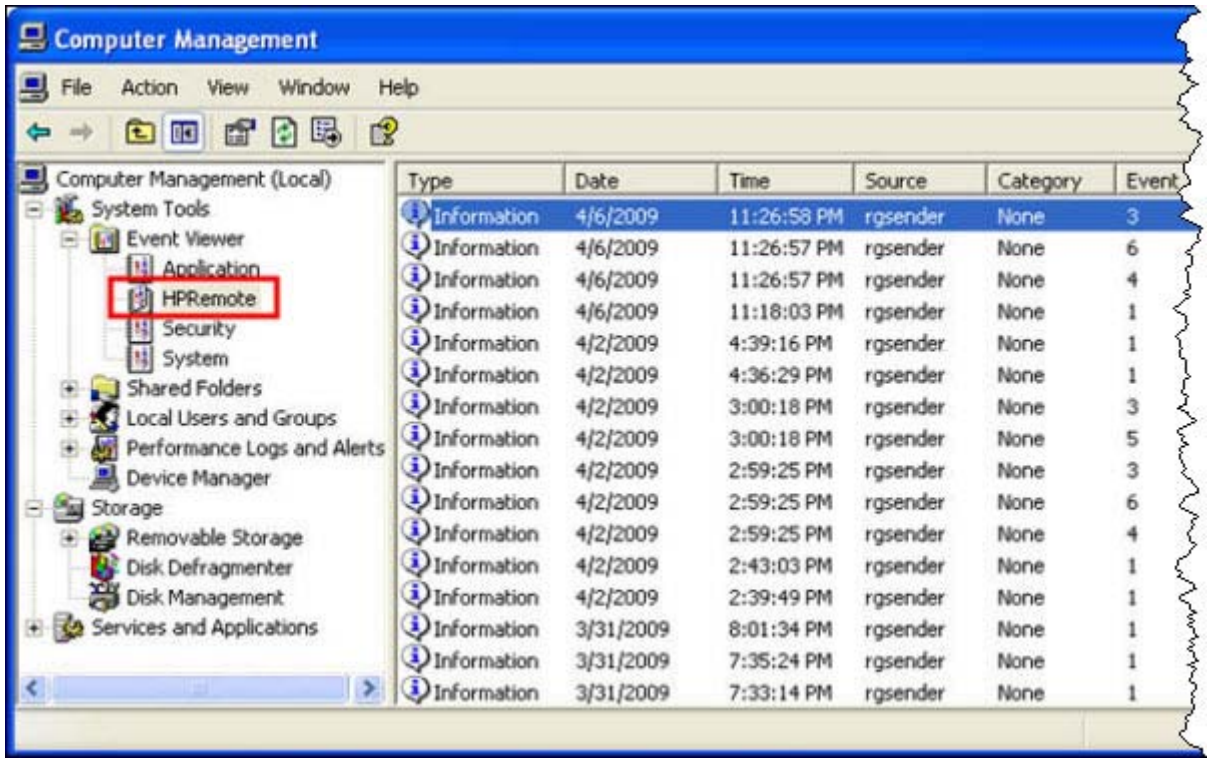
9 Sender event logging on Windows

The RGS Sender on Windows supports event logging. Event logging provides information useful for troubleshooting connection problems, and can also be used to automatically terminate applications on the Sender in case the connection is lost between the Sender and the Receiver. This chapter describes the Sender event logging capabilities while the next chapter describes how to use event logging to terminate applications on the Sender.

9.1 The HPRemote log

The Sender event log is called the HPRemote log, and can be viewed using the Windows Event Viewer (see Figure 9-1 The HPRemote log on page 181)

Figure 9-1 The HPRemote log



To view the HPRemote log, bring up the above dialog by selecting:

Control Panel > Administrative Tools > Computer Management

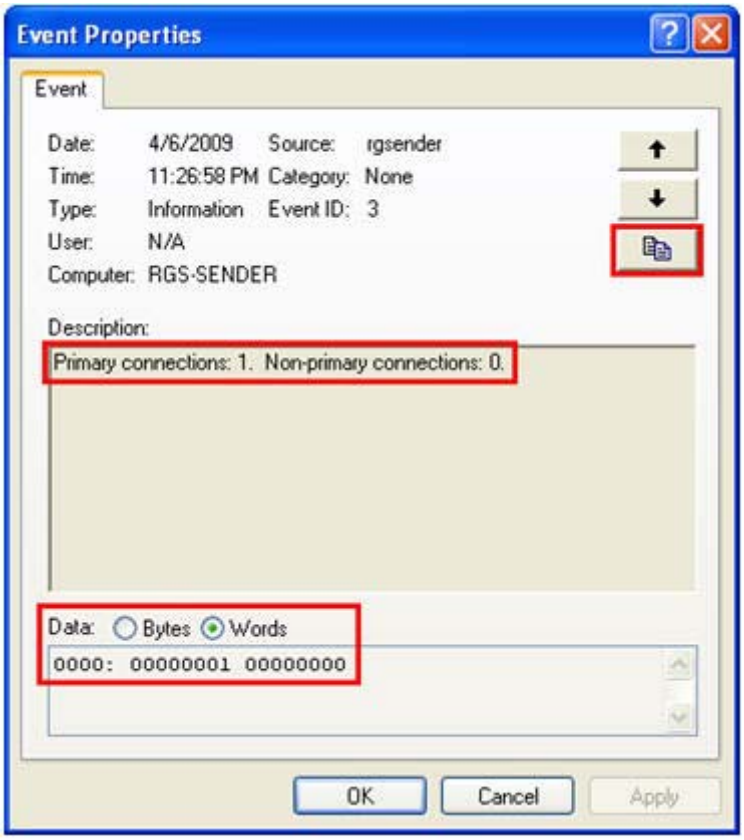
Then, in the left pane, select System Tools followed by Event Viewer—the HPRemote Event Viewer is highlighted. The HPRemote log reflects recent RGS connection activity. The log entries are in "Last In, First Out" (LIFO) order. By default, the most recent events are listed first.

NOTE: RGS event logging is supported only on the RGS Sender on Windows. It is not supported on the RGS Receiver.

NOTE: The HPRemote log allows you to implement a capability called Remote Application Termination. Remote Application Termination enables applications on the Sender (Remote) Computer to be automatically terminated if the RGS connection to the Receiver is lost. See Remote Application Termination on page 186 for details.

To view the properties of a particular event, double-click on the event of interest—this brings up the Event Properties window. Figure 9-2 Event Properties window on page 182 shows the Event Properties window for the highlighted event in Figure 9-1 The HPRemote log on page 181. As you can see, the Sender event that has been logged is the Sender connection state.

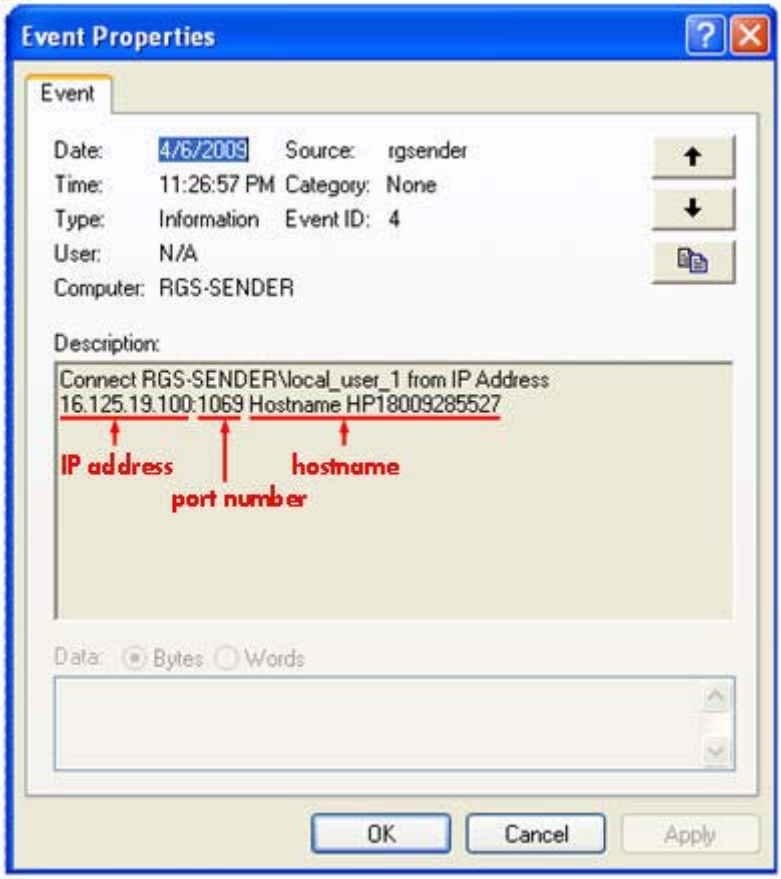
Figure 9-2 Event Properties window



The highlighted radio buttons allow viewing of the connection data (in this case, the number of primary and non-primary connections) in byte and word formats. The Section HPRemote log format on page 186 provides more details on the supported data formats. To copy the details of an event to the Clipboard, click the highlighted button in Figure 9-2 Event Properties window on page 182. By doing a paste into, for example, Notepad, you can view a text listing of the event details.

Whenever the Local Computer (Receiver) either establishes a connection to the Sender or disconnects from the Sender, the IP address and port number of the Local Computer are logged in the HPRemote log. At RGS 5.2.5, logging of the hostname was added to the HPRemote log. In Figure 9-3 Reporting of the Local Computer IP address, port number and hostname when a connection is made to the Sender on page 183, a connection has been established to the Sender from a Local Computer with IP address 16.125.19.100, port number 1069, and hostname HP18009285527.

Figure 9-3 Reporting of the Local Computer IP address, port number and hostname when a connection is made to the Sender



9.2 Usages of the HPRemote log

The HPRemote log has several important usages:

- **Troubleshooting**—The HPRemote log can be used to aid troubleshooting of connection issues between the RGS Sender and Receiver. If you're unable to view the HPRemote log because of RGS connection difficulties, Microsoft Remote Desktop can be used to connect to the Remote Computer to view the HPRemote log.
- **Automatic Remote Application Termination**—Network outages or loss of connectivity between a Remote and Local Computer can leave a remote desktop session running without supervision. To prevent applications from running unattended, a customer-designed agent can use the HPRemote log to monitor the status of connections to determine if application termination is required. If so, the agent would be designed to take the appropriate action to terminate the application.

