2X ThinClientServer

Version 3

Manual

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1. Introduction to Server-based computing

What is server-based computing?

Server-based computing (SBC) is a technology whereby applications are deployed, managed, supported and executed on the server and not on the client. Instead only the screen information is transmitted between the server and client. This architecture solves the many fundamental problems that occur when executing the applications on the client itself.

In SBC environments hardware & software upgrades, application deployment, technical support, and data storage & backup are simplified because only the servers need to be managed. Data and applications reside on a few servers rather then on hundreds or thousands of clients. PCs become terminals and can be replaced by simpler, less expensive and most importantly easier to manage devices called "thin clients."

The benefits of server-based computing

1. Management - Administrators can deploy, manage and support applications much more easily because they are held on a central server (or central server farm) and are managed from a single point, simplifying application access and administration.
2. Device independence - Users can access their desktop and indeed any enterprise application from any type of client device.
3. Remote Access – Users can access their desktop and enterprise applications from anywhere on the network, or from home, or on the road.
4. Performance – Server-based computing performs better than a web application or using a client server model. These types of applications require a lot of data to be sent back and forth between the server and the client. Because of the advanced compression ratios achieved by protocols such as ICA, NX and RDP, sending just the screen updates between the server and client is much faster.

5. Security – Server-based computing keeps all the data on the secure servers without it being 'spread out' onto the less secure client computers. Furthermore the server is in the server room, which is far more secure than on the user's desk.
6. Less prone to viruses and security breaches – because servers are by definition better managed and because the server OS is more secure, it's far more difficult for a computer to get infected by a virus.
7. Eliminates patch management of clients – because the clients are not running Windows, there is no need to patch the desktop computers on a regular basis.
8. Reduces Total Cost of Ownership [TCO] by as much as 50 per cent.
9. Scalability – New servers and clients can easily be added.
10. Increased Availability – It's easy to make the terminal servers fault tolerant and to perform load balancing. In addition, servers are inherently designed to be more reliable than your average desktop.

What are thin clients?

A thin client is a general term for a device that relies on a server to operate. It provides a display device, keyboard and mouse and basic processing power in order to interact with the server. It does not store any of the data locally – it's very thin in features and functionality – hence the term 'thin client'.

A thin client often does not have local storage and requires little processing resources. Thin client hardware can be a converted old PC, a dedicated thin client device, or simply a new low cost PC with a thin client OS installed. The fact that little processing power is needed, and the fact that the hardware can be used for a longer period of time (on average 6 years instead of 3 years), significantly reduces capital expense at the desktop.

Most importantly, the overhead costs associated with administration, maintenance, support, security and installation are significantly lower than a traditional PC.

How does it work?

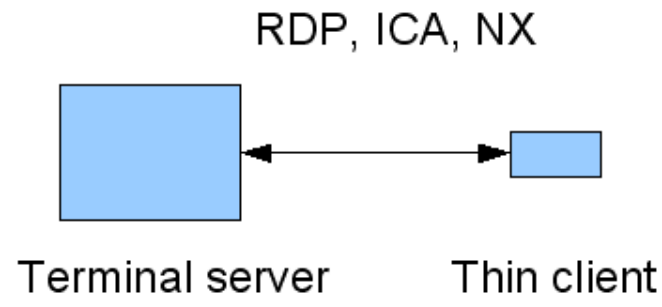


Figure 1: Server-Based Computing

The server-based computing technology revolves around 3 main components:

1. A multi-user operating system that allows multiple users to log on and work concurrently, using applications in separate, protected sessions on a single server. Examples of terminal servers are Microsoft Terminal Services 2000/2003, Citrix Metaframe, 2X TerminalServer for Linux.
2. A thin client, which runs a minimal amount of software, but at least one program that connects to the terminal server. The thin client and the terminal server can be running completely different types of operating systems: For example Linux based thin clients are currently the most popular way to connect to a Windows terminal server! On the thin client there will be a program such as rdesktop (Linux) or Remote Desktop Connection (Windows) to connect to the terminal server.
3. A protocol to allow the terminal server and thin client to communicate and send only the keystrokes, mouse clicks and screen updates across the network. Of course this will be suitably compressed. Popular protocols are RDP (Remote Desktop protocol), ICA and NX.

Server-based computing advantages in a nutshell

Server-based computing is currently considered as the most efficient, flexible and cost-effective system for application delivery and administration. It boasts the following advantages:

- Reduces desktop hardware investment
- Significantly reduces administrator staffing costs
- Significantly reduces desktop maintenance costs

- Virtually removes the need for desktop upgrades
- Removes desktop software application upgrades
- Removes desktop operating system upgrades
- Removes viruses from the desktop
- Reduces training costs
- Reduces bandwidth costs
- Reduces or eliminates the need for remote office servers
- Reduces user downtime while waiting for help desk response
- Reduces system downtime through better redundancy and disaster recovery capabilities
- Applications available to all users anytime and anywhere
- Quick expansion through ease of deployment
- Enables standardization of corporate applications
- Reduces risk of data loss since data is centralized and can be more easily backed up
- End users will experience improved support
- Helps prevent theft of company data
- Reduces/Eliminates installation of non productive software such as games.

2. Introduction to 2X ThinClientServer

What is 2X ThinClientServer?

2X ThinClientServer provides a complete solution for the central deployment, configuration and management of thin clients, and provides load balancing and redundancy of terminal servers.

A small footprint Linux distribution is deployed to thin clients (all popular thin clients are supported) OR to normal PCs, allowing you to convert existing PCs to thin clients. Thin client settings (screen size, which terminal servers to log into, etc.) can be controlled centrally.

2X ThinClientServer is thin client vendor independent: You can use old computers, new low cost computers and dedicated thin client devices from different vendors - and manage all these thin clients through one consistent and open interface.

Rather then have to commit to one particular thin client vendor and be forced to buy all your hardware from that vendor, you can get flexibility to choose what's best for you and the possibility to re-use your old computer hardware.

How it works

In a nutshell, 2X ThinClientServer serves out the 2X ThinClientOS to the thin clients. After the 2X ThinClientOS has booted, it obtains its connection settings from the 2X ThinClientServer. These settings are then used to connect to the terminal server.

The 2X ThinClientOS itself can be retrieved from the TFTP server (included with 2X ThinClientServer) via PXE or Etherboot (which does not rely on the network card's ROM to load the PXE stack), or it can be booted from a storage device (Hard disk, CD-Rom). The exact process by which the thin client boots and presents the desktop to the user is explained in the following steps:

Step 1: Booting the thin client:

1. The thin client/computer is switched on. Based on the BIOS setting, the thin client/computer now boots either via the hard disk, PXE, Etherboot, or CD-Rom.

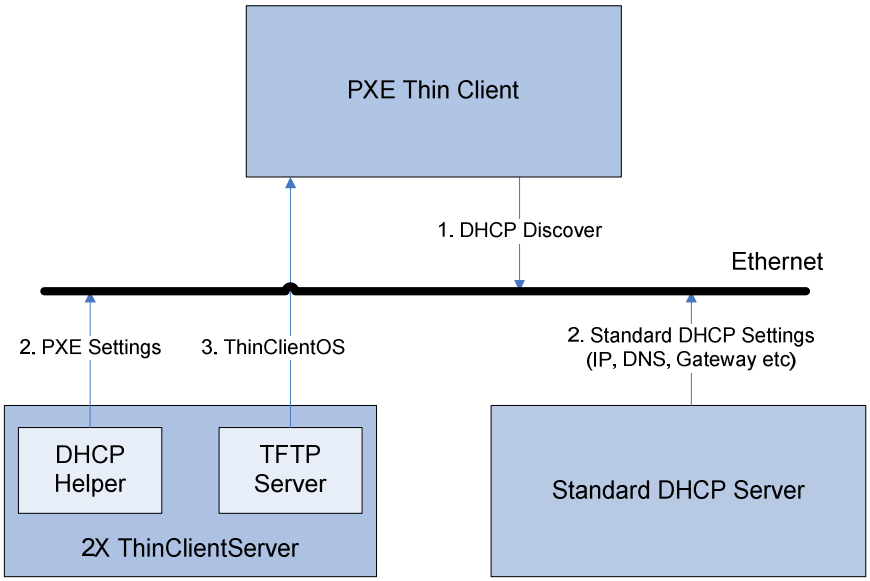


Figure 2: PXE booting

2. If you have selected PXE booting OR Etherboot, the thin client/computer will obtain the IP address of the TFTP server via DHCP broadcasts. (In most installations the TFTP server will be installed on the same server as 2X ThinClientServer). The thin client will then download the 2X ThinClientOS image from the TFTP server and proceed to boot up the thin client using that Operating System image. Because the 2X ThinClientOS image is small (approx 9 MB) this will be very fast.
3. If you chose to boot 2X ThinClientOS from CD-Rom, or hard disk, the operating system will boot up directly from that image without retrieving the image from the TFTP server.

Step 2: 2X ThinClientOS connects to 2X ThinClientServer

1. After 2X ThinClientOS has booted, it obtains the IP address of 2X ThinClientServer from the network settings returned by the 2X DHCP Helper Service.

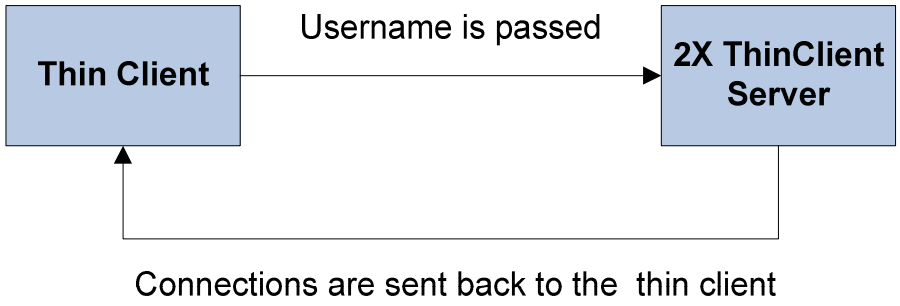


Figure 3: PXE booting

2. 2X ThinClientOS now prompts for the username and password. The username is passed to 2X ThinClientServer, which then looks for the user in the local users database, LDAP or Active Directory server. It finds the associated user profile and matches this user profile with connection settings for that user in the 2X ThinClientServer database. These connection settings are passed back to 2X ThinClientOS.
3. 2X ThinClientOS now runs the appropriate remote desktop client (RDP, ICA, NX) with the required settings, including username and password, and connects the user to the correct terminal server.

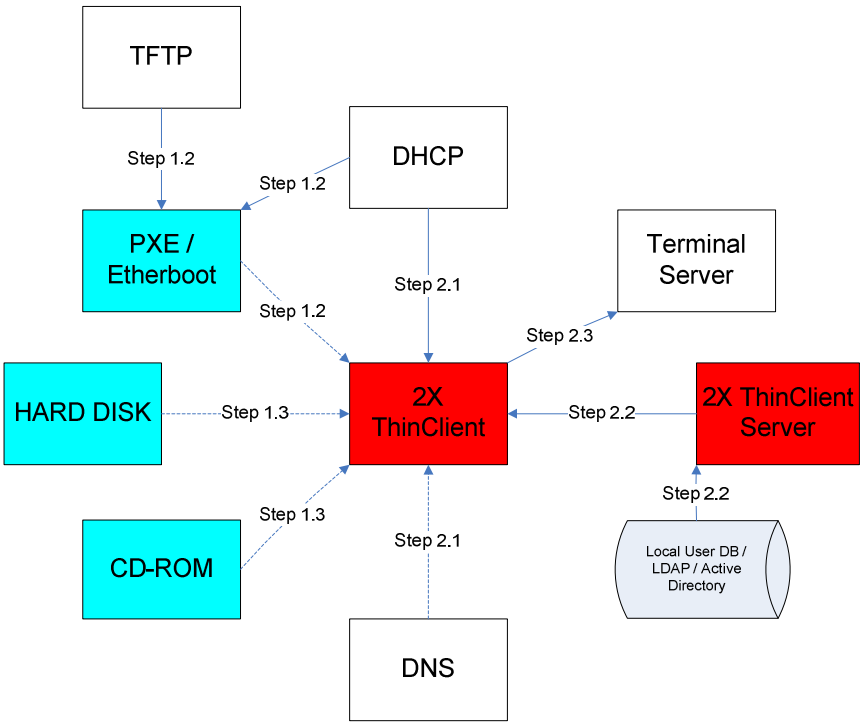


Figure 4: The complete thin-client boot and connection process

2X ThinClientServer components

2X ThinClientServer consists of a number of components:

1. The 2X ThinClientOS image – the actual Operating System that the thin client will boot. This image is either written to the hard disk or CD-Rom, and booted from there, or it is downloaded via TFTP and booted after download.
2. The 2X ThinClientServer program, which interacts with the actual thin client.
3. The 2X DHCP Helper service, which provides additional parameters to thin clients to enable centrally managed thin clients to communicate with 2X ThinClientServer.
4. A TFTP server – to serve out the 2X ThinClientOS image to the computers booting via Etherboot or PXE
5. A Management Console – to allow for web based configuration of all the connection settings. This is provided via a web server, namely Apache. Apache is one of the world's most widely used web servers. Originally developed in 1995 by a group that went on to become the Apache Group, the Apache HTTP Server is Open Source Software, and considered by proponents to be fast, scalable and secure.
6. A MySQL server – this is a light-weight SQL database server that stores all the connection settings for the users.
7. The PHP environment – PHP hypertext pre-processor is a widely-used general-purpose scripting language that is especially suited for web development.

2X ThinClientServer features

Thin client vendor independent

Use thin clients from different vendors, old/existing computers, or new low cost computers - and manage all these thin clients through one consistent and open interface. Rather than having to commit to one particular thin client vendor from whom to buy all your hardware, you get the freedom to choose and the possibility to re-use your existing computer hardware.

Web-based management interface

Thin client devices and users' connection settings can be managed centrally via the web management interface. It shows currently active thin clients and user sessions, generates reports, and includes a centralized database of thin client events, for easy troubleshooting.

Easy updates of thin client operating system & software

Updates to 2X ThinClientOS are easily deployed: Just download the latest version from the 2X website and copy it to the Thin Client Server: Thin clients booting from PXE will use the new OS at next boot-up. Thin clients booting from the hard disk can be remotely updated via the web-based interface.

Manage user's connection settings centrally

Centrally configure user's connection settings such as Terminal server name, type (RDP, Citrix ICA or NX), screen resolution and more. There is no need to push out these connection settings to the thin client devices, since they are retrieved when the user logs on.

Supports local media and printers

Locally connected printers or storage devices are supported seamlessly. Printers will show up in the list of printers on the user's desktop, and local media will appear in Windows explorer just like other media.

How it works

2X ThinClientServer deploys a small footprint Linux-based OS to old PCs, new low cost PCs and to popular thin client devices (HP, Neoware, Wyse, Maxspeed and more). Thin clients always boot the latest version of the OS from the ThinClientServer. Hardware & connection settings (including resolution, logging and more) are retrieved from the server when the client logs on, making thin clients easy to manage.

Connection settings are managed based on username, department or thin client

Most thin client management software can only configure connection settings based on device. 2X ThinClientServer links connection settings to Active Directory/LDAP usernames, groups or OU's (organizational units). This reduces the administration involved with adding users and managing roaming users.

Convert old PCs to powerful thin clients

2X ThinClientServer allows you to extend the life span of your current computers by converting them to thin clients. Re-using your old PCs or extending the life span of your current ones adds up to considerable savings over time.

Server runs on Windows or Linux

2X ThinClientServer is available for both Windows or Linux servers, and includes a TFTP server for deployment of the OS.

Use low cost thin clients

Because 2X ThinClientServer includes a thin client OS and a centralized management interface for all thin client devices, you can opt for low-cost thin clients without OS & management software. This is the most expensive part of a thin client and can increase the per thin client cost from $200 to $500.

Thin client computing: reduced administration and end user support

Administrators can enjoy greatly reduced support and administration: Thin clients are far easier to manage since the thin client OS is deployed centrally and only includes a remote terminal client. Only the servers need to be managed, meaning that deploying patches, applications and virus updates is far easier. Enforcing desktop settings and backing up user files is easier too. Better security and fault tolerance is achieved by using RAID, load balancing and housing the Terminal Servers in a secure, air-conditioned server room. Helping users is simple too: Just shadow their session in real time and find out exactly what is happening without getting off your chair

Other Features

- Thin clients can boot via PXE, CD ROM, floppy or hard disk
- Thin clients can be configured to log to Syslog for easy troubleshooting
- Thin clients can be discovered via SNMP, allowing you to use other network management software if desired
- Reports on sessions and user usage
- Customize logon screen with your own logo
- Supports RDP (inclusing 2X published applications), ICA (including Citrix published applications), and NX protocols.

3. Installing 2X ThinClientServer on Windows

System Requirements

Before you install 2X ThinClientServer, please ensure that you meet all the following requirements

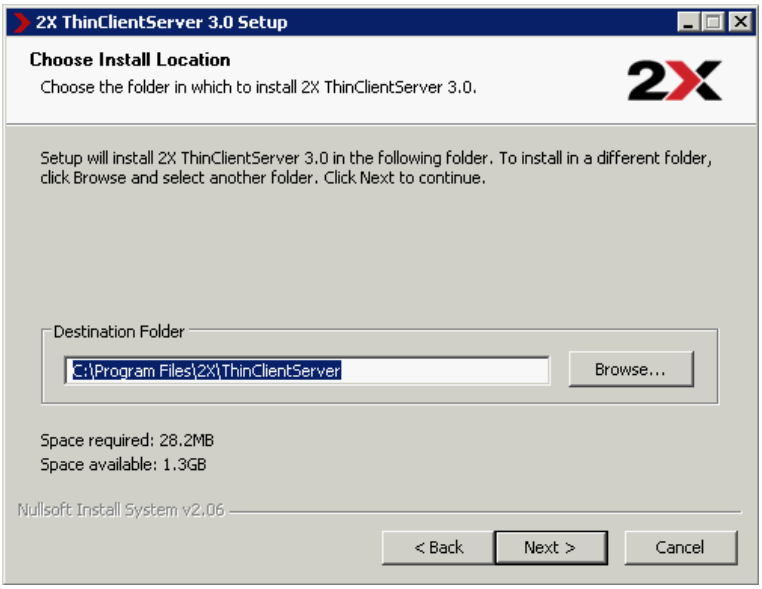
- Windows 2000/2003 server or Windows 2000/XP.
- 256 MB of RAM or more
- 800 MHz processor or higher

Step 1: Run set-up

1. Run set-up by double-clicking on the file 2XTCS2SETUP.EXE.

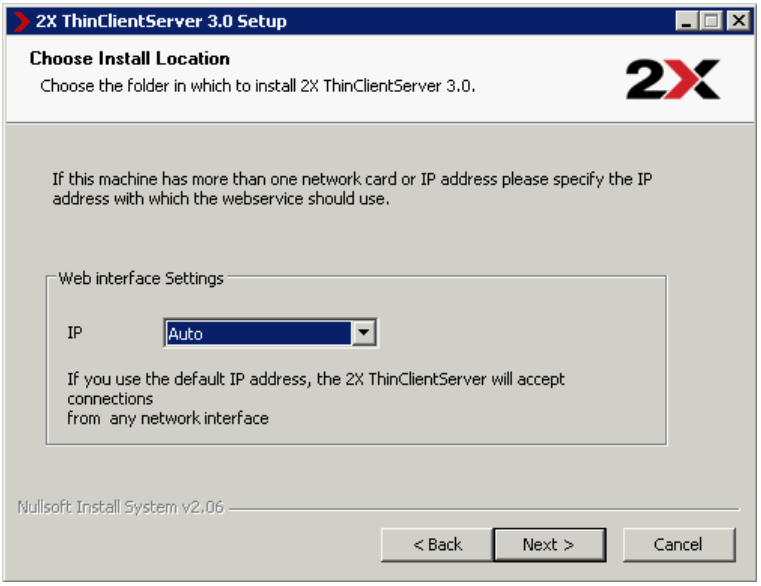
Screenshot 1: 2X ThinClientServer setup wizard

2. Click Next to start installation.
3. In the License agreement dialog box, review the license agreement and click Yes to continue the installation.



Screenshot 2: Choosing the installation folder

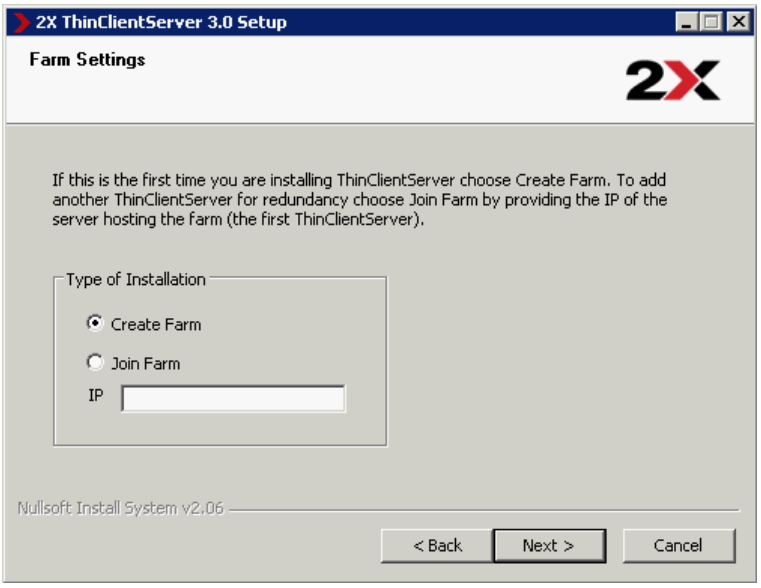
4. Choose the destination location for 2X ThinClientServer and click **Next**. 2X ThinClientServer will need a minimum of approximately 50 MB of free hard disk space.



