



# Sun Ray™ Connector for Windows OS Installation and Administration Guide

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Sun Microsystems, Inc.  
[www.sun.com](http://www.sun.com)

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Adobe PostScript

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# Preface

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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 System Software 3.1 Administrator's Guide*. For information on administering Windows terminal services, see [www.microsoft.com](http://www.microsoft.com).

## Scope

This manual is written from the point of view of the Sun Ray Connector software and 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.

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## 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 3.1 of the Sun Ray Server Software and have a network connection to at least one Microsoft Windows Terminal Server.

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## 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.



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# Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> 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 3.1 Administrator's Guide for the Solaris™ Operating System</i>	819-2384-10
	<i>Sun Ray Server Software 3.1 Administrator's Guide for the Linux Operating System</i>	819-2389-10
Release Notes	<i>Sun Ray Server Software 3.1 Release Notes for the Solaris™ Operating System</i>	819-2386-10
	<i>Sun Ray Server Software 3.1 Release Notes for the Linux Operating System</i>	819-2391-10

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# Sun Ray Connector for Windows OS

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## Introduction

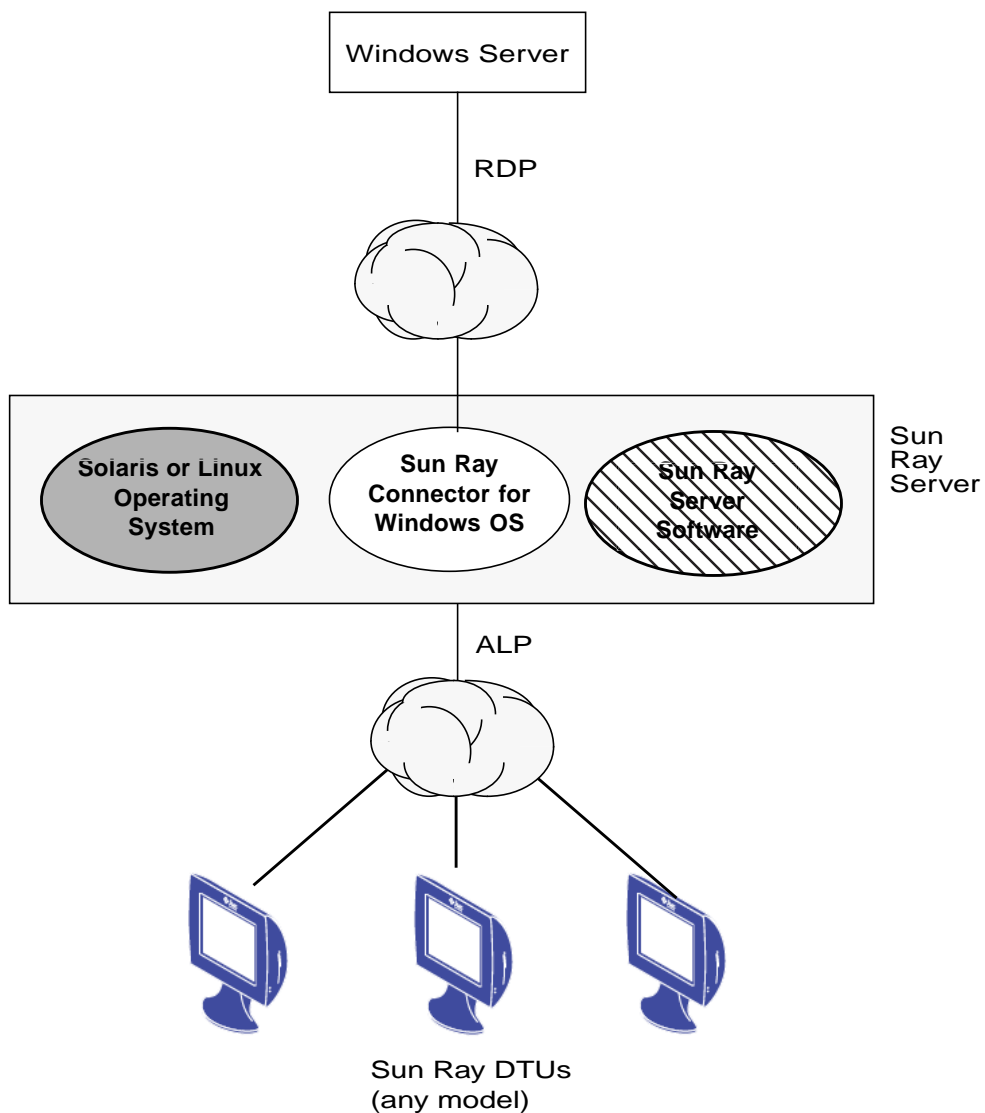
The Sun Ray Connector for Windows OS is a Sun-supported terminal services client based on the Microsoft Remote Desktop Protocol (RDP). It enables Sun Ray users to access applications running on remote Windows Terminal Servers so that those who are accustomed to Windows-based applications or who need to access documents in certain formats can now do so from a Sun Ray thin client. For convenience, the Sun Ray Connector for Windows OS is often called the Sun Ray Connector in this document.

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.

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## Architectural Overview

From a user point of view, the Sun Ray Connector mediates between the Sun Ray desktop and the Microsoft 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](#). 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** Sun Ray-Windows Connectivity via RDP and ALP Protocols

# Features

The Sun Ray Connector provides audio support, compression and encryption, device support for smart cards, local drives, and serial devices, and printer redirection as well as copy-and-paste functionality between Windows applications and the Sun Ray desktop. These features are described in the following sections.

## Audio Support

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

## Clipboard

The Sun Ray Connector enables cut-and-paste 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.

## Compression

The Sun Ray Connector uses Microsoft Point-to-Point Compression (MMPC) to compress data between Sun Ray clients and the Windows Terminal Server.

## Encryption

The Sun Ray Connector provides encryption of the connection to secure all data being transferred from and to the Windows server. For this purpose, it uses RSA Security's RC4 cipher, which encrypts data of varying size with a 56-bit or a 128-bit key. FIPS-compliant encryption is not supported.

Three levels of encryption can be configured at the 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.

---

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

---

## Local Drive Mapping

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 local mounted drives. In fact, any file can be mounted and mapped from the Sun Ray environment to the Windows environment.

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**Note** – Mapping of mass storage devices is not supported in Linux implementations of the Sun Ray Connector.

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## Printing

Once a connection is established, the user can print from Windows applications via a network printer or locally attached printer on the Windows Terminal Server, a network printer or a local printer on the Sun Ray server, or a local printer attached to the Sun Ray DTU.

## 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 170 DTU or via a serial dongle.

## Smart Cards

The Sun Ray Connector uses the PC/SC SRCOM bypass, based on the PC/SC framework,<sup>1</sup> to allow applications on the Windows Terminal Server to access information from smart cards inserted in the Sun Ray DTU. Typically, this feature might be used to provide two-factor authentication using digital certificates, or to permit the use of electronic signatures or other information stored on a smart card.

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**Note** – Smart Card support is not available for Linux.

---

## Licensing

The Sun Ray Connector supports both per-user and per-device Terminal Server Client Access License (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.

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 page 6.

---

1. The PC/SC SRCOM bypass is supported on Solaris platforms but not on Linux.

---

# Installation

## Installation Requirements

The Sun Ray Connector requires the following:

- Sun Ray Server Software (SRSS) version 3.1 on any supported operating system.

**TABLE 1** Supported Operating System Versions for the Sun Ray Connector

SuSE Linux Enterprise Server (SLES)	Red Hat Enterprise Linux Advanced Server (RHEL AS)	Solaris 8	Solaris 9	Solaris 10	TSOL
8.0 at the SP3 level or later	3.0	Solaris 8 Update 7 or higher (Solaris 8 2/02)	Solaris 9 Update 7 or higher (Solaris 9 9/04)	SPARC and x86 (Solaris 10 3/05)	Trusted Solaris 8 (7/03 and 2/04)

- The latest SRSS patches:
  - 120879-01 or later for SRSS on Solaris SPARC
  - 120880-01 or later for SRSS on Solaris x86
  - 120881-01 or later for SRSS on Linux
- The `SMClibgcc` package (on Solaris 8 and Solaris 9 systems only)
- For TSOL PSR4, the latest `libCstd` and `libCrun` patches are:
  - 108434-20
  - 108435-20
- OpenSSL