  The Chapter Remote Application Termination on page 186 , describes how to create an agent that uses the HPRemote log to automatically monitor the connection between the Remote and Local Computers—and then take whatever action you require. Sample code is provided to facilitate creation of the agent.
- **Other automated actions**—The basic principle behind using the HPRemote log to perform automatic Remote Application Termination can be used to create an agent to automatically monitor and process any of the events logged by the RGS Sender. The Section, HPRemote log format on page 186 , lists the events logged by the RGS Sender, and describes their format. Using the sample code provided, you can create an agent to automatically monitor and process any Sender events.

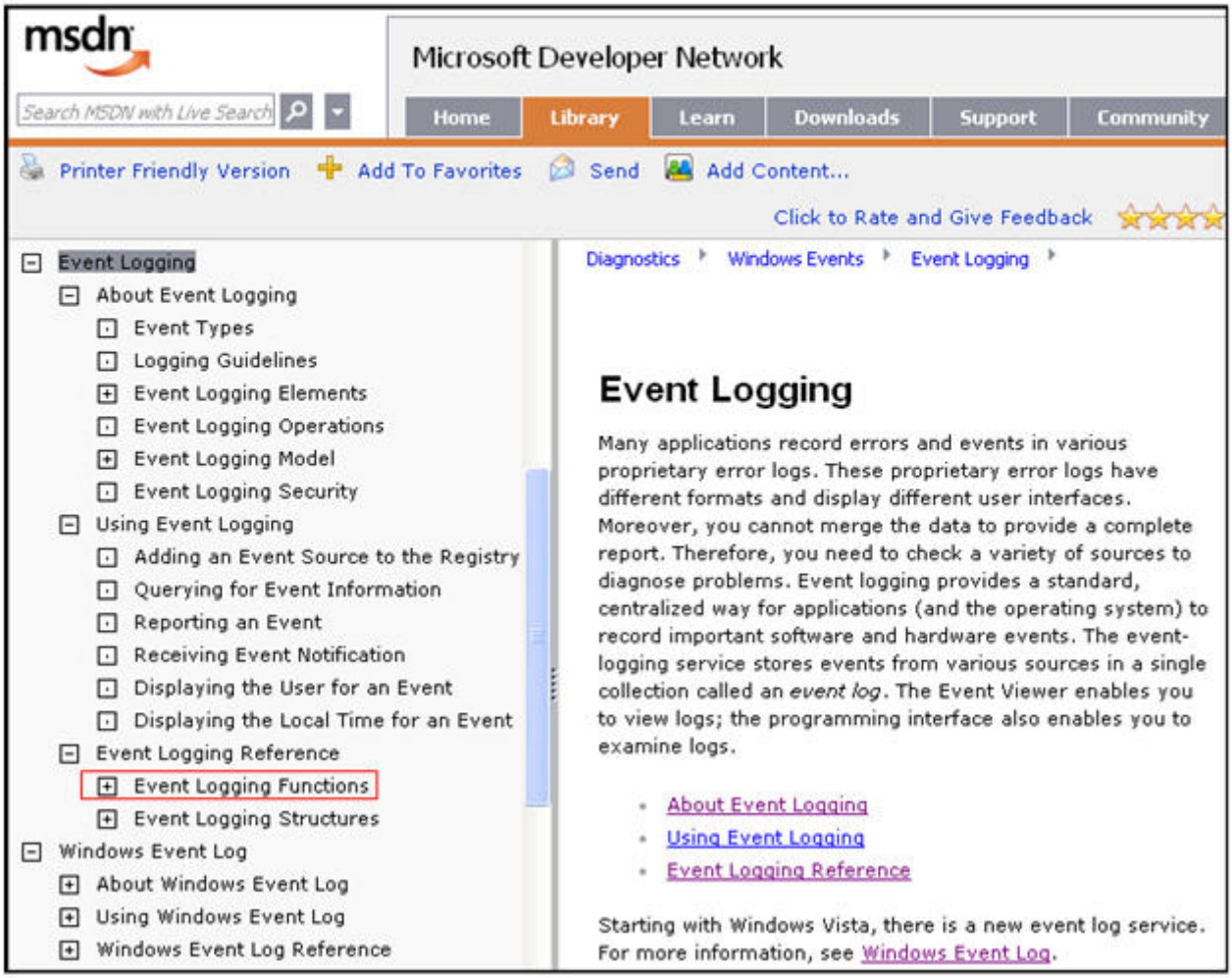
9.3 Additional information on event logging

For additional information on Windows event logging, search Microsoft Developer Network (MSDN) as shown in Figure 9-4 MSDN event logging information on page 185. Clicking on the first search result will typically display the page shown.

Figure 9-4 MSDN event logging information

Search criteria: site:msdn.microsoft.com "event logging"

Page typically displayed by the first search result:



10 Remote Application Termination

This chapter describes how to create a Windows agent on the Sender that provides Remote Application Termination. “Remote application” refers to user applications that are running on the Remote Computer (Sender). The sample agent described in this chapter is designed to terminate applications on the Sender when an RGS disconnect occurs.

10.1 RGS connection and user status

As described in Establishing an RGS connection using Standard Login on page 19, an RGS connection normally require two authentication steps:

- The first authentication step is from the RGS Receiver to the RGS Sender—this is called authenticating the RGS connection. The dialog for this authentication step is generated and displayed by the RGS Receiver on the Local Computer.
- The second authentication step is when logging into or unlocking the Remote Computer desktop session—this is called logging into the Remote Computer. The login or unlock dialog is generated by the Remote Computer, and is displayed in the Remote Display Window on the Local Computer.

A desktop session can operate independently of the RGS connection. This allows a user to disconnect and reconnect to desktop sessions as part of a normal workflow. However, when an RGS connection is unintentionally disconnected, the user may require remote applications to be terminated to prevent them from operating unsupervised.

The sample agent described in this chapter monitors the number of primary users connected to the Remote Computer. When the number of primary users drops to zero, the agent terminates all applications on the Remote Computer. To determine the number of primary users, the agent reads and interprets the HPRemote log.

10.2 HPRemote log format

Data in the HPRemote log consists of a Message ID followed by optional data in both character string and binary data formats. Binary data provides direct access to data without requiring application parsing. Character strings format the binary data into human-readable messages compatible with the Windows Event Viewer. Table 10-1 RGS Sender events logged in the HPRemote log on page 186 shows the events logged in the HPRemote log. The Message IDs are defined in the header file RGSenderEvents.h, and are 32-bit values. The EventID is from the Code field within the Message ID and, for the HPRemote log, ranges from 1 to 13.

Table 10-1 RGS Sender events logged in the HPRemote log

Message ID	Description

Table 10-1 RGS Sender events logged in the HPRemote log (continued)

RGSENDER_CONNECT_STATE EventID: 3	The connection state consists of zero or more **primary** connections and zero or more **non-primary** connections. Each event entry records the current number of active connections in each category. Events appear when the connection status of these users changes. The first field represents the number of primary connections. The second field represents the number of non-primary connections. Each state field provides a text string and binary, 32-bit unsigned integer for application use. Event Viewer Message: Primary connections:%1. Non-primary connections:%2. Strings: %1 = number of primary connections %2 = number of non-primary connections Data: UINT32 numPrimary UINT32 numNonprimary Event Viewer Example: Primary connections:1 Non-primary connections:0
RGSENDER_CONNECT EventID: 4 **NOTE:** Parameter %2 is new in the RGS 5.1.5 release.	A new connection was established with an associated name. If Easy Login is enabled, the name assignment will be deferred until login and the associated name may be "Anonymous". Event Viewer Message: Connect %1. Strings: %1 = name associated with connection %2 = IP address and port number of Local Computer Data: None Event Viewer Example: Connect MYDOMAIN\myusername.

Table 10-1 RGS Sender events logged in the HPRemote log (continued)

RGSENDER_DISCONNECT EventID 5 **NOTE:** Parameter %2 is new in the RGS 5.1.5 release.	A receiver has disconnected. The message will contain the name associated with the connection. If Easy Login is enabled and the Receiver disconnects prior to a login, the associated name may be "Anonymous". Event Viewer Message: Disconnect %1. Strings: %1 = name associated with connection %2 = IP address and port number of Local Computer Data: None Event Viewer Example: Disconnect MYDOMAIN\myusername.
RGSENDER_STARTUP EventID: 1	Reference event registered to aid in interpretation of the event log by Event Viewer. Signifies proper startup of the RGS Sender service. Event Viewer Message: RGS Sender startup. Strings: None Data: None
RGSENDER_SHUTDOWN EventID: 2	Reference event registered to aid in interpretation of the event log by Event Viewer. Signifies proper shutdown of the RGS Sender service. Event Viewer Message: RGS Sender shutdown. Strings: None Data: None

Table 10-1 RGS Sender events logged in the HPRemote log (continued)

RGSENDER_SET_PRIMARY EventID: 6	A connection with an associated name is set as the primary connection. Event Viewer Message: Set %1 as primary connection. Strings: %1 = name associated with connection Data: None Event Viewer Example: Set MYDOMAIN\myusername as primary connection.
RGSENDER_SET_NONPRIMARY EventID: 7	A connection with an associated name is assigned to a non-primary status. This may happen as a result of a logout. Event Viewer Message: Set %1 as non-primary connection. Strings: %1 = name associated with connection Data: None Event Viewer Example: Set MYDOMAIN\myusername as non-primary connection.
RGSENDER_ASSIGN_USER EventID: 8	If Easy Login is enabled, the assignment of the name will be deferred until login. When the name is assigned, this message will be generated. Event Viewer Message: Assign %1 connection to %2. Strings: %1 = original name of connection %2 = new name of connection Data: None Event Viewer Example: Assign Anonymous connection to MYDOMAIN\myusername.

Table 10-1 RGS Sender events logged in the HPRemote log (continued)

RGSENDER_USB_CONNECT_DEVICE EventID: 9	A new USB device was connected to the Sender via remote USB. Event Viewer Message: USB Device Connect:Class=%1, Vendor ID=%2, Product ID= %3, Manufacturer=%4, Product=%5 Strings: %1 = USB device class %2 = USB device vendor ID %3 = USB device product ID %4 = USB device manufacturer string %5 = USB device product string Data: None
RGSENDER_USB_DISCONNECT_DEVICE EventID: 10	A new USB device was disconnected to the Sender via remote USB. Event Viewer Message: USB Device Connect:Class=%1, Vendor ID=%2, Product ID= %3, Manufacturer=%4, Product=%5 Strings: %1 = USB device class %2 = USB device vendor ID %3 = USB device product ID %4 = USB device manufacturer string %5 = USB device product string Data: None
RGSENDER_CONNECT_USB_DENIED EventID: 13	A USB device connection was denied by the USB access control list. Event Viewer Message: USB Device Connect:Class=%1, Vendor ID=%2, Product ID=%3, Strings: %1 = USB device class %2 = USB device vendor ID %3 = USB device product ID Data: None

10.3 Agent design issues

Designing an agent to provide Remote Application Termination requires consideration of a number of issues in order to minimize data loss and determine when a last-resort shutdown of a disconnected desktop session is required. Listed below are several topics to consider when designing application control agents for your environment. The topics are not exhaustive—use them as a starting point for a more complete design that meets your business requirements.

10.3.1 Desktop session logout

- **Situation**—In some circumstances, loss of a primary user connection should trigger a full shutdown of all applications and force a logout of the desktop session (perhaps after a specified time limit for reconnection has expired). This action would drop all connections to the remote session.
- **Benefit**—Implementing a full desktop session shutdown/logout ensures that all connection activity ceases immediately and ensure that applications are prevented from further unattended actions. Shutdown of a remote session frees the workstation for connection by other users. This approach is the most absolute and secure solution for desktop session management. Agent relies upon Windows logout routines to terminate environment—simple in design and result.
- **Issue**—Forcing a desktop session shutdown/logout can result in data loss for any open applications on the desktop session. Forcing session logouts can result in application alert prompts requiring user interaction to save altered data. These prompts can delay or halt an interactive logout. Session termination also destroys memory of window placement on the desktop, and requires user intervention at restart.

10.3.2 Selective environment shutdown

- **Situation**—Partial shutdown of an environment only terminates specific applications of interest. It does not implement a full desktop session logout. It selectively protects only the most critical applications requiring oversight and control.
- **Benefit**—Preserves the active desktop session for connection at a later time. Selectively terminates the applications of interest. Preserves data not governed by an automated shutdown policy. Supports session recovery with an arbitrary connection time. If done in layers (giving some applications more time to live than others), then a gradual "soft landing" shutdown can occur that ultimately results in a full logout. Idle resources over a specific amount of time can be returned to a remote server pool.
- **Issue**—Potentially more complicated to implement. Can require coordination of multiple agents to handle layered shutdown. May still result in data loss for specific applications. May also require a master semaphore to halt/terminate multiple agents if the user reconnects and wants to stop the shutdown process.

10.3.3 Wrapping applications of interest

- **Situation**—Agents can be launched that supervise only specific applications in a given environment. Tying agents to specific applications is a selective safety net for every user.
- **Benefit**—Application-specific agents can be implemented as plug-ins or support utilities for a given application. In the future, certain software providers may provide custom interfaces for safe shutdown messages from an agent or the operating system. Custom agents can be independently maintained and tied to specific application releases for greater support flexibility. Independent agent design supports unit testing and decouples environmental dependencies.
- **Issue**—Users need specific recourse to disarm an agent if they reconnect. Applications may not interact well with a dedicated agent (and only shutdown due to a global shutdown request). Dedicated agents could possibly be compromised.

10.3.4 Administrator alerts

- **Situation**—Instead of shutting down an environment, an agent can be designed to alert an administrator or operator to determine the status of the user before taking action. This watchdog approach can further be defined to exploit redundant network connection support to a remote system to allow user-directed shutdowns to occur.
- **Benefit**—System agents are not required to take destructive action—they serve only as alarms and monitors for alternative human intervention.
- **Issue**—May require redundant networking channel. Requires administrator or operator availability to support.

10.3.5 Anticipating user disconnects and reconnects

- **Situation**—Users must first be warned about the consequences of disconnection. Agents that provide protection for a disconnected session may become a nuisance for unsuspecting users if they fail to address protective measures in place for their safety. For example, users must know how much time they have to reconnect before safeguards take action. If a remote agent arms itself for application termination, users should be presented with a large, unmistakable disarming "opt-out" panel that, upon login and discovery, they can halt any agent actions before termination. Organizations should carefully discuss and publicize safety measures due to potential data loss.
- **Issue**— Users should not be able to disable or specify their own timeouts due to potential irreversible data loss.

10.3.6 General agent design guidelines

In developing an agent, HP recommends following these guidelines:

- The agent should externally log its decisions and actions for postmortem analysis.
- Independent agents should provide their own opt-out, disarming dialogs with countdown feedback before taking action.

- Expect the unexpected—where possible, limit your actions to those areas you are certain of the outcomes to minimize loss of data and productivity.
- Always inspect error codes when reading event logs—the reliability of this RGS communication method depends upon the Windows Event Log system. While we have yet to see a failure in this path, we recommend using all information available to its fullest potential.

10.4 Sample Agent

The sample Windows agent presented below monitors the HPRemote event log and interprets its events. Comments are included in the agent code showing where additional code would be added to determine if the number of primary users has dropped to zero. If so, further code can be added to terminate applications on the Sender. A number of design issues for the Windows agent are described in the previous section.

The sample code is a fixed-polling Windows agent that reads and interprets the HPRemote event log. The agent uses two functions:

1. processEvent(eventServer, eventSource, dwEventNum)
    - open event log, read event dwEventNum, close event logTo
    - if a valid read, process recognized EventIDs, then return
2. monitorEvents(eventServer, eventSource, seconds)
    - for a finite number of seconds (or infinite if seconds <= 0) do
    - open event log, read log length, close event log
    - if log has changed, processEvent(), else sleep for X ms.

To properly use the function monitorEvents(...), the following strings must be defined in the function call:

- LPCTSTR eventServer: if string is defined as "\\\\yourservername", then the log is stored on a remote server - if the string is empty (NULL), then the log is stored locally (note that four backlashes compiles to two in a string constant).
- LPCTSTR eventSource: the name of the target event generator, e.g., rgreceiver

The sample agent use Microsoft event logging functions such as OpenEventLog, ReadEventLog, and CloseEventLog. For information on these functions, refer to the Event Logging Functions link highlighted in the figure used in Additional information on event logging on page 185 .

The sample agent is listed below. Where noted, user-specific code should be added. The agent header file, RGSenderEvents.h, is installed with the RGS Sender and is located at:

C:\Program Files\Hewlett-Packard\Remote Graphics Sender\include\RGSenderEvents.h

---

```
#include <windows.h>

#include <stdio.h>

#include "RGSenderEvents.h"

#define BUFFER_SIZE 1024 // safe EVENTLOGRECORD size for now

#define EVENT_SERVER NULL // remote server = "\\\\nodename"; local = NULL

#define EVENT_SRC "rgsender" // specifies specific event name source in // HPRemote

BOOL processEvent(LPCTSTR eventServer, LPCTSTR eventSource, DWORD dwEventNum)
```

```
{
HANDLE h;
EVENTLOGRECORD *pevlr;
BYTE bBuffer[BUFFER_SIZE];
DWORD dwRead, dwNeeded;
BOOL result;
// Open, read, close event log ============================================

if ((h = OpenEventLog(eventServer, eventSource)) == NULL)
{
... report error status ...
return true;
}
// Set the pointer to our buffer. Strings and data will get appended to the EVENTLOGRECORD structure.
pevlr = (EVENTLOGRECORD *) &bBuffer

// Read the event specified by dwEventNum

result = ReadEventLog(h, // event log handle
EVENTLOG_SEEK_READ | // start at specific event
EVENTLOG_FORWARDS_READ, // advance forward
dwEventNum, // record to read
pevlr, // pointer to buffer
BUFFER_SIZE, // size of buffer
&dwRead, // number of bytes read
&dwNeeded); // bytes in next record
if (CloseEventLog(h) == false)
{
... report error status ...
return true;
}
// Process event (example: print out event) ==============================
if (result)
{
// We only know how to process specific events
```

```
if (pevlr->EventID == RGSENDER_CONNECT_STATE)
{
// Retrieve the two UINT32 fields of this message
// representing primary and non-primary connections.
unsigned int *pData = (unsigned int *)
((LPBYTE) pevlr + pevlr->DataOffset);
// Examine state of primary connections here for other
// agent response if number drops to zero...
... example only prints out retrieved record to console ...
printf ("Event: %u Primary: %u Secondary: %u\n",
dwEventNum, pData[0], pData[1]);
}
... Process other events here if desired ...
}
else
{
... report unrecognized event here ...
return true;
}
return false;
}
void monitorEvents(LPCTSTR eventServer, LPCTSTR eventSource, int seconds)
{
DWORD dwCurrentIndex = 0;
DWORD dwCurrentStart;
DWORD dwCurrentCount;
DWORD dwNewIndex;
int waitedFor;
// This function will monitor the log for the specified number of
// seconds. If seconds is less than zero, we will wait forever.
for (waitedFor = 0; seconds < 0 || waitedFor < seconds; )
{
HANDLE h;
```

```
// Open, read status of log, close event log ==========================
if ((h = OpenEventLog(eventServer, eventSource)) == NULL)
{
... report error status here ...
return;
}
// If an event is added, either the start or count will change.
// Get the start and count. Microsoft does not specify what
// reasons these functions could fail, so we cannot ensure
// success. Check the return value.
if (GetOldestEventLogRecord(h, &dwCurrentStart) == false ||
GetNumberOfEventLogRecords(h, &dwCurrentCount) == false)
{
CloseEventLog(h);
... report error - unable to obtain event logs ...
return;
}
if (CloseEventLog(h) == false)
{
... report error status here ...
return;
}
// Determine state of log change ======================================
// Compute the index of the last event. If the count is zero, then
// there are no events and the index is 0.
if (dwCurrentCount == 0)
{
dwNewIndex = 0;
}
else
{
dwNewIndex = dwCurrentStart + dwCurrentCount - 1;
}
```

```
// If the new index is different than the current, update the current
// and process the current event. Otherwise, we sleep for a while.
if (dwNewIndex != dwCurrentIndex)
{
// We have at least one new event. Print out the last event.
dwCurrentIndex = dwNewIndex;
if (dwNewIndex)
{
if (processEvent(eventServer, eventSource, dwCurrentIndex))
{
... event processing error here ...
return;
}
}
}
else
{
// No new events. Sleep for 1 second.
Sleep(1000);
waitedFor += 1;
}
}
return;
}
main( ... )
{
... setup and initialize agent ...
monitorEvents(EVENT_SERVER, EVENT_SRC, seconds);
... cleanup agent here or send alerts ...
... may wish to return status from monitorEvents ...
}
```

10.5 Additional features for Windows systems

The following optional procedures for the RGS Sender service can improve the reliability of your remote agent solution.

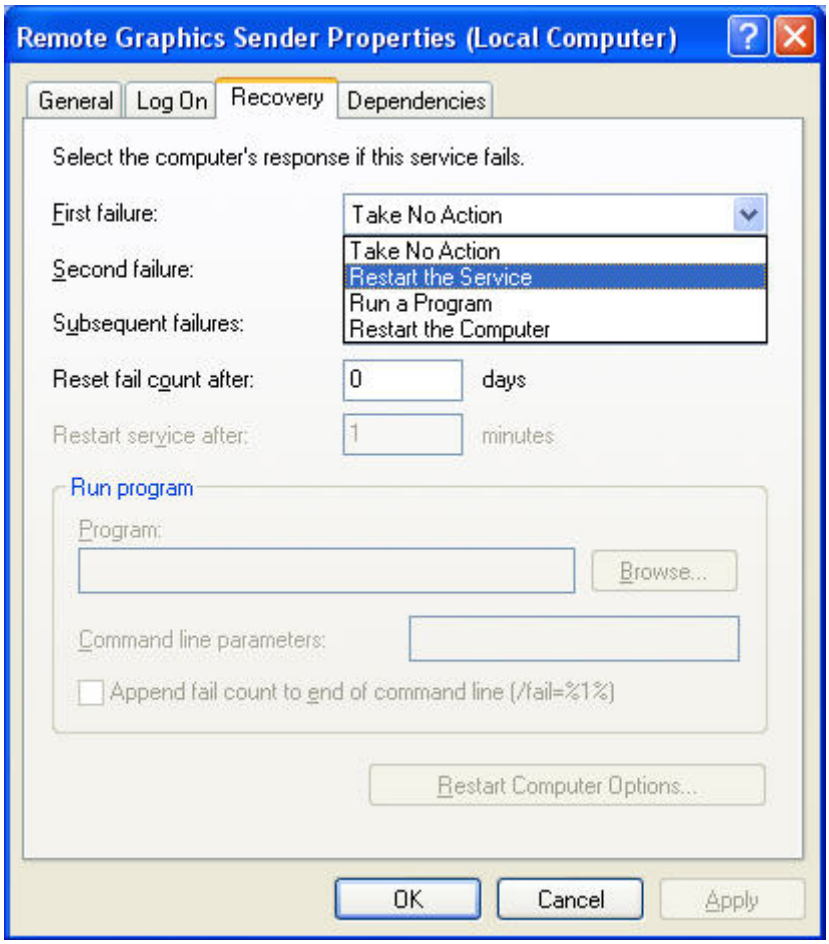
10.5.1 RGS Sender Service Recovery Settings

This section discusses restart options for the RGS Sender and possible interactions of the agent with the Sender.

- By default, most Windows services are installed without any automatic restart/recovery settings. This means that, when a service terminates, Windows will, by default, not restart the service unless explicitly set. When RGS Sender software is first installed, it is installed with the Windows default (do not restart).
- Restarting the RGS Sender service can support RGS reconnection with a RGS Receiver client (unless a system error prevents the RGS service from restarting).
- In designing the agent, you should consider whether or not to check for the existence of a running RGS Sender service as an indication of a sufficient primary user connection. If service restarts are programmed for your environment, this test may be unnecessary.
- To set the RGS Sender service for automatic restart, you must adjust its **Recovery Property** through the **Administrative Tools** and **Services** control panel options.
- Actions to take for the first failure, second failure, and subsequent failures are available in the properties menu (see Figure 10-1 Remote Computer Sender recovery options on page 200). The Recovery options include:
  - Take No Action
  - Restart the Service

- Run a Program
- Restart the Computer

Figure 10-1 Remote Computer Sender recovery options



10.5.2 Microsoft Remote Desktop Recovery

If the RGS Sender becomes unavailable and the Receiver can no longer connect to the Sender, a Windows system with Remote Desktop services enabled can access the Remote Computer to diagnose the issue.

11 Optimizing RGS performance

This chapter provides suggestions on optimizing RGS performance, including optimizing the Remote Computer display settings and the network configuration.

11.1 Performance tuning for all platforms

The following suggestions apply to all platforms:

- Set the network to full-duplex mode—To obtain the best performance, the network between the RGS Sender and RGS Receiver should operate in full-duplex mode.
- Disable transition effects—Don't use color or animated cursors on the Remote Computer. Although RGS displays color and animated cursors very well, this typically requires more network bandwidth and CPU resources.
- Set the Remote Computer desktop background to a solid color to minimize the amount of image data that needs to be sent. On Windows, perform the following:
  - Select the Control Panel
  - Bring up the Display Properties window
  - Select the Desktop tab, and set the background to None. Alternatively, select the Themes tab, and select Windows Classic in the Theme box.
- Set the Sender and Receiver to 32 bits per pixel—On Windows, perform the following:
  - Select the Control Panel
  - Bring up the Display Properties window
  - Select the Settings tab, and set the Color Quality to **Highest (32 bit)**
- Lower the Sender display resolution—RGS is an image-based remote visualization technology. Therefore, lowering the display resolution can significantly improve performance.

11.2 Performance tuning for Windows

This section provides performance tuning tips for RGS on Windows.

1. Lock desktop icons on the Remote Computer by performing the following steps:
   - Select the Control Panel
   - Bring up the Display Properties window

- Select the Desktop tab and select Customize Desktop.
- On the Web tab, check **Lock desktop items**.

2. Sender process priority—Occasionally, an activity such as rotating a model in a 3D design program may appear slow and erratic, and image update may appear inconsistent. If the Sender is running on Windows, OS scheduling may be an issue. This can often be resolved by increasing the process priority of the Sender. See the Setting the Windows Sender process priority on page 59 for further details.
3. Java Applications—Some recent versions of the Java Runtime Environment and version 1.3 used DirectX. To see screen updates on Windows XP Professional with these versions of Java, Automatic 3D Updates must be enabled (see Using the rgadmin tool on page 60). Rendering through DirectX will often cause the entire DirectX window to be registered as a screen modification. This can result in higher bandwidth and slightly higher CPU utilization by the Remote Graphics Sender. In some cases, performance may be improved by using GDI rather than DirectX with Java.

   - To use GDI with Java, the "-Dsun.java2d.noddraw=true" option needs to be supplied to the java or javaw executable. For example:

     java -Dsun.java2d.noddraw=true SomeApp

   - This can be done by passing this option on the command line or adding this option to the _JAVA_OPTIONS environment variable. For example:

     set _JAVA_OPTIONS=-Dsun.java2d.noddraw=true

     java SomeApp

11.3 Troubleshooting graphics performance

The dominant factor impacting performance on the Sender is the frame buffer read performance of the graphics adapter. Frame buffer read performance of at least ten frames per second is recommended for optimum RGS performance.

RGS uses the Remote Computer graphics adapter to accelerate rendering of the image. After the image on the Remote Computer is modified, the RGS Sender reads the rendered image from the frame buffer, compresses it, and transmits it to the Receiver.

On Windows, use BltTest to test the frame buffer read performance of the Remote Computer. This tool is available at: http://www.stereopsis.com/blttest/

11.4 Configuring your network for optimal performance

RGS depends on low network latency and reasonably high network bandwidth. There are several methods to test and measure the network bandwidth, latency, and the number of hops between Sender and Receiver computers:

- Use the ping command to measure network latency. From a command prompt on Windows or a terminal window on Linux, execute ping hostname. This will report the network latency. Be sure the ping protocol (ICMP) is not blocked by a firewall. Windows may be set up with IPSec filters—be sure there is no IPSec filter policy disabling ICMP traffic.
- Use Traceroute (Linux) or tracert (Windows) to measure the network latency between two computers. Traceroute will report the number of hops it takes to reach a computer in addition to the network latency.
- Use ttcp to measure the network bandwidth. ttcp is available at:

  http://www.pcausa.com/Utilities/pcattcp.htm

Once you've characterized your network performance, you can decide if improvement is required. Several possible steps are described below.

The computer network interface will auto-negotiate the network speed with the network switches on the local network. The negotiated speed can vary from 10 Mb/sec half duplex to 10 Gb/sec full duplex. Most modern network interfaces and switches will negotiate the highest possible speed available. However, unless the network has been carefully designed for maximum throughput, the network interfaces and switches may auto-negotiate to a sub-optimal speed.

If the network interface and switches are configured to auto-negotiate properly, you can leave the settings to auto-negotiate. If you want to force the network to operate at a particular speed, the settings in the network interface and switches can be hardcoded. You must be careful with these settings, however. If the network interface and switch settings don't complement each other, the network will have poor performance.

- **Configuring the network interface on Windows**—You can change the link speed and duplex mode on Windows by opening the Device Manager. Click **Control Panel>System>Hardware Tab>Device Manager**. Once the Device Manager is open, click the **+** next to Network adapters. Then, right-click on the network adapter that you want to change, and select Properties. Click the Advanced tab. Each network adapter has its own properties/settings that can be changed. The property that affects the link speed and duplex is usually named "Link Speed & Duplex". Click that property. If you want auto-negotiation, select the Auto Detect entry in the Value box. If you want to hard-code the speed and duplex, always choose the fastest link your network can support, and always choose full duplex.
- **Configuring the Network Interface on Linux**—On Linux systems, the ethtool tool can be used to configure networking. Perform the following steps to obtain and set the network characteristics on Linux. To obtain the LAN characteristics for interface 0, as root, type:

  ```
  $ /usr/local/sbin/ethtool eth0
  ```

  To set the LAN characteristics for a 100 Mb/sec connection running full-duplex mode, as root, type:

  ```
  $ /usr/local/sbin/ethtool -s eth0 speed 100 duplex full autoneg off
  ```

If you are not satisfied with your network performance, look at the log files on your network switch (if the Local Computer is connected to one). A significant number of errors on the switch port may indicate that the computer or network is not configured correctly. Work with your IT organization to optimize your computer and network configuration.

12 Troubleshooting RGS

This chapter provides suggestions on troubleshooting potential issues with RGS. Refer also to RGS error messages on page 206 which lists the RGS error messages and their potential causes.

12.1 Potential RGS issues and troubleshooting suggestions

Table 12-1 Potential RGS issues and troubleshooting suggestions on page 205 lists several potential RGS issues, and provides a number of troubleshooting suggestions.

Table 12-1 Potential RGS issues and troubleshooting suggestions

Issue	Suggestion
Can't connect to the RGS Sender	Verify that the pre-connection checklist is satisfied as described in Pre-connection checklist on page 77.
A connection is established but it appears to time out.	See the section Adjusting Network timeout settings on page 127.
Graphics performance appears slow	See Optimizing RGS performance on page 201.
Remote audio doesn't work	• If using a Linux Receiver, verify that audio has been installed correctly as described in Linux Receiver Audio Requirements on page 72. • See the troubleshooting suggestions in Potential audio issues on page 114.
Remote USB doesn't work	• Verify that USB has been correctly configured during Receiver installation on Windows as described in Installing the Receiver on Windows on page 45. • See the troubleshooting suggestions in Troubleshooting remote USB on page 123

13 RGS error messages

This chapter lists the error messages reported by the RGS Receiver, and describes potential reasons for the error messages.

13.1 Receiver error messages

Error	Description
Connection lost!	The RGS Sender has closed the connection. Possible reasons include: • The Sender may have explicitly disconnected your connection. For example a user may have selected disconnect all connections from the Sender icon or Sender GUI or the user may have logged off. • Another user has connected to the Sender using the same username and password. • If you connected to a desktop that was not logged in and another user logged in your connection will be disconnected. • If you were connected to a logged in desktop and the logged in user disconnects your connection will be disconnected too. • The network may have been disconnected, closed, or temporarily disrupted. • The Sender service/daemon may have been stopped, re-started, or killed. • The Sender system may have been stopped/shutdown, or re-started. • If connecting to a Linux computer, the X Server may have been stopped or re-started. • The Sender or X Server may have experienced a failure.
Unable to connect to Sender!	If this error is reported, see Pre-connection checklist on page 77 for a list of possible causes.
Authentication failed!	The RGS Sender has refused to allow a connection. Possible reasons include the following: • The authentication credentials that you entered, such as domain name, user name and password, are not valid or recognized by the Sender system. • The Sender's authentication is not configured appropriately. Please consult the User's manual and README.txt for the latest directions and issues with respect to configuring authentication.

Directory not found or not accessible!	The directory file is not available. Possible reasons include: • The directory file name or location has been mistyped. • The file has been moved or is no longer available. • The network is down or experiencing a disruption. • The user does not have read permission on the file.
User not found in directory!	The username of the current user of the HP Remote Graphics Software Receiver is not found in the directory file. Possible reasons include: • The username entered in the directory file does not exactly match the real username. • The domainName entered in the directory file is incorrect. See Directory file format on page 149 for information about choosing the correct domainName. • The username of the current user is not entered in the directory. If the directory file is on a shared drive with restrictive permissions, consult an IT specialist to add the proper entry.
Authorization failed!	The connection was authenticated, but another user is already logged into the desktop of the Sender system. When a connection is attempted to another user's desktop, a dialog is displayed on the Sender desktop asking the logged in user to allow the connection. A user is not allowed to connect to another user's desktop unless they are explicitly allowed/ authorized. Either the connection was not granted access, or the dialog timed-out and the connection was implicitly denied.
Error: No license found for the Sender you are trying to connect to!	A license was not found for the RGS Sender.
Error: License Expired for the Sender you are trying to connect to!	The license has expired for the RGS Sender.
Error: License Invalid for the Sender you are trying to connect to!	The license is invalid for the RGS Sender.
Setup Mode hotkey sequence too short.	The key sequence specified by the user is too short.
Setup Mode hotkey sequence too long.	The key sequence specified by the user is too long.
Setup Mode hotkey sequence may only consist of Ctrl, Alt, Shift and Space.	The key sequence specified by the user contains invalid keys.
A space may only be entered after Ctrl, Alt or Shift is pressed.	The Setup Mode hotkey sequence cannot start with a space.
Setup Mode hotkey sequence is invalid. The sequence has been reset to the default.	The Setup Mode hotkey sequence specified using a property either on the command-line or in the property configuration file is invalid, and has been reset to the default.
Setup Mode hotkey sequence is invalid. The sequence has been disabled.	The Setup Mode hotkey sequence specified using a property either on the command-line or in the property configuration file is invalid, and the property Rgreceiver.Hotkeys.IsMutable is disabled. Therefore, hotkeys have been disabled.

Connection denied! The iLO remote console is enabled.	The iLO remote console is enabled on the HP Blade Workstation. The Blade must be configured in User Mode before connections are allowed.
Unable to connect to Sender: The Receiver was unable to resolve the specified hostname or IP Address. Verify that you entered the value correctly.	This is usually indicative of a DNS error.
Unable to connect to Sender: The Receiver resolved the specified hostname or IP address, but cannot connect to the Sender. Verify that the system is accessible on your network and that the Remote Graphics Sender service has been started and is listening on a pubic IP address and is not blocked by a firewall.	The Receiver was able to look up and resolve the specified hostname or IP address. However, the Receiver was unable to establish a connection to the Sender. There are several possibilities such as the Sender is not installed, the Sender is not running, the Sender is listening on the wrong network interface, or a firewall is blocking the Sender.

A Appendix A: Using RGS with HP VDI

This appendix describes how to use RGS with the HP Virtual Desktop Infrastructure (VDI) solution. Using RGS with HP VDI assumes you have a comprehensive working knowledge of VMware's virtualization products and running Microsoft products within the VMware virtualization environment. For general information on HP VDI, please visit the website http://www.hp.com/go/vdi. For an overview of using RGS with HP VDI, see Using RGS with desktop virtualization on page 41. For a list of common virtualization terms, please see below:

- Hypervisor—A hypervisor is a computer virtualization software environment that allows multiple operating systems to run on a host computer concurrently.
- VMware ESX—VMware ESX is the hypervisor offered by VMware, Inc
- Virtual desktop—A virtual desktop is the desktop operating system that runs within the VMware ESX environment. The VMware ESX-supported desktop operating systems that support RGS are Windows XP Professional SP2 and Windows XP Professional SP3.
- Virtual machine—A virtual machine (VM) is the combination of VMware ESX and a virtual desktop. The RGS Sender runs on the virtual machine.
- Static HP VDI—Static HP VDI is the one-for-one replacement of a desktop computer by a virtual machine directly connected to a user on a client computer. No connection broker is involved in static HP VDI configurations.
- Dynamic HP VDI—With dynamic HP VDI, users log in through a connection broker, which assigns the user to one of several pooled virtual machines.
- VMware View Manager—VMware View Manager (also known just as VMware View) is a virtual desktop manager (connection broker) that connects authorized client computer users to virtual desktop sessions. In this document, VMware View is the connection broker used to create dynamic HP VDI configurations.
- View Client— The View Client is software that runs on the client computer, and allows the user to connect to the virtual desktop using VMware View. The RGS Receiver also runs on the client computer.
- View Agent—The View Agent runs on each virtual desktop to support establishment of an RGS connection to the client computer.

The table below shows the versions of RGS that are supported on the different versions of VMware ESX. The only desktop operating systems that are supported in concert with RGS on VMware ESX are Windows XP Professional SP2 and SP3, Windows Vista SP1 or greater and Windows 7.

VMware ESX version	RGS version
ESX 3.0.1	RGS 5.1 or newer

ESX 3.0.2	RGS 5.2 and newer. Note that, unlike the other versions of VMware ESX, this version of VMware ESX requires RGS 5.2 or newer.
ESX 3.0.2 Update1	RGS 5.1 or newer
ESX 3.0.3	RGS 5.1 or newer. See **NOTE**.
ESX 3.5	RGS 5.1 or newer
ESX 3.5 Update 1, 2, 3, and 4	RGS 5.1 or newer
ESX 4	RGS 5.1 or newer

NOTE: During installation of Windows XP Professional on these versions of VMware, the USB driver file usbd.sys will not be installed. In order for RGS Remote USB to work, you'll need to install a usbd.sys file that is compatible with your particular version of Windows XP Professional, either Windows XP Professional SP2 or Windows XP Professional SP3. The required usbd.sys file can be found on your Windows XP Professional installation media, and should be installed in the \windows \system32\drivers folder.

The table below shows the VMware View versions that support RGS. Only VMware View 3.1 (and newer versions) support RGS, and only with RGS 5.2.5 (and newer versions).

	RGS 5.2.4 and older	**RGS 5.2.5 and newer**
VMware View 3.0 and older	VMware View 3.0 (and older versions) do not support any versions of RGS	
VMware View 3.1 and newer	RGS 5.2.4 (and older versions) are not supported by VMware View 3.1 (and newer versions)	VMware View 3.1 (and newer versions) support RGS 5.2.5 (and newer versions) on Windows XP Professional SP2 and SP3
VMware View 4.0 (when available)		RGS 5.2.5 or newer on Windows XP Professional SP2 and SP3

A.1 VMware ESX networking considerations

Networking configuration in general can have a significant impact on RGS performance. In virtual environments, this is extended to the ESX network stack. The ESX network stack, if improperly configured, can significantly impact the quality of audio and video streaming from VDI sessions. The best practice for ESX network configuration is to configure one or more physical network interfaces for RGS traffic. These network interfaces should not be used for service console, NFS, iSCSI, or VMotion. General VM network traffic such as Internet access may use the same network interface as RGS if network topology requires it.

A.2 Using RGS with static HP VDI

Static HP VDI is a one-for-one replacement of a desktop computer by a virtual machine directly connected to a user on a client computer. To install RGS in a static HP VDI environment, perform the following three steps—these steps are expanded on subsequently.

1. Create a new virtual machine complete with Windows XP Professional and applications.
2. Modify the ESX configuration file for the virtual machine to support RGS.
3. Install and configure the RGS Sender on the virtual machine.

These steps are described in the next three sections.

A.2.1 Create a new virtual machine

Create a new virtual machine by performing the following steps:

1. Create a new virtual machine for Windows XP Professional using standard VMware procedures.

   NOTE: For best RGS performance, HP recommends 2 vCPUs.

2. Install any desired Windows XP Professional OS patches.
3. Install all required user applications.
4. Shut down the virtual machine.

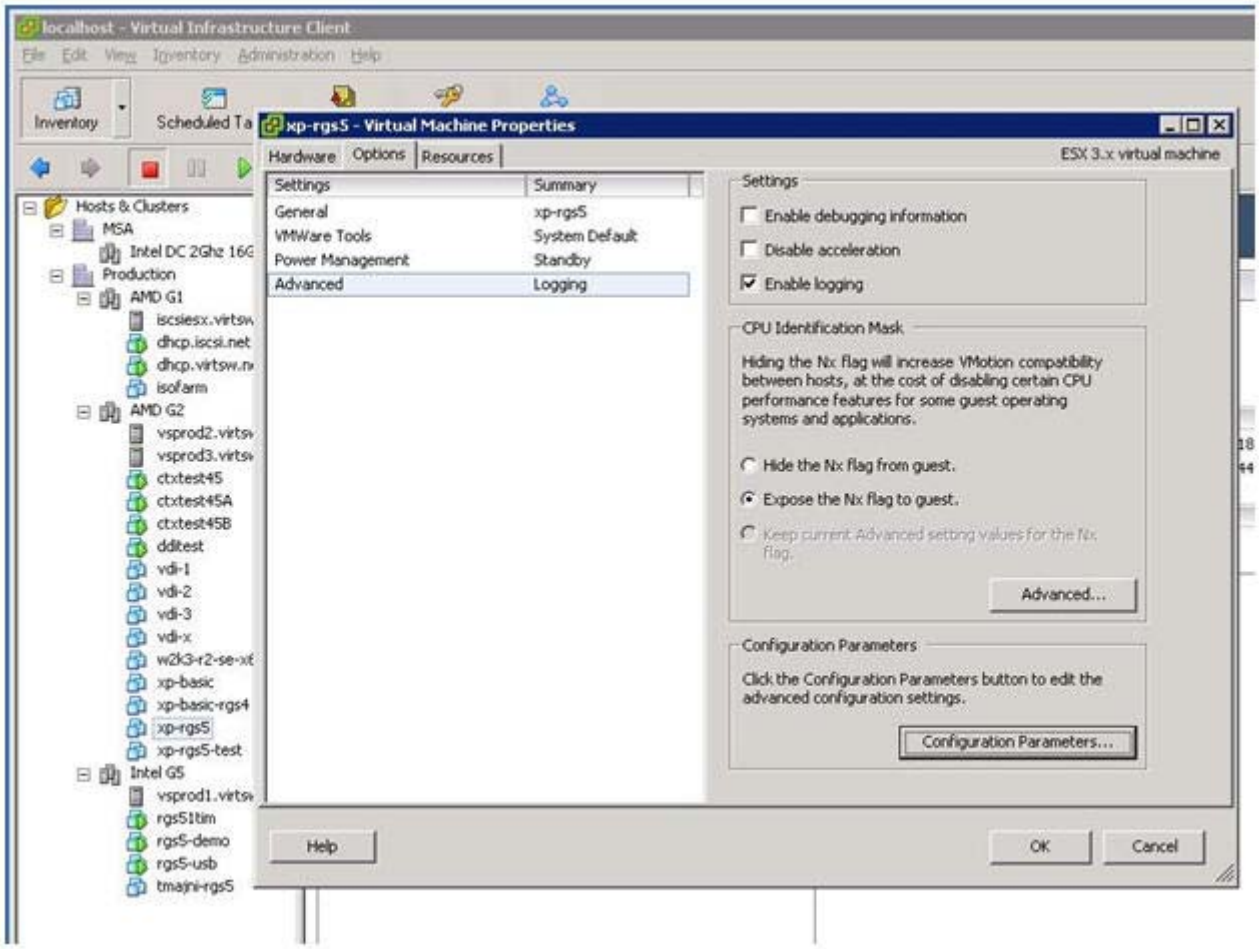
A.2.2 Modify the VMware ESX configuration (VM .vmx file)

The underlying virtual machine configuration file must be modified to support RGS and USB devices over the RGS communication channel. Most values in this file can be set using the Virtual Center GUI. However, a few values must be set by manually editing the .vmx file of the virtual machine. Administrators may also use scripting to fully automate this process.

The Virtual Infrastructure Client GUI for editing the virtual machine configuration is shown in Figure A-1 Virtual Infrastructure Client GUI on page 212. In this figure, the virtual machine named “xp-rgs5” has been selected by a mouse right click. “Edit Settings…” has been selected from the drop down menu to

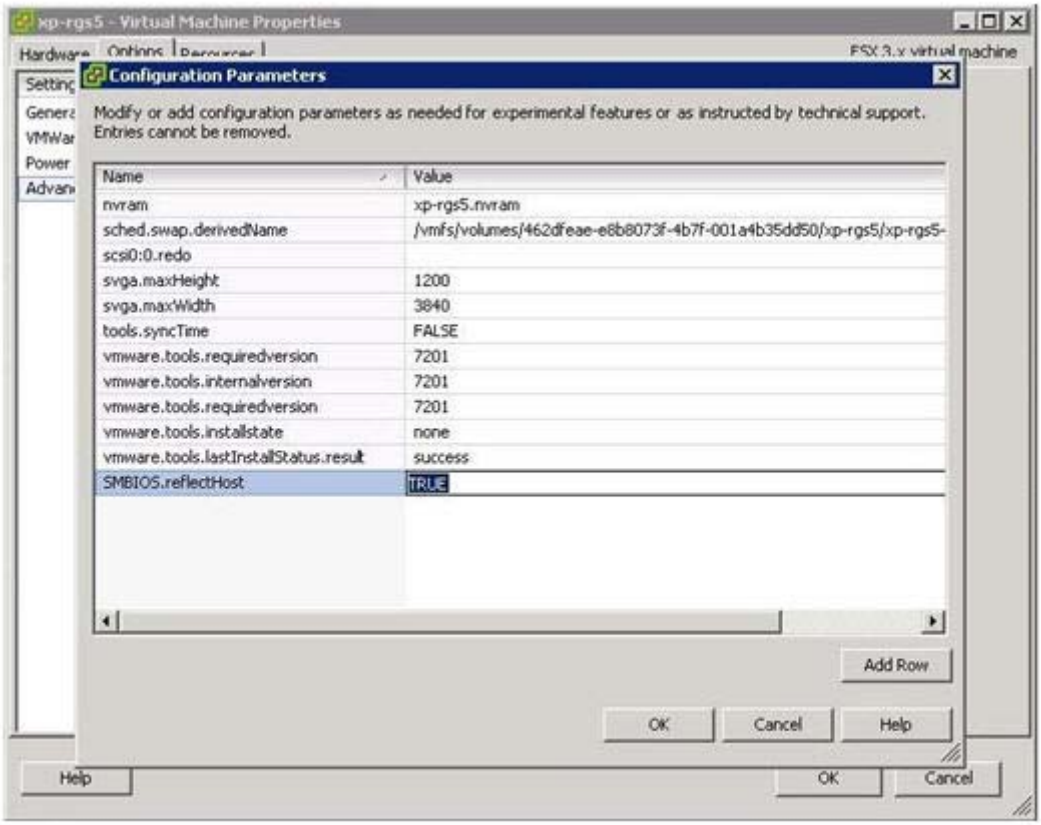
display the machine's properties. To edit the configuration parameters, click the Options tab and select the Advanced line item.

Figure A-1 Virtual Infrastructure Client GUI



Click the **Configuration Parameters** button inFigure A-1 Virtual Infrastructure Client GUI on page 212 to display the configuration parameters shown in Figure A-2 Configuration parameters dialog on page 213.

Figure A-2 Configuration parameters dialog



NOTE: Not all configuration parameters can be added using the dialog shown above. Please see VMware View documentation for more details. When adding Svga options, it is recommended that you do this by manually editing the .vmx file.

The Configuration Parameters that affect RGS functionality are:

SMBIOS.reflectHost = TRUE

NOTE: This parameter is needed for RGS versions prior to 5.2.0. It is no longer needed for RGS 5.2.0 and later versions.

This parameter causes the underlying hardware platform SMBIOS records to be mapped into the SMBIOS records of the virtual machine. RGS requires the presence of HP-specific SMBIOS records to become active. This value may be set using the GUI or by directly editing the .vmx file of the virtual machine.

usb.present = TRUE

This parameter causes ESX to materialize a USB hardware device for the virtual machine use. This is required to support remote USB functionality for RGS. This value can only be set by directly editing the .vmx file of the virtual machine. This value is not propagated by Virtual Center clone or template operations. The placement of this variable in the .vmx file is critical for proper operation, and should be placed before the extendedConfigFile parameter, which is near the beginning of the file.

NOTE: If you're using the VMware View USB implementation, the above parameter is not needed.

Svga.maxHeight = <max screen height in pixels>

This parameter tells the VMware virtual VGA device driver the maximum height of screen to support. This value may be set by GUI or by directly editing the .vmx file of the virtual machine.

Svga.maxWidth = <max screen width in pixels>

This parameter tells the VMware virtual VGA device driver the maximum width of screen to support. This value may be set by GUI or by directly editing the .vmx file of the virtual machine.

Svga.vramSize = <size in bytes of the VGA screen buffer>

This parameter tells the VMware virtual VGA device driver the size of screen buffer to use. This value may only be set by directly editing the .vmx file of the virtual machine and is not propagated by clone and template operations.

The default maximum screen resolution for ESX 3.0.1 running XP images is 1180x885 with 16 or 32 bit color depth. This can be changed by setting the three svga.<X> parameters described above. The following table shows several common screen size configurations.

Screen Resolution	svga.maxWidth	svga.maxHeight	Svga.vramSize	
			16bit color	32bit color
1280x1024	1280	1024	2621440	5242880
1600x1200	1600	1200	3840000	7680000
Dual 1600x1200	3200	1200	7680000	15360000
1680x1050	1680	1050	3528000	7056000
1920x1200	1920	1200	4608000	9216000
Dual 1920x1200	3840	1200	9216000	18432000

To compute **Svga.vramSize** values for other screen topologies, use the following formula:

H x W x D = V where
H = screen height in pixels
W = screen width in pixels
D = color depth in bytes (2=16bit, 4=32bit)
V = vramSize in bytes

A.2.3 Installing the RGS Sender on the virtual machine

The RGS Sender is installed on the virtual machine the same way as on a physical machine. The installation CD or ISO image must be mounted inside the virtual machine, or the file images can be made available on a file share for installation. The RGS Sender installation steps are:

1. Start the RGS Sender installer.
2. Follow the Sender installer on-screen instruction and select the options appropriate for your environment.

A.3 Using RGS with dynamic HP VDI (based on VMware View)

In this document, dynamic HP VDI is based on using the VMware View manager. The following steps assume you are familiar with VMware View, and have read the View installation and configuration documentation—that information is not repeated here. To install RGS in a VMware View environment, perform the following four steps; these steps are expanded on subsequently.

1. Create a new virtual machine complete with OS and applications.

NOTE: When building a Virtual Machine for RGS in a VMware View environment, the RGS Sender must be installed prior to View Agent installation.

2. Install the RGS Sender and modify the Sender configuration file, rgsenderconfig, to optimize VMware View operation.
3. Install the View Agent as described in VMware View installation documentation.
4. Install the RGS Receiver and the Client Agent on the client computer.

These steps are described in the next four sections.

A.3.1 Create a new virtual machine

Follow the procedure described in Section A-2-1 Create a new virtual machine on page 211 to create a new virtual machine complete with OS and applications.

A.3.2 Install the RGS Sender on View Master/Parent VM and modify the configuration file to optimize for VMware View environment

The RGS Sender configuration file, rgsenderconfig, must be modified to support RGS in a VMware View environment. This is done as follows:

1. Launch the RGS Sender install executable.
2. During installation, all but the following options may be kept at their default values:
   a. If you're using the VMware implementation of USB redirection, do not enable RGS Remote USB.
   b. The initial release of VMware View 3.1 that supports RGS 5.2.5 does not support RGS Single Sign-on or Easy Login; do not select either of these options.
3. Locate the RGS Sender configuration file, rgsenderconfig, at "C:\Program Files\Hewlett-Packard \Remote Graphics Sender". Right click on the file and remove the Read Only property.
4. Edit the rgsenderconfig file by un-commenting and modifying the following lines to have values of 0:

   Rgsender.IsBlankScreenAndBlockInputEnabled=0

   Rgsender.IsCollaborationNotificationEnabled=0

   Please see Section A-5 Disabling the RGS warning popup on page 217 for further details.

NOTE: Ensure that you remove the "#" from all lines you wish to activate in the rgsenderconfig file.

5. Save the rgsenderconfig file. Restart the RGS Sender or the Sender computer in order to have the new configuration file settings take effect.

A.3.3 Install View Agent on View Master/Parent VM

The VMware View Agent must be installed after RGS is installed.

1. Launch the View Agent install executable.
2. Install according to View Agent installation instructions.

A.3.4 Install the RGS Receiver and View Client on the client computers

NOTE: The RGS Receiver must be installed prior to installing the View Client.

1. Launch the RGS Receiver install executable, and accept the Receiver installation defaults.
2. You may make changes to the RGS Receiver configuration file, rgreceiverconfig. Please see Setting property values in a configuration file on page 153 for more information.

   Optional: To allow RGS to automatically detect your client screen resolution, follow this procedure on your client computer:

   a. Locate the RGS Receiver configuration file, rgreceiverconfig, at "C:\Program Files\Hewlett-Packard\Remote Graphics Receiver". Right click on the file and remove the Read Only property.

   b. Edit the rgreceiverconfig file by un-commenting and modifying the following line to have a value of 1:

      Rgreceiver.IsMatchReceiverResolutionEnabled=1

      NOTE: Ensure that you remove the "#" from all lines you wish to activate.

   c. Save the rgreceiverconfig file.
3. Install the View Client on the client computer.

A.4 Running RGS diagnostics

You should run the RGS diagnostics utility, rgdiag.exe, following installation of the RGS Sender to determine what additional OS configuration needs to be done to properly support RGS in the VDI environment. OS configuration typically includes the following:

- Firewall configuration to allow rgsender.exe to pass through.
- Simple file sharing mode unset.
- Using regedt32, set registry key HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon\AllowMultipleTSSessions to 0 (zero)

For information on running rgdiag.exe, see Using the RGS Diagnostics Tool on Windows on page 55.

A.5 Disabling the RGS warning popup

RGS alerts the user when the main console is still viewable. The hardware feature used for screen blanking is not available in VMware ESX virtual machines. Therefore, by default, this warning message appears on the user's desktop. The persistent "Sender Monitor is Viewable" popup can be removed by editing the rgsenderconfig file in the RGS Sender directory. This can be done by un-commenting the following line, and setting it as shown:

Rgsender.IsBlankScreenAndBlockInputEnabled=0

A.6 RGS operating modes available with VDI

Both RGS operating modes can be used in establishing a connection from a client computer to a virtual desktop session:

- Normal Mode
- Directory Mode

A.7 Using HP Session Allocation Manager with HP VDI

HP Session Allocation Manager (SAM) 2.1 or later can be used to manage RGS connections from client computers to virtual desktop sessions provided that the HP SAM Registration Service is installed within the virtual desktop. For information on SAM, visit http://www.hp.com/go/sam.

B Appendix B: USB devices supported by RGS

NOTE: Prior to RGS 5.2.0, this list of USB devices was maintained in a separate document available at http://www.hp.com/support/rgs_manuals, titled *USB Devices Supported by Remote Graphics Software*. The list itself was an Excel spreadsheet with an internal description of "Client-attached USB Devices Accessible by the RGS Sender". Beginning at RGS 5.2.0, the supported USB devices are now listed in this appendix, which supersedes the above document.

This appendix lists the client-attached USB devices that can be accessed by the RGS Sender. Two types of client computers are listed:

1. HP Blade Workstation Clients, such as the HP gt7725 or gt7720 Blade Workstation Client.
2. Clients based on Windows XP and Windows XPe, such as a PC running Windows XP or a thin client running Windows XPe.

For the two types of client computers, the first RGS release supporting each USB device is listed. It is assumed that both the RGS Sender and Receiver are running the same version of RGS. Unless otherwise noted, the RGS Sender is running on Microsoft Windows XP Professional 32-bit edition. If a cell is grayed-out for a USB device, that device is not supported on the associated client computer.

Table B-1 PDA devices

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP IPAQ 6315	RGS 3.0	RGS 5.0	MS Active Sync 3.7
HP IPAQ 2215	RGS 3.0	RGS 5.0	MS Active Sync 3.7
HP IPAQ hw6915	RGS 3.0	RGS 5.0	Requires 4.5 Active Sync
HP IPAQ hw6940	RGS 3.0	RGS 5.0	Requires 4.5 Active Sync
HP IPAQ hw6920	RGS 3.0	RGS 5.0	Requires 4.5 Active Sync
HP IPAQ hw6925	RGS 3.0	RGS 5.0	Requires 4.5 Active Sync
Palm Tungsten T3	RGS 3.0	RGS 5.0	Palm Desktop 4.1
Palm Tungsten E	RGS 3.0	RGS 5.0	Palm Desktop 4.1
Palm Tungsten E2	RGS 3.0	RGS 5.0	Palm Desktop 4.1
Palm Tungsten T5	RGS 3.0	RGS 5.0	Palm Desktop 4.1
Palm Treo 650	RGS 3.0	RGS 5.0	Palm Desktop 4.1
Blackberry 7280	RGS 3.0	RGS 5.0	Desktop Manager 3.6
	RGS 5.0	RGS 5.0	Desktop Manager 4.0

Table B-1 PDA devices (continued)

Blackberry 7230	RGS 3.0	RGS 5.0	Desktop Manager 3.6
	RGS 5.0	RGS 5.0	Desktop Manager 4.0
Blackberry 7100g	RGS 3.0	RGS 5.0	Desktop Manager 3.6
	RGS 5.0	RGS 5.0	Desktop Manager 4.0
Blackberry 7290	RGS 3.0	RGS 5.0	Desktop Manager 3.6
	RGS 5.0	RGS 5.0	Desktop Manager 4.0
Blackberry 8100	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8300	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8310	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8320	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8700c	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8700g	RGS 5.0	RGS 5.0	Desktop Manager 4.2
Blackberry 8800	RGS 5.0	RGS 5.0	Desktop Manager 4.2

Table B-2 Trader keyboards

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Bloomberg CTB100 US/UK	RGS 4.0.0	RGS 5.0	
Bloomberg SEA100 US/UK	RGS 5.0	RGS 5.0	Support for audio was added at RGS 5.2.0
Bloomberg FRE100 US/UK	RGS 5.2	RGS 5.2	
WEY HK2000	RGS 4.0.1	RGS 4.0.1	

Table B-3 Trader keypads

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
CA Designs Currenex KP3U/C1	RGS 4.0.2	RGS 5.0	
Cantor ESpeed 2	RGS 4.2.0	RGS 5.0	
Cantor ESpeed 6	RGS 4.2.0	RGS 5.0	
Cantor ESpeed 7	RGS 4.2.0	RGS 5.0	
Cantor ESpeed 8	RGS 4.2.0	RGS 5.0	

Table B-3 Trader keypads (continued)

RBS Greenwich Capital gSpeed	RGS 4.2.0	RGS 5.0
Brokertech model 1	RGS 4.2.0	RGS 5.0

Table B-4 Security devices

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Axalto smartcard reader	RGS 4.0.2	RGS 5.0	
Digital Persona Keyboard	RGS 5.0	RGS 5.0	
Digital Persona Fingerprint reader	RGS 5.0	RGS 5.0	
HP Smart Card keyboard		RGS 5.0	
Access Biometrics	RGS 4.0.0	RGS 5.0	
ActivIdentity smart card reader V2	RGS 5.0	RGS 5.0	
ActivIdentity smart card reader V3		RGS 5.1.3	
Keytronic USB Smartcard keyboard		RGS 5.1.3	
SCM SCR331 USB reader		RGS 5.1.3	

Table B-5 Touchscreen devices

USB Device	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
ELO Entuitive TouchSystems 1229L	RGS 4.0.2	RGS 5.0	The application for this device needs to have real USB hardware on the Sender computer or it will not run.

Table B-6 USB keys

The following client-attached USB devices can be accessed by a Remote Computer running Windows XP Professional x64 Edition if the RGS Sender version is 5.1.1 or later.

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
SanDisk	RGS 5.0	RGS 5.0	

Table B-6 USB keys (continued)

PNY 1G	RGS 5.0	RGS 5.0	
Geek Squad 0.5 G	RGS 5.0	RGS 5.0	
Cruzer Mini 4G	RGS 5.0	RGS 5.0	
Lexar JumpDrive 256M	RGS 5.0	RGS 5.0	
HP 2G	RGS 5.0	RGS 5.0	
HP 128M	RGS 5.0	RGS 5.0	
Memorex	RGS 5.0	RGS 5.0	

Table B-7 CD R/W

USB Device	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Memorex DVD/R - CD/RW	RGS 5.0	RGS 5.0	

Table B-8 DVD R/W

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Pioneer DVR-111D DVD-RW	RGS 5.0	RGS 5.0	
HP DVD300e	RGS 5.0	RGS 5.0	
Sony External Multiformat DVD Recorder	RGS 5.0	RGS 5.0	

Table B-9 Hard drives

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP Personal 500GB	RGS 5.0	RGS 5.0	
SimpleTech 80GB	RGS 5.0	RGS 5.0	
Maxtor 300GB OneTouch III	RGS 5.0	RGS 5.0	This device works out-of-the box with RGS, but it does not work with RGS if you also install the Maxtor One-Touch software.

Table B-10 Floppy drives

USB Device	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP 3.5 inch	RGS 5.0	RGS 5.0	

Table B-11 Printers

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP OfficeJet 9110	RGS 5.0	RGS 5.0	
HP Photosmart 8750	RGS 5.0	RGS 5.0	
HP LaserJet 3000DN	RGS 5.0	RGS 5.0	
HP Color LaserJet 2820	RGS 5.0	RGS 5.0	
HP Business Inkjet 2800	RGS 5.0	RGS 5.0	
HP Officejet Pro L7680	RGS 5.0	RGS 5.0	
Epson Stylus R800	RGS 5.0	RGS 5.0	
HP 2015dn	RGS 5.0	RGS 5.0	
HP 3005x	RGS 5.0	RGS 5.0	

Table B-12 Scanners

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP OfficeJet 9110	RGS 5.0	RGS 5.0	
HP ScanJet 5590	RGS 5.0	RGS 5.0	
HP ScanJet G4010 Photo Scanner	RGS 5.0	RGS 5.0	
Cannon CanoScan LiDE 600f Color Image Scanner	RGS 5.0	RGS 5.0	
CardScan 700c	RGS 5.0	RGS 5.0	
CardScan Executive (800c)	RGS 5.0	RGS 5.0	

Table B-13 Human Interface Devices

The following client-attached USB devices can be accessed by a Remote Computer running Windows XP Professional x64 Edition if the RGS Sender version is 5.1.1 or later.

Table B-13 Human Interface Devices (continued)

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
HP Spaceball 5000	RGS 4.0.2	RGS 5.0	
Magellan Spacemouse	RGS 4.0.2	RGS 5.0	
HP SpacePilot	RGS 4.0.2	RGS 5.0	
LLC504 Penpower HID device	RGS 5.2.2	RGS 5.2.2	

Table B-14 Enclosure

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Adaptec USB 2.0 enclosure for IDE hard drives	RGS 5.0	RGS 5.0	The enclosure works, but the behavior can differ depending on the drive used inside the enclosure.

Table B-15 Webcams

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Logitech QuickCam Communicate Deluxe WebCam	RGS 5.2	RGS 5.2	
Microsoft RoundTable WebCam	RGS 5.2	RGS 5.2	
Logitech QuickCam Pro5000 WebCam	RGS 5.2	RGS 5.2	
Logitech Pro9000 WebCam	RGS 5.2	RGS 5.2	
Logitech QuickCam Ultra Vision	RGS 5.2	RGS 5.2	
Microsoft LifeCam NX-6000	RGS 5.2	RGS 5.2	
Microsoft LifeCam VX-7000	RGS 5.2	RGS 5.2	
Intel Easy PC Camera	RGS 5.2	RGS 5.2	
Creative Web Cam Notebook	RGS 5.2	RGS 5.2	

Table B-16 Headsets

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Plantronics USB Audio 470 Headset	RGS 5.2	RGS 5.2	
Plantronics USB Audio 500 Headset	RGS 5.2	RGS 5.2	
Plantronics USB Audio 625 Headset	RGS 5.2	RGS 5.2	
Jabra GN8120 Headset	RGS 5.2	RGS 5.2	
Cyber Acoustics AC-840 Headset	RGS 5.2	RGS 5.2	

Table B-17 Sound playback devices

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
ClearOne Chat 50 USB Speaker	RGS 5.2	RGS 5.2	
Polycomm Communicator C100S	RGS 5.2	RGS 5.2	

Table B-18 Sound recording devices

In addition to the USB sound recording devices listed below, any USB sound recording device supported by Windows can be connected to the Local Computer when the Remote USB Configuration setting is USB Devices are Local. In this case, the Receiver RGS Audio Recorder is used, not the Remote USB driver (see Remote audio on Windows on page 32 for further details).

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Philips SpeechMike Pro Plus	RGS 5.2	RGS 5.2	
Logitech USB Desktop Microphone 980186-0403	RGS 5.2	RGS 5.2	

Table B-19 Character input devices

USB Devices	HP Blade Workstation Clients	Clients based on Windows XP and Windows XPe	Notes
Elan Crystal Touch Pen Pad	RGS 5.2	RGS 5.2	

C Appendix C: Linux remote audio device support

As shown in Figure 2-21 RGS audio subsystem on Linux on page 34, an audio device is required to be installed in Linux-based Remote Computers in order for application-generated audio to be sent to the Local Computer. Furthermore, the audio device installed in the Remote Computer must have the ability to record from a control that is the mix of all audio signals. On a Windows computer, by way of comparison, this control is often called “Stereo Mix”. Linux, however, does not follow a standard naming convention for this control—hence, the need to evaluate individual audio devices to determine their suitability for use on Linux.

Listed below are the PCI audio cards (with their on-card model numbers) that are known to work on Linux-based HP xw Personal Workstations operating as Remote Computers:

- SoundBlaster Audigy 4—SB0660
- SoundBlaster Audigy 4—SB0610
- SoundBlaster Audigy 2ZS—SB0350
- SoundBlaster Live!—CT4780

In addition, the following HP xw Personal Workstations have audio hardware on the motherboard that is suitable for generating remote audio on Linux-based Remote Computers:

- xw4200
- xw6200
- xw8200
- xw4300
- xw4550
- z400
- z600
- z800

Local user Standard Login process and primary user flowchart

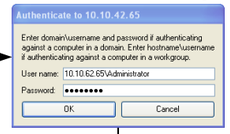
local user

attempt to log in using Standard Login

Connect — **Attempt to connect to Remote Computer**

Windows-to-Windows connection AND local user credentials match any credentials on Remote Computer ?

N → **RGS authentication dialog**



"authenticating the connection"

Y → **silent authentication**

authentication succeeded ?

Y

N

If another user attempts to connect to the Remote Computer with the same credentials as the local user, the local user Remote Display Window below will terminate.

Login dialog in Remote Display Window

is another user already logged into the Remote Computer (the primary user) ?

N

Y → **do the credentials of local user match the credentials of the primary user?**

N

Y → **Is desktop locked or is primary user disconnected (but still logged in) ?**

Y

N → **Is desktop locked or is primary user disconnected (but still logged in) ?**

Y

local user can unlock

N → **has local user logged in ?**

Y

N → **has another user logged in ?**

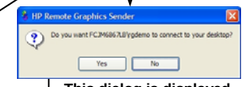
Y → **Remote Display Window is terminated when another user logs in, local user will need to reconnect**

local user is now the primary user

In both cases, the local user becomes the new primary user and the prior primary user is disconnected.

Remote Display Window

RGS connection established



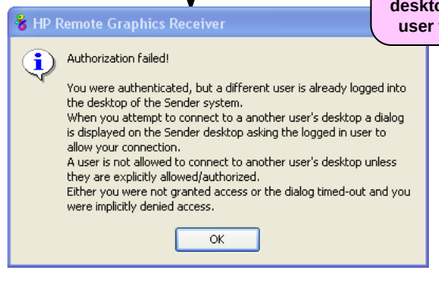
This dialog is displayed for the primary user

Remote Display Window

Remote Display Window is terminated when primary user unlocks desktop or re-connects, local user will need to reconnect

does primary user authorize connection ?

Y

N → 

This is the collaboration path – multiple local users can connect to the primary user's desktop, subject to authorization by the primary user.

primary user

Remote Display Window

press Disconnect ?

Y → **Remote Display Window terminated**

N

did someone else log in with my credentials ?

Y → **press Connect ?**

N

Y

Remote Display Window

lock screen ?

Y

did I unlock screen ?

N

Y

N → **did someone else log in with my credentials ?**

N

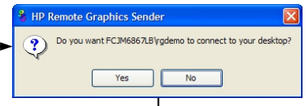
Y

N → **log out ?**

Y

Now a local user with an authenticated connection

N → **is another user attempting to connect ?**

Y → 

Respond to dialog

N

N → **did someone else log in with my credentials ?**

Y

Remote Display Window terminated

now a local user → **local user**

Standard Login Process

Index