Integrating Sun Ray™ 1 Enterprise Appliances and Microsoft Windows NT

Technical White Paper

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Contents

Introduction 1

Businesses, over time, make significant investments in diverse computing technologies. This often results in enterprise networks which contain a heterogeneous mix of computer systems and operating environments.

Today's enterprise challenges IT management with providing users greater levels of functionality and unrestricted access to high performance enterprise applications and services while, at the same time, finding ways to reduce the total cost of ownership of desktop systems.

As the total cost of ownership for desktop systems escalates, IT managers are seeking ways to reduce purchase and upgrade costs and cut the larger expenses of administration and maintenance. The answer is Sun Ray™ 1 enterprise appliance, Sun's newest solution for the low-cost enterprise desktop.

This technical brief is intended to provide the necessary information and guidance for integrating the Sun Ray 1 enterprise appliance and Microsoft Windows NT. The audience for this paper includes anyone interested in understanding the various aspects of integrating the Sun Ray 1 enterprise appliance and Microsoft Windows NT as well as individuals involved in the implementation process.

- Section two provides a brief overview of the Sun Ray 1 enterprise appliance, the Sun Ray Hot Desk architecture, and Sun Enterprise™ computing. For more detailed information, see the *Sun Ray 1 Enterprise Appliance Overview and Technical Brief* white paper.

- Section three outlines solutions for accessing Microsoft Windows NT (and specifically, Microsoft Office) functionality from a Sun Ray 1 enterprise appliance. Two solutions are discussed: accessing Solaris™ Operating Environment productivity applications that provide comparable and compatible functionality to Microsoft Office, and accessing Microsoft Windows NT applications from a Sun Ray 1 enterprise appliance.
- Section four provides information about installing the software required to deploy these solutions.

Integrating Sun Ray 1 Enterprise Appliance and Microsoft Windows NT is a companion piece to the *Sun Ray 1 Enterprise Appliance Overview and Technical Brief* white paper. The *Sun Ray 1 Enterprise Appliance Overview and Technical Brief* describes the architecture of the Sun Ray 1 enterprise appliance, the Hot Desk architecture, and the Sun Ray enterprise system components in much more detail than can be covered in this paper.

Note – This technical brief supports the 1.0 version of Sun Ray enterprise software, and will be modified appropriately with subsequent versions of Sun Ray enterprise software.

The Sun Ray 1 Enterprise Appliance, Hot Desk Architecture, and Sun Enterprise Computing 2

Sun Ray 1 Enterprise System

The Sun Ray enterprise system is the newest solution offered by Sun Microsystems Inc. for a zero administration appliance on the desktop. The deployable components in this system are:

- The Sun Ray 1 enterprise appliance
- A SPARC™ server running the Solaris 2.6 or Solaris 7 Operating Environment.
- The Sun Ray enterprise server software
- A dedicated interconnect between the Sun Ray enterprise server and the Sun Ray 1 enterprise appliance

Sun Ray 1 Enterprise Appliance

A stateless, zero administration “plug-and-work” device that is centrally managed by, and draws its computing resources from, a server running the Sun Ray enterprise server software. With no operating system or client software on the desktop appliance, application client processes and other services run unchanged on the server. The output is transmitted by way of the high-speed dedicated interconnect, to the attached Sun Ray 1 enterprise appliance.

Sun Ray Enterprise Server Software

The server-based software used to manage, administer, and provide the screen display for any Sun Ray 1 enterprise appliance in the workgroup.

The main components of the Sun Ray enterprise server software are:

- Authentication Manager — Recognizes and validates Sun Ray 1 enterprise appliance users
- Session Manager — Maps a user session on a server to a physical Sun Ray 1 enterprise appliance and binds/unbinds related services to and from specific Sun Ray 1 enterprise appliances
- Administration Tool — Provides user management and usage monitoring

Interconnect

A dedicated, high-speed, unmanaged interconnection for communication between the Sun Ray enterprise server and Sun Ray 1 enterprise appliances. Based on Fast Ethernet (100BaseT) technology, the Sun Ray enterprise system leverages commodity network components and standard protocols.

Sun Ray Enterprise Server

A Sun Ray enterprise server is any SPARC server running the Solaris Operating Environment (release 2.6 or 7) and the Sun Ray enterprise server software. The Sun Ray enterprise server runs the Sun Ray enterprise server software, that manages connections to the Sun Ray 1 enterprise appliances and performs enterprise appliance-specific administration functions. In addition, the Sun Ray enterprise server hosts user client sessions, and may also host other applications, depending on capacity. Applications that used to run on an individual's desktop — the window system, mail clients, Web browsers, and other user application clients and services — run on servers in the Sun Ray enterprise environment. They take advantage of the server's memory and CPU resources, and exploit the server's superior administration and security features.

Applications hosted on other servers on the network can be accessed by users attached via the Sun Ray 1 enterprise appliances. This can include applications running on other versions of UNIX®, applications running under Windows NT 4.0 TSE (accessed via the Citrix MetaFrame technology) and legacy applications accessed via 3270 gateways and emulation software.

Sun Ray Hot Desk Architecture

The Sun Ray Hot Desk architecture is a computing model, initially targeted at the workgroup, where all user state is centralized on the server and linked, by a dedicated interconnect, to a simple zero administration appliance on the desktop.

Today's Sun Ray Hot Desk architecture implementation is composed of:

- The Sun Ray 1 enterprise appliance
- The Sun Ray enterprise server software
- Hot Desk technology

This model delivers a wide array of computational services to a local community of users, through a new partitioning of system functionality. The Hot Desk technology enables use of a true, low-cost appliance on the desktop. At the same time it delivers the full power and performance of a server to the desktop, through centralization and the sharing of resources.

The Sun Ray Hot Desk architecture is the first implementation of Sun's model of computing where client sessions are maintained on the server and instantly available from any device, anytime, anywhere, within the workgroup.

Sun Ray Hot Desk Technology

This is the technology underlying the Sun Ray Hot Desk architecture. "Hot Desk" or "hot desking" refers to the ability of the user to access their sessions instantly from any Hot Desk enabled appliance in the workgroup. "Hot desking" is enabled by the "Sun Ray Hot Desk technology."

The key elements of the Sun Ray Hot Desk technology are:

- A fast and efficient interface used to communicate between the Sun Ray enterprise server and any Sun Ray 1 enterprise appliance

- Smart card technology
- Server software which instantly maps users' sessions to appliances

While the initial release supports only Sun Ray 1 enterprise appliance in the workgroup, Sun plans to license hot desk technology so that users will be able to access their sessions from any hot desk enabled device from within the workgroup.

Hot Desk Architecture Benefits

The Sun Ray Hot Desk architecture retains many of the desirable features of previous approaches without their drawbacks. It significantly reduces acquisition costs, administration, and desktop maintenance compared to thin-client computing, but without the resource limitations -- all services and resources reside centrally on a server, so functionality is not limited by capacity on the desktop. It also provides the centralization, control, and sharing of resources that marked mainframe computing, while providing users a level of performance and access to applications and resources that go far beyond what most other desktop systems can provide.

By defining a new way of delivering services to the desktop, Sun's Hot Desk architecture offers substantially greater levels of functionality at a significantly lower overall cost than other approaches.

Sun Enterprise Computing

Because the Sun Ray 1 enterprise appliance and the Hot Desk architecture depend on centralized computing resources, Sun Enterprise servers running the Solaris Operating Environment are therefore an integral component in the Sun Ray enterprise system.

Sun Enterprise Servers

Sun Enterprise servers provide scalable, symmetric multiprocessing capabilities, featuring up to 64 high-performance UltraSPARC™ processors, up to 64 GB of physical memory, and up to 20 TB of disk storage. This helps ensure the necessary performance for peak demands as well as virtually

unlimited growth. For the highest levels of availability, Sun Enterprise servers also have comprehensive reliability, availability, and scalability (RAS) that can deliver the lowest level of downtime.

Solaris Operating Environment

Sun's Solaris Operating Environment is the premiere environment for enterprise network computing. Designed with the needs of enterprises in mind. The Solaris 7 Operating Environment with advanced 64-bit technology, provides data center-class reliability, superior scalability, and unprecedented performance. The Solaris Operating Environment includes significant features to support multi-user environments and is uniquely suited to the Sun Ray enterprise system environment.

Accessing Microsoft Windows Functionality from the Solaris Operating Environment 3

Microsoft Office is the most commonly used Windows-based office productivity application suite on today's corporate desktop. Many Sun customers wish to provide their users with access to this functionality. At the same time, they are faced with the challenge of lowering the cost of the desktop and protecting their current investments in technology.

One solution is to provide users with access via a Sun Ray 1 enterprise appliance to native Solaris Operating Environment office productivity applications and tools that provide similar functionality to the Microsoft Office suite of applications, or provide the basis for developing such functionality.

Sun's StarOffice™ software is a full-featured, interoperable, multi-platform office productivity suite that provides comparable and compatible functionality to Microsoft Office.

The other solution is to provide access to Microsoft Office applications running in a Windows NT environment. For customers who need access to both Solaris Operating Environment applications and other Windows applications, this may be an ideal alternative. This is accomplished using Citrix System's MetaFrame software running on a Windows application server, and Citrix's Independent Computing Architecture (ICA) Client for either the Solaris Operating Environment or Java technology.

Alternatives to Microsoft Office

StarOffice Software

Sun's StarOffice productivity suite is both a single and multi-user-based application with components for word processing, spreadsheet calculation, e-mail exchange, task & event planning, data base tasks, and presentation creation. It maintains a strong look and feel of and supports full interoperability with Microsoft Office. StarOffice software runs on the Solaris Operating Environment, or as a Java™ technology client.

The StarOffice productivity environment includes a spreadsheet, word processor, presentation, graphics, database, event planning, e-mail, and news reader applications. With the StarOffice software you can import, edit, print, and export Microsoft Office files – Word, PowerPoint, and Excel -- as well as files from other office suites -- Lotus and Corel. It runs natively on the Solaris Operating Environment (SPARC™ and Intel platforms), Windows 95, Windows 98, and Windows NT, OS/2, and Linux

StarOffice software is available as a free download, and can be installed on multiple computers for internal use. Web-based support is included, and additional support is available for purchase.

Additional Information

Additional information about the StarOffice software is available on the Sun web site at the following URL:

```
http://www.sun.com/staroffice
```

Purchasing Information

End-user copies of the StarOffice software can be downloaded free from the StarOffice web site. It is available for a number of platforms: Solaris Operating Environment (SPARC or Intel), Windows 95/98/NT, Linux (x86) or OS/2. It is also available in eight languages: English, French, German, Italian, Spanish, Swedish, Dutch and Portuguese. The link to the download area can be found on the main StarOffice web page:

```
http://www.sun.com/staroffice/index.html
```

A full media kit with CD and documentation is also available, and can be ordered via the web site.

Integration with Microsoft Windows NT

Integration with Microsoft Windows NT means that a Sun Ray 1 enterprise appliance user can interact in some way with a Microsoft Windows NT server and its resources. Two levels of integration with Microsoft Windows NT are available today to a Sun Ray 1 enterprise appliance user:

- Simple file access—the ability to view and copy PC file text
- Application execution—launching of applications residing on a Windows application server, with the user interface displayed on the Sun Ray 1 enterprise appliance

Simple File Access

Simple file access is the most basic level of interaction with Microsoft Windows NT. It provides the ability to view, share, copy and paste PC file text without requiring the originating application. Sun's PC file viewer application provides this capability.

PC File Viewer

The PC file viewer software is a built-in feature of Solaris Operating Environment CDE. PC file viewer lets a user instantly view and copy text from many popular types of PC files or attachments, whether or not the originating application is installed on the local workstation or Sun Ray enterprise server. With PC file viewer, a Sun Ray 1 enterprise appliance user can easily read e-mail attachments and other files created by Microsoft Word, Excel, PowerPoint, Lotus 1-2-3, COREL, and AutoCAD applications. PC file viewer supports seventeen file formats including word processing, presentation, spreadsheet and graphics formats.

Additional Information

Additional information about PC file viewer software is available in the product data sheet. The product data sheet can be viewed on the Sun Microsystems web site at the following URL:

http://www.sun.com/desktop/products/software/pcviewer.html

Purchasing Information

PC file viewer is included with the Solaris 7 Operating Environment. It is also included on the SMCC Supplement CD for Solaris 2.6 5/98 that is shipped with Sun servers and workstations. For customers running Solaris 2.6 Hardware 3/98 - CDE or Solaris 2.6 8/97 - CDE, PC file viewer can be downloaded free of charge. Links to the download can be found at:

http://www.sun.com/desktop/products/software/pcviewer.html

or

http://www.sun.com/products-n-solutions/software/interoperability/

Windows Application Execution

A more advanced interaction with Microsoft Windows NT is application execution. Application execution entails establishing a connection with a Microsoft Windows NT server from a Solaris Operating Environment user session, and launching an application on the Windows NT server. The two requirements for this capability are a multi-user operating environment with remote display capability, and a method for remotely displaying output on a non-Windows-based desktop unit.

Today, accessing and running Microsoft Windows NT applications from a Solaris Operating Environment user session associated with a Sun Ray 1 enterprise appliance requires the installation of three software components:

- Microsoft Windows NT Server 4.0, Terminal Server Edition (TSE), running on a WIndows-NT compatible server
- Citrix Systems MetaFrame (running on the same server as Windows NT TSE)
- Citrix Systems “ICA Client for Solaris,” running within the Sun Ray 1 enterprise appliance user’s session on the Sun Ray enterprise server
  or
- Citrix’s “ICA Client for Java”

Microsoft Windows NT Server, Terminal Server Edition

Windows NT/TSE adds multi-user and remote display capabilities to the Windows NT Server operating environment, extending it with Windows-based terminal support. Thin or fat clients can establish multiple, concurrent sessions on a single server, use 32-bit Windows NT applications, and display output remotely. 32-bit Windows NT applications run on Windows NT Server, TSE, without modification. Most existing Windows NT-based management tools can be used to manage clients.

Additional Information

Additional information about Windows NT/TSE is available on the Microsoft web site at the following URLs:

```
http://www.microsoft.com/ntserver/terminalserver/default.asp
```

Purchasing Information

Microsoft Windows NT/TSE software can be purchased through a Microsoft Authorized Reseller. Microsoft Authorized Resellers and other purchasing options can be located on the Microsoft web site at the following URL:

```
http://www.microsoft.com/shop/default.asp
```

MetaFrame Software

Product Information

Citrix's MetaFrame™ is application server software for Microsoft's Windows NT Server 4.0, Terminal Server Edition. MetaFrame extends Windows NT Terminal Server 4.0 with additional client and server functionality. While Windows NT 4.0 uses proprietary protocols that only allow Windows clients to access applications, MetaFrame provides support for multiple clients and open protocols such as ICA. MetaFrame includes support for heterogeneous environments, enterprise-scale management and seamless desktop integration, while also providing improved management, access, performance and security for business applications.

ICA technology shifts computing from the client to the server. In the Hot Desk Architecture, it is the link between the Sun Ray computational service provider and the multi-user Windows NT server. MultiWin extends the Microsoft Windows NT Server operating environment with multi-user capabilities.

Additional Information

Additional information about Citrix MetaFrame server software is available on the Citrix web site at the following URL:

`http://www.citrix.com/products/metaframe`

Purchasing Information

Citrix MetaFrame server software can be purchased through a Citrix Authorized Reseller. A list of Citrix Authorized Resellers is available on the Citrix web site at the following URLs:

`http://www.citrix.com/csn/lookup.asp` (resellers in the U.S., Canada, and Bermuda)

`http://www.citrix.com/csn/ilookup.asp` (international resellers)

Citrix's ICA Client Software

The ICA clients are the desktop component of a two part system utilizing a Citrix server for application deployment. The "Citrix ICA Client for Solaris" is the client component, that runs in the Solaris Operating Environment, for the Citrix MetaFrame server software.

Purchasing Information

The Citrix ICA client for the Solaris Operating Environment or for Java technology can be downloaded free of charge from the Citrix web site at the following URL:

`http://download.citrix.com`

How Interoperability with Microsoft Windows NT Works

The Windows NT/TSE operating system, the MetaFrame software, and Citrix's ICA client software work together to bring Windows NT applications and services to a Solaris Operating Environment user session displayed on a Sun Ray 1 enterprise appliance. Figure 1 provides a pictorial representation of the relationship between and location of the software components used to provide access to Microsoft Windows NT applications.

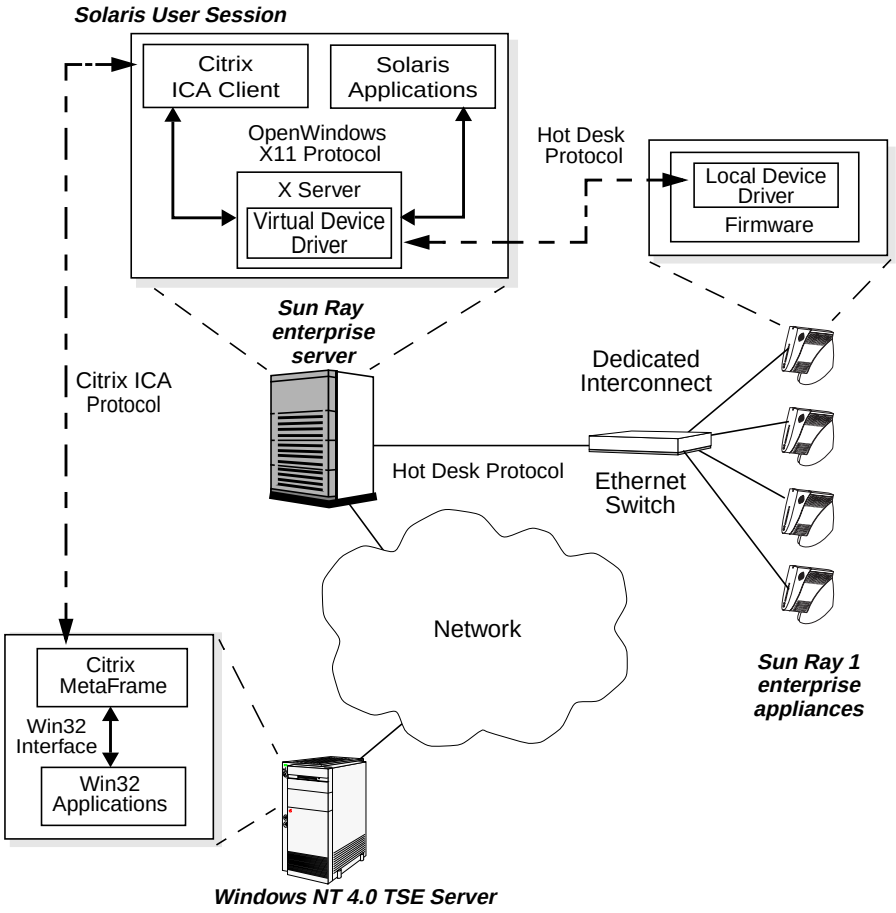

Figure 1 Optional software from Citrix Systems is used to display Windows applications on Sun Ray 1 enterprise appliances.

Figure 1 illustrates both the physical relationship and interconnection of the hardware components, as well as the interaction of the software components that reside on each system. Physically, the Windows NT server and the SunRay enterprise server communicate using standard protocols over the existing network infrastructure (LAN, WAN, or whatever). The Sun Ray server communicates to the Sun Ray 1 enterprise appliance over the dedicated interconnect using the Hot Desk protocol.

Windows Application Execution

Windows application execution occurs in the following manner (refer to Figure 1):

1. Sun Ray 1 enterprise appliance user establishes a session on the Sun Ray enterprise server and launches the Citrix ICA client application.
2. User logs into Windows NT session using his/her NT user name and password.
3. Sun Ray 1 enterprise appliance user selects a published application or server to run, using the Windows desktop user interface displayed via the Citrix client.
4. Citrix ICA client application sends input to the MetaFrame software on Microsoft Windows NT/TSE server via the ICA protocol.
5. The Citrix MetaFrame software sends the input to Windows NT 32-bit application.
6. Windows NT 32-bit application processes the input and renders output to a frame buffer in the MetaFrame software
7. Citrix's MetaFrame software extracts the data from virtual frame buffer and transmits output, via the ICA protocol, to the ICA client running under the user's session on the Sun Ray enterprise server.
8. The Citrix ICA client renders the output to the X-Windows system on the Sun Ray server via X protocol, which in turn renders the output to a virtual frame buffer.
9. The Sun Ray enterprise server software extracts data from frame buffer and transmits the screen buffer contents to the Sun Ray 1 enterprise appliance over the dedicated interconnect, using the Hot Desk protocol.

10. The local frame buffer on the Sun Ray 1 enterprise appliance renders the output to the attached display device.

Running Microsoft Windows NT Sessions

Once Microsoft Windows NT/TSE and Citrix MetaFrame software have been properly installed and configured, Sun Ray 1 enterprise appliance users can initiate interaction with Microsoft Windows NT from their desktop.

One method is to run the executable “wfcmgr” from the Citrix installation directory and then double-click on either a published application or server connection from the displayed list. A second method is to either double-click on an icon for Citrix’s MetaFrame located on the desktop or select the icon for Citrix’s MetaFrame from a preconfigured subpanel.

Software Installation 4

StarOffice Software

The StarOffice software consists of both client and server components. It can be used as a single or multi-user application. It is installed and configured on either a Sun workstation running the Solaris Operating Environment or an available Sun Ray enterprise server. Detailed installation and configuration directions for Star Office software are available in the following documents:

- *StarOffice Installation for Solaris Guide*
- *StarOffice Getting Started Guide*

Both guides ship with the product.

Microsoft Windows NT Server, Terminal Server Edition

Microsoft Windows NT Server, TSE operating environment consists of a server component only and is installed and configured on an available Microsoft Windows-compatible machine. Detailed installation and configuration directions for Microsoft Windows NT Server, TSE software are available in the following documents:

- *Microsoft Windows NT Server, TSE Start Here Guide*
- *Microsoft Windows NT Server, TSE Administrator's Guide*

Both of the above documents ship with the Microsoft Windows NT, TSE product.

Note – There are no special installation and configuration directions for Microsoft Windows NT, TSE software in regards to interoperability with Microsoft Windows NT, other than being sure to install the software using the domain model and not the stand-alone server model.

Citrix MetaFrame Server Software

Citrix MetaFrame server software resides on a PC server running the Microsoft Windows NT Server, TSE operating environment. The directions below provide general installation steps for Citrix MetaFrame server software. Consult the Citrix MetaFrame Administrator's Guide for detailed installation and configuration steps.

Installing on Microsoft Windows NT

1. Install and configure Citrix MetaFrame server software using the setup wizard.
2. Publish Applications (if desired).

Citrix MetaFrame Client Software

Citrix MetaFrame client software resides on the Sun Enterprise Server and runs as a Solaris application or Java applications depending on which client you choose. The directions below provide general installation and configuration steps for Citrix MetaFrame client software.

Citrix ICA Client for Solaris Operating Environment

1. Create an installation directory for the "Citrix ICA client for Solaris" client software on your Sun Enterprise server.
2. Download, uncompress, and untar the "Citrix ICA client for Solaris" client software.
3. Run `setupwfc` and create server entries.
4. Complete server entries and publish applications.

5. Connect published applications to servers.

Citrix ICA Client for Java Technology

1. Create an installation directory for the “Citrix ICA client for Java” client software on you Sun Enterprise server.
2. Download the `setup.class` file and the README text.
3. Download the *ICA Java Client Administrator’s Guide*. This guide is in PDF format, which requires the Adobe Acrobat reader for viewing.
4. Follow the instructions of the ICA Client for Java JDK 1.1 download page for further instructions.

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