OpenSSL is installed by default on Solaris 10 as well as on Red Hat and SuSE, but not on earlier version of Solaris, and is sometimes removed from Solaris 10 installations. Please confirm that OpenSSL is installed before proceeding.
- Windows 2000 Server with Service Pack 4 or Windows 2003 Server with Service pack 1
- 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.mspx>

---



# Installation Procedure

If you have already mounted the Sun Ray Connector for Windows OS CD-ROM locally or from a remote server, or if you have 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 for Windows OS software:

```
# ./installer
```

## 5. Run the automatic configuration script:

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

The `uttscadm` script prompts you at this point for a path to the OpenSSL libraries and your LDAP Admin password.

## 6. Restart Sun Ray services:

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

# Uninstallation Procedure

1. Before uninstalling the Sun Ray Connector for Windows OS, use the following command to clean up the LDAP database:

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

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

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

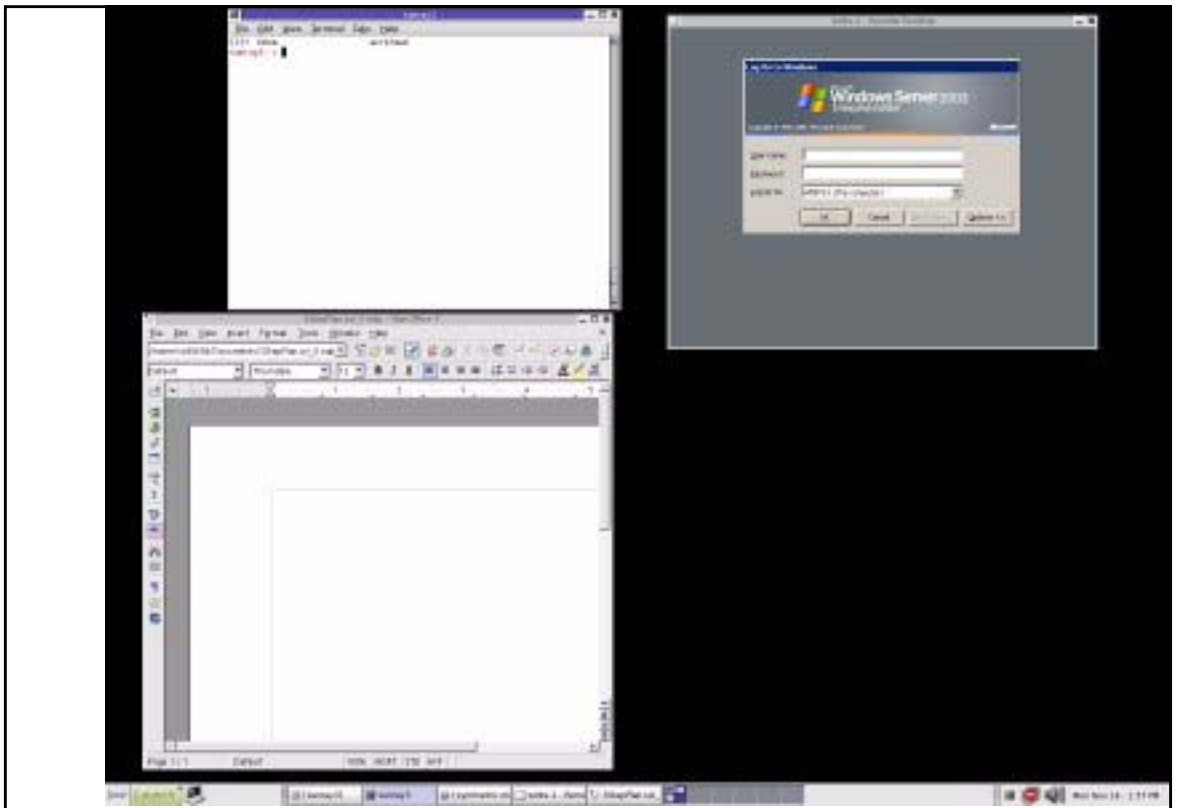
---

# 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.



**FIGURE 2** A Windows session can occupy the whole screen or run inside a Solaris or Linux window as shown in this figure

## Command Line Options

The `uttsc` command with no options other than the name or address of a Windows Terminal Server displays a Windows session in a window on the Sun Ray DTU. 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:

1. **Add the following entry to your users' man path:**

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

2. **They can then display the man page:**

```
% man uttsc
```

## 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 is expected to need very little administration; however, administrators should be aware of the following issues, suggestions, and configuration instructions.

## Audio Support

The Sun Ray Connector enables users to access the normal range of audio players running on the Windows Terminal Server from the Sun Ray desktop. The RDP Protocol does not support upstream audio (sound recording) on the Sun Ray desktop.

---

**Note** – If multiple Terminal Server sessions try to open an audio device, the first session gains exclusive control over the device for the duration of audio playback; other attempts will fail. Once playback is complete, however, another terminal session can open the audio device.

---

## Compression and Encryption

The administrator needs to determine the site-wide policy for licensing (per-user or per-device) and decide which of the available levels of encryption to use. Once these decisions are taken, the Windows Terminal Server can be configured accordingly.

Compression is disabled by default. It can be enabled on a per-connection basis with CLI options.

## Licensing

Licenses can be administered with a new CLI, `utlicenseadm`. 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 startup, based upon the existing LDAP schema. No administrator setup or intervention is required.

# Load Balancing

Load balancing is handled transparently by the Windows Terminal Server.

## 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, and it presents the appropriate configuration to the Windows Terminal Server when a user reconnects to it via the Sun Ray Connector.

A new CLI, `uttscprinteradm`, has been created to help 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 `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, you must restart the Sun Ray Connector with the relevant print queues specified on the command line.

---

**Note** – These instructions pertain to raw print queues.<sup>2</sup> Please consult your operating system documentation for instructions on setting up queues for PostScript drivers. See also the `lp` and `lpadmin` `man` page.

---

## *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:**

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

2. **Enable the print queue.**

```
# enable <printer-name>
```

3. **Accept the print queue.**

```
# 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
```

---

2. 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.

### 3. Restart the cups daemon.

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

## *Red Hat Linux*

To complete this procedure for Red Hat Linux:

#### 1. 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
```

#### 2. Set up a raw print queue:

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

## *SuSE Linux*

No soft link is required for SuSE Linux. To create the raw printer queue:

#### ● Specify the printer and printer device node with the lpadmin command:

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

## Making Sun Ray Printers Available to Windows

To make Sun Ray-attached printers available to a Windows session, specify the corresponding print queues on the command line. Printer data is created on the Windows server, so the name of the printer's Windows driver should be specified if possible.

- If you specify a Windows driver, use a raw Sun Ray print queue.



- If you do not specify a Windows driver, use a PostScript queue for the Sun Ray printer. The Windows server uses a generic PostScript driver to generate print data.

---

**Tip** – To find the printer driver name, check the Windows Registry key *My Computer/HKEY\_LOCAL\_MACHINE/System/CurrentControlSet/Control/Print/Environment/Windows NT x86/Drivers/Version-3*. All printer drivers installed on the system are in this list.

---

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

```
# uttsc -r printer:<prntername>=<driver name> <Windows server>
```

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

```
# uttsc -r printer:<prntername> <Windows server>
```

- **To make multiple printers available, type:**

```
# uttsc -r printer:<printer1>=<driver1> ,<printer2>=<driver2> <Windows server>
```

## 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 SRCOM bypass on the Sun Ray server and smart card middleware on the Windows Terminal Server. You can download the PC/SC SRCOM bypass from the Sun Download Center at:

<http://www.sun.com/download>

# Setting Up a Controlled Access Mode Implementation for the Sun Ray Connector

Sun Ray Controlled Access Mode (CAM) allows 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 CAM, the Sun Ray DTU behaves like a Windows Based Terminal, and users do not interact with the Solaris login.

To configure a CAM implementation for the Sun Ray Connector, follow the instructions in [“Controlled Access Mode” on page 177](#) of the *Sun Ray Server Software 3.1 Administration Guide for Solaris*, specifying the `uttsc` command, Windows server name, and other options in the Add/Edit Apps panel.

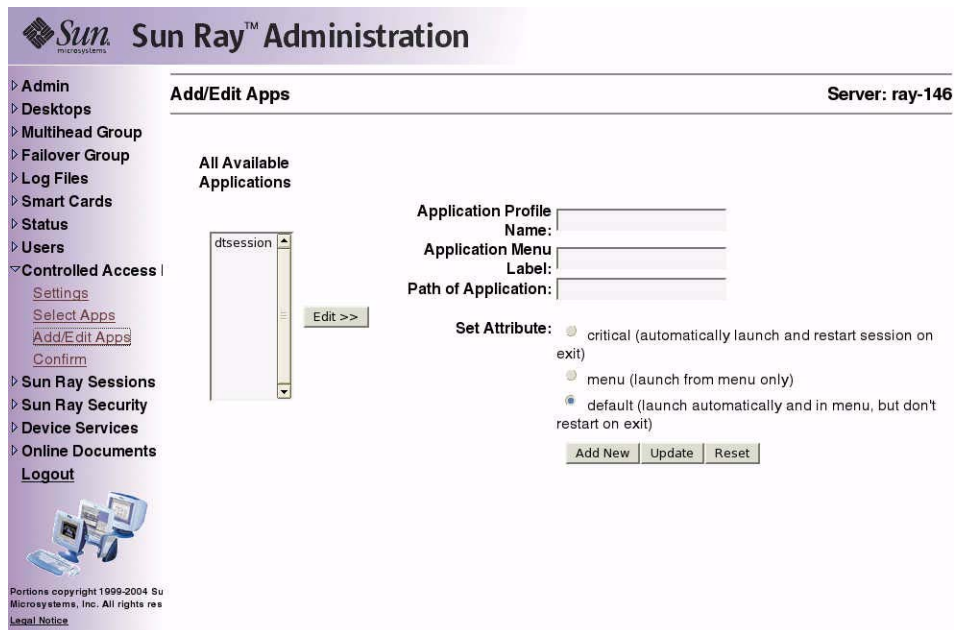


FIGURE 3 Sun Ray Server Software 3.1 Add/Edit Apps Panel

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# Troubleshooting

## Authentication

## Connecting to the Windows Server

## Printing Problems

### Printer Caching

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

To restore the settings, use the printer driver that was used when the settings were changed. Using a different driver, even without changing any settings, can invalidate stored settings 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 14.

## Printing via Windows

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

## 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.

## Local Printing via Sun Ray DTU

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 administrator must specify the printer with the `uttsc` CLI. See [“Printing” on page 12](#) and the `uttsc` man page.

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# Glossary

- CAM** Sun Ray Server Software controlled access mode, also 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.
- 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.
- 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.
- kiosk mode** Old term for CAM.
- MMPC** Microsoft Point-to-Point Compression protocol.
- PAM** Pluggable Authentication Module. A set of dynamically loadable objects that gives system administrators the flexibility of choosing among available user authentication services.
- 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.
- regional hotdesking** Also known as Automatic Multigroup Hotdesking (AMGH), this SRSS feature allows users to access their sessions across wider domains and greater physical distances than was possible in earlier versions of SRSS. Administrators enable this feature by defining how user sessions are mapped to an expanded list of servers in multiple failover groups.

<b>RDP</b>	Microsoft Remote Desktop Protocol.
<b>server</b>	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.
<b>service</b>	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.
<b>session</b>	A group of services associated with a single user.
<b>session mobility</b>	The ability for a session to “follow” a user’s login ID or a token embedded on a smart card.
<b>Sun Ray DTU</b>	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.
<b>Terminal Server client</b>	The client software used to access remote sessions hosted on a Windows Terminal Server, in this case, the Sun Ray Connector.
<b>thin client</b>	Thin clients remotely access some resources of a computer server, such as compute power and large memory capacity. The 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.
<b>upstream audio</b>	The capability for recording sound from the client to the server.
<b>Windows terminal</b>	Any device used to access Windows applications residing on a Windows Terminal Server.
<b>Windows Terminal Server</b>	A server that hosts Microsoft applications for remote terminals or clients.