Screenshot 3: Choosing the IP addresses for the service to listen on

5. If you have multiple network cards, or multiple IP addresses on one network card, setup will ask you for the IP address to which the 2X ThinClientServer must bind. Select Auto unless you want

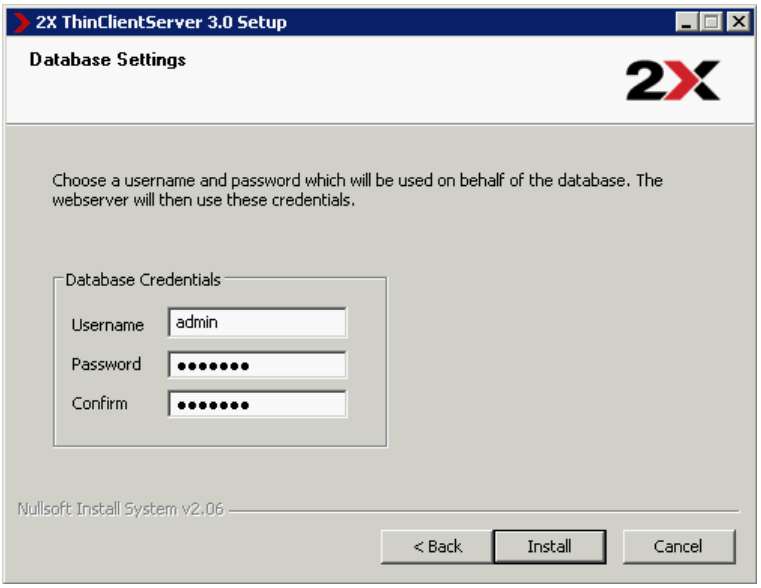
to exclude a particular network card.



Screenshot 4: Choose Server configuration in a Farm scenario

6. Set-up will ask you whether you want to create a 2X ThinClientServer farm or join an existing farm. If this is the first time you are installing 2X ThinClientServer, choose “Create Farm”. If you want to add a 2X ThinClientServer to an existing installation to improve the deployment of thin clients in large installations, then choose “Join Farm” and enter the IP address of the 2X ThinClientServer hosting the farm (typically the first 2X ThinClientServer).

Firewall Issues:
Please note that for a member server to join a farm successfully, it will be necessary to ensure that TCP connections on port 3306 to the 2X ThinClientServer hosting the farm can be established.



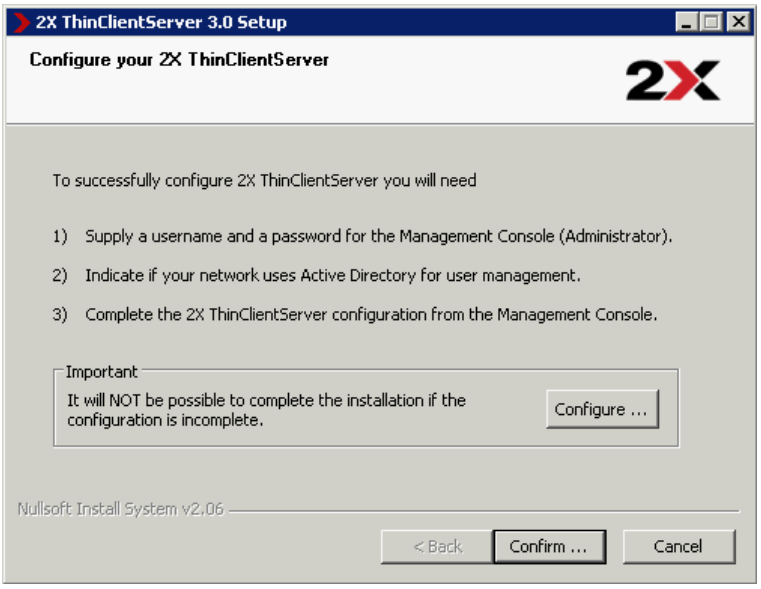
Screenshot 5: Setting the database credentials

7. Setup will ask you for a username and password for the settings to connect to the 2X ThinClientServer database. Click Install to start the installation.
8. Setup will now copy all files and install the necessary services.

   Setup will have installed the following new services:

   - 2X ThinClientServer Management Console (web-based)
   - 2X TFTPd
   - 2X DHCP Helper
   - MySQL

Windows XP Service Pack 2:
Please note that Windows XP Service Pack 2 has the Windows Firewall enabled by default, and the first time a Web Server is installed (such as 2X ThinClientServer Management Console), will request the user to confirm whether to continue blocking "Apache HTTP Server". It will be necessary to click the "Unblock" button on this dialog for the Management Console to function correctly.

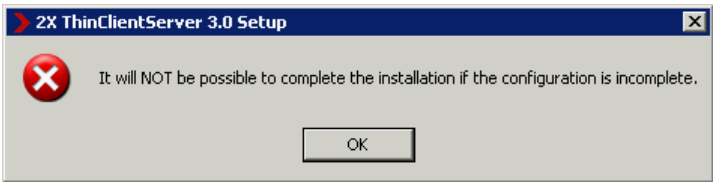


Screenshot 6: Waiting for the user to complete configuration …

9. You must now connect to the 2X ThinClientServer Management Console by selecting the "Configure …" button to configure the initial parameters for 2X ThinClientServer. Please refer to Chapter 5 for detailed initial configuration information.

   You may launch the Management Console at any time for further configuration by starting a web browser and enter the name of the machine on which 2X ThinClientServer is installed on port 980. (For example: http://thinserver.2x.com:980)

10. Once the initial configuration is complete, return to the 2X ThinClientServer Setup program and click the "Confirm …" button.



Screenshot 7: Wizard detects an incomplete setup

11. If the initial configuration is NOT complete, the 2X ThinClientServer Setup program will report an error. Click "OK" to acknowledge the error message and select the "Configure …" button to launch the Management Console. Refer to Chapter 5 for detailed initial configuration information.

Screenshot 8: Completing the 2X ThinClientServer Installation procedure.

12. Click the “Finish” button. Initial configuration was complete and the installation procedure was completed successfully.

4. Installing 2X ThinClientServer on Linux

System requirements

Before you install 2X ThinClientServer, please ensure that you meet all the following requirements

- RPM based Linux distribution
- 256 MB of RAM or more
- 800 MHz processor or higher

Step 1: Install the RPM

Open a terminal as root (super user). Change directory to the location where you downloaded the RPM from the 2X download site. Run the following command:

```
rpm -i thinclientserver-rc1-r821.i386.rpm
```

Fedora Core 3 and 4 - Dependency Issues:

Prior to installing 2X ThinClientServer for Linux, it will be necessary to install the following package:

`compat-libstdc++`

Please ensure that the version installed is compatible with gcc version 3.2.

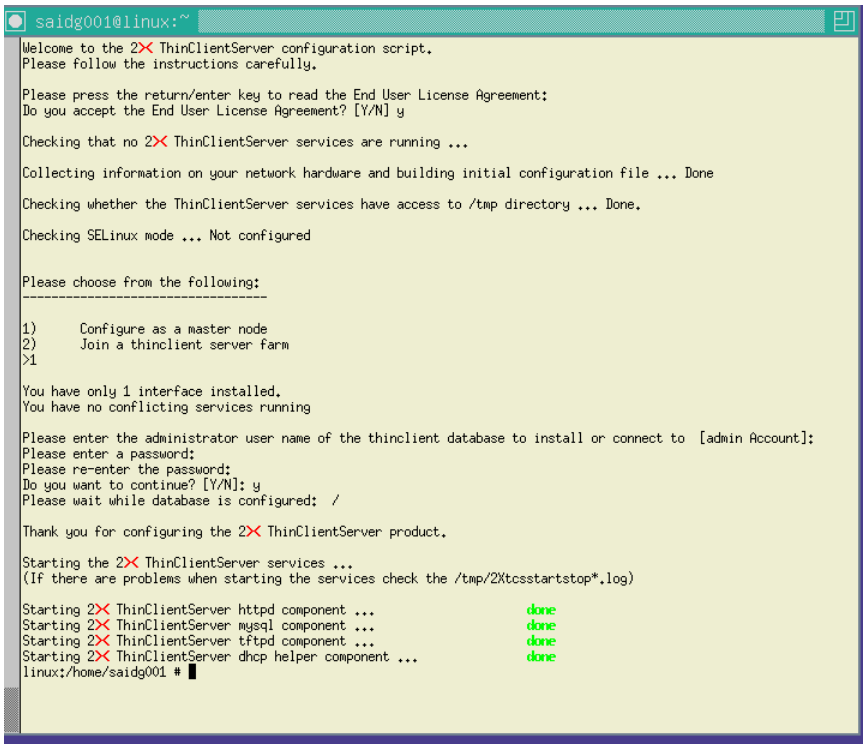
Changing server options after installation

It is required to configure the 2X ThinClientServer after installing before the service is started up. Open a terminal as root (super user). Run the following command:

2Xthinclientserver_conf.sh

Firewall Issues:
Please note that for a DHCP Server to provide TCP/IP settings to the Thin Client successfully, it will be necessary to ensure that:

1. *UDP connections on port 67 to the DHCP Server can be established.*
2. *UDP connections on port 68 to the Thin Client can be established.*
3. *UDP connections on port 67 to the 2X ThinClientServer can be established for the 2X DHCP Helper Service.*
4. *UDP connections on port 69 to the 2X ThinClientServer can be established for the 2X TFTP Service.*



Screenshot 9: Completing the configuration script for 2X ThinClientServer.

Follow the instructions as shown above. The username and password are the ones used to access the database storing the configuration settings.

You must now connect to the 2X ThinClientServer Management Console to configure the initial parameters for 2X ThinClientServer by starting a web browser and entering the name of the machine on which 2X ThinClientServer is installed on port 980 (for example: http://thinserver.2x.com:980)

Please refer to Chapter 5 for detailed initial configuration information.

You may launch the Management Console at any time for further configuration by starting a web browser and entering the name of the machine on which 2X ThinClientServer is installed on port 980.

Firewall Issues:
Please note that for a 2X ThinClientServer Management Console to function, it will be necessary to ensure that TCP connections on port 980 to the 2X ThinClientServer can be established.

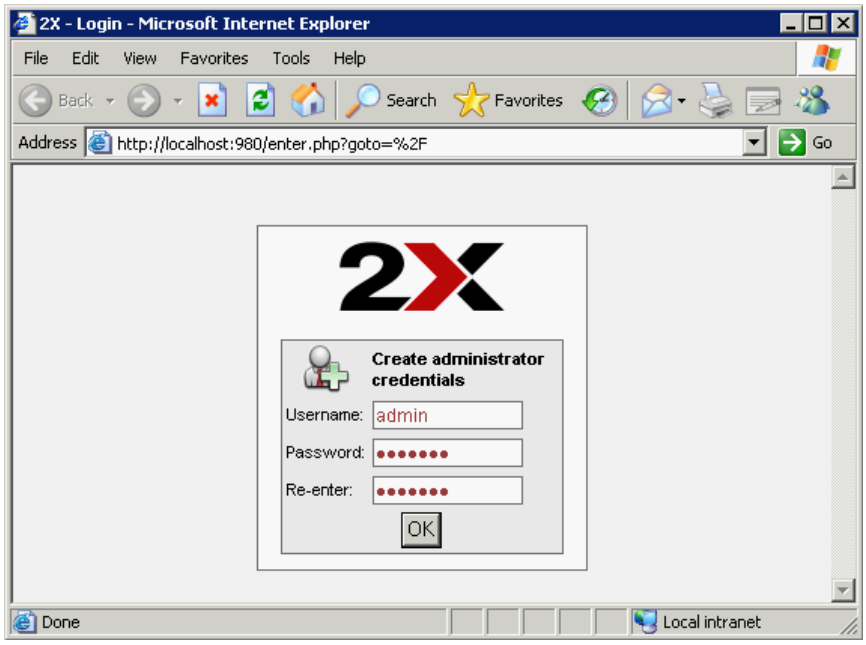
5. Initial Configuration of 2X ThinClientServer

To complete installation of 2X ThinClientServer

Ensure that JavaScript is enabled on the Web Browser you are using to access the Management Console. If JavaScript is not enabled, functionality of the Management Console will be severely impaired, and it will not be possible to complete the installation.

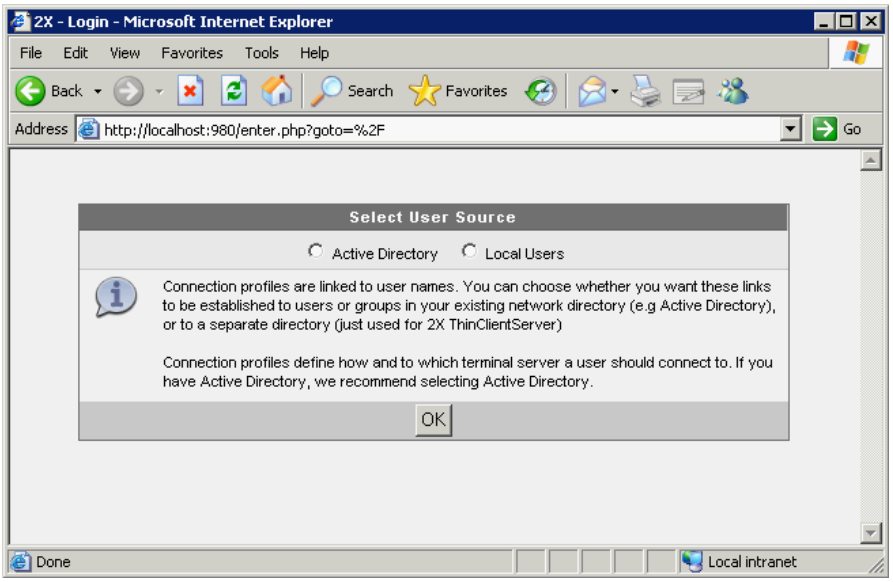
To enable JavaScript in Internet Explorer, go to Tools -> Internet Options -> Security tab. Select the Local Intranet icon and click on the "Custom Level…" button. Scroll down to Scripting -> Active Scripting and select the "Enable" option.

To enable JavaScript in Mozilla Firefox, go to Tools -> Options -> Content tab and select the "Enable JavaScript" option.



Screenshot 10: Setting the Administrator credentials for the Management Console.

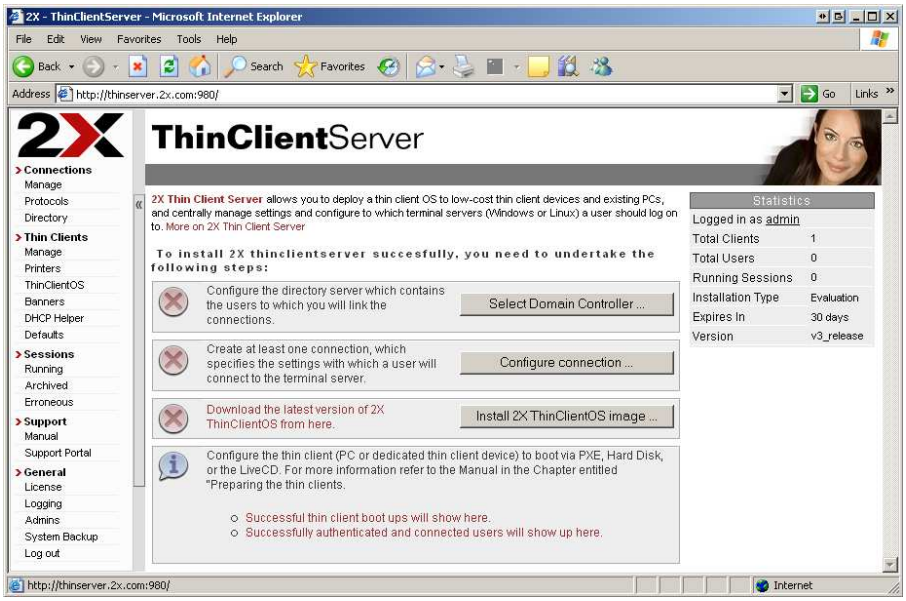
1. Type in the username and password for the administrator user who will have the rights to configure 2X ThinClientServer. Click on "OK" when ready.



Screenshot 11: Selecting the user source.

2. If you will be using Active Directory to retrieve lists of users, groups, and organisational units, select “Active Directory”. If you will be using local users for the list of users to manage, select “Local Users”. Click on “OK” when ready.

Re-configuration Issues:
Please note that it is NOT possible to change the userlist retrieval method after it has been selected. *For a 2X ThinClientServer to retrieve Active Directory information successfully, it will be necessary to ensure that TCP connections on port 389 to the Active Directory Server can be established.*



Screenshot 12: Management Console main information screen

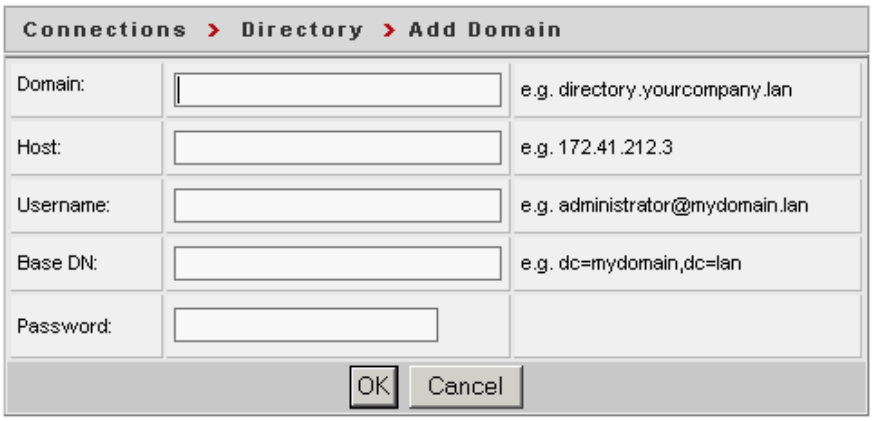
3. You will now be presented with the Management Console main information screen.

The warning icons in the centre of the page indicate the configuration procedures that must be performed prior to concluding the installation procedure.

4. Configuring the Directory Server

If you selected "Local Users" as your User Source in Step 2 above, the Management Console main screen will not prompt you to perform this procedure, and you will be able to successfully configure 2X ThinClientServer without configuring a Directory Server.

4.1. Click the button labelled “Select Domain Controller …”



Screenshot 13: Configuring the Directory Server.

4.2. Enter the domain name containing the users which will need to be assigned thin client logon rights.

4.3. Enter the fully-qualified domain name (or alternatively the IP address) of an Active Directory Server.

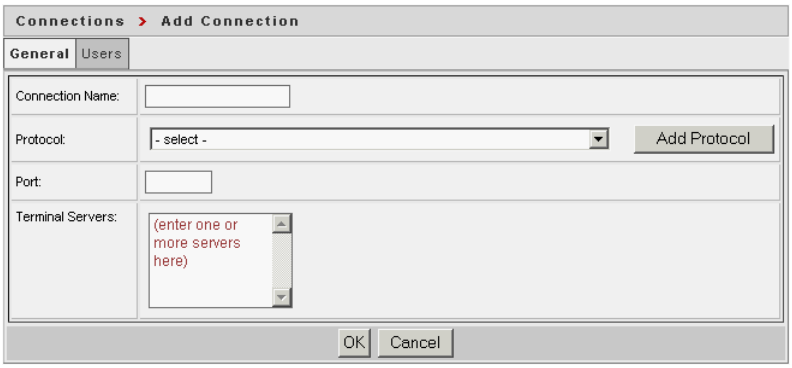
4.4. Enter a username residing within the selected domain which has **read** access to the directory. It is recommended to create a separate user for 2X ThinClientServer with a password that never expires. No data will be written to the Active Directory. The username should be in the format user@domain.com.

4.5. The Base DN connection string will automatically be displayed. If you are familiar with LDAP and Active Directory, you can edit this string to filter out results you don't need. A default Base DN is suggested when you type in your domain name. This should let you browse all your Active Directory for users.

4.6. Enter a password needed by the Active Directory to authenticate the user specified above.

4.7. Click “OK” when ready.

5. Return to the Management Console main information screen and click the button labelled “Configure connection …”



Screenshot 14: Configure a connection to a Terminal Server.

5.1. Specify a name for the connection & select a protocol.

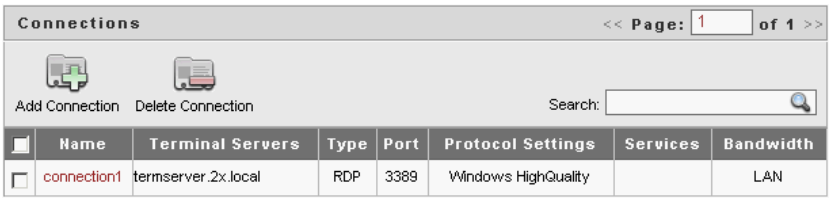
(If you want to define a new protocol, you can do so using the 'Add Protocol' button.)

