



Sun Ray™ Connector for Windows Operating Systems 2.1 Installation and Administration Guide

BETA DRAFT

Sun Microsystems, Inc.
www.sun.com

Part No. 820-3776-05
July 2008, Revision A

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Preface

This volume provides instructions for installing, using, and administering the Sun Ray™ Connector for Windows OS, a Sun-supported terminal services client based on the Microsoft Remote Desktop Protocol (RDP).

Audience

This manual is intended for system and network administrators who are already familiar with Windows operating systems and the Sun Ray™ computing paradigm. In particular, this document should provide Windows administrators with what they need to install, set up, and administer the Sun Ray Connector. For information on administering Sun Ray servers, please see the *Sun Ray Server Software 4.1 Administrator's Guide for the Solaris Operating System* or the *Sun Ray Server Software 4.1 Administrator's Guide for the Linux Operating System*.

For information on administering Windows terminal services, see www.microsoft.com.

Scope

This manual is written from the point of view of the Sun Ray Connector software running on the Solaris™ and Linux operating systems. Although the Sun Ray Connector is a Windows terminal services client, this manual does not give any instructions for administering Windows Terminal Servers or other Microsoft products.

Before You Read This Book

This guide assumes that you have access to a Sun Ray Desktop Unit (DTU) attached to a Sun Ray Server running version 4.1 of the Sun Ray Server Software and have a network connection to at least one Microsoft Windows Terminal Server.

Using UNIX Commands

This document does not contain information on basic UNIX® commands and procedures, such as shutting down the system, booting the system, or configuring devices. This document does, however, contain information about specific Sun Ray system commands as they pertain to management of the Sun Ray Connector.

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your .login file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Administration	<i>Sun Ray Server Software 4.1 Administrator's Guide for the Solaris Operating System</i>	820-3768
Administration	<i>Sun Ray Server Software 4.1 Administrator's Guide for the Linux Operating System</i>	820-3769
Installation	<i>Sun Ray Server Software 4.1 Installation and Configuration Guide for the Solaris Operating System</i>	820-3770
Installation	<i>Sun Ray Server Software 4.1 Installation and Configuration Guide for the Linux Operating System</i>	820-3771
Release Notes	<i>Sun Ray Server Software 4.1 Release Notes for the Linux Operating System</i>	820-3774
Release Notes	<i>Sun Ray Server Software 4.1 Release Notes for the Solaris Operating System</i>	820-3775
Release Notes	<i>Sun Ray Connector for Windows OS, Version 2.1 Release Notes</i>	820-3777

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Introduction

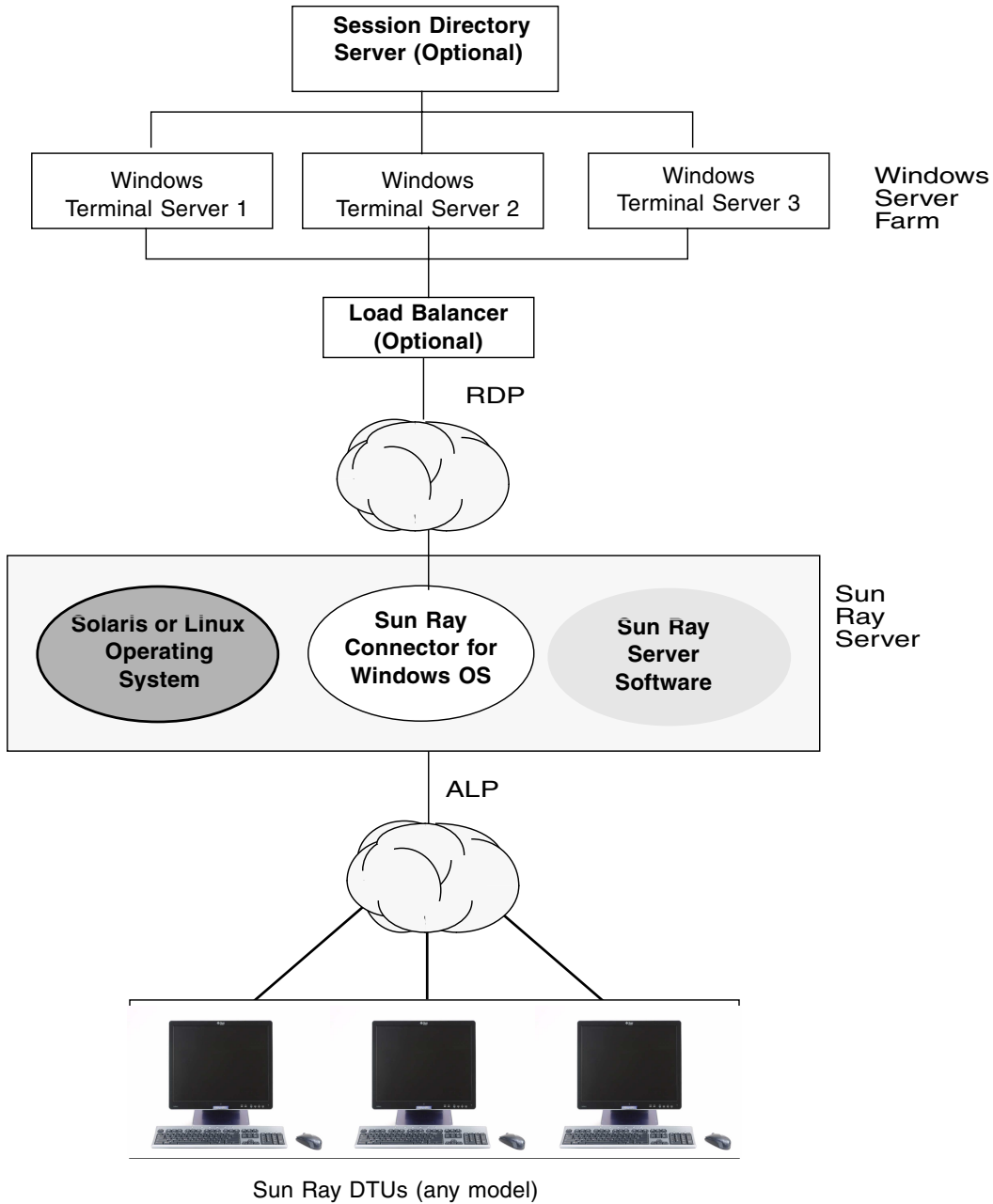
The Sun Ray™ Connector for Windows OS is a Sun-supported terminal services client, based on the Microsoft Remote Desktop Protocol (RDP), that enables Sun Ray users to access applications running on remote Microsoft Windows Terminal Servers (WTS). It is especially useful to those who are accustomed to Windows-based applications or who wish to access documents in certain formats from a Sun Ray thin client. The Sun Ray Connector for Windows OS is often referred to as the Sun Ray Connector or simply as the Connector.

The Sun Ray Connector gives users access to a Windows desktop, either occupying the entire Sun Ray screen or running in a window in a Solaris™ or Linux environment.

Architectural Overview

From a user point of view, the Sun Ray Connector mediates between the Sun Ray desktop and the Windows Terminal Server. Residing on the Sun Ray server, it uses the Remote Desktop Protocol (RDP) to communicate with the Windows Terminal Server and the Appliance Link Protocol™ (ALP) to communicate with the Sun Ray desktop, as suggested in [FIGURE 1-1](#). Once installed, the Sun Ray Connector requires only that a user type a simple command to connect to a Windows Terminal Server where the usual applications reside. The command can be modified to accommodate a variety of preferences, or options, for instance to specify screen size or a list of available printers.

FIGURE 1-1 Sun Ray–Windows Connectivity



Features

The Sun Ray Connector supports:

- compression
- encryption
- smart cards
- session directory
- local drives
- audio devices
- video playback
- serial devices
- printer redirection
- clipboard

These features are described in the following sections.

Compression

The Sun Ray Connector uses Microsoft Point-to-Point Compression (MPPC) to compress data between the Sun Ray Server, which runs the Sun Ray Connector, and the Windows Terminal Server.

Encryption

The Sun Ray Connector uses RSA Security's RC4 cipher, which encrypts data of varying size with a 56-bit or a 128-bit key, to secure all data being transferred to and from the Windows server.

Four levels of encryption can be configured at the Windows Terminal Server:

- Low
All data from client to server is encrypted based on maximum key strength supported by the client.
- Client-compatible
All data between client and server in both directions is encrypted based on the maximum key strength supported by the client.

- High

All data between the client and server in both directions is encrypted based on the server's maximum key strength. Clients that do not support this strength of encryption cannot connect.

- FIPS-Compliant

FIPS-compliant encryption is not supported¹.

Note – Data encryption is bidirectional except at the Low setting, which encrypts data only from the client to the server.

Smart Cards

The Sun Ray Connector uses the PC/SC framework to allow applications on the Windows Terminal Server to access smart cards inserted in the Sun Ray DTU. Typically, this feature is used to provide two-factor authentication with digital certificates or to permit the use of electronic signatures or other information stored on a smart card. See [“Smart Cards” on page 34](#).

Note – Smart Cards and the PC/SC framework are supported on the Solaris Operating System but not on Linux.

Session Directory

The Sun Ray Connector supports server session reconnection based on Session Directory, a database that keeps track of which users are running which sessions on which Windows Terminal Servers, and load balancing information. Session Directory functionality enables Sun Ray Connector users to reconnect not only to an existing Sun Ray session but also to be reconnected automatically to the right Windows session.

Both IP address-based and token-based reconnection are supported; however, token-based redirection requires the use of a hardware-based load balancer for Windows Terminal Servers configured as a server farm. The capacity to utilize server farms and load balancing allows Windows Terminal Servers to accommodate a larger number of Sun Ray users and DTUs.

1. FIPS is an acronym for the Federal Information Processing Standards defined by the National Institute of Standards and Technology.

Note – To participate in a Session Directory-enabled server farm, Windows Terminal Servers must run Windows Server 2003 R2 Enterprise Edition or Windows Server 2003 R2 Data Center edition. Session Directory is an optional component that can be configured to use Microsoft proprietary or third-party load balancing products.

For details of setup, configuration, and operation, please see Microsoft's documentation, for instance at:

<http://www.microsoft.com/windowsserver2003/techinfo/overview/sessiondirectory.mspx>

Local Drive Mapping

File systems from removable media devices, such as flash drives or ZIP drives, connected to Sun Ray USB ports can be mapped to the Windows environment, where they appear as locally mounted drives. Any file can be mounted and mapped from the Sun Ray environment to the Windows environment.

Caution – Windows filenames cannot contain the following characters: / : * ? " < > | . Make sure that redirected UNIX folders do not contain any files that use these characters in their names.

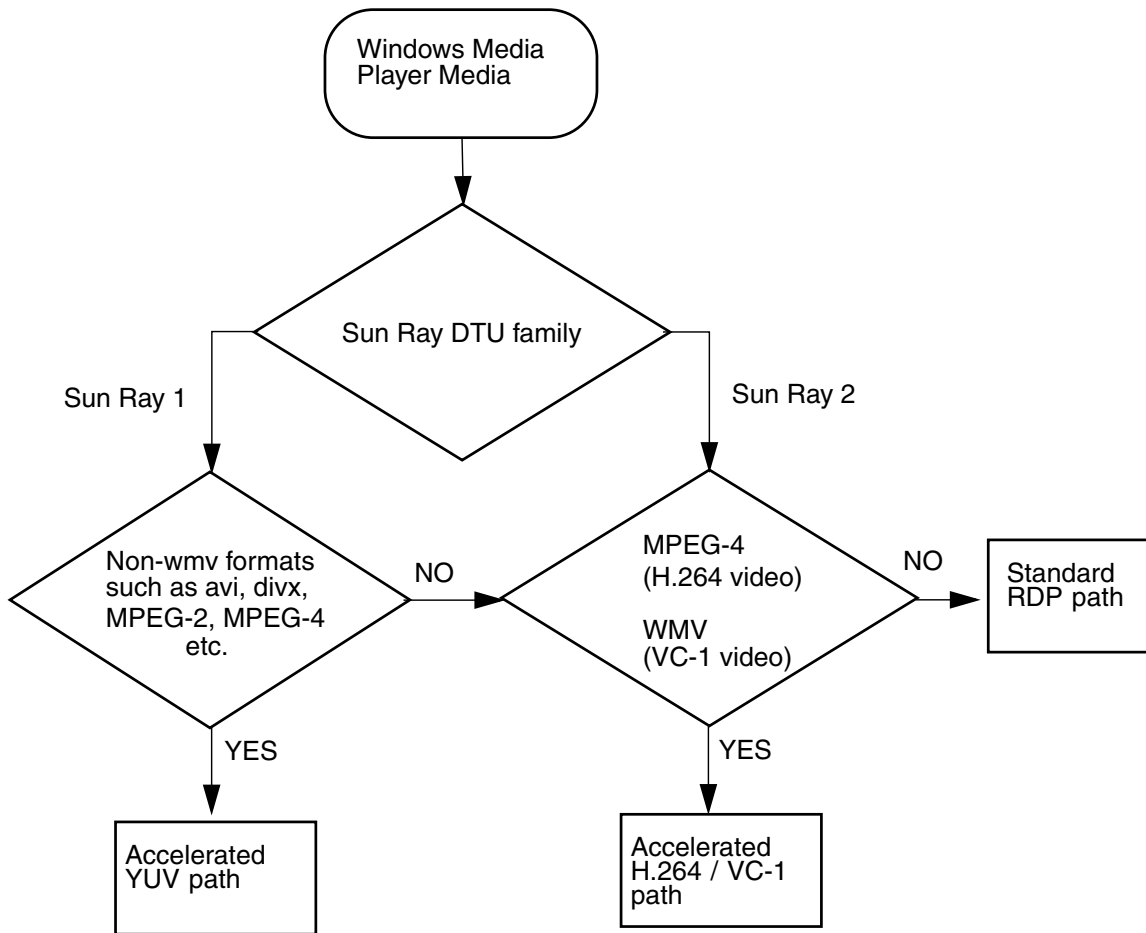
Audio Support

Users can play sound files on their Sun Ray desktops (downstream audio) with audio applications located on the Windows Terminal Server; however, recording from the Sun Ray DTU to the Windows Terminal Server (upstream audio) is not supported by the RDP Protocol and has therefore not been implemented.

Multimedia Support

Sun Ray media extensions improve playback of certain kinds of video by adding support for *H.264* and *VC-1* codecs directly in Sun Ray 2 DTUs. H.264 is the video compression standard used by MPEG-4 part 10. VC-1 is the common video compression standard used by Windows Media Player 9 and 10. Not all profiles and levels of each *codec* are supported. Videos need to be properly encoded to be able to play.

FIGURE 1-2 Multimedia Handling



An accelerated path for *YUV* video delivery enables improved playback of video formats such as MPEG-1 and MPEG-2 by reducing the bandwidth required to deliver the decoded video to the Sun Ray DTU. The accelerated YUV path is used automatically so long as the correct software decoders are available for the video format required and the software is configured to make use of the Xvideo extension. The following YUV formats are supported:

- Planar: YV12, I420
- Packed: UYVY, YUY2

H.264 or VC-1 video playback on a Sun Ray 1 DTU, which does not have a hardware decoding capability, uses software decoding and the accelerated YUV path.

H.264 Video

Baseline, up to level 2.0, is the best profile supported by the current Sun Ray hardware. Certain videos encoded in the Main profile may play; however, the Sun Ray decoder does not support [CABAC](#) encoding or data partitioning, and cannot decode high-profile streams. Unsupported streams result in a black window or an error reported to the player.

For best results, video files should be encoded in Baseline profile at up to 352x288 pixels (CIF) and 15 frames per second.

VC-1 Video

All VC-1 profiles, Simple/Main and Advanced, are supported in Sun Ray 2 units, but only up to the following levels:

TABLE 1-1 Supported VC-1 Video Levels

Profile	Video Level
Simple Profile, Low Level =	176x144 pixels (QCIF) at 15 frames per second
Simple Profile, Main Level =	352x288 pixels (CIF) at 15 frames per second
	320x240 pixels (QVGA) at 24 frames per second
Main Profile, Low Level =	320x240 pixels (QVGA) at 24 frames per second
	352x288 pixels (CIF) at 30 frames per second
Advanced Profile, Level 0 =	352x288 pixels (CIF) at 25 frames per second
	352x288 pixels (CIF) at 30 frames per second
	352x240 pixels (SIF) at 30 frames per second

VC-1 Simple/Main profiles are compatible with the Windows Media Video 9 format and also use the hardware decoding in the Sun Ray DTU.

Note – Not all .wmv files are VC-1 encoded. Those that are not VC-1 encoded are handled by enhanced DTU firmware, as suggested in [FIGURE 1-2](#).

Session Reconnection

If a Sun Ray Connector session is relaunched or hotdesked while a supported media format clip is playing, an error alert box may be displayed (see [FIGURE 1-3](#), and the user must relaunch the clip from Windows Media Player.

Note – Not all .wmv files are VC-1 Encoded. Only those that are VC-1 encoded are handled by the enhanced firmware.

FIGURE 1-3 Media Player Error



Serial Port Mapping

Users can access serial devices connected to a Sun Ray DTU from their Windows sessions. Serial devices can be connected either directly to the serial ports on a Sun Ray DTU or by means of a serial adapter.

Printing

Once a connection is established, a user can print from Windows applications using any of the following:

- a network printer or a locally-attached printer on the Windows Terminal Server
- a network printer or a locally-attached printer on the Sun Ray server
- a local printer attached to the Sun Ray DTU

Network printing is recommended over locally-attached printing.

Clipboard

The Sun Ray Connector enables cut-and-paste text functionality between Windows applications and applications running on the Sun Ray desktop, whether Linux or Solaris versions. Copying and pasting is enabled for all supported languages,

including double-byte languages, such as Chinese, Japanese, and Korean. The Sun Ray Connector does not support copying and pasting functionality for Rich Text format.

Licensing

The Sun Ray Connector supports both per-user and per-device Terminal Server Client Access Licenses (TS-CAL). When per-device licensing is configured for Windows Terminal Server, each Sun Ray DTU is granted a new license from the licensing server. Implications of these licensing modes are discussed under [“Licensing Modes and Hotdesking” on page 28](#).

Licensing information is stored in the Sun Ray data store and can be retrieved and presented each time a Windows connection is made.

For information on administering licenses, see the `utlicenseadm` man page. See also the note on Microsoft license requirements under [“Installation” on page 15](#).

Limitations

Certain limitations, listed below, are caused by dependencies on other products. Limitations in the current implementation of the Sun Ray Connector are documented in the *Sun Ray Connector for Windows OS, Version 2.1 Release Notes*.

Copy-and-Paste, Cut-and-Paste

The following behaviors, although similar, are caused by limitations in different applications:

- Once a copy-and-paste operation has been performed from a `dtterm` window, subsequent copy-and-paste operations from the same window to a Windows application always show the data from the first such operation.
- Cut-and-paste operations do not work from `dtpad` to Windows applications.
- Cut-and-paste menu options do not work correctly in transfers from StarOffice applications.

USB Disk

Removing a USB disk from a Sun Ray DTU while it is still being accessed by a Windows application leaves a stale mount point on the Sun Ray server.

Installation

The Sun Ray Connector for Windows Operating Systems Version 2.1 requires Sun Ray Server Software 4.1 or later on any supported operating system.

TABLE 2-1 Supported Operating System Versions for the Sun Ray Connector

Operating System	Version
SuSE Linux Enterprise Server (SLES)	10
Red Hat Enterprise Linux Advanced Server (RHEL AS)	5.1
Solaris (SPARC and x86)	Solaris 10 Update 5
Solaris Trusted Extensions(SPARC and x86)	Solaris 10 Update 5

The Sun Ray Connector software must *always* be installed and configured on the primary data store server, otherwise Terminal Server licenses and printer configurations will not be stored. This is the case even if the primary data store server is not used to host Sun Ray sessions.

Additional installation requirements include:

- OpenSSL — generally installed by default on Solaris 10 as well as on Red Hat and SuSE. Please confirm that OpenSSL is installed before proceeding.
- Windows 2003 Server with Service Pack 2 Rollup 2 or
Windows XP Professional with Service Pack 3 (32-bit) or
Windows XP Professional with Service Pack 2 (64-bit)
Windows Vista
- All necessary Microsoft licenses for accessing Windows Terminal Services

Note – If you access terminal server functionality provided by Microsoft operating system products, you need to purchase additional licenses to use such products. Consult the license agreements for the Microsoft operating system products you are using to determine which licenses you must acquire. Currently, information regarding Terminal Services can be found in the following URL:

<http://www.microsoft.com/windowsserver2003/howtobuy/licensing/ts2003.msp>

Basic Installation (Solaris)

- Before running the installer, create a dedicated UNIX group for the sole use of the Sun Ray Connector.

```
# groupadd <group-name>
```

where *group-name* is the name you assign to this group. The first character of the name must be alphabetic. Do not add users to this group. Once you have created and named the group, follow the steps below to install the Sun Ray Connector.

If you have already mounted the Sun Ray Connector CD-ROM, locally or from a remote server, or extracted the ESD files to an image directory, begin at [Step 4](#).

1. Open a shell window as superuser on the Sun Ray server.

To avoid installation script errors that can occur if user environment settings are carried forward, use one of the following commands for superuser login instead of using the `su` command without arguments:

```
% su -
```

```
% su - root
```

2. Insert the Sun Ray Connector for Windows OS CD-ROM.

If a File Manager window opens, close it. The File Manager CD-ROM window is not necessary for installation.

3. Change to the image directory, for example:

```
# cd /cdrom/cdrom0
```

4. Install the Sun Ray Connector software.

```
# ./installer
```

The installer prompts for the name of the group you want to use for the Sun Ray Connector.

```
Enter the name of a pre-existing group for use by Sun Ray Connector:
```

5. Enter the name of the group you created for this purpose at the beginning of this procedure, as below, then press Enter or Return to continue.

```
Enter the name of a pre-existing group for use by Sun Ray Connector:  
group-name
```

6. Run the automatic configuration script.

```
# /opt/SUNWuttsc/sbin/uttscadm -c
```

The uttscadm script launches the SRWC proxy daemon uttscpd and adds an entry for uttscpd in the `/etc/services` file, using port 7014 as the default. uttscpd is described under “Proxy Daemon” on page 30.

7. Restart Sun Ray services if the script asks you to do so.

```
# /opt/SUNWut/sbin/utrestart
```

Note – It is not necessary to restart Sun Ray services if the uttscadm script does not ask you to do so.

Basic Installation (Linux)

If you have already mounted the Sun Ray Connector CD-ROM locally or from a remote server or extracted the ESD files to an image directory, begin at [Step 4](#).

1. Open a shell window as superuser on the Sun Ray server.

To avoid installation script errors that can occur if user environment settings are carried forward, use one of the following commands for superuser login instead of using the `su` command without arguments:

```
% su -
```

```
% su - root
```

2. Insert the Sun Ray Connector for Windows OS CD-ROM.

If a File Manager window opens, close it. The File Manager CD-ROM window is not necessary for installation.

3. Change to the image directory, for example:

```
# cd /cdrom/cdrom0
```

4. Install the Sun Ray Connector software.

```
# ./installer
```

5. Run the automatic configuration script.

```
# /opt/SUNWuttsc/sbin/uttscadm -c
```

The `uttscadm` script may prompt you for a path to the OpenSSL libraries.

6. Accept the default path, or supply a different path, if applicable.

7. Restart Sun Ray services if the script asks you to do so.

```
# /opt/SUNWut/sbin/utrestart
```

Note – It is not necessary to restart Sun Ray services if the `uttscadm` script does not ask you to do so.

Uninstallation

1. Before uninstalling the Sun Ray Connector, use the following command to unconfigure it:

```
# /opt/SUNWuttsc/sbin/uttscadm -u
```

On Solaris, the `uttscpd` entry is removed from the `/etc/services` file and the SRWC proxy daemon is stopped.

2. To remove the Sun Ray Connector software, type the following command:

```
# /opt/SUNWuttsc/sbin/uninstaller
```

3. Answer Y or N to the Accept (Y/N) prompt.
 - a. Answer N to leave the existing installation in place.
or
 - b. Answer Y to uninstall the old version of Sun Ray Connector software.

Upgrade Procedure

Note – To upgrade from an earlier version of the Sun Ray Connector, you must run the installer and the `uttscadm` configuration script, as described in this procedure.

1. Change to the image directory of the Sun Ray Connector CD-ROM, for example:

```
# cd /cdrom/cdrom0
```

2. Install the Sun Ray Connector software.

```
# ./installer
```

The installer script indicates what Sun Ray Connector software is already installed on your system, for example:

```
Sun Ray Connector 2.0 is currently installed.  
Do you want to uninstall it  
and install Sun Ray Connector 2.1?  
Accept (Y/N):
```

3. Answer Y or N to the Accept (Y/N) prompt.
 - a. Answer N to leave the existing installation in place.
or
 - b. Answer Y to uninstall the old version of Sun Ray Connector software. and install the newer version.

The existing Sun Ray data store is not removed or touched by the upgrade procedure.

4. Run the automatic configuration script again.

```
# /opt/SUNWuttsc/sbin/uttscadm -c
```

Multimedia Redirection Component

The Windows multimedia redirection component includes Sun Video Renderer and Sun Audio Renderer, which are Microsoft DirectShow filters, and Sun DMO, which is a DirectX Media Object (DMO) component. They all intercept H.264 and VC-1 and uncompressed YUV streams. The redirection component is delivered in the Supplemental section of the SRWC image, under `Supplemental/SunMMR`. It supports Windows Media Player 10 or 11 on Windows 2003 and Windows XP.

▼ To Install and Register the Multimedia Component:

1. Run `setup.exe` on the destination Windows server.
2. Select the Everyone option during installation.

Additional Required Components for H.264 (MPEG-4)

The multimedia redirection component does not include any audio/video demux and decoders for H.264 (MPEG-4) streams; however, the following components can be used for playback and redirection:

- MatroskaSplitter:
<http://haali.cs.msu.ru/mkv/>
- ffDShow:
<http://sourceforge.net/projects/ffdshow>
or
<http://www.ffdshow.info/>
- MainConcept codec:
<http://www.mainconcept.com>
(Select Codec SDK)

Note – Only MPEG splitter, MPEG decoder, MP4 splitter, MP4 decoder, and H.264 decoder are required.

Using the Sun Ray Connector

Once the Sun Ray Connector software has been installed, type the following command to connect to the desired Windows Terminal Server:

```
% /opt/SUNWuttsc/bin/uttsc <options> <hostname.domain>
```

If the Windows Terminal Server is in the same domain as the Sun Ray desktop, it is not necessary to specify the domain name; however, you may specify the full IP address instead of *hostname.domain* if you prefer.

Command Line Options

The `uttsc` command specifying no options but the name or address of a Windows Terminal Server displays a Windows session on the Sun Ray DTU (See [FIGURE 3-1](#)). The default screen size is 640 x 480 pixels.

To display a session in full-screen mode or to modify it in other ways, see the command line options listed in the `uttsc` man page.

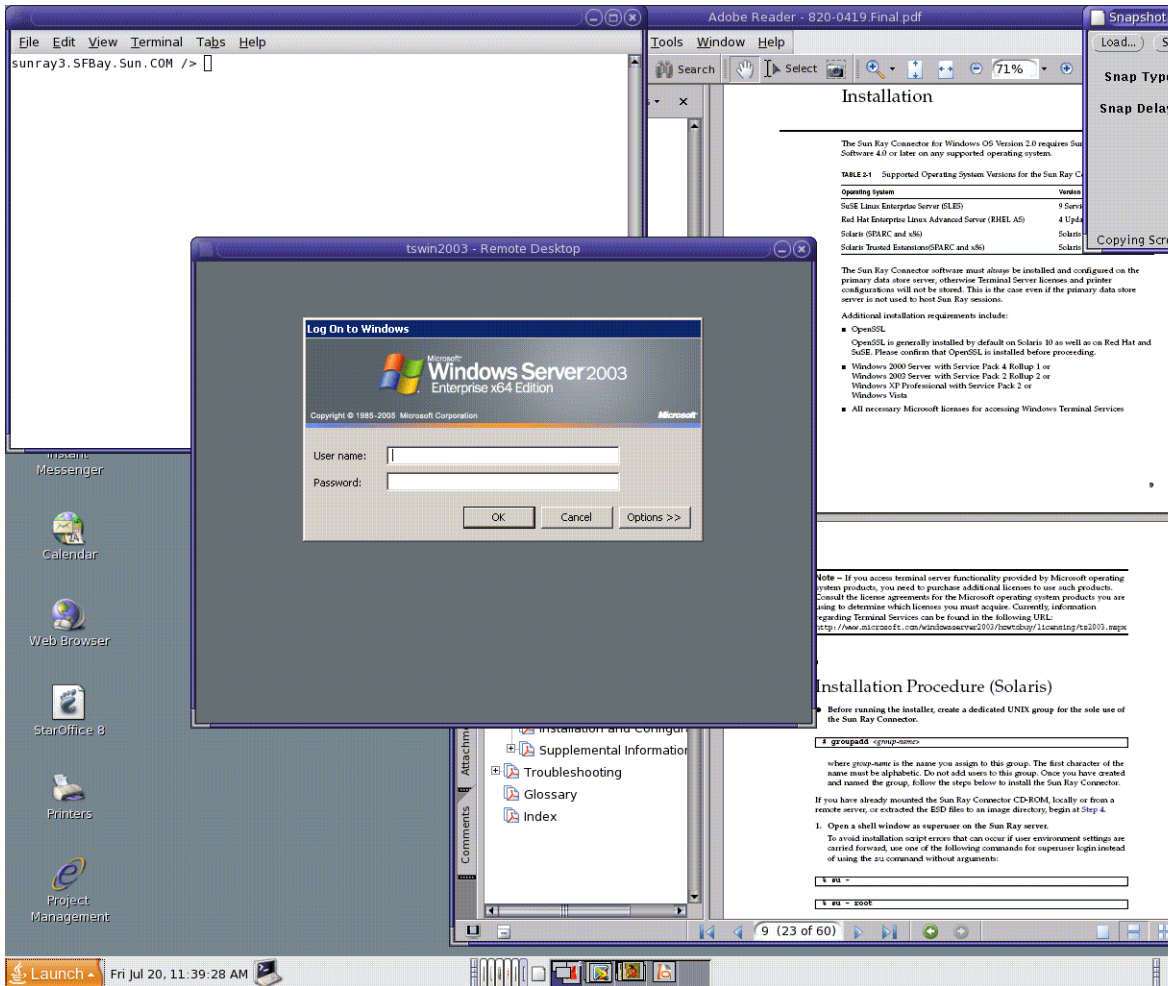
To allow your users to access the `man` command directly, add the following entry to your users' man path:

```
/opt/SUNWuttsc/man
```

They can then display the man page by typing:

```
% man uttsc
```

FIGURE 3-1 A Windows Session Running in a Solaris Window



Depending on what options are specified, you can allow a Windows session to occupy the whole screen or to run within a Linux or a Solaris window, as in this example. See the `utts` man page for a listing of all options.

Graphical User Interface (GUI)

No graphical user interface is available for the Sun Ray Connector at this time; however, launchers can be set up to provide users with desktop icons or menu items to connect to the Windows session.

For details on how to set up launchers, please consult the desktop documentation for your operating system.

Administration

The Sun Ray Connector requires very little administration; however, administrators should be aware of the following issues, suggestions, and configuration instructions.

Compression and Encryption

Compression is enabled by default. It can be disabled on a per-connection basis with a CLI option. For example, to disable compression:

```
% /opt/SUNWuttsc/bin/uttsc -z <hostname.domain>
```

For encryption, the administrator needs to decide which of the available levels to use, after which the Windows Terminal Server can be configured accordingly. (See “Encryption” on page 7.)

JDS Integration Package

The Sun Java™ Desktop System (JDS) integration package for the Solaris Operating System delivers a CLI called `uttscwrap`, which improves integration of the Sun Ray Connector with the JDS desktop on Solaris 10. The JDS integration package is included in the Supplemental folder of the Sun Ray Connector software image.

`uttscwrap` provides a login dialog that allows input of credentials for password-based authentication (`username/domain/password`). The credentials can be saved through the dialog for subsequent invocations. At the next launch, the dialog is pre-filled with the credentials.

Note – `uttscwrap` is designed for credential caching for password-based authentication only. It cannot be used with smart card authentication. For smart card authentication, please use the Sun Ray Connector directly (`/opt/SUNWuttsc/bin/uttsc`).

Credentials are saved separately for each Windows server/application combination. This allows you to save different credentials the following ways:

- For different applications on the same server
- For different applications on different servers
- For different server sessions with no applications launched

Any new credentials saved for a server/application replace previously saved credentials.

Use `uttscwrap` when desktop or menu launchers are defined to launch either Windows Terminal Services sessions or Windows applications on various Windows servers.

To launch the Sun Ray Connector through `uttscwrap`, specify the same parameters on the `uttscwrap` command line as you would use on the `uttsc` command line.

Licensing

Licenses can be administered with the `utlicenseadm` CLI. Administrative functions for licenses include listing and deleting. See the `utlicenseadm` man page for details.

Microsoft Terminal Services licensing information is stored in the Sun Ray data store automatically upon Windows session startup, using the existing LDAP schema. No administrator setup or intervention is required.

Licensing Modes and Hotdesking

Terminal Server Client Access Licenses can be configured in two modes on the Windows Terminal Server: per-user and per-device. In per-user mode, the user's hotdesking experience is virtually seamless. In per-device mode, however, to ensure correct TS-CAL license handling, users must re-authenticate every time they hotdesk to a different DTU.

The differences in the user's hotdesking experience are summarized below.

Per-user Mode

The user logs into a Sun Ray session with a smart card and opens a connection to a Windows session.

1. The user removes the smart card and reinserts it in the same DTU.
2. The user removes the smart card and inserts it in a different DTU.

In both cases, the user is instantly reconnected to the existing Windows session, and other features and services are unaffected.

Per-device Mode

The user logs into a Sun Ray session with a smart card and opens a connection to a Windows session.

1. The user removes the smart card and reinserts it in the same DTU.
The user is instantly reconnected to the existing Windows session.
2. The user removes the smart card and inserts it in a different DTU.

The Windows login screen prompts the user for username and password, after which the user is reconnected to the existing Windows session. Other features and services are similarly affected. For example:

- Windows Media Player stops playing audio, although the application is still active on the Windows session. The user needs to replay the audio.
- Any serial port transfer is stopped.

However, all the command line options specified remain valid.

Note – The `uttsc` command provides a CLI option (`-O`) that can be used to prevent the Sun Ray Connector from disconnecting upon detection of hotdesking events.



Caution – With the `-O` option, the Sun Ray Connector does not disconnect/reconnect when a hotdesk event occurs, nor does it refresh licenses on different DTUs, instead using the original license granted upon connection to the first DTU. This may cause you inadvertently to violate your Microsoft Terminal Server license agreement. Since you have full responsibility for license compliance, be aware of the danger and use the `-O` option only with caution.

Load Balancing

Terminal services session load balancing is handled transparently by the Windows Terminal Server. For more detailed information, please refer to Microsoft documentation at:

<http://www.microsoft.com/windowsserver2003/technologies/clustering/default.aspx>

Proxy Daemon

On Solaris only, the Sun Ray Connector uses a daemon process named `uttscpd` to act as a proxy for interactions with the Sun Ray data store. It uses port 7014 by default. A corresponding command, `uttscrestart`, allows the administrator to restart `uttscpd`.

At install time, the installer asks for a valid, existing UNIX group under which to install the proxy daemon and the Connector binaries. This group is used to establish a secure connection between the Connector and the proxy. The proxy validates and allows connections from a binary only if it belongs to this group.

Note – Do not use this group for any users or other components.

Note – Restarting the `uttscpd` daemon does not affect existing Sun Ray Connector sessions.

Printing

The Sun Ray Connector supports printing to:

- network printers visible on the Windows server
- local printers attached to the Windows server
- local printers attached to the Sun Ray server
- network printers visible on the Sun Ray server
- local printers attached to the DTU

Note – Network printers are not affected by hotdesking. Printers connected to DTUs are available for printing from any DTU connected to the same Sun Ray server.

Printer Configuration Caching

The Sun Ray server maintains a cache, in the Sun Ray data store, of printer configurations that users set up on the Windows Terminal Server. The Sun Ray server presents the appropriate configuration to the Windows Terminal Server when a user reconnects using the Sun Ray Connector.

The `uttscprinteradm` CLI helps administrators to maintain this information. It can be used to list the available information and to perform cleanup in case of user or printer deletion. See the `uttscprinteradm` man page for further information.

Setting Up Print Queues

Printer setup in Windows environments is beyond the scope of this document; however, printer setup requirements for Solaris and Linux are described below.

The Windows Terminal Server session is aware only of the print queues specified in the command line when the Sun Ray Connector is started. To change print queues, restart the Sun Ray Connector with the relevant print queues specified on the command line.

Note – These instructions pertain to raw print queues.¹ Please consult your operating system documentation for instructions on setting up queues for PostScript drivers. See also the `lp` and `lpadmin` man pages.

1. When a Solaris or Linux print queue is configured with a print driver, the `lp` utility sends print data to the driver for processing before redirecting it to the printer. When a print queue is configured without a driver, `lp` sends unprocessed, or *raw* data to the printer. A print queue configured without a printer driver is called a raw queue.

Solaris Printing

To set up a raw print queue on a Sun Ray server running Solaris:

1. Specify the printer and printer device node using the `lpadmin` command.

```
# /usr/sbin/lpadmin -p <printer-name> -v \  
/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node>
```

2. Enable the print queue.

```
# /usr/bin/enable <printer-name>
```

3. Accept the print queue.

```
# /usr/sbin/accept <printer-name>
```

Linux Printing

To set up a raw print queue on a Sun Ray server running any supported flavor of Linux:

1. Uncomment the following line from the `/etc/cups/mime.convs` file:

```
application/octet-stream application/vnd.cups-raw 0 -
```

2. Uncomment the following line from the `/etc/cups/mime.types` file:

```
application/octet-stream
```

3. Restart the `cups` daemon.

```
# /etc/init.d/cups restart
```

4. Create a soft link to the Sun Ray printer node in `/dev/usb`.

For example, if the device node is `/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node>`, then use the following command:

```
# ln -s \  
/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node> \  
/dev/usb/sunray-printer
```

Use this soft link (`/dev/usb/sunray-printer`) as the Device URI while creating the print queue.

Note – On Red Hat, it may be necessary to create the `/dev/usb` directory as well as to re-create the soft link after rebooting.

5. To complete the procedure, set up a raw print queue.

```
# /usr/sbin/lpadmin -p <printer-name> -E -v usb:/dev/usb/sunray-printer
```

6. To complete this procedure for SuSE Linux:

- a. Update `/etc/cups/cupsd.conf` to set the `RunAsUser` property to `No`.
- b. Restart the `cups` daemon.

```
# /etc/init.d/cups restart
```

Making Sun Ray Printers Available to Windows

To make Sun Ray-attached printers available to a Windows session, specify the corresponding raw Sun Ray print queues on the command line. Printer data is created on the Windows server, so it is important to specify the name of the printer's Windows driver and install it on the Windows server. If you make a printer available without specifying a driver, the Sun Ray Connector defaults to a PostScript driver.

Tip – To find the printer driver name, check the Windows Registry key `MyComputer/HKEY_LOCAL_MACHINE/System/CurrentControlSet/Control/Print/Environments/Windows NT x86/Drivers/Version-3`. All printer drivers installed on the system appear on this list.

- To specify a printer's Windows driver, type:

```
% /opt/SUNWuttsc/bin/uttsc -r printer:<printername>=<driver name> <hostname.domain>
```

- To make a printer available without specifying a driver, type:

```
% /opt/SUNWuttsc/bin/uttsc -r printer:<printername> <hostname.domain>
```

- To make multiple printers available, type:

```
% /opt/SUNWuttsc/bin/uttsc -r printer:<printer1>=<driver1>,<printer2>=<driver2> <hostname.domain>
```

Session Directory

The Session Directory feature requires no configuration or administration by the Sun Ray administrator. The Windows administrator has several configuration options, such as whether to allow users to connect to a Windows Terminal Server directly or through a load balancer; however, these options are beyond the scope of this document. Please refer to Microsoft documentation for details.

Smart Cards

In addition to normal Sun Ray smart card functionality, such as hotdesking, the Sun Ray Connector enables additional smart card functionality, such as:

- strong, two-factor authentication for access control
- PIN-based logins
- digital signing, encrypting, and decrypting of email messages from Windows-based email clients

For this purpose, it uses the Sun Ray PC/SC framework on the Sun Ray server and smart card middleware on the Windows Terminal Server.

Smart card redirection is disabled by default. It can be enabled on a per-connection basis with the following CLI option:

```
% /opt/SUNWuttsc/bin/uttsc -r scard:on <hostname.domain>
```

To set up Smart Card login for Windows with the Sun Ray Connector:

1. Set up Active Directory and Certification Authority (CA) on the Windows Server.

2. Install the PC/SC framework.

See the *Sun Ray Server Software 4.1 Release Notes* for further details.

3. Install Smart Card middleware product on the Windows Terminal Server.

Note – If you use ActivClient middleware, set “Disable PIN Obfuscation” to Yes through ActivClient user console on the Windows Server.

4. Enroll the necessary Certificate(s) onto the Smart Card, using either a Sun Ray Token Reader or an External Smart Card Reader connected to the Windows Server.

Configuring Solaris Trusted Extensions

For the Sun Ray Connector to function properly on a Solaris Trusted Extensions server, the Windows Terminal Server which is to be accessed must be made available at the desired level. Use the following procedure to configure Solaris Trusted Extensions:

1. Make a Windows Terminal Server available to the `public` template.

a. Start the Solaris Management Console (SMC):

```
# smc &
```

b. Make the following selections under Management Tools:

i. Select `hostname:Scope=Files, Policy=TSOL`.

**ii. Select System Configuration->Computers and Networks
->Security Templates->public.**

c. From the menu bar, select Action->Properties->Hosts Assigned to Template.

d. Select Host.

e. Enter the IP Address of the Windows Terminal Server (e.g., 10.6.100.100).

f. Click Add.

g. Click OK.

2. Configure port 7014 as a shared multi-level port for the `uttscpd` daemon

a. Select `hostname:Scope=Files, Policy=TSOL`.

**b. Select System Configuration->Computers and Networks
->Trusted Network Zones->global.**

c. If it is not already running, start the Solaris Management Console (SMC):

```
# smc &
```

d. From the menu bar, select Action->Properties.

e. Enable ports by clicking Add under Multilevel Ports for Shared IP Addresses.

f. Add 7014 as Port Number, Select TCP as Protocol, and click OK.

g. Restart network services by running the following command:

```
# svcadm restart svc:/network/tnctl
```

h. Verify that this port is listed as a shared port by running the following command:

```
# /usr/sbin/tninfo -m global
```

3. Create entries for the `uttscpd` daemon.

The `/etc/services` file entry for the SRWC proxy daemon is created automatically in the global zone at configuration time; however, corresponding entries need to be created in local zones.

a. Create a corresponding entry in each local zone where the Sun Ray Connector will be launched.

These entries can be created manually or by loopback-mounting the global zone `/etc/services` file into the local zones for read access.

b. To create this entry manually, edit the local zone file by inserting the following entry:

```
uttscpd      7014/tcp      # SRWC proxy daemon
```

4. Reboot the Sun Ray server.

Kiosk Session

The Sun Ray Connector's Kiosk Mode¹ Session enables the administrator to set up groups of DTUs to access a restricted set of applications, typically in settings where users are expected to use only one application, or where security is an especially important consideration. In Kiosk Mode, the Sun Ray DTU behaves like a Windows Based Terminal, and users do not interact with the Solaris or Linux login.

The core components of the Kiosk Mode Session are:

- a Kiosk Session Service session descriptor
(`/etc/opt/SUNWkio/sessions/uttsc.conf`)
- a Kiosk Session Service session script
(`/etc/opt/SUNWkio/sessions/uttsc/uttsc`).

Added applications are not supported.

Session Descriptor

The session descriptor defines a number of attributes useful for the administration and launching of the session. These include the following:

TABLE B-1 Kiosk Session Descriptors

Descriptor	Description
KIOSK_SESSION_EXEC	Identifies the location of the session script.
KIOSK_SESSION_LABEL KIOSK_SESSION_DESCRIPTION	Identify a label and description respectively to be used by the Sun Ray Admin GUI.
KIOSK_SESSION_ARGS	Identifies default session script arguments.

For more details, see [“Session Script Arguments” on page 40](#).

1. An earlier implementation of similar functionality was called Controlled Access Mode (CAM).

Session Script

The session script is responsible for launching the Sun Ray Connector. The script provides a simple wrapper on the Sun Ray Connector executable, `/opt/SUNWuttsc/bin/uttsc`.

A two-minute timeout is imposed on Windows sessions that remain at the Windows login screen. When this timeout elapses, the associated Windows session is terminated, and the Sun Ray Connector terminates subsequently. This can result in a user experience where, assuming no Windows login takes place, a desktop unit appears to reset every two minutes. To avoid this, the session script supports its own timeout, which affects its behavior when it detects that the Sun Ray Connector has terminated. If the timeout interval has not elapsed, the session script relaunches the Sun Ray Connector. If the timeout has elapsed, the session script terminates, and the Kiosk session also terminate as a result. The timeout may be specified as a session script argument. It has a default value of 30 minutes.

Session Script Arguments

A number of arguments are supported by the session script. These may be specified using the Sun Ray Admin GUI. The list of supported arguments may be split into Sun Ray Connector and non-Sun Ray Connector arguments. Sun Ray Connector arguments are not processed in any way by the session script and are simply passed directly to the Sun Ray Connector. Non-Sun Ray Connector arguments are processed by the session script itself.

The complete argument list should be formatted according to the following example:

```
[<Non Sun Ray Connector arguments>] [ "--" <Sun Ray Connector arguments>]
```

Non-Sun Ray Connector Arguments

Currently, only a single non-Sun Ray argument, `-t`, is supported. It is defined as follows:

`-t <timeout>` sets the value of a timeout interval (in seconds) after which the session script will terminate in the event of a Sun Ray Connector termination. If Sun Ray Connector terminates before the timeout has elapsed it will be restarted by the session script. The default value for `<timeout>` is 1800 (30 minutes). Values less than or equal to 0 indicate that the session script should never restart the Sun Ray Connector.

Sun Ray Connector Arguments

You may specify any valid `uttsc` arguments here. The `-m` and `-b uttsc` arguments are used by default. These arguments enable full-screen mode and disable the pull-down header respectively.

Note – The Sun Ray Connector requires at least a `server` argument. As previously mentioned, you may use the Sun Ray Admin GUI to include this server argument in the session script argument list.

Installation and Configuration

The Sun Ray Connector Kiosk Session is installed automatically as part of Sun Ray Connector installation. The package name is `SUNWuttsc-kio`. With the Sun Ray Connector Kiosk Session installed, the user no longer needs to specify the `uttsc` command.

To configure a Kiosk implementation for the Sun Ray Connector, follow the instructions in “[Kiosk Mode](#)” in the *Sun Ray Server Software 4.1 Administration Guide*. Select Predefined Descriptor, choosing Sun Ray Connector for Windows OS from the drop-down menu on the Kiosk Mode page, which is located under the Advanced tab in the Sun Ray Administration tool.

The user then must add session arguments to the Arguments field at the bottom of the same page (see “[Session Script Arguments](#)” on page 40). The minimal required argument is the host name, so the field content should have at least:

```
<myhost.mydomain>.com
```

A timeout option (`-t <timeout>`) can be added before the `--`, and further `uttsc` options can be added after the `--`. For example, the example line below specifies:

- a 10-minute timeout (specified in seconds) until the session is cycled if the user does not log in
- printer forwarding
- smart card redirection
- optimized SRWC hotdesking behavior

```
-t 600 -- -r printer:officelaser -r scard:on -O myhost.mydomain.com
```

FIGURE B-1 Selecting a Kiosk Session

The screenshot shows the Sun Ray Administration web interface. At the top, there are buttons for 'VERSION', 'LOG OUT', and 'HELP'. Below these, the user is identified as 'admin' on server 'srsdemo-01'. The main title is 'Sun Ray Administration' with the Java logo and 'Sun Microsystems, Inc.' on the right. A navigation bar contains tabs for 'Servers', 'Sessions', 'Desktop Units', 'Tokens', 'Advanced', and 'Log Files'. Underneath, there are sub-tabs for 'Security', 'System Policy', 'Kiosk Mode', 'Card Probe Order', and 'Data Store Password'. The 'Kiosk Mode' sub-tab is active, displaying the 'Edit Kiosk Mode' dialog. The dialog title is 'Edit Kiosk Mode' and the instruction is 'Specify the session type and general properties for Kiosk Mode. Click OK to store the changes.' The 'Session' dropdown is open, showing four options: 'Sun Ray Connector for Windows OS' (selected), 'Common Desktop Environment', 'Sun Java Desktop System 3', and 'Sun Ray Connector for Windows OS'. Other fields include 'Timeout', 'Maximum CPU Time', 'Maximum VM Size' (with a 'KB' label), 'Maximum number of Files', 'Maximum File Size' (with a '512B blocks' label), 'Locale', and 'Arguments' (containing 'tswin2003' and a default value '-t 1800 -m -b'). 'OK' and 'Cancel' buttons are at the bottom right. A status bar at the very bottom shows 'Done' on the left and 'srsdemo-01:1661' with a small icon on the right.

Note – When the SRWC session is selected, there is nothing to edit on the main Kiosk page. The Applications list is not available because the Sun Ray Connector session does not support the arbitrary addition of applications.

Supplemental Information

Two features linked to Sun Ray Connector are commonly implemented at customer sites: Follow-Me-Printing and Windows Session Locking. Implementations of these features rely on technology not available by default and non-public Sun Ray interfaces as well as the use of certain public Sun Ray interfaces for purposes other than their intended use. For these reasons, these features are not provided as supported elements of this session; however, descriptions of how these features are commonly implemented are provided in the following sections.

Follow-Me Printing

This feature is used to allow the default printer for a given Windows session to appear to move with a user from one Sun Ray DTU to another. Use the following steps to provide this feature.

- 1. For each Sun Ray of interest, specify an associated printer in the Sun Ray Data Store.**

This may be done by navigating to the relevant Desktop Unit in the Sun Ray Admin GUI and setting its Other Information field to the name of the relevant printer.

- 2. Provide a shell script which queries the printer name stored in the Sun Ray Data Store for the current Sun Ray DTU and writes that name to the user's \$HOME/.printers file.**

For example:

```
#!/bin/sh
if [ `uname` = Linux ] ; then
  theFlag="-P"
fi
theMACAddress=`cd $theFlag $UTDEVROOT ; /bin/pwd | sed
's/.*<.....>\/\1/'`
thePrinter=`/opt/SUNWut/sbin/utdesktop -o |
            grep $theMACAddress          |
            /usr/bin/awk -F, '{print $3}'`
echo "_default $thePrinter" > $HOME/.printers
```

- 3. Use utaction to invoke the script above on an initial connection and subsequently whenever a user moves from one Sun Ray DTU to another.**

This can be done by providing an `Xsession.d` script if you are using `dtlogin` as your login manager or an `xinitrc.d` script if you are using Gnome Display Manager (GDM) as your login manager. For example, you might create the script `/usr/dt/config/Xsession.d/1100.SUNWut` for `dtlogin` or `/etc/X11/xinit/xinitrc.d/1100.SUNWut` for GDM as follows:

```
#!/bin/sh
/opt/SUNWut/bin/utaction -i -c <path-to-script> &
```

where `<path-to-script>` is the path to the script you created to retrieve the printer name.

Note – The name `1100.SUNWut` is chosen purposely in this case to ensure that the script is run or sourced after the existing script `0100.SUNWut`. This is required as `0100.SUNWut` is responsible for setting `$UTDEVROOT` which is needed by the first sample script above.

Note – For information on the bundled `gdmgreeter`, see the `kiosk` man page.

4. Modify your Kiosk session script arguments to redirect the printer to Windows.

You may modify these arguments using the Sun Ray Admin GUI. In this example you need to add the argument `-r printer:_default` to the existing arguments, resulting in an argument list similar to the following:

```
-t 1800 -- -m -b -r printer:_default myHost
```

where `myHost` corresponds to the server argument passed to `uttscc`.

Windows Session Locking

It may be preferable that a Windows session be locked when a user's session moves away from a given Sun Ray DTU. A commonly used approach to implement this is to send the lockscreen keystrokes to the Windows Session using `xvkbd` (invoked by `utaction`).

As with the previous example, you may invoke `utaction` from an `Xsession.d` or `xinitrc.d` script as follows:

```
#!/bin/sh
XVKBD=/usr/openwin/bin/xvkdb
/opt/SUNWut/bin/utaction -d "$XVKBD -text '\Ml'" &
```

Note – Since `xvkbd` is not available by default, you should modify the `XVKBD` setting above so that it correctly identifies the installation location of `xvkbd` in your case.

Note – The keystroke sequence `\M1` activates the Windows lock for Windows 2003/XP sessions. You may need to modify it for other Windows versions.

Troubleshooting

Printer Caching

If a user changes the driver for a printer, the settings are not restored.

To restore the settings, use the same printer driver that was used when the settings were changed.



Caution – Use of a different driver, even if no settings are changed, can invalidate settings stored for that printer with any previous driver.

Printer Not Visible in Windows

If a Sun Ray printer specified on the Solaris or Linux command line is not available on Windows (not visible in the Printers and Faxes View), the user should confirm that the printer driver name is correct and installed on the Windows server. See [“Making Sun Ray Printers Available to Windows”](#) on page 33.

Windows Printing

If a Windows job does not print, whether on a local or a network printer, the user should contact the Windows system administrator.

Solaris or Linux Printing

If a job fails and cannot be diagnosed and fixed with the ordinary Unix remedies (`lpq`, `lprm`, etc.), the user should contact the appropriate system administrator.

Sun Ray DTU Local Printing

Users can continue to send jobs from Solaris or Linux applications to printers locally attached to their Sun Ray DTU. To enable access to printers attached to the Sun Ray DTU for Windows jobs, the user must specify the printer with the `uttsc` CLI. See “[Printing](#)” on [page 30](#) and the `uttsc` man page.

Multimedia Debugging

When multimedia enhancements are in use, as when video clips in a supported format are played, debugging messages are logged in the following files:

- `/var/dt/Xerrors` (on Solaris)
- `/var/log/gdm/$DISPLAY.log` (on Linux)

Multimedia error messages and their meanings are listed in [TABLE C-1](#):

TABLE C-1 Multimedia Error Messages

Message	Comments
Display :3.0 Video port Id 39 YUV: YV12	Start of stream for XVideo. Note that the XVideo protocol does not require start/stop, so an application may send multiple streams without a new debug message.
Display :3.0 Video port Id 39 YUV: I420	
Display :3.1 Video port Id 49 YUV: YV12	
Display :3.0 Video port Id 39 YUV: YV12 low bandwidth on	An XVideo stream is using the low bandwidth logic or bandwidth has increased so it is resuming the normal logic.
Display :3.0 Video port Id 39 YUV: YV12 low bandwidth ended	
Display :3.0 Video port Id 39 Compressed: H264	Start of an XvEnc compressed video stream.
Display :3.0 Video port Id 39 Compressed: VC1	

TABLE C-1 Multimedia Error Messages

Message	Comments
Display :3.0 Video port Id 39 YUV: YV12 hotdesked	A stream has been connected to a DTU.
Display :3.0 Video port Id 39 Compressed: H264 hotdesked	
Display :3.0 Video port Id 39 Compressed: H264 hotdesked firmware does not support compressed video	An XvEnc stream has been connected to a DTU that does not support decoding (non-P8 or P8 with old firmware).
Display :3.1 Video port Id 49 YUV: YV12	In a multihead configuration, Display indicates which head the video is being played on. Each head's port ID is in a different range

Error Messages

Sun Ray Connector error messages and their meanings are listed in [TABLE C-2](#).

TABLE C-2 uttsc Error Messages

Message	Comments
Error (%d): Unable to establish data store connection.	The Sun Ray Connector was unable to open a connection to the Sun Ray Data Store. Ensure that the SRDS has been configured for Sun Ray software and is reachable. Also, ensure that the Sun Ray Connector has been successfully configured before launching it.
Error(%d): Unable to determine SRSS version.	SRWC could not determine SRSS version information. Ensure that SRSS 4.0 or above is installed and configured successfully.
Error(%d): Unable to launch Sun Ray Connector. Only SRSS 4.0 and above are supported.	SRWC 2.1 is supported only on SRSS 4.0 and above. Ensure that the correct version of SRSS is installed.
Sun Ray session is not connected, please try again.	Ensure that SRWC is being launched from a valid connected Sun Ray session.
Cannot obtain DTU MAC address.	SRWC was unable to contact the Sun Ray Authentication Manager to retrieve the DTUs MAC address. Ensure that this daemon is reachable.
Error: Sun Ray Token ID cannot be determined. Sun Ray Connector can only be launched from a Sun Ray session.	SRWC was launched from a non-Sun Ray session (e.g., telnet or console). It can only be launched from a connected DTU session.
Unable to create new audio device. Using default audio device.	utaudio failed to create a new audio device. Check the messages logged by utaudio for more information. SRWC will try to use the default audio device for the session.
Device <device_name> is not allocated. Audio will not work in this session. Continuing..	On Solaris Trusted Extensions platforms, if the default audio device is not allocated, then SRWC will not be able to use any new audio device or the default audio device. In this case, the SRWC session will proceed but without audio support.
Warning. Printer preferences will not be stored. Please run uttscadm to complete configuration before launching Sun Ray Connector.	If uttscadm has not been run before the Sun Ray Connector is launched, the printer preferences as sent by the Windows Terminal Server will not be stored and hence cannot be later reused. This is not a fatal error; the session will continue to be launched.
Unable to connect to Sun Ray Connector Proxy. Please ensure uttscadm has been run before launching the Sun Ray Connector.	Make sure the proxy daemon (uttscpd) is up and running. If the Sun Ray Connector is launched before uttscadm has been run to configure it, then the Sun Ray Connector Proxy is not reachable. This message can be seen on Solaris systems only.
Unable to launch Sun Ray Connector. Please ensure utconfig has been run before launching the Sun Ray Connector.	If Sun Ray Connector is launched without having configured Sun Ray Data Store using utconfig (from Sun Ray Server Software), then the connector cannot be used.

Glossary

A

- AAC** Advanced Audio Coding, a “lossy” compression format capable of delivering relatively high quality at relatively low bit rates.
- ALP** The Sun Appliance Link Protocol, a suite of network protocols that enable communication between Sun Ray servers and DTUs.

C

- CABAC** Context-adaptive binary arithmetic coding, a “lossless” entropy coding technique used in H.264/MPEG-4 AVC video encoding.
- CAM** An earlier implementation of Sun Ray Server Software controlled access mode. The current implementation is known as *kiosk mode*.
- client** Normally, this term refers both to the physical hardware, such as a Sun Ray thin client desktop unit, and the process that accesses resources such as compute power, memory, and applications from a server. The server may be located remotely or locally. In the present context, the Sun Ray DTU is a client of the Sun Ray server; the Sun Ray Connector software is a Windows Terminal Server client.
- client-server** A common way to describe network services and the user processes of those services. Although this term can apply to a wide range of interactions between desktops and larger computing facilities, the thin client model suggests that all, or nearly all, computing be performed on the server.

codec A device or program capable of encoding and/or decoding a digital data stream or signal.

D

data store The Sun Ray data store is a repository for information needed to administer several aspects of the Sun Ray server software, such as failover groups, for example. The Sun Ray Connector utilizes it to store licensing information and printer preferences.

downstream audio The capability for using applications located on a server to play audio files on a client. For example, .wmv files can be played on a remote Windows Terminal Server and heard on a Sun Ray DTU.

DTU Sun Ray desktop units (originally known as Desktop Terminal Units).

H

H.264 A standard for video compression developed by MPEG and VCEG for a wide range of bit rates and resolutions. Also known as MPEG-4 AVC (Advanced Video Coding) and MPEG-4 Part 10.

hotdesking The ability for a user to remove a smart card, insert it into any other DTU within a server group, and have the user's session "follow" the user, thus allowing the user to have instantaneous access to the user's windowing environment and current applications from multiple DTUs.

K

kiosk mode A facility to run sessions without UNIX login under an anonymous user account. Kiosk sessions provide a preconfigured, usually restricted, software environment. The term kiosk mode was used interchangeably with [CAM](#) in earlier versions of SRSS. As of SRSS 4.0, however, this module was completely rewritten and is now officially called kiosk mode. The term CAM is meant to refer to implementations in SRSS 3.1 and earlier.

M

MPPC Microsoft Point-to-Point Compression protocol.

P

PCM Pulse Code Modulation.

R

raw print queue A print queue enabled without a print driver having been specified. Instead of processing data before sending it to a printer, the `lp` utility sends raw, unprocessed data to the printer.

RDP Microsoft Remote Desktop Protocol.

S

server Generically defined as a network device that manages resources and supplies services to a client. This manual refers in particular to the Sun Ray server(s), which host Sun Ray sessions and DTUs, and to Windows Terminal Servers, which act as hosts for Windows applications that can be reached by RDP clients, of which the Sun Ray Connector is an example. The Sun Ray DTU is a client of the Sun Ray server; the Sun Ray Connector is a Windows Terminal Server client.

server farm A cluster of servers linked with load balancing software.

service For the purposes of the Sun Ray Server Software, any application that can directly connect to the Sun Ray DTU. It can include audio, video, X servers, access to other machines, and device control of the DTU.

session A group of services associated with a single user.

- Session Directory** A database that keeps track of which users are running which sessions on which Windows Terminal Servers, which makes it possible for users to reconnect to their previously disconnected Windows sessions.
- session mobility** The ability for a session to “follow” a user’s login ID or a token embedded on a smart card.
- Sun Ray DTU** The desktop unit, originally known as the desktop terminal unit, is the physical appliance used to transmit keystrokes and mouse events to and receive display information from the Sun Ray server. The Sun Ray DTU hardware has a built-in smart card reader, and most models also contain a flat-panel display.
-

T

Terminal Server

- client** The client software used to access remote sessions hosted on a Windows Terminal Server, in this case, the Sun Ray Connector.
- thin client** Thin clients remotely access some resources of a computer server, such as compute power and large memory capacity. Sun Ray DTUs rely on the server for all computing power and storage. Within the client-server computing model, thin clients are distinguished from fat clients by the absence of local operating systems, applications, disc drives, fans, or other devices that fat clients need in order to operate.
-

U

- upstream audio** The capability for recording sound from the client to the server.
- URI** Uniform Resource Identifier, the generic term for all types of names and addresses that refer to objects on the World Wide Web.
- URL** Uniform Resource Locator, the global address of documents and other resources on the World Wide Web. A URL is a specific type of URI.
-

V

- VC-1** Simple, lossless mechanism to store images or a sequence of images.

W

- Windows terminal** Any device used to access Windows applications residing on a Windows Terminal Server.
- Windows Terminal Server** A server that hosts Microsoft applications for remote terminals or clients.
- WMA** Windows Media Audio data compression file format and codec developed by Microsoft.

Y

- YUV** The color encoding system used for analog television.

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