5.2. The default terminal server port will be filled in automatically depending on what protocol type you select from the following options:

- *Linux (NX)*
- *Windows (RDP)*
- *Citrix (ICA)*
- *Citrix Published Applications*
- *2X Published Applications*

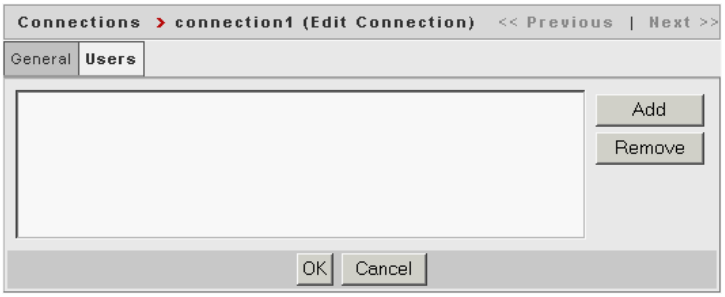
5.3. Now enter a primary (and, optionally, one or more secondary) terminal server to connect to by entering the FQDN or IP Address for the Terminal Server to be assigned to this connection. (Secondary terminal servers will be used in case the primary is not available.)

5.4. Click 'OK' when ready.



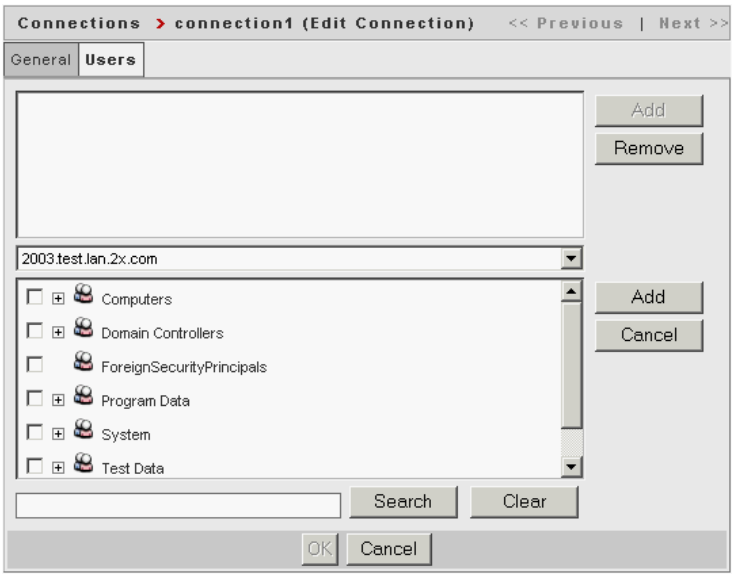
Screenshot 15: List of configured connections.

5.5. Click on the connection you have just created, and select the "Users" tab.



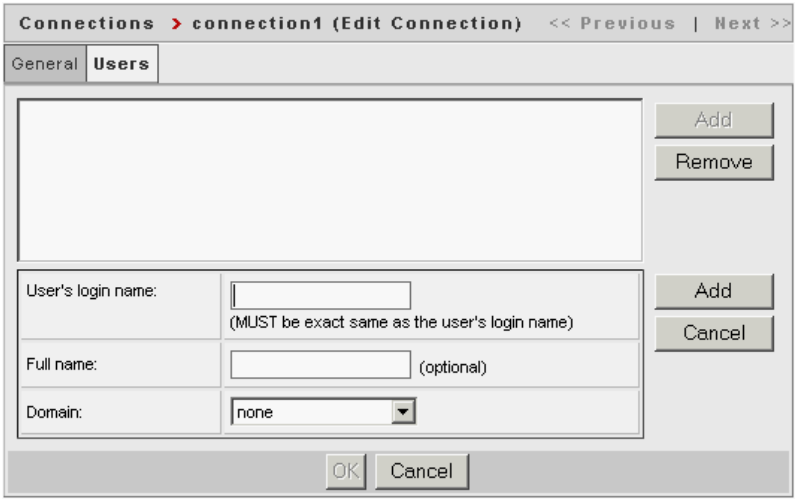
Screenshot 16: List of users assigned to a connection.

5.6. Click on the “Add” button.



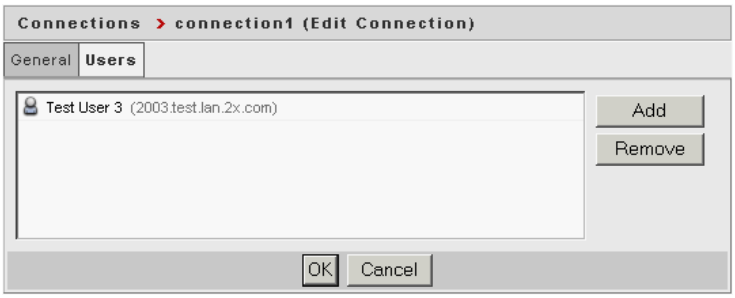
Screenshot 17: List of available users from Active Directory list.

If you selected "Local Users" as the user source in Step 2 above, the user interface presented will be as follows:



Screenshot 18: List of available users from Local list.

5.7. Use the scrollbar to identify and select the users, groups, and/or organisational units to associate with this connection, and click the "Add" button.



Screenshot 19: New users added to a connection now visible in the list.

If you selected "Local Users" as the user source in Step 2 above, simply enter the user's login name and click the "Add" button. You may optionally specify the user's full name. You may also optionally specify the domain within which the username resides.

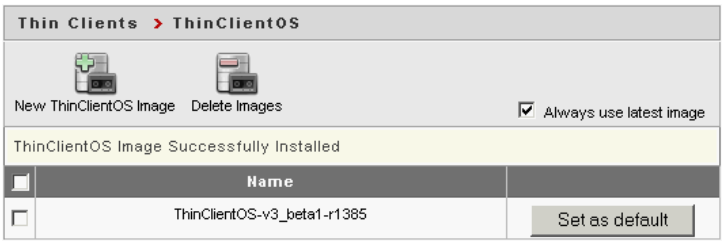
5.8. Click the "OK" button to save your changes.

6. Return to the Management Console main information screen and click the button labelled "Install 2X ThinClientOS image ..."

6.1. Using a different web browser window (or tab), download the latest 2XThinClientOS_<versionnumber>.zip from http://downloads.2x.com/thinclientserver.

Screenshot 20: Select file to make available as a 2X ThinClientOS image.

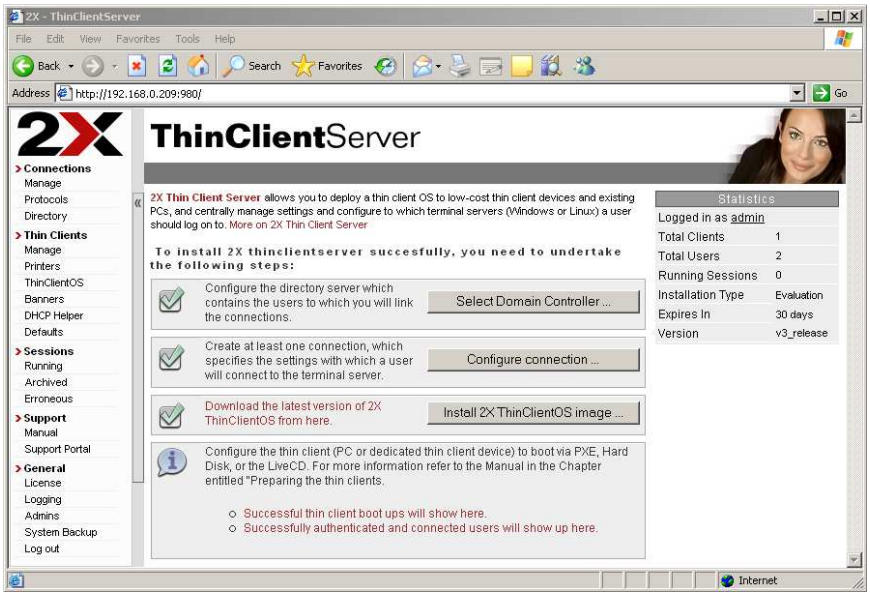
6.2. Click the "Browse…" button to locate and select the file downloaded in step 6.1 above. Click on "OK" to install the new image.



Screenshot 21: List of successfully installed 2X ThinClientOS images.

Please note that it may take some time to install the file, especially if the 2X ThinClientServer machine is connected to this machine over a slow link. It may be necessary to configure a longer session timeout to allow for this eventuality.

7. Return to the Management Console main information screen to ensure that all initial configuration items have been completed successfully.



Screenshot 22: The Management Console showing configuration status

8. Once all the initial configuration elements have been completed, you can log out of the Management Console.

Firewall Issues:
Please note that for a 2X ThinClientServer Management Console to function, it will be necessary to ensure that TCP connections on port 980 to the 2X ThinClientServer can be established.

6. Configuring 2X ThinClientServer

Introduction

Ensure that JavaScript is enabled on the Web Browser you are using to access the Management Console. If JavaScript is not enabled, functionality of the Management Console will be severely impaired, and it will not be possible to complete the installation.

To enable JavaScript in Internet Explorer, go to Tools -> Internet Options -> Security tab. Select the Local Intranet icon and click on the "Custom Level…" button. Scroll down to Scripting -> Active Scripting and select the "Enable" option.

To enable JavaScript in Mozilla Firefox, go to Tools -> Options -> Content tab and select the "Enable JavaScript" option.

The 2X ThinClientServer is the place where all connection settings are stored. Upon boot-up, thin clients connect to the server and retrieve the settings that will determine how and to which terminal server they will connect.

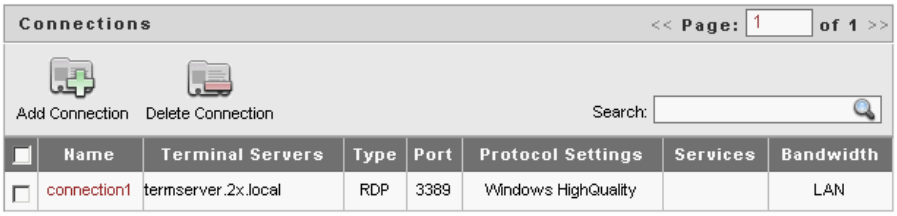
Settings can be applied to an individual thin client (by MAC address), by username, by group (effectively capturing all the members of the group), or by organizational unit (OU). This gives the administrator maximum flexibility.

The 2X ThinClientServer can be managed from anywhere in the network because the Management Console is web-based.

To load up the 2X ThinClientServer configuration page, simply click on the Configuration link in the 2X ThinClientServer program group on the 2X ThinClientServer machine, or load up a browser from anywhere in the network and enter the IP address or hostname of the 2X ThinClientServer machine together with the port number (980), like the following example:

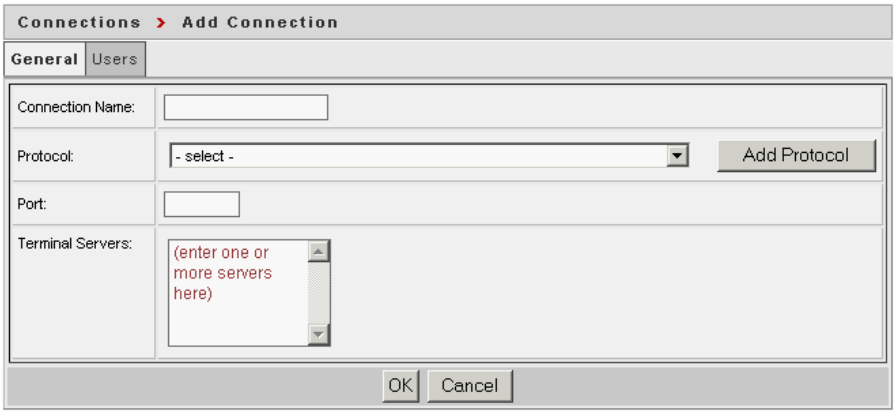
http://thinserver.2x.com:980

Manage: Manage a connection



Screenshot 23: List of configured connections

1. Add a Connection



Screenshot 24: Add Connection dialog

1.1. To add a connection, click the “Add Connection” icon.

1.2. Specify a name for the connection & select a protocol.

(If you want to define a new protocol, you can do so using the 'Add Protocol' button.)

1.3. The default terminal server port will be filled in automatically depending on what protocol type you select from the following options:

- *Linux (NX)*
- *Windows (RDP)*
- *Citrix (ICA)*
- *Citrix Published Applications*
- *2X Published Applications*

1.4. Now enter a primary (and, optionally, one or more secondary) terminal server to connect to by entering the FQDN or IP Address for the Terminal Server to be assigned to this connection. (Secondary terminal servers will be used in case the primary is not available.)

1.5. Click ‘OK’ when ready.

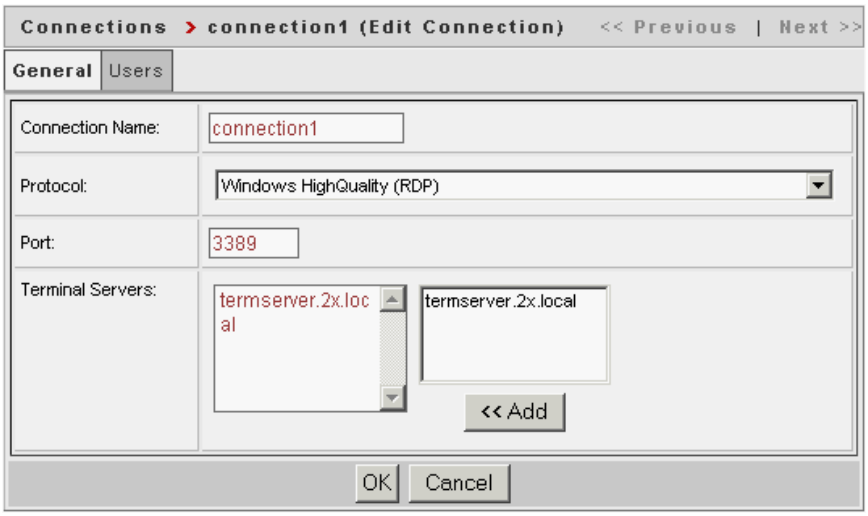
2. Delete a Connection

2.1. To delete a connection, mark the tick box next to the connection to be deleted and click the “Delete Connection” icon. To confirm deletion, click “OK” on the confirmation dialog.

2.2. You can select several connections simultaneously by marking more than tick box, and subsequently delete all the marked entries by clicking the “Delete Connection” icon.

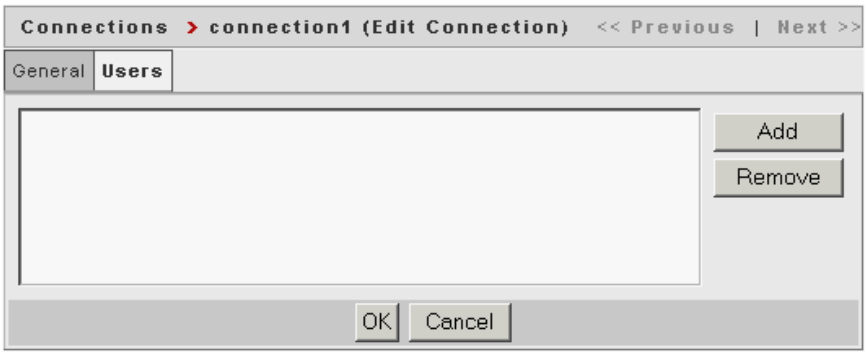
3. Edit a Connection

3.1. To edit a connection, click on the connection which you would like to edit.



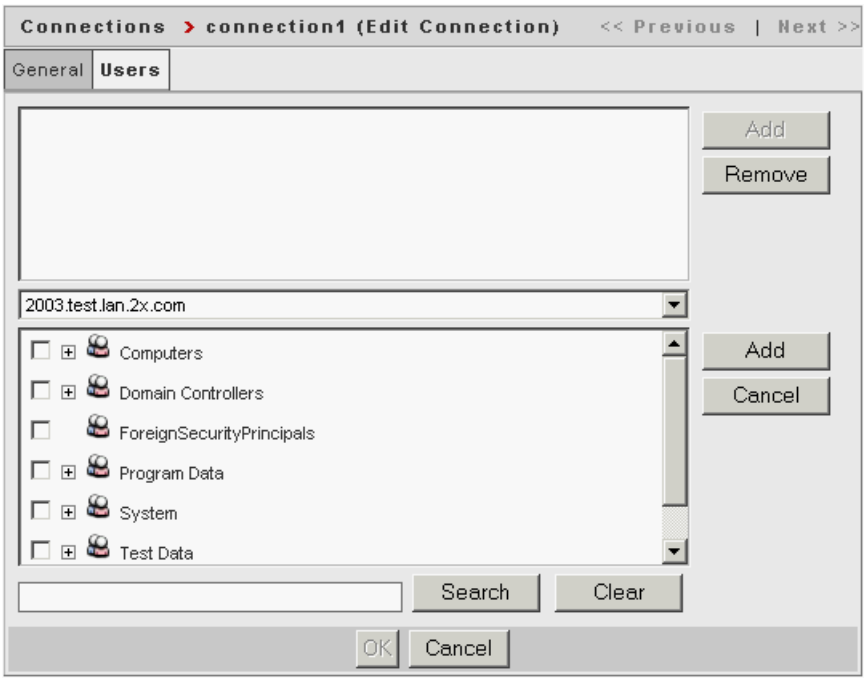
Screenshot 25: Editing connection parameters – general settings

3.2. Inside the “General” tab, you can configure the name of the connection, the communication protocol to use, the port number the terminal server is listening on (if different from the default which was set automatically when the connection was created), and the terminal server(s) to connect.



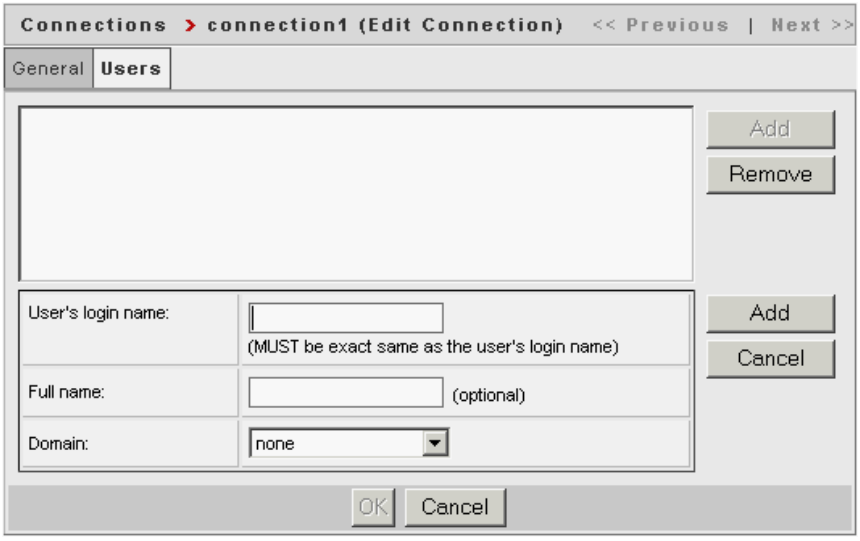
Screenshot 26: Editing connection parameters – assigned users

3.3. Inside the “Users” tab, you can configure the users who can access the terminal server via this connection.



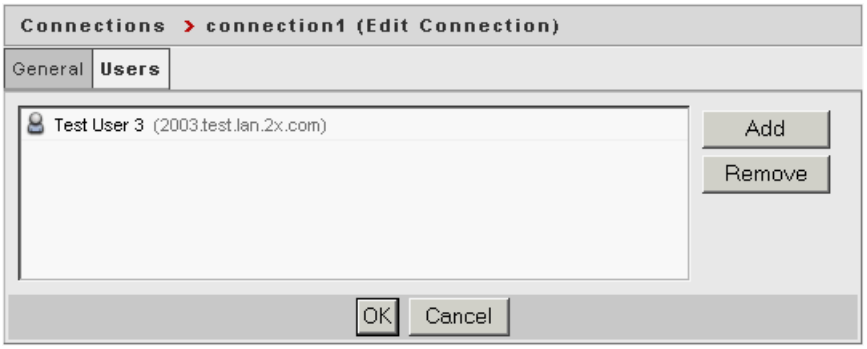
Screenshot 27: Adding users to a connection – Active Directory user source

If you selected "Local Users" as the user source in Step 2 above, the user interface presented will be as follows:



Screenshot 28: Adding users to a connection – Local user source

4. Use the scrollbar to identify and select the users, groups, and/or organisational units to associate with this connection, and click the “Add” button.



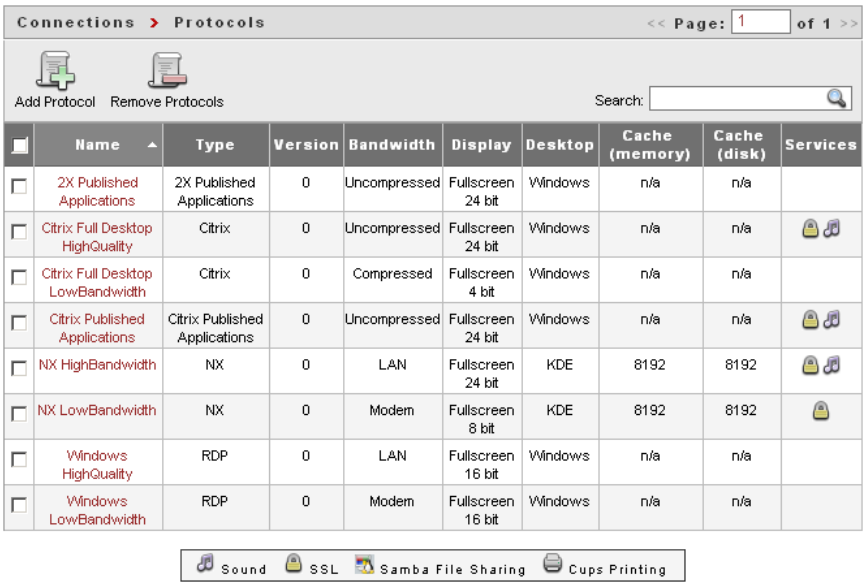
Screenshot 29: List of users assigned to a connection

If you selected “Local Users” as the user source in Step 2 above, simply enter the user’s login name and click the “Add” button. You may optionally specify the user’s full name. You may also optionally specify the domain within which the username resides.

5. To remove a user’s assignment to this connection, select the user to be removed, and click the “Remove” button.

6. Click the “OK” button to save your changes.

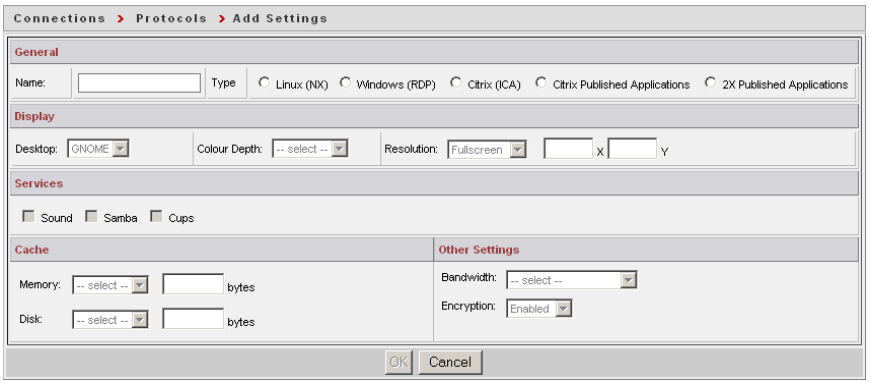
Protocols: Configure the connection protocols



Screenshot 30: List of configured connection protocols

2X ThinClientServer comes with a list of preset Protocol Settings. These presets are typically sufficient for standard use, but should you need to create a customized Protocol, proceed as follows: First start by creating a protocol setting. A protocol setting is a collection of settings for a particular protocol, for example: RDP, ICA or NX. Protocol settings can vary depending on the protocol. To create a protocol setting:

1. Click on protocols under the connections node in the left pane. The right pane will show all protocol settings currently available. Several pre-configured connection protocols (often sufficient for normal configuration) are already available when 2X ThinClientServer is installed. Click on the 'Add Protocol Setting' button.



Screenshot 31: Add Connection Protocol dialog

2. Under the general section, give the protocol setting a recognisable name and select the relevant protocol connection. Depending on your choice a number of options will be greyed out – these greyed out options are not available for the protocol selected.

2.1. Creating a Linux (NX) connection protocol

2.1.1. For the “General: Name” field, enter a name that will describe the protocol.

2.1.2. For the “General: Type” field, choose “Linux (NX)”.

2.1.3. For the “Display: Desktop” field, choose the desktop environment that the server will present to the thin client. Options available are “Gnome” and “KDE”.

2.1.4. For the “Display: Colour Depth” field, choose a value from 8-bit, 15-bit, 16-bit, and 24-bit. The factors that determine this choice are available bandwidth and the number of expected simultaneous connections. These factors may also influence the choice for the “Display: Resolution” field.

2.1.5. For restricting Colour Depth to handle possible hardware limitations on the thin clients, please use the “Thin Client -> Manage -> Edit Client -> Display Settings” node in the Management Console.

2.1.6. For the “Display: Resolution” field, you may choose from one of the pre-defined settings (640x480, 800x600, 1024x768, 1280x960, 1280x1024, Full Screen). You may also customise this setting by specifying the X and Y geometry parameters by selecting “Custom” from the drop-down list, which will enable the fields “X” and “Y” for this purpose.

2.1.7. For restricting Display Resolution to handle possible hardware limitations on the thin clients, please use the “Thin Client -> Manage -> Edit Client -> Display Settings” node in the Management Console.

2.1.8. You may enable or disable the forwarding of sound to the thin client by toggling the “Services: Sound” checkbox.

2.1.9. You may enable or disable the forwarding of SMB folder shares to the thin client by toggling the “Services: Samba” checkbox.

2.1.10. You may enable or disable the forwarding of print services to the thin client by toggling the “Services: Cups” checkbox.

2.1.11. For the “Cache: Memory” field, you may specify the amount of Memory Cache the thin client will reserve. You may either choose one of the pre-defined settings (8Mb, 16Mb or 32Mb), or you may specify an arbitrary amount by choosing the “Custom” setting, and filling in the amount in bytes required in the adjacent field which becomes enabled after choosing this option.

2.1.12. Please note that the Custom setting requires you to specify the amount in bytes.

2.1.13. For the “Cache: Disk” field, you may specify the amount of Disk Cache the thin client will reserve. You may either choose one of the pre-defined settings (8Mb, 16Mb or 32Mb), or you may specify an arbitrary amount by choosing the “Custom” setting, and filling in the amount in bytes required in the adjacent field which becomes enabled after choosing this option.

2.1.14. Please note that the Custom setting requires you to specify the amount in bytes.

2.1.15. For the “Other Settings: Bandwidth” field, you can specify the protocol bandwidth utilisation (choosing from “Modem”, “Broadband”, and “LAN”) to optimise the experience for the available bandwidth.

2.1.16. For the “Other Settings: Encryption” field, you may choose to enable or disable encryption for client sessions accessing the Terminal Server using this protocol.

2.1.17. Click on 'OK' to save the protocol settings. You will be able to associate them with a connection.

Firewall Issues:
Please note that for a Linux (NX) Session to run successfully, it will be necessary to ensure that TCP connections on port 22 to the 2X TerminalServer can be established.

2.2. Creating a Windows (RDP) connection protocol

2.2.1. For the “General: Name” field, enter a name that will describe the protocol.

2.2.2. For the “General: Type” field, choose “Windows (RDP)”.

2.2.3. For the “Display: Desktop” field, the Management Console will pre-select the value “Windows (RDP)”. The Management Console will not allow changing this value since it is the only valid setting.

2.2.4. For the “Display: Colour Depth” field, choose a value from 8-bit, 15-bit, 16-bit, and 24-bit. The factors that determine this choice are available bandwidth and the number of expected simultaneous connections. These factors may also influence the choice for the “Display: Resolution” field.

For restricting Colour Depth to handle possible hardware limitations on the thin clients, please use the “Thin Client -> Manage -> Edit Client -> Display Settings” node in the Management Console.

2.2.5. For the “Display : Resolution” field, you may choose from one of the pre-defined settings (640x480, 800x600, 1024x768, 1280x960, 1280x1024, Full Screen). You may also customise this setting by specifying the X and Y geometry parameters by selecting “Custom” from the drop-down list, which will enable the fields “X” and “Y” for this purpose.

For restricting Display Resolution to handle possible hardware limitations on the thin clients, please use the “Thin Client -> Manage -> Edit Client -> Display Settings” node in the Management Console.

2.2.6. You may enable or disable the forwarding of sound to the thin client by toggling the “Services -> Sound” checkbox.

Note that the "Services: Samba" and "Services: Cups" options are not applicable to a Windows (RDP) connection and are therefore disabled.

2.2.7. For the "Other Settings: Bandwidth" field, you can specify the protocol bandwidth utilisation (choosing from "Modem", "Broadband", and "LAN") to optimise the experience for the available bandwidth.

2.2.8. For the "Other Settings: Encryption" field, you may choose to enable or disable encryption for client sessions accessing the Terminal Server using this protocol.

Note that the "Cache: Memory" and "Cache: Disk" options are not applicable to a Windows (RDP) protocol and are therefore disabled.

2.2.9. Click on 'OK' to save the protocol settings. You will be able to associate them with a connection.

Firewall Issues:
Please note that for a Windows (RDP) Session to run successfully, it will be necessary to ensure that TCP connections on port 3389 to the Windows Terminal Server can be established (or whichever port the Terminal Server was reconfigured to listen on).

2.3. Creating a Citrix (ICA) connection protocol

2.3.1. For the "General: Name" field, enter a name that will describe the protocol.

2.3.2. For the "General: Type" field, choose "Citrix (ICA)".

2.3.3. For the "Display: Desktop" field, the Management Console will pre-select the value "Windows (RDP)". The Management Console will not allow changing this value since it is the only valid setting.

2.3.4. For the "Display: Colour Depth" field, choose a value from 8-bit, 15-bit, 16-bit, and 24-bit. The factors that determine this choice are available bandwidth and the number of expected simultaneous connections. These factors may also influence the choice for the "Display: Resolution" field.

2.3.5. For restricting Colour Depth to handle possible hardware limitations on the thin clients, please use the "Thin Client -> Manage -> Edit Client -> Display Settings" node in the Management Console.

2.3.6. For the “Display : Resolution” field, you may choose from one of the pre-defined settings (640x480, 800x600, 1024x768, 1280x960, 1280x1024, Full Screen). You may also customise this setting by specifying the X and Y geometry parameters by selecting “Custom” from the drop-down list, which will enable the fields “X” and “Y” for this purpose.

2.3.7. For restricting Display Resolution to handle possible hardware limitations on the thin clients, please use the “Thin Client -> Manage -> Edit Client -> Display Settings” node in the Management Console.

2.3.8. You may enable or disable the forwarding of sound to the thin client by toggling the “Services: Sound” checkbox.

2.3.9. Note that the “Services: Samba” and “Services: Cups” options are not applicable to a Citrix (ICA) protocol and are therefore disabled.

2.3.10. For the “Other Settings: Bandwidth” field, you can specify whether the traffic between the server and the thin client will be compressed or uncompressed to optimise the experience for the available bandwidth.

2.3.11. For the “Other Settings: Encryption” field, you may choose the level of encryption for client sessions accessing the Terminal Server using this protocol.

2.3.12. Note that the “Cache: Memory” and “Cache: Disk” options are not applicable to a Citrix (ICA) protocol and are therefore disabled.

2.3.13. Click on 'OK' to save the protocol settings. You will be able to associate them with a connection.

Firewall Issues:
Please note that for a Citrix (ICA) Session to run successfully, it will be necessary to ensure that TCP connections on port 1494 to the Citrix Presentation Server can be established.

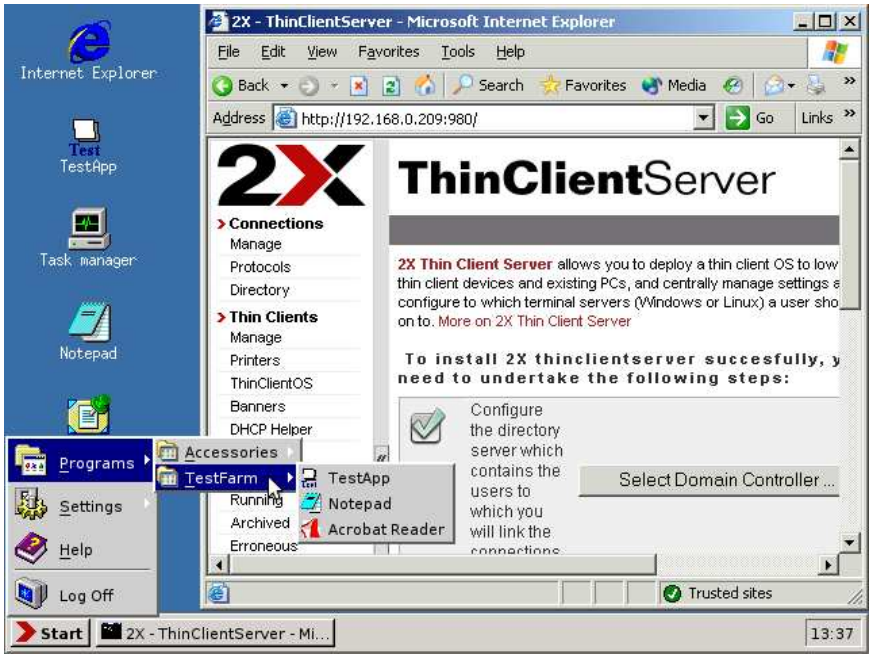
2.4. Creating a Citrix Published Applications connection protocol.

2.4.1. Please note that the Citrix PNAgent extension MUST be installed on the network to enable this functionality.

2.4.2. For the “General: Name” field, enter a name that will describe the protocol.

2.4.3. For the “General: Type” field, choose “Citrix Published Applications.

2.4.4. Click on “OK” to save the protocol settings. You will be able to associate them with a connection.



Screenshot 32: A managed desktop with Citrix Published Applications

2.4.5. Booting a thin client and logging in with a user assigned to a connection using this protocol will provide the user with a managed desktop incorporating the Citrix-configured published applications.

Firewall Issues:
Please note that for a Citrix Published Application Session to run successfully, it will be necessary to ensure that TCP connections on port 80 to the Citrix Presentation Server can be established.

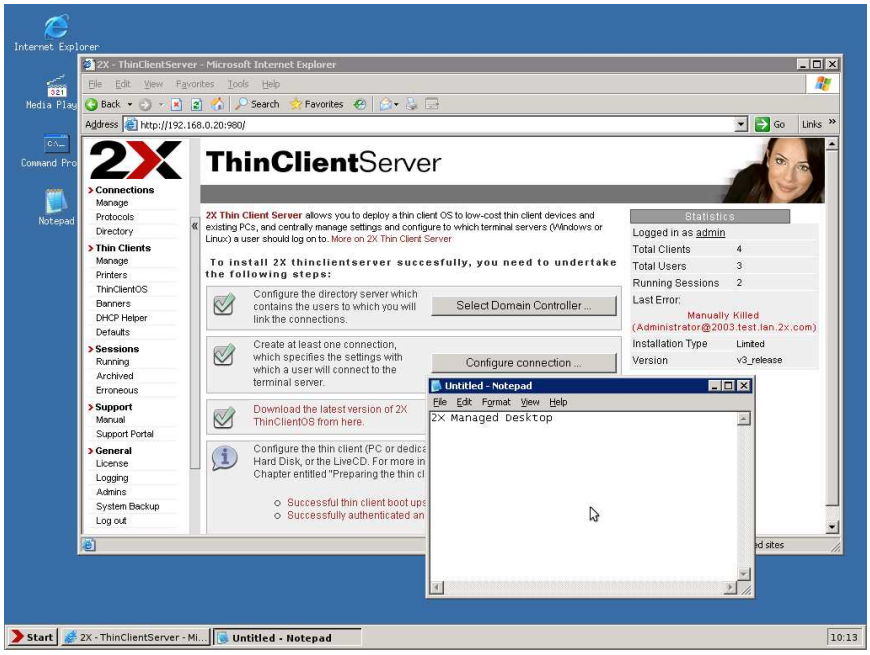
2.5. Creating a 2X Published Applications connection protocol.

2.5.1. Please note that 2X ApplicationServer MUST be installed on the network to enable this functionality.

2.5.2. For the “General: Name” field, enter a name that will describe the protocol.

2.5.3. For the "General: Type" field, choose "2X Published Applications.

2.5.4. Click on "OK" to save the protocol settings. You will be able to associate them with a connection.



Screenshot 33: A managed desktop with 2X Published Applications

2.5.5. Booting a thin client and logging in with a user assigned to a connection using this protocol will provide the user with a managed desktop incorporating the 2X ApplicationServer-configured published applications.

Boot up a thin client and connect!

After you have configured the 2X ThinClientServer and prepared a thin client, you can now test the system by simply booting up the thin client. You should get a connection screen and be able to log on to a terminal server.

7. Preparing the Thin Clients

Introduction

After you have installed the 2X ThinClientServer, you can proceed to install/configure a thin client or computer to boot 2X ThinClientOS. 2X ThinClientOS can be booted from a storage device (CD-Rom, hard disk, or flash disk) or it can boot over the network (PXE or Etherboot). Etherboot works very similar to PXE, however it does not rely on the bios of the computer to boot via the network but on a small boot image copied to a CD-Rom, floppy disk, a hard disk, or even the ROM of a network card.

For more information about the boot methods and how 2X ThinClientServer works, see Chapter 2 - Introduction to 2X ThinClientServer.

The 2X ThinClientOS is provided in the form of 2 files and can be downloaded from the www.2x.com website. The 2X ThinClientOS is provided as:

1. an ISO file to burn on a CD-Rom. The file name is called 2XThinClientOS_<version number>.iso. This can be used to:
   - boot from CD
   - install on to the hard disk or flash disk
   - boot from the network.
2. a ZIP file to be installed onto 2X ThinClientServer or else to be extracted to the TFTP server directory. 2X ThinClientOS will then be downloaded and booted by thin clients configured to boot via PXE or Etherboot. The file name is called 2XThinClientOS_<versionnumber>.zip.

   This same file is also used to update the version on the 2X ThinClientServer, so that thin clients that have 2X ThinClientOS installed on the hard disk can automatically download the latest version.

Thin Client System Requirements

- Any thin client/computer with a Pentium processor or higher
- 32 MB of RAM is needed for CD-Rom or hard disk
- 64 MB of RAM is needed for PXE or Etherboot

- 450 MHz processor or higher
- If you want to boot via PXE, ensure that your thin client device supports PXE booting. Not all thin clients or computers can boot via PXE
- If you want to boot via Etherboot, ensure that your thin client device has a supported network card. A list of supported network cards can be found here:

  http://www.etherboot.org/db/

Configuring a thin client to boot the image from CD-Rom

Step 1: Downloading the thin client OS

Download the 2X ThinClientOS image as an ISO file, called 2XThinCLientOS_<version number>.iso from:

http://downloads.2x.com/thinclientserver

Step 2: Burning the ISO image to a CD-Rom

Now burn the downloaded image to CD-Rom. To do this:

- If using Windows XP and Nero Burning Rom simply go to menu “Recorder”, choose option “Burn Image…”, and select the downloaded .ISO file.
- If using Linux & K3B, simply go to Burn CD. Select the ISO image and click 'Start'.
- Verify that the ISO matches the relevant MD5 Checksum provided on the http://www.2x.com download site. You can download a 3rd party MD5 checksum verifier for Windows from the following location:

  http://www.karenware.com/powertools/pthasher.asp

- Use good quality CD-Rom (avoid CD-RW) media which is known to work with your CD-Rom drive.
- Burn the CD as a finalised single session using track-at-once (TAO).
- Enable Buffer-Underrun Protection.
- Ensure that the downloaded ISO file is not in use (for example by anti-virus software).
- Set the burning speed to match the recommended speed specified by the CD-Rom media and gradually lower the speed if problems are encountered reading the CD-Rom.
- Ensure that the system has enough free resources to complete the burning process.
- If problems persist try to boot from the CD-Rom drive used to burn the ISO.

Step 3: Configure the thin client to boot from CD-Rom

After you have burned the CD-Rom, insert the CD-Rom into the CD-Rom drive of the thin client / computer. Now ensure that the thin client will attempt to boot from the CD-Rom and not from another storage device. Go into the computers BIOS and check that the boot sequence starts with the CD-Rom drive.

Configuring a thin client to boot from a hard disk or flash disk (CD install)

Be sure to make a backup of all data before attempting to install.

Step 1: Downloading the thin client OS

Download the 2X ThinClientOS image as an ISO file, called 2XThinCLientOS_<version number>.iso from:

http://downloads.2x.com/thinclientserver

Step 2: Burning the ISO image to a CD-Rom

Now burn the downloaded image to CD-Rom. To do this:

- If using Windows XP and Nero Burning Rom, simply go to menu “Recorder”, choose option “Burn Image…”, and select the downloaded .ISO file.
- If using Linux & K3B, simply go to Burn CD. Select the ISO image and click 'Start'.
- Verify that the ISO matches the relevant MD5 Checksum provided on the http://www.2x.com download site. You can download a 3rd party MD5 checksum verifier for Windows from the following location:

  http://www.karenware.com/powertools/pthasher.asp

- Use good quality CD-Rom (avoid CD-RW) media which is known to work with your CD-Rom drive.
- Burn the CD as a finalised single session using track-at-once (TAO).
- Enable Buffer-Underrun Protection.
- Ensure that the downloaded ISO file is not in use (for example by anti-virus software).
- Set the burning speed to match the recommended speed specified by the CD-Rom media and gradually lower the speed if problems are encountered reading the CD-Rom.
- Ensure that the system has enough free resources to complete the burning process.

- If problems persist try to boot from the CD-Rom drive used to burn the ISO.

Step 3: Configure the thin client to boot from CD-Rom

After you have burned the CD-Rom, insert the CD-Rom into the CD-Rom drive of the thin client / computer. Now ensure that the thin client will attempt to boot from the CD-Rom and not from another storage device. Go into the computers BIOS and check that the boot sequence starts with the CD-Rom drive.

Step 4: Installing 2X ThinClientOS on the hard disk

Be sure to make a backup of all important data before installing 2X ThinClientOS.

As soon as the computer boots, follow these steps to install the image to the hard disk:

1. Choose “2X ThinClientOS Installer” using the cursor keys and press ENTER.
2. Click OK on the welcome message.
3. The installer will check if you have free unpartitioned space on the hard disk – if it finds free space, it will automatically create a partition of 32 megabytes and install 2X ThinClientOS.
4. If it does not find unpartitioned space, it will prompt you whether you wish to:
   a) Overwrite an existing partition – this option will allow you to select an existing partition, which the installer will use to install 2X ThinClientOS.

      Note: All data on this partition will be erased.

   b) Resize a partition – this option will cause the installer to attempt to resize an existing partition by reducing it by 32 MB, and then creating a new partition for the 2X ThinClientOS.

   c) Erase entire hard disk – this option will erase all data on the hard disk and create a single partition for 2X ThinClientOS.

   d) Manually partition – this option will start a partitioning program and allow you to re-partition the hard disk. After the partitioning is complete, the installer will allow you to select which partition to install 2X ThinClientOS on.

5. The installer will now prompt you to install a boot loader menu. This allows you to select, at boot-time, whether to boot into 2X ThinClientOS or whether to boot into the Operating System which was originally installed.
6. The installer will now copy the 2X ThinClientOS image to the hard disk. After it is finished, the machine must be rebooted.

Step 5: Configure the thin client to boot from the hard disk

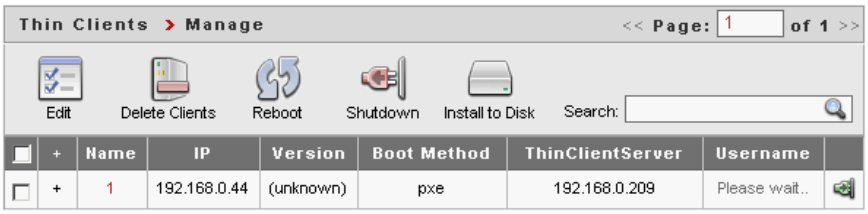
After you have installed 2X ThinClientOS, you must now ensure that the thin client / computer will boot from the hard disk. Go into the computer's BIOS and check that the boot sequence starts with the hard disk.

Note that the 2X ThinClientOS will automatically update itself with the latest version, if you have installed a later version of 2X ThinClientOS on the 2X ThinClientServer.

Configuring a thin client to boot from a hard disk or flash disk (Network install)

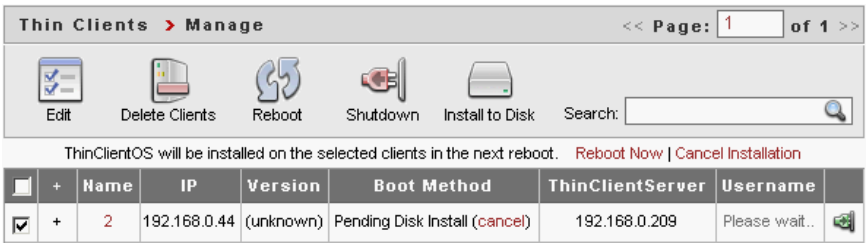
Be sure to make a backup of all data before attempting to install.

1. Configuring the thin client to boot via PXE: Enter the BIOS of the thin client / computer and configure it to boot via PXE. Reboot the thin client / computer, enter the BIOS, and check for a boot sequence entry. For more information, check the documentation of your thin client / computer.
2. Booting the thin client for the first time: You will need to boot the thin client so that 2X ThinClientServer can add the thin client to the list of detected thin clients. Once the thin client has booted successfully and displays the login screen, you are ready to move to step 3.
3. Flagging the thin client for a hard disk install



Screenshot 34: List of thin clients

3.1. From the Management Console go to Thin Clients -> Manage. Identify the new thin client, click the check box relevant to the thin client in the first column, click the "Install to Disk" icon, and click "OK" on the confirmation dialog.



Screenshot 35: List of thin clients after flagging units for a Hard Disk installation

3.2. The “Boot Method” field will change to “Pending Disk Install (cancel)”. You can click “cancel” if you do not want to perform the installation on the thin client.

3.3. You must now reboot the thin client to initialise the installation procedure. The thin client will again boot over the network, but will receive new parameters instructing it to perform a hard disk installation.

3.4. The installer will check if you have free unpartitioned space on the hard disk – if it finds free space, it will automatically create a partition of 32 megabytes and install 2X ThinClientOS.

3.5. If it does not find unpartitioned space, it will prompt you whether you wish to:

3.5.1. Overwrite an existing partition – this option will allow you to select an existing partition, which the installer will use to install 2X ThinClientOS.

Note: All data on this partition will be erased.

3.5.2. Resize a partition – this option will cause the installer to attempt to resize an existing partition by reducing it by 32 MB, and then creating a new partition for the 2X ThinClientOS.

3.5.3. Erase entire hard disk – this option will erase all data on the hard disk and create a single partition for 2X ThinClientOS.

3.5.4. Manually partition – this option will start a partitioning program and allow you to re-partition the hard disk. After the partitioning is complete, the installer will allow you to select which partition to install 2X ThinClientOS on.

3.6. The installer will now prompt you to install a boot loader menu. This allows you to select, at boot-time, whether to boot into 2X ThinClientOS or whether to boot into the Operating System which was originally installed.

3.7. The installer will now copy the 2X ThinClientOS image to the hard disk. After it is finished, the machine must be rebooted.

4. Configure the thin client to boot from the hard disk

4.1. After you have installed 2X ThinClientOS, you must now ensure that the thin client / computer will boot from the hard disk. Go into the computer's BIOS and check that the boot sequence starts with the hard disk.

Note that the 2X ThinClientOS will automatically update itself with the latest version if you have installed a later version of 2X ThinClientOS on the 2X ThinClientServer.

Configuring a thin client to boot via PXE

Step 1: Download the 2X ThinClientOS image

Download the 2X ThinClientOS image as a ZIP file, called 2XThinClientOS_<version number>.zip from:

http://downloads.2x.com/thinclientserver

Step 2: Copy the image to a 3rd party TFTP Server (optional)

If you are using a 3rd party TFTP server instead of the one already bundled with 2X ThinClientServer, please note the following:

Upon boot, the thin client must find a TFTP server and download the 2X ThinClientOS image. Therefore you must extract the contents of the "PXE" folder found within the downloaded 2XThinClientOS ZIP file to the directory from which the TFTP server serves files. The industry default is X:\tftproot. To install the remaining files needed during the boot procedure, ensure you install the new 2X ThinClientOS image by following the section entitled "Installing a new 2X ThinClientOS" later on in this chapter.

Note that 2X ThinClientServer will automatically install it's own TFTP Server to allow for this functionality without additional configuration from the user. This step is only necessary in the case a TFTP Server is already installed on the 2X ThinClientServer machine and providing services to the network, or if you intend to use a TFTP server already commissioned elsewhere on your network.

Step 3: Configuring thin clients to boot via PXE

Now you need to enter the BIOS of the thin client / computer and configure it to boot via PXE. Reboot the thin client / computer, enter the BIOS, and check for a boot sequence entry. For more information, check the documentation of your thin client / computer.

Configuring a thin client to boot via Etherboot using the 2X ThinClientOS LiveCD

Step 1: Download the 2X ThinClientOS image

Download the 2X ThinClientOS image as a ZIP file, called 2XThinCLientOS_<version number>.zip from:

http://downloads.2x.com/thinclientserver

Note: The Etherboot image is the same image used for PXE booting. Therefore if you have already downloaded the PXE image you can use that same image.

Step 2: Copy the image to a 3rd party TFTP Server (optional)

If you are using a 3rd party TFTP server instead of the one already bundled with 2X ThinClientServer, please note the following:

Upon boot, the thin client must find a TFTP server and download the 2X ThinClientOS image. Therefore you must extract the contents of the "PXE" folder found within the downloaded 2XThinClientOS zip file to the directory from which the TFTP server serves files. The industry default is X:\tftproot. To install the remaining files needed during the boot procedure, ensure you install the new 2X ThinClientOS image by following the section entitled "Installing a new 2X ThinClientOS" later on in this chapter.

Note that 2X ThinClientServer will automatically install it's own TFTP Server to allow for this functionality without additional configuration from the user. This step is only necessary in the case a TFTP Server is already installed on the 2X ThinClientServer machine and providing services to the network, or if you intend to use a TFTP server already commissioned elsewhere on your network.

Step 3: Download the 2X ThinClientOS LiveCD

The 2X ThinClientOS LiveCD provides the option to boot over the network from your CD-Rom using Etherboot. If you wish to use a floppy disk or hard drive to boot via Etherboot, you can proceed directly to Step 6. Download the 2X ThinClientOS image as an ISO file, called 2XThinCLientOS_<version number>.iso from:

http://downloads.2x.com/thinclientserver

Step 4: Burning the ISO image to a CD-Rom

To burn the downloaded image to CD-Rom:

- If using Windows XP and Nero Burning ROM simply go to menu "Recorder", choose option "Burn Image…", and select the downloaded .ISO file.

- If using Linux & K3B, simply go to Burn CD. Select the ISO image and click 'Start'.
- Verify that the ISO matches the relevant MD5 Checksum provided on the http://www.2x.com download site. You can download a 3rd party MD5 checksum verifier for Windows from the following location:

  http://www.karenware.com/powertools/pthasher.asp
- Use good quality CD-Rom (avoid CD-RW) media which is known to work with your CD-Rom drive.
- Burn the CD as a finalised single session using track-at-once (TAO).
- Enable Buffer-Underrun Protection.
- Ensure that the downloaded ISO file is not in use (for example by anti-virus software).
- Set the burning speed to match the recommended speed specified by the CD-Rom media and gradually lower the speed if problems are encountered reading the CD-Rom.
- Ensure that the system has enough free resources to complete the burning process.
- If problems persist try to boot from the CD-Rom drive used to burn the ISO.

Step 5: Configure the thin client to boot from CD-Rom

After you have burned the CD-Rom, insert the CD-Rom into the CD-Rom drive of the thin client / computer. Now ensure that the thin client will attempt to boot from the CD-Rom and not from another storage device. Go into the computers BIOS and check that the boot sequence starts with the CD-Rom drive.

Installing a new version of 2X ThinClientOS

2X releases new updates to the 2X ThinClientOS on a regular basis. These updates will incorporate improvements to hardware detection, updates to terminal server clients, and more.

Thin clients that boot from the hard disk, via PXE, or via Etherboot, will automatically retrieve and use the latest 2X ThinClientOS version installed via the Management Console.

To install the latest 2X ThinClientOS:

1. Download the latest 2XThinClientOS_<version number>.zip from http://downloads.2x.com/thinclientserver

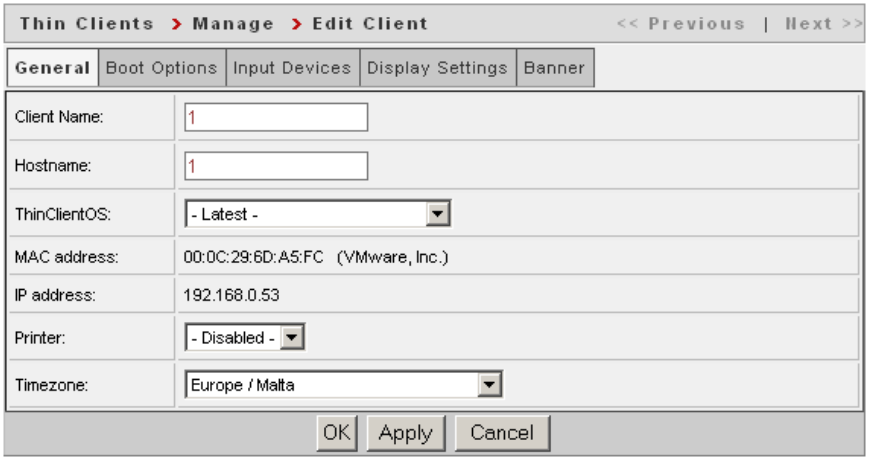
2. If your thin clients boot via PXE or Etherboot, extract the contents of the PXE folder in the ZIP file to the TFTP directory on the 3rd party TFTP server. This is not necessary if you are using the TFTP server bundled with 2X ThinClientServer. The next time the thin client boots, it will use the latest 2X ThinClientOS.

Screenshot 36: Installing the latest 2X ThinClientOS

3. Install the downloaded 2X ThinClientOS version by going to the Thin Clients > ThinClientOS node in the 2X ThinClientServer Management Console.

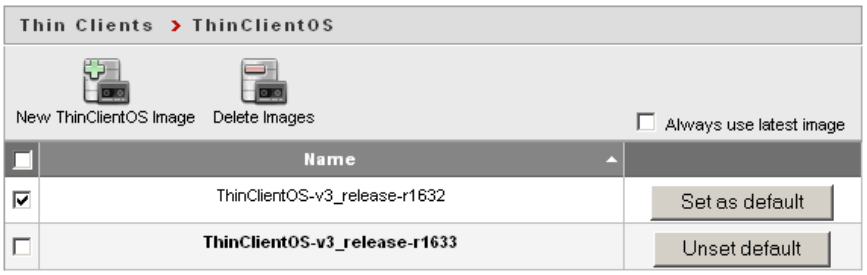
Screenshot 37: Select new 2X ThinClientOS image

4. Click on 'New ThinClientOS image'. Now you will be able to browse for the 2X ThinClientOS file you downloaded using the Browse button.



Screenshot 38: Checking that thin clients use the latest 2X ThinClientOS

5. Once installed, all thin clients that are configured to use the latest thin client OS image will retrieve the update and install it automatically. Only a reboot is required.



Screenshot 39: List of installed releases of 2X ThinClientOS with default image highlighted

6. To set different versions to be booted automatically, select the image of your choice by pressing the button “Set as default”.

   All thin clients will retrieve the update if they require it, although you can override this by going to the Thin Client > Manage node, and on the general settings page, selecting a different OS version to use.

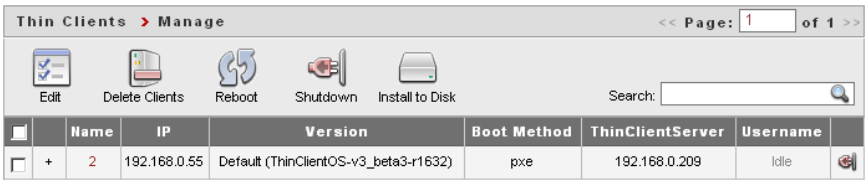
8. Managing Thin Clients & Sessions

Introduction

The 2X ThinClientServer Management Console allows you to manage thin clients and view past and active sessions.

Managing the thin clients

Some settings can only be managed on a ‘per-thin client’ basis. For example, you can enable or disable devices connected to a thin client.



Screenshot 40: List of thin clients available for management

To manage a thin client, click on the 'Manage' node under 'Thin Clients'. All thin clients will be listed in the right pane.

You can use the search facility provided to filter by keywords those clients you would like view. Simply type some text in the “Search” field and those thin clients that do not match the text entered will be filtered out of the list.

Clicking on the “+” sign in the first column will expand the thin client record and show more information about the thin client, such as the 2X ThinClientOS version, the VGA card, and so on.

Editing thin client settings

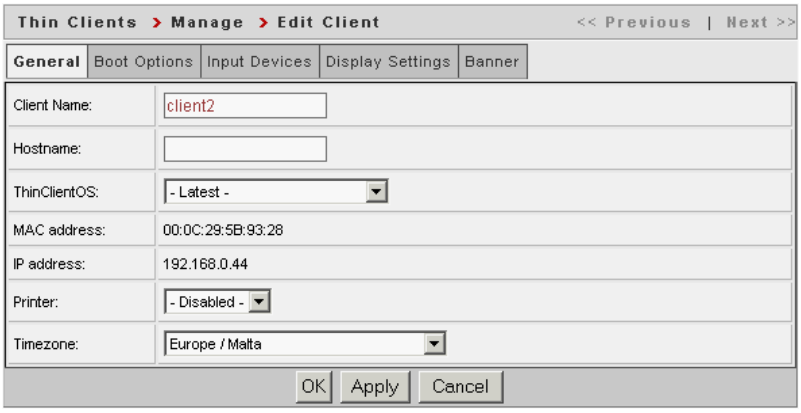
You can configure the following settings on a thin client:

- Client name
- Hostname
- Printer to be used
- Input devices
- Display settings
- Logging settings
- Login banner settings

To edit these settings, simply click on the thin client name. This brings you to the Edit Client page, which consists of 5 tabs – General, Boot Options, Input Devices, Display Settings and Banner.

You can alter any of the settings. To save, click the OK button.

General settings



Client name: Allows you to enter a recognizable name for the thin client.

Hostname: Allows you to set the hostname the machine will respond to on the network.

ThinClientOS: Allows you to specify which version of the 2X ThinClientOS to use.

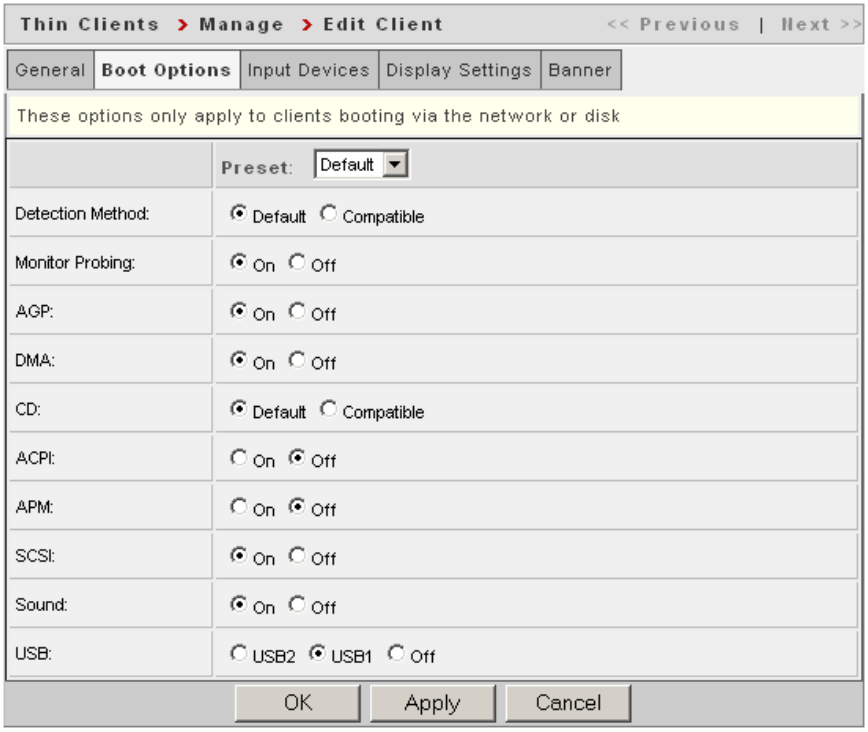
MAC address: displays the MAC address of the thin client.

IP address: Displays the current IP of the thin client.

Printer: Allows you to enable or disable a printer.

Timezone: Allows you to configure the thin client's time zone.

Boot Options



Screenshot 41: List of Boot Options available for customization

Preset: Quickly change the amount of hardware to auto detect on boot up. Default attempts to use all available hardware typically needed for operating as a thin client. Safe mode is very conservative but can cause a degraded experience when using your terminal server.

Detection Method: If 2X ThinClientOS hangs on boot up during the detection procedure, switch to “Compatible” mode for better hardware support.

Monitor Probing: If the combination of your monitor and video card causes problems when attempting to display the login screen, you can switch off monitor probing. You should then force a resolution onto the thin client using the “Display Settings” tab. Make sure you consult the documentation of your hardware before trying out the different resolutions.

AGP: If the video card is not using the AGP bus or you wish to use an emulation mode due to incompatible drivers switch off AGP auto detection.

DMA: DMA is not supported on some hardware and can cause errors when mounting the LiveCD or other media on the thin client. Switching this off could slow down the boot process but will ensure that 2X ThinClientOS loads safely.

CD: Switch to “Compatible” mode for an alternative driver for accessing CD-Rom devices.

ACPI: Switching on ACPI only if you need advanced power management and you are sure that your hardware supports the proper ACPI spec. Some ACPI hardware controllers are not complete and could possible hang the 2X ThinClientOS.

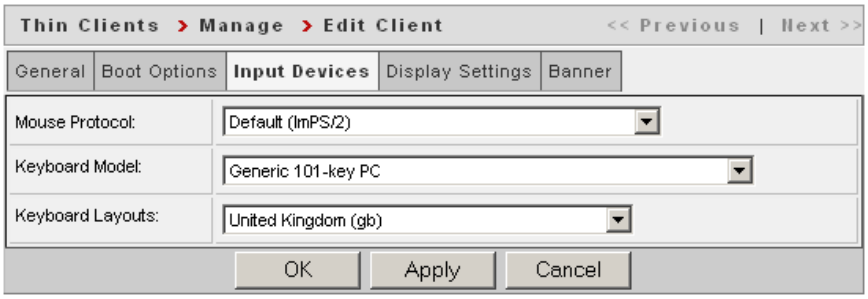
APM: Switch Advanced Power Management on only if you need support for legacy power management. Consult your hardware documentation for support for power management.

SCSI: Switch off auto-detection of SCSI drives, CD-Rom drives, or floppy drives should they give problems.

Sound: Switch sound off if it is causing crashing on boot up or during operation.

USB: Choose the level of USB support available from your hardware. USB2 is still considered experimental: use with care.

Input Devices



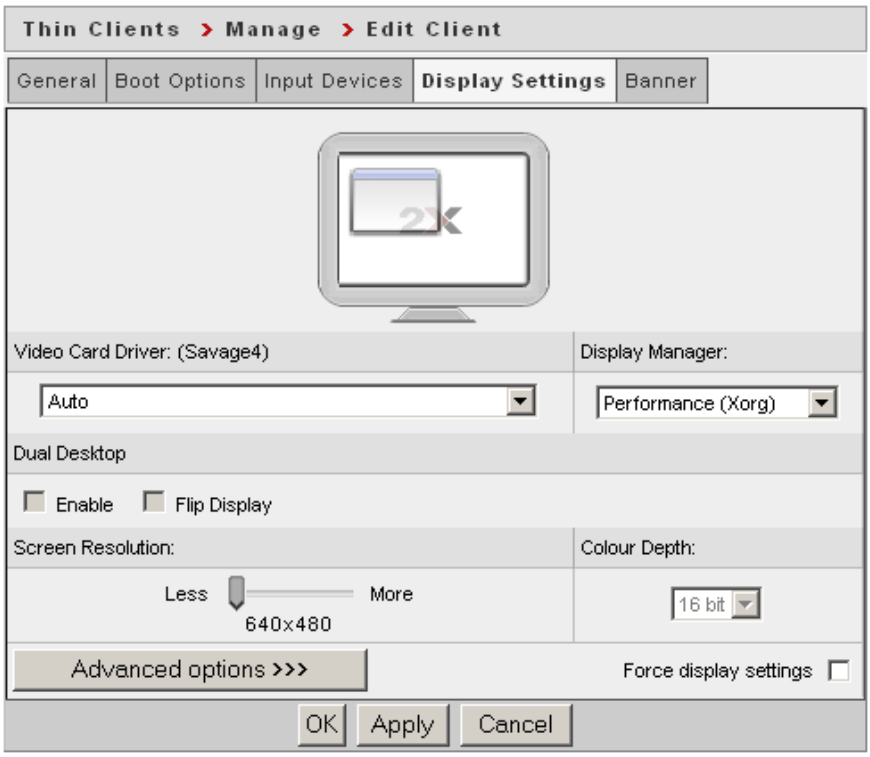
Screenshot 42: List of Input Devices settings available for customization

Mouse Model: Specify the mouse attached to the thin client.

Keyboard model: Specify the keyboard attached to the thin client.

Keyboard layout: Select the appropriate keyboard layout.

Display Settings



Screenshot 43: Display Settings customization options

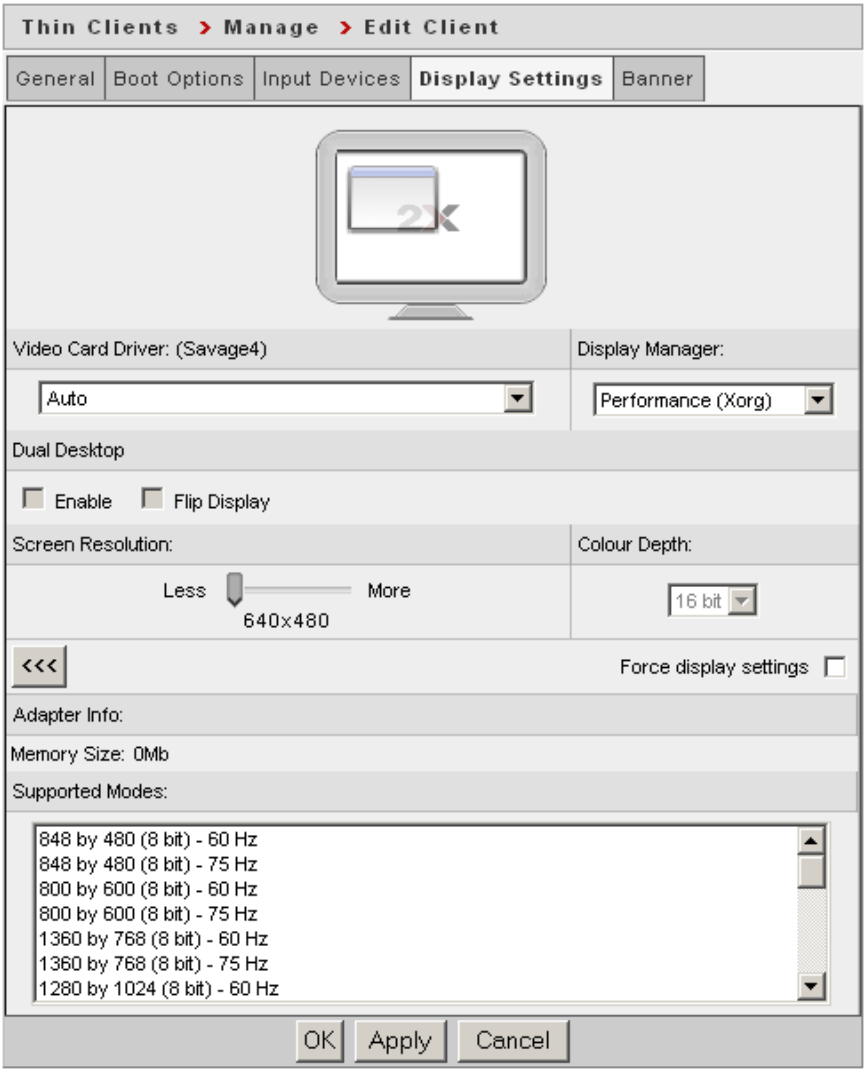
Video Card Driver: If the thin client has auto-detectable video hardware, the appropriate driver is displayed. If necessary, you may set the video driver manually for the thin client.

Display Manager: The default setting for new thin clients is "Performance (Xorg)". If the thin client requires support for older hardware you can choose "Compatibility (XFree86)".

Dual Desktop: If 2X ThinClientOS detects hardware capable of supporting dual monitors, you will be able to enable support for this configuration. You may also choose the "Flip Display" option if you would like to switch the monitors between Primary and Secondary.

Screen Resolution: Specify the resolution you would like 2X ThinClientOS to use.

Colour Depth: Specify the number of colours used by 2X ThinClientOS. This is subject to the memory available to the video card.



Screenshot 44: Display Settings customization options (advanced mode)

Advanced options: If the video subsystem returns a list of supported video modes to 2X ThinClientOS, this option is enabled. Click on "Advanced options" to choose a particular display mode that the video subsystem reports to 2X ThinClientOS as being available.

Use this option with caution – check the monitor manufacturer's specifications and ensure that the display mode selected is supported by your monitor before booting a thin client with one of these display modes.

Force display settings: Check this box if you want to override the display settings auto-detected by 2X ThinClientOS.

Banner

Screenshot 45: Choose default banner

Use default banner: Use the default banner as specified under "Thin Clients -> Banners".

Deleting a thin client

You can use this facility to eliminate from the list of thin clients available for management those thin clients that are obsolete because they are no longer connected to the network.

Rebooting a thin client

You can use this facility to force a thin client to reboot to enable debugging features, or to enable a new version of 2X ThinClientOS for the thin client.

Shutdown a thin client

You can use this facility to force a thin client to shut down.

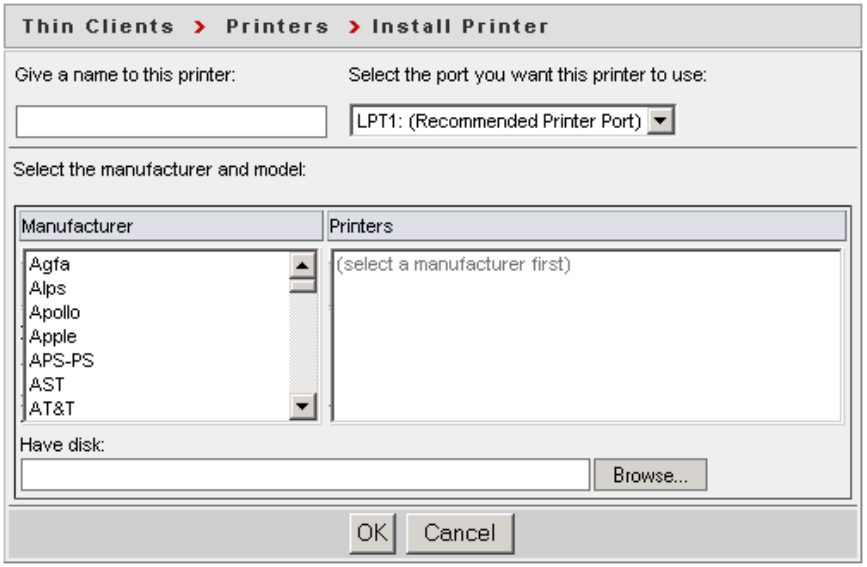
Install to Disk

You can use this facility to flag a thin client for a hard disk install. A thin client which has performed a network boot may be flagged for a hard disk install. The thin client will, on the next network boot, receive parameters the will trigger the thin client to perform a hard disk install, and will subsequently be able to boot 2X ThinClientOS directly from the hard disk.

Managing Printers

You can use the search facility provided to filter by keywords those printers you would like view. Simply type some text in the “Search” field and those printers that do not match the text entered will be filtered out of the list.

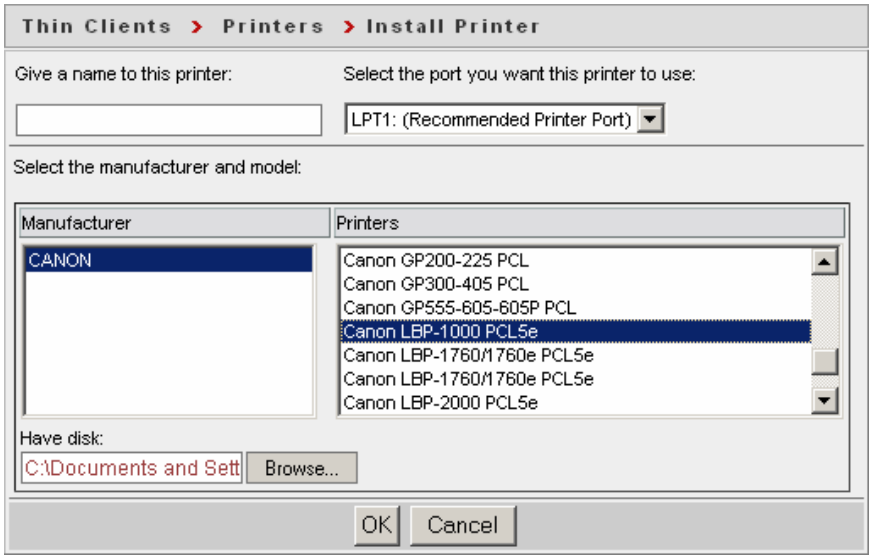
2X ThinClientServer supports printing to printers connected to a thin client. In order for this to work, an administrator must install the drivers for the printer connected to the thin client in the Thin Clients > Printers node. To do this:



Screenshot 46: Install Printer dialog

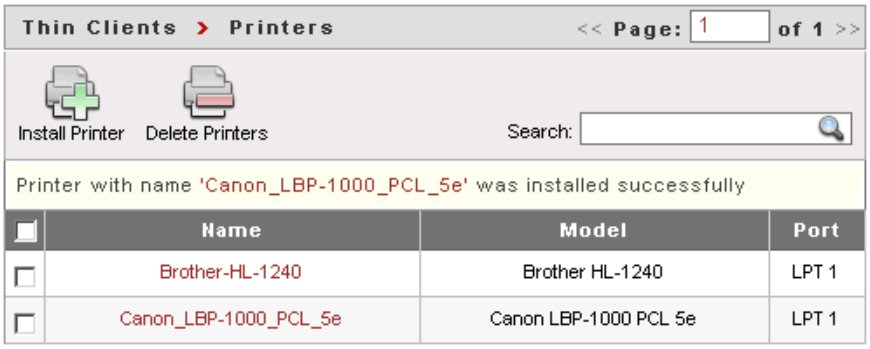
1. Click on the Printers node
2. Specify the name of the printer and the port to which it is connected.
3. Select the manufacturer and the model. Click on the “OK” button. The printer will now show up in the list of printers.
4. If your printer is not listed:
    1. Obtain your printer driver installation media.
    2. Install your printer on Windows Terminal Server as a local printer connected to a USB port or LPT port as appropriate, from the Control Panel.
    3. To configure your 2X ThinClientServer, click the “Install Printer” icon from the “Thin Clients -> Printers” node in the Management Console.
    4. Click on the “Browse” button next to the “Have Disk” field.

5. Browse to the path where the installation files for your printer have been saved.



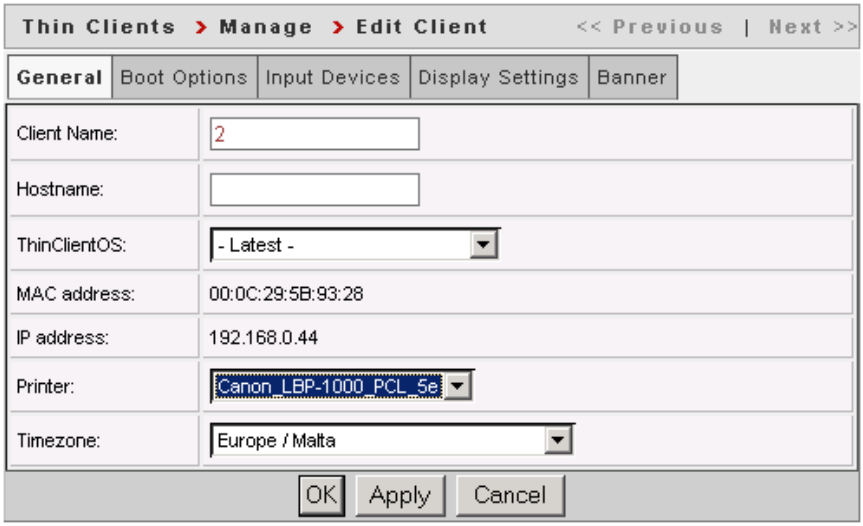
Screenshot 47: Installing driver files for a new printer

6. Select the appropriate .INF file containing the setup information for your printer. The Manufacturer field and the Printer field will now list the information contained in the .INF file selected. Select the appropriate Manufacturer and Printer and click “OK”.



Screenshot 48: New printer successfully installed

7. You will be returned to the “Thin Clients -> Printers” node. The newly added printer is now visible.



Screenshot 49: Assigning a printer to a thin client

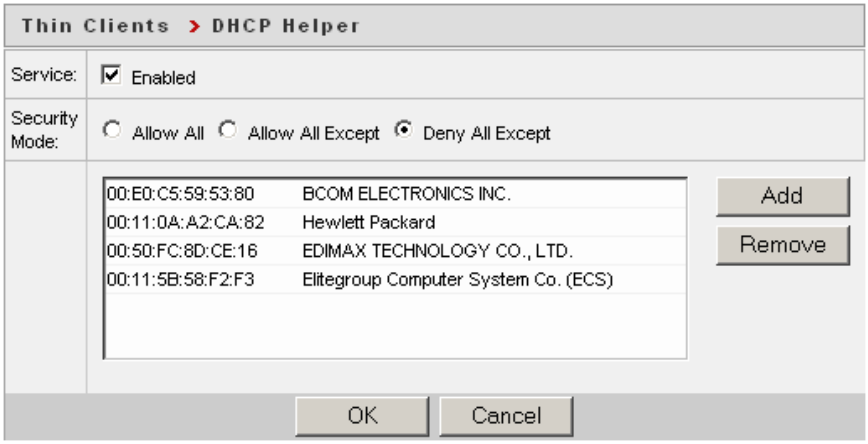
5. Now you can select the printer from the Edit general thin client settings screen.
6. Click on the 'Thin Clients > Manage' node and click on the thin client(s) to which the printer must be connected. The Edit Client page will appear.
7. Select the printer you just created in the Printer list.
8. Click “Apply” or “OK” to confirm.
9. At the next thin client log-on, the printer will appear under 'My Printers'.

Managing Banners

2X ThinClientServer allows the system administrator to specify the default banner for all thin clients which have not been allocated a custom banner.

Managing the 2X DHCP Helper

2X ThinClientServer allows the system administrator to specify which thin clients are allowed to connect using the configured connections, by applying selection rules that work by thin client MAC address.



Screenshot 50: Managing thin client access rules by MAC address

Service: The DHCP Helper service is enabled by default. You may disable the DHCP Helper service to reject any further thin clients from booting from the 2X ThinClientServer. This option may also be used if you would like to retain exclusively legacy-mode (prior to 2X ThinClientServer version 3) DHCP configuration.

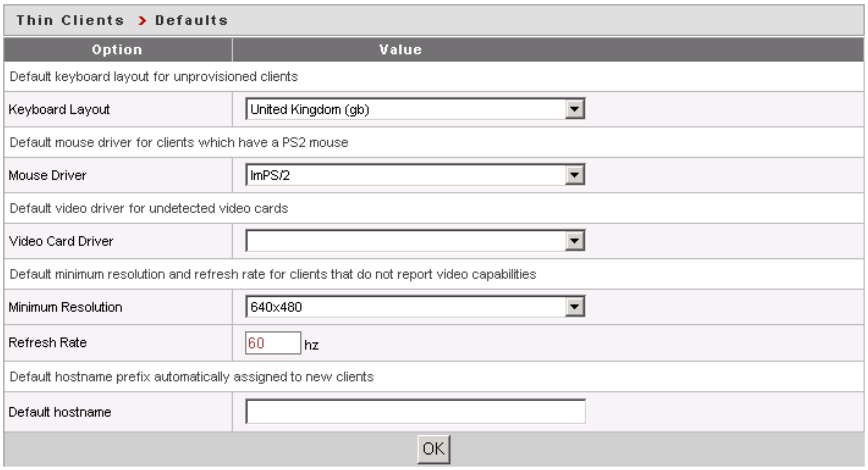
Security Mode Allow All: This setting can be used to allow all thin clients to connect without regard to MAC address filtration rules.

Security Mode Allow All Except: This setting can be used to allow all thin clients to boot from the 2X ThinClientServer unless they match an entry in the MAC address filtration rules.

Security Mode Deny All Except: This setting can be used to deny all thin clients from booting from the 2X ThinClientServer unless they match an entry in the MAC address filtration rules.

Defaults

2X ThinClientServer allows the system administrator to specify default settings for all clients it provisions.



Screenshot 51: Thin Clients default settings dialog

The following settings can be passed to thin clients as default settings:

Keyboard Layout – to allow for thin clients with localised keyboards. This will apply to thin clients connecting for the first time only, allowing the user to retain his layout should he customise it.

Mouse Driver – to allow for thin clients which require a particular mouse driver (e.g. PS2)

Video Card Driver – to allow for thin clients which have video cards that 2X ThinClientOS cannot detect

Minimum Resolution and **Refresh Rate** – to allow for thin clients which do not report their video capabilities to 2X ThinClientOS

Default hostname – prefix used to assign hostnames automatically by combining the prefix and an auto-incrementing integer.

Sessions

The 'Sessions' node shows you the users that are or have connected to a terminal server. There are 3 sub-nodes for currently active sessions, past sessions and erroneous sessions.

Screenshot 52: Terminal server sessions

Running: The session log shows the username, connection applied, thin client name & IP address, terminal server connected to, and start and end of session (if terminated).

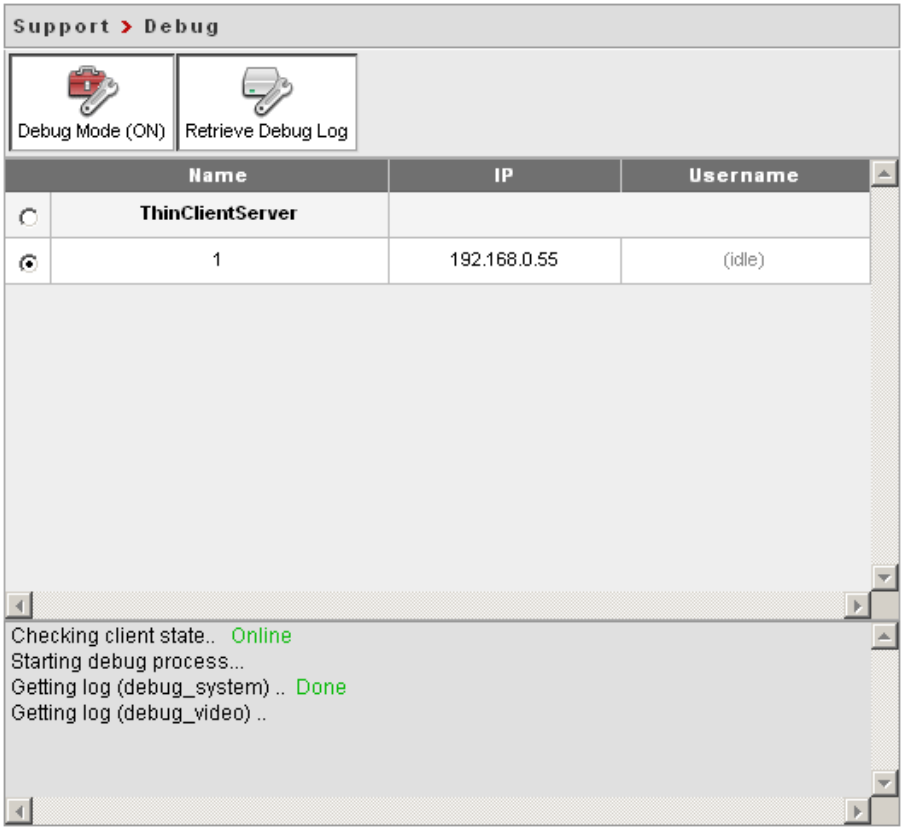
Archived: The session log shows the details of previously-terminated sessions.
Erroneous: The session log shows the details of previously-terminated sessions that generated an error.

Support

The ‘Support’ node shows the user the options available to him to obtain documentation and support relative to the day-to-day usage of 2X ThinClientServer.

Manual: The default installation of 2X ThinClientServer will include the user manual (this document) in PDF version for reference. Please note that you will require a PDF reader to view the manual. Adobe Acrobat Reader is a free application that will allow viewing of PDF documents, and can be obtained from http://www.adobe.com.

Debug: This node will allow the user to manipulate options for debugging and logging of session events for 2X ThinClientServer and 2X ThinClientOS for subsequent submission to the 2X Support Centre for effective resolution of support issues.



Screenshot 53: Debug dialog

Debug Mode: This icon allows the user to toggle global Debug Mode on or off. When Debug Mode is off, debug operations are not possible.

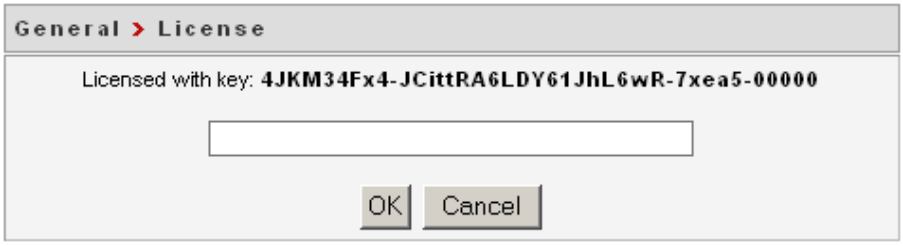
Note that switching Debug Mode to ON will trigger all thin clients to boot in "Debug" mode. This implies that it is preferable to leave Debug Mode on for only the time necessary to complete the collection of Debug Information necessary to analyse the issue being investigated.

Retrieve Debug Log: This will trigger a thin client reboot (after user confirmation). When the user is satisfied that enough logging information has been recorded, he may click the "Retrieve Debug Log" icon and select a location to save the collected information. This information may be analysed directly by the user or submitted to the 2X Support Centre for analysis.

Support Portal: This node will link you directly to the 2X Support Centre Portal at http://support.2x.com.

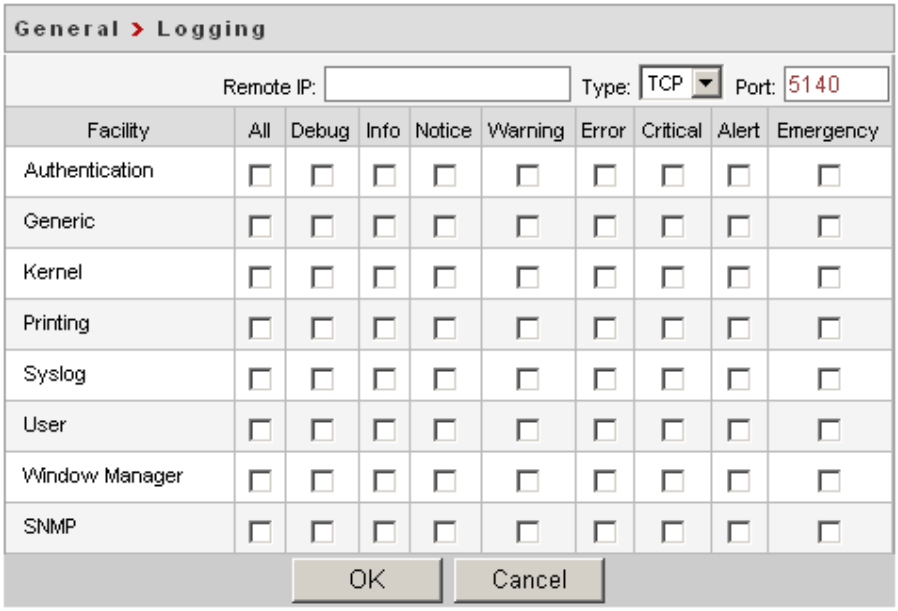
General

The ‘General’ node provides the user with additional administrative functionality not related to day-to-day configuration of thin clients.



Screenshot 54: License key dialog

License: This node will show you the license key used to configure 2X ThinClientServer, and also provide the means to upgrade 2X ThinClientServer to accept a larger number of thin client connections.

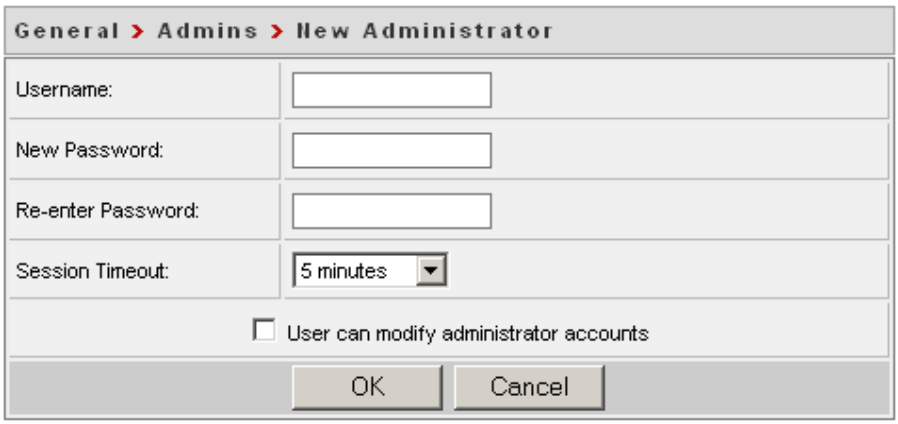


Screenshot 55: Logging to Syslog Server configuration dialog

Logging: This node will allow the user to specify a Syslog Server (if available) for logging of events generated by 2X ThinClientOS during normal functions. The event types available are: Authentication, Generic, Kernel, Printing, Syslog, User, Window Manager, and SNMP. The user may also select which message type(s) to report to the Syslog server. The message types available are: Emergency, Alert, Critical, Error, Warning, Notice, Info, and Debug – with the additional possibility of selecting the “All” option to enable all message types.

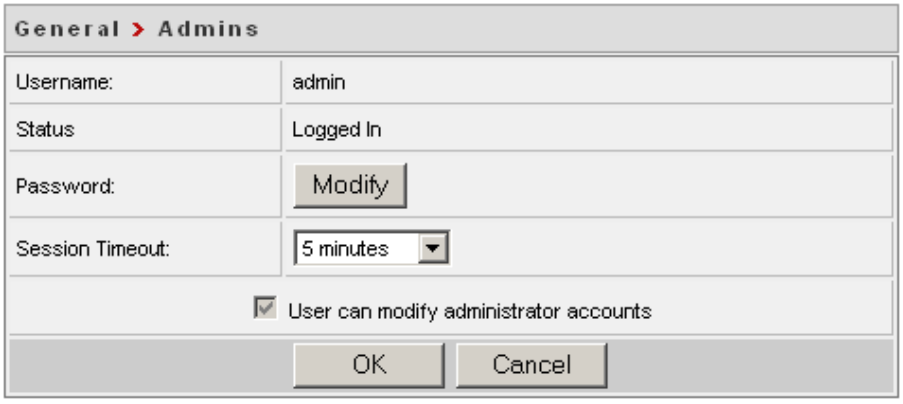
Screenshot 56: Administrators List dialog

Admins: This node will allow the user to manage credentials for access to the Management Console and the parameters assigned to each administrator.



Screenshot 57: New Administrator dialog

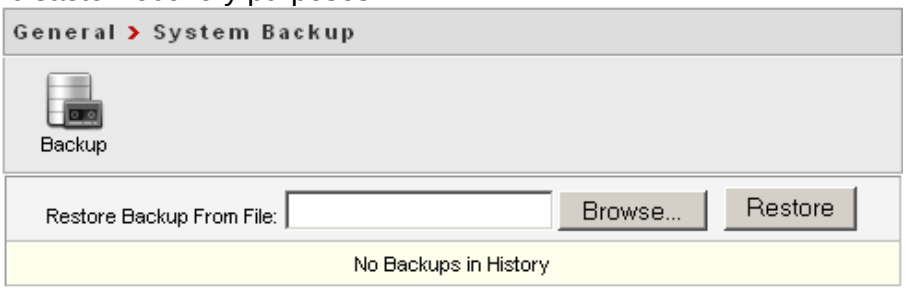
New Administrator: Click this icon to add an Administrator to the list, specifying the username, password, session timeout duration, and whether the new user has rights to modify the list of administrators.
Delete Administrators: Click this icon to delete the selected administrators.



Screenshot 58: Edit administrator user parameters

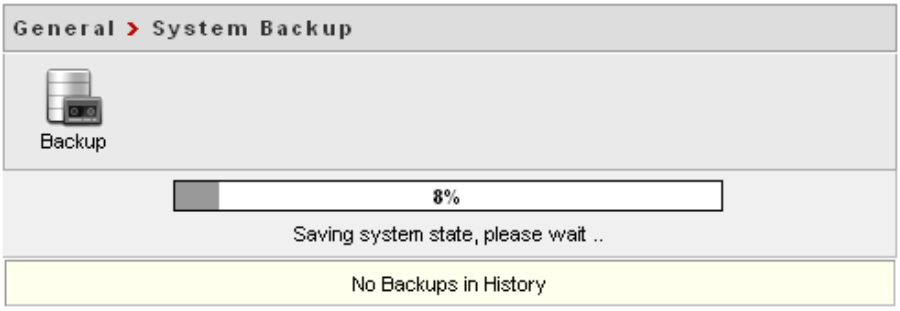
Edit Administrators: Click an administrator's username to display the Edit Administrator dialog to adjust the parameters assigned to the selected administrator.

System Backup: This node will allow the user to create backup files for disaster recovery purposes.

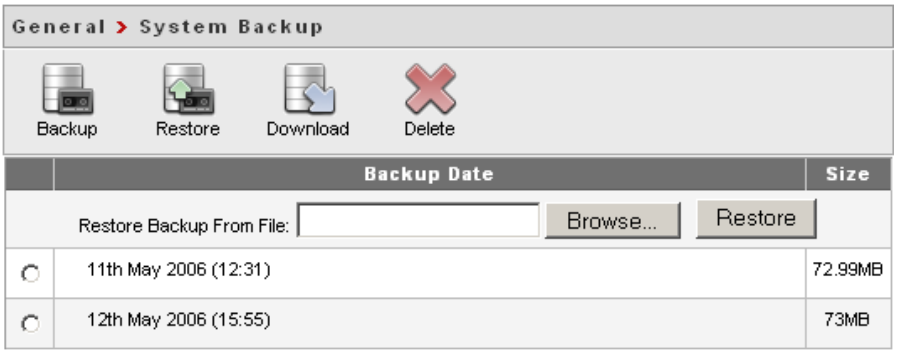


Screenshot 59: System Backup dialog

Backup: Click this icon to start the backup procedure.



Screenshot 60: Backup in progress…



Screenshot 61: List of stored backups

Restore: Select the backup set for restore and click the Restore icon. Upon the completion, the Management Console will resume from the login screen.

Download: Select the backup set for download and click the Download icon. The Management Console will now prompt for a location to save the file. This feature allows the creation of off-site backups. This file may later be used to restore from off-site backup by clicking the “Browse…” button, browsing for the file to restore, and clicking the “Restore” button.

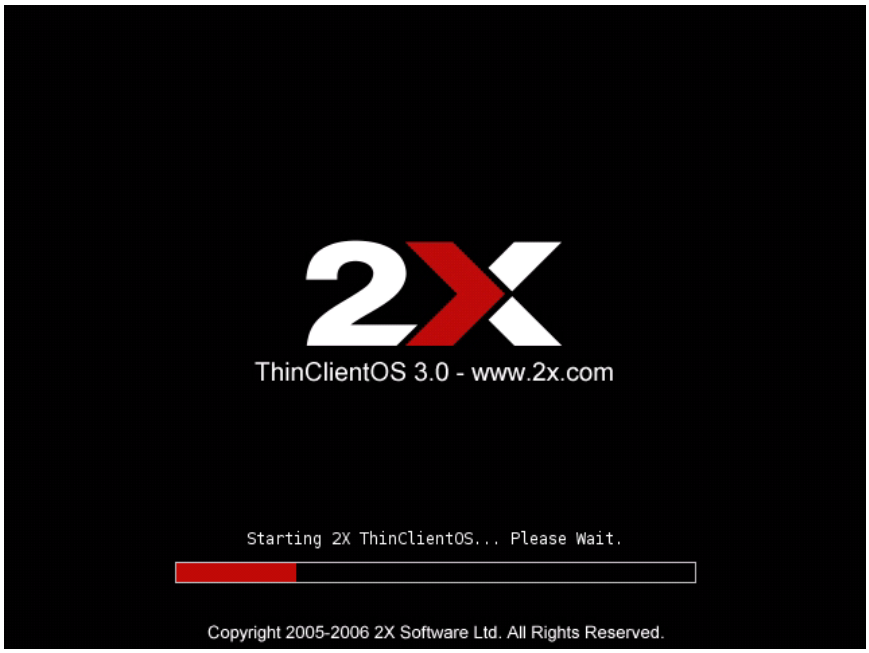
Delete: Select the backup set for deletion and click the Delete icon.

8. Thin client user manual

Introduction

Connecting and working on a terminal server is transparent compared to working on a normal PC. However there a few small differences, which are detailed in this chapter. It makes sense to copy and paste this chapter into an email and send to users who have been switched to thin client desktops.

Logging on to your desktop



Screenshot 62: 2X ThinClientOS booting up

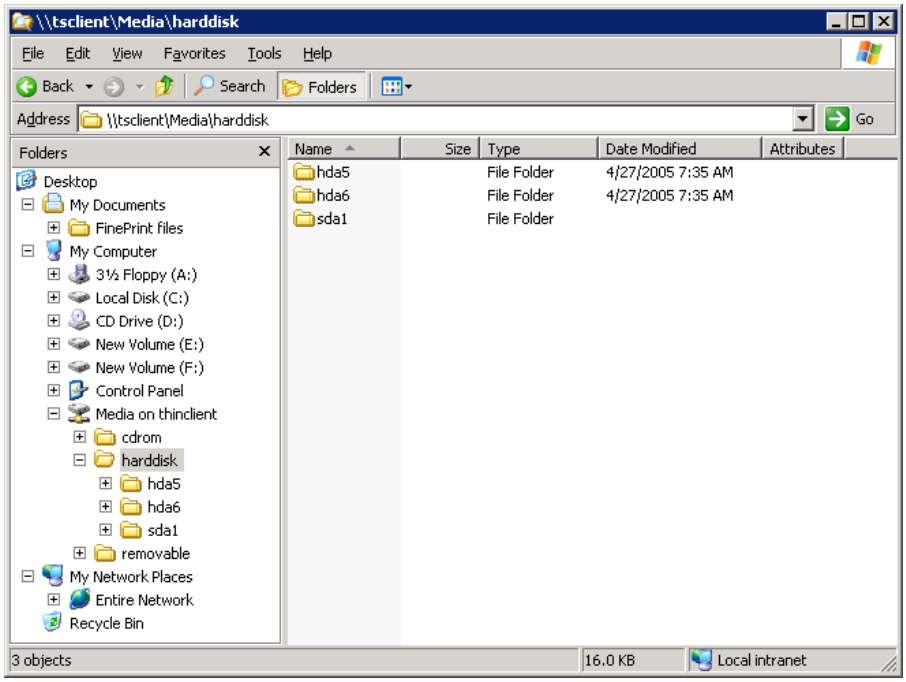
When you switch on your thin client / computer, 2X ThinClientOS will present you a logon screen. Enter your login name, hit enter or tab and enter your password. Now hit enter or click OK. A connection will now be established with the terminal server and your usual desktop will be loaded!

Screenshot 63: Logging in

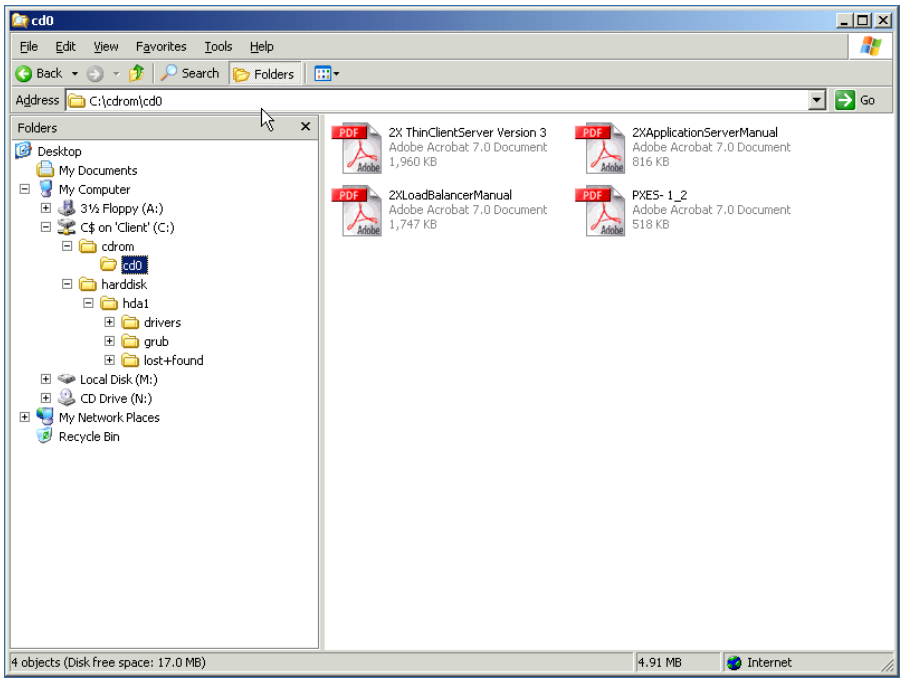
Logging off the Terminal Server

If you want to shut down your session with the terminal server, simply log off. You will be returned to the 2X ThinClientOS screen. To power off the computer/thin client, select 'Shut down'.

Accessing local shares & storage devices



Screenshot 64: Accessing media on the thin client

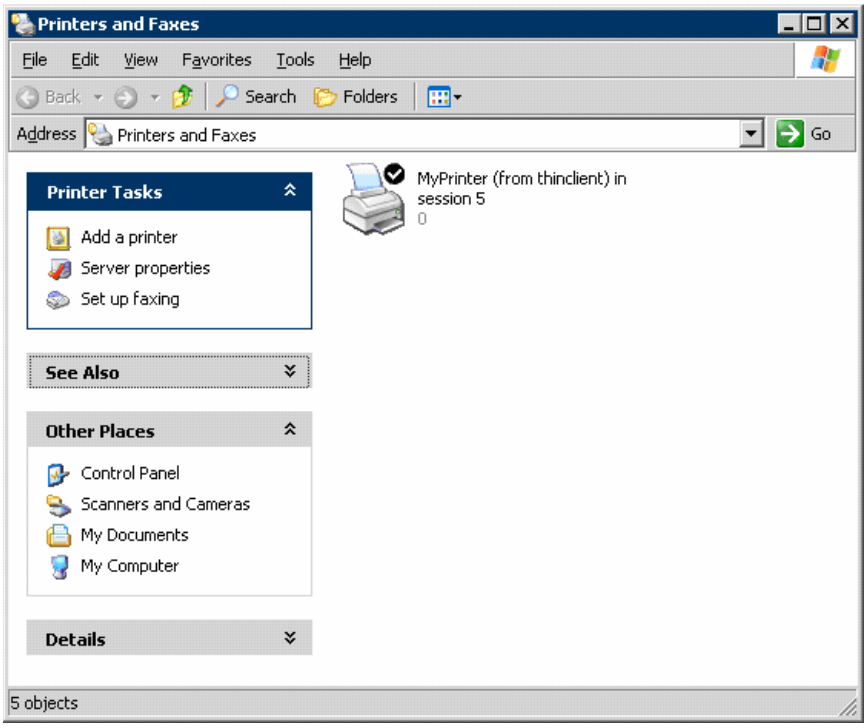


Screenshot 65: Accessing media on the thin client in a Citrix environment

If the thin client on which a user is working has local storage – for example a hard disk, CD-Rom drive or even a USB stick, then the user can access this media via a link 'Media on thinclient' (provided

the administrator has granted access). In Windows, this appears as an icon with hard disk and a network connection. The screenshot shows how the local storage will appear. Users can use this storage as they would normally do on their computers.

Printing to a local printer



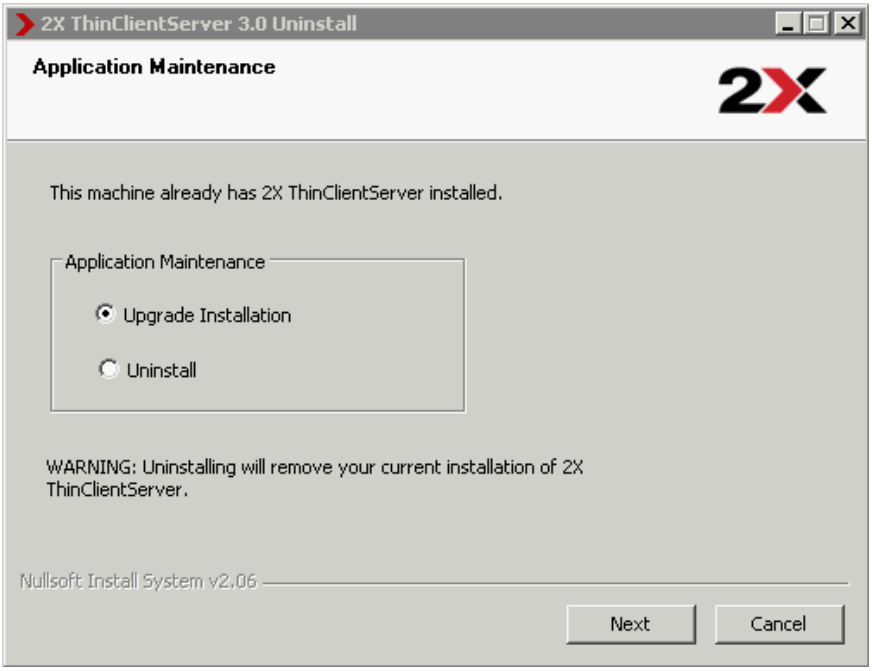
Screenshot 66: Printing to a printer connected to the thin client

If you have a printer connected to the thin client, and if this printer has been installed and configured with the thin client via the 2X Management Console, then the printer will show up in 'Printers and Faxes' and you can print to this local printer.

9. Upgrading or Repairing a 2X ThinClientServer Installation

Upgrading 2X ThinClientServer

1. Run setup by double-clicking on the file 2XTCS2SETUP.EXE.

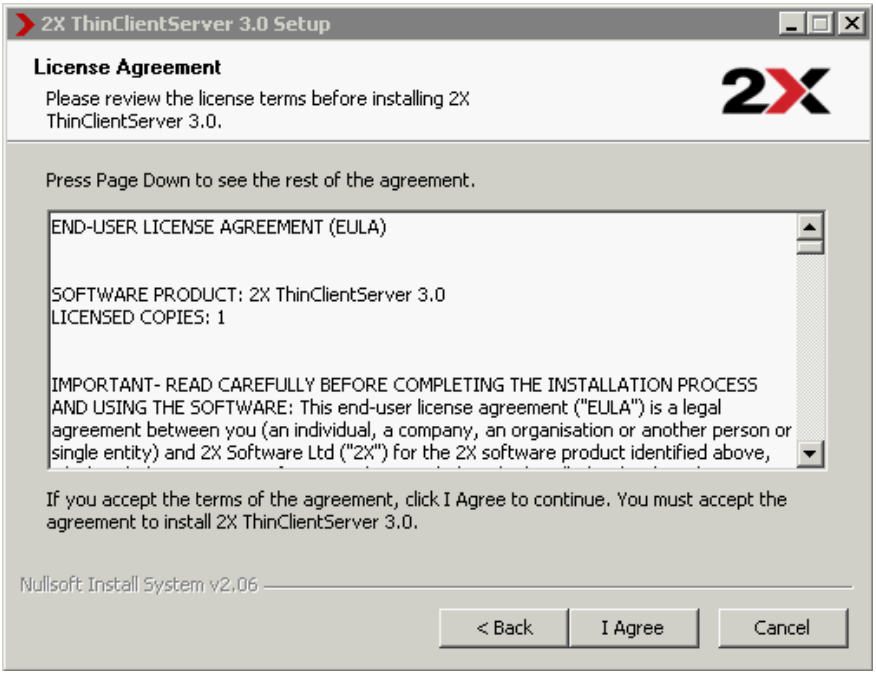


Screenshot 67: Upgrading 2X ThinClientServer

2. Click “Next” to proceed with the upgrade. The Install Wizard will proceed to uninstall the current version of the program, retaining any settings and configuration files. Click on “Finish” in the next dialog to proceed with installing the new version.

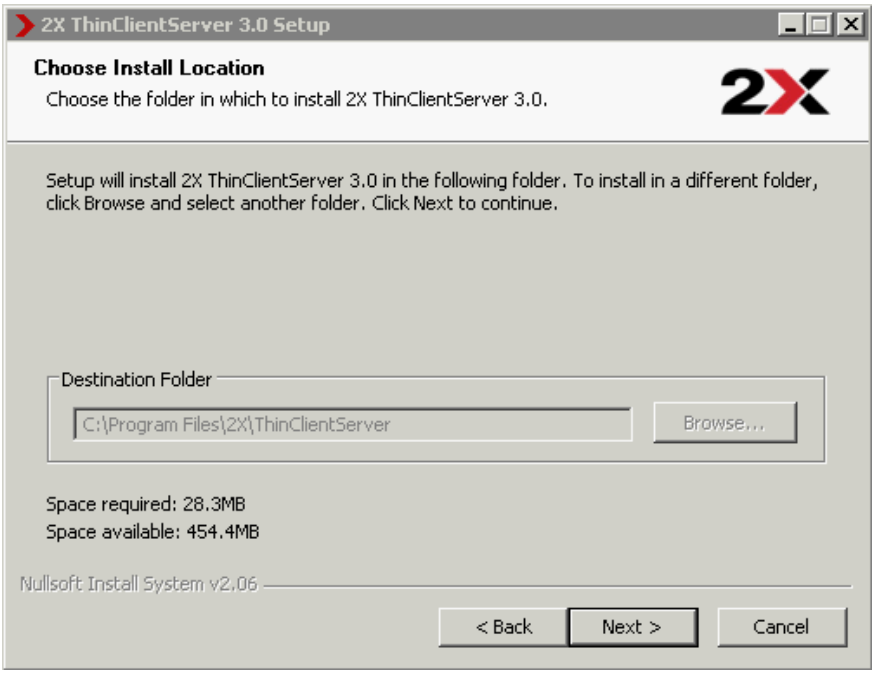
Screenshot 68: Installing the new version of 2X ThinClientServer

3. Click “Next” to proceed to the License agreement page.



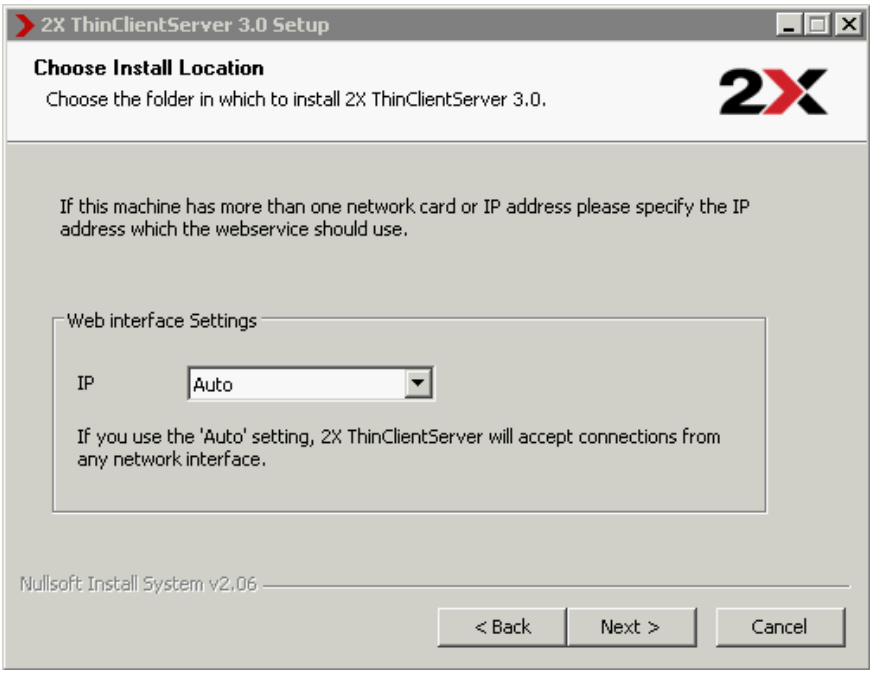
Screenshot 69: The 2X ThinClientServer License Agreement

4. Click “I Agree” to accept the License Agreement. You must accept the agreement to install 2X ThinClientServer 2.0.



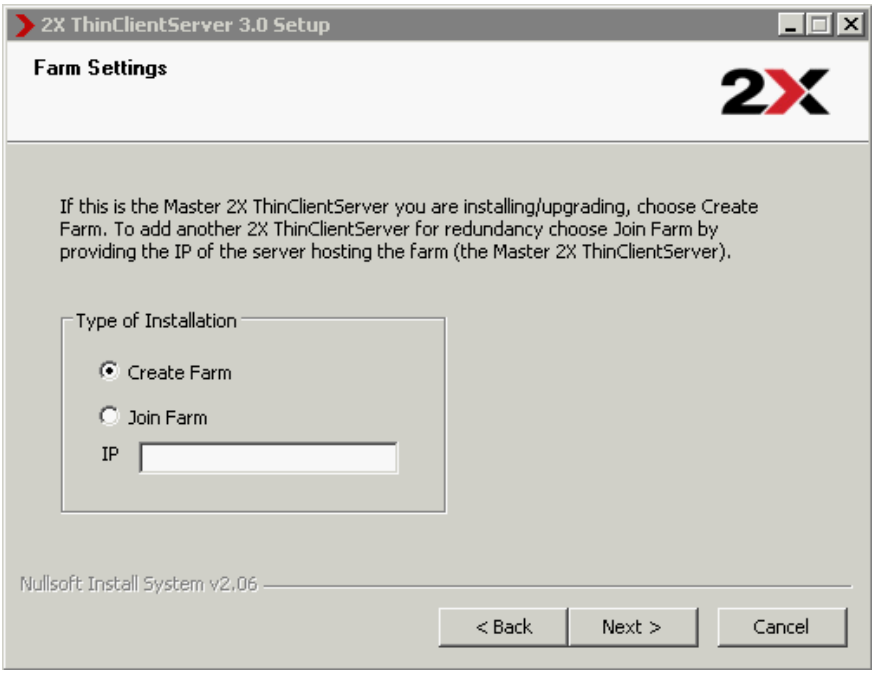
Screenshot 70: The Destination Folder

5. The next dialog will show you the destination folder where the upgraded files will be installed. Click “Next”.



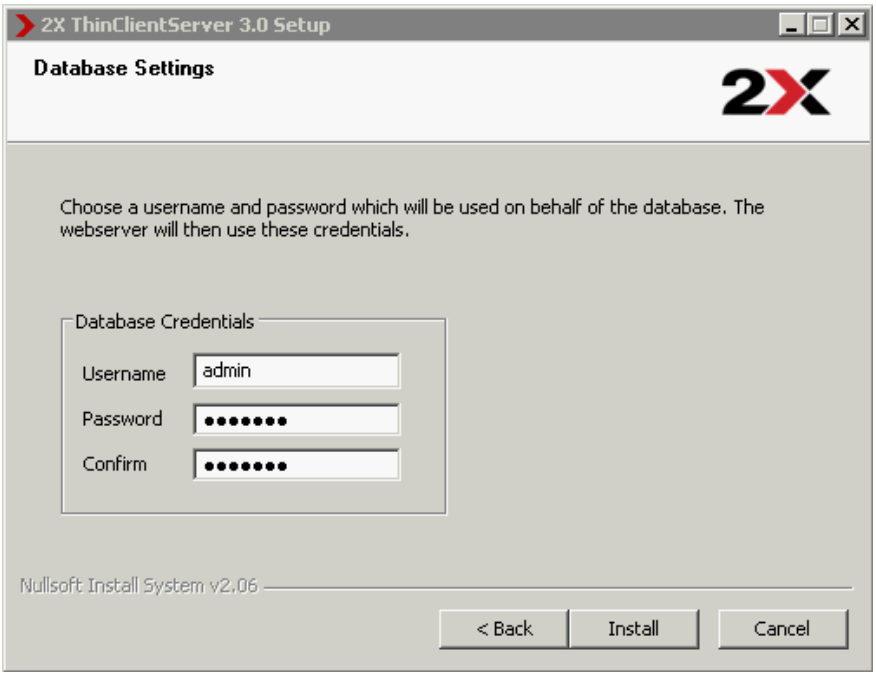
Screenshot 71: Choose the IP Address

6. If you have multiple network cards, or multiple IP addresses on one network card, setup will ask you for the IP address to which the 2X ThinClientServer must bind. Select Auto unless you want to exclude a particular network card.



Screenshot 72: Creating or Joining a 2X ThinClientServer Farm

7. Set-up will ask you whether you want to create a 2X ThinClientServer farm or join an existing farm. If this is the first time you are installing 2X ThinClientServer, choose “Create Farm”. If you want to add a 2X ThinClientServer to an existing installation to improve the deployment of thin clients in large installations, then choose “Join Farm” and enter the IP address of the 2X ThinClientServer hosting the farm (typically the first 2X ThinClientServer).



Screenshot 73: Specify database credentials

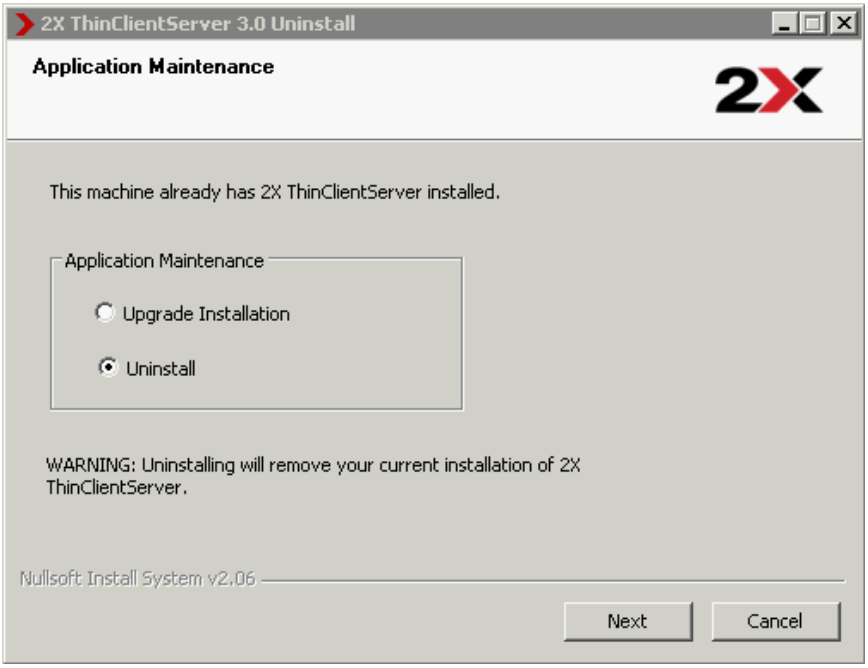
8. Setup will ask you for a username and password for the settings to connect to the 2X ThinClientServer database. Click **Install** to start the installation.

9. Setup will now copy all files and install the necessary services. The progress will be shown. Click **Finish** when ready.

10. Uninstalling 2X ThinClientServer

Uninstalling 2X ThinClientServer

1. Locate the “2X ThinClientServer 2.0” caption listed in the “Add/Remove Programs” application inside the Control Panel.
2. Click on the button “Change/Remove” to start the installation process.



Screenshot 74: Choose “Uninstall”

3. Choose the “Uninstall” option as shown above.
4. Click on “Next” to proceed with the un-installation.
5. Click on “Finish” when done.

   Warning: This will delete all data stored by ThinClientServer, including “Session”, “ThinClientOS” and “Connection” settings.

11. Firewall Settings

From:	To:	Port:	Description
Thin Client	2X TerminalServer	TCP 22	Remote Session
Thin Client	Citrix Server	TCP 1494	Remote Session
Thin Client	MS Terminal Server	TCP 3389	Remote Session
Thin Client	2X Application Server	TCP 3389	Remote Session
Thin Client	DNS Server	UDP 53	Name Resolution
Thin Client	DHCP Server	UDP 67	TCP/IP Settings Retrieval
Thin Client	DHCP Helper	UDP 67	TCP/IP Settings Retrieval
Thin Client	TFTP Server	UDP 69	Operating System Retrieval
Thin Client	DHCP Helper	UDP 4011	TCP/IP Settings Retrieval
Thin Client	2X ThinClientServer	TCP 943	Thin Client Settings
Web Browser	2X ThinClientServer	TCP 980	Management Console (HTTP)
2X ThinClientServer	Master 2X TCS	TCP 3306	MySQL Queries (Farm Scenario)
2X ThinClientServer	Domain Controller	TCP 389	LDAP Queries
2X ThinClientServer	Thin Client	UDP 161	SNMP Client Status Information
2X ThinClientServer	Thin Client	UDP 68	TCP/IP Settings Delivery
Thin Client	2X Application Server	TCP 20002	Remote Session

12. Troubleshooting

2X ThinClientOS Boot Process

TCMR001 /proc filesystem already mounted!

Corrupt installation detected. Please contact 2X Technical Support.

TCMR002 Installer package not available.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR003 Distribution not found.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR004 Not enough memory to create root partition in ram.

Insufficient memory for correct operation. Please refer to minimum hardware specifications in Chapter 14.

TCMR005 Unable to load unionfs module.

Corrupt installation detected. Please contact 2X Technical Support.

TCMR006 Unable to mount distribution media.

Reconfigure your thin client's BIOS settings to disable DMA or UDMA features on all IDE channels. Please contact 2X Technical Support.

TCMR007 Distribution version mismatch.

Corrupt installation detected. Please contact 2X Technical Support.

TCMR008 rootdisk.img failed integrity check.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR011 install.img failed integrity check.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR012 Unable to mount rootdisk image.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR015 Unable to mount installer image.

Corrupt installation detected. Please refer to Chapter 6 and review the methodologies for creating a bootable CD from an ISO file. For further assistance please contact 2X Technical Support.

TCMR016 Unable to pivot to new root.

Corrupt installation detected. Please contact 2X Technical Support.

TCMR017 Unable to activate swap space.

Hard Disk error detected. Please re-install 2X ThinClientOS to attempt to resolve this issue. If this error persists after repeated re-installation, it is likely that the only solution will be to replace the faulty Hard Disk.

TCMR018 Unable to update rootdisk image.

Hard Disk error detected. Please re-install 2X ThinClientOS to attempt to resolve this issue. If this error persists after repeated re-installation, it is likely that the only solution will be to replace the faulty Hard Disk.

2X ThinClientOS Autoconfiguration

TCAC001 No network devices were detected.

A network card was not detected by 2X ThinClientOS. Make sure that a working network card is installed on the thin client. If a network card is correctly installed and you still encounter this problem, please send us the full technical details of the model and manufacturer of the card in question.

TCAC002 No network settings were received from the DHCP service.

If no settings are provided by the DHCP service, or if the settings provided are incomplete, you should consult Chapter 3. The following settings are required for 2x ThinClientOS to boot up:

- A working DHCP server
- An IP address
- A record to a DNS server
- A DNS suffix

Should you be doing a PXE install you may optionally need:

- An entry for *thinsrv* pointing to your 2X ThinClientServer
- An entry to the IP address of the TFTP server providing the boot image and settings. If you are using the TFTP server bundled with 2X ThinClientServer then the IP address is the same as that of 2X ThinClientServer
- An entry for the path of the PXE loader called pxelinux.0

TCAC003 Unable to mount root file system read-only.

Corrupt installation; reinstall 2X ThinClientOS.

TCAC004 Unable to mount root file system read/write.

Corrupt installation, reinstall 2X ThinClientOS.

TCAC005 Unable to correct root file system errors.

Corrupt installation, reinstall 2X ThinClientOS.

TCAC006 No settings were received from the 2X ThinClientServer.

2X ThinClientOS was unable to contact the 2X ThinClientServer. Either the 2X ThinClientServer is off, or otherwise inaccessible. Check your firewall configuration.

TCAC007 Timeout when communicating with the 2X ThinClientServer.

2X ThinClientOS was unable to complete the hardware reporting routine via SNMP with the 2X ThinClientServer. Either the 2X ThinClientServer is off, or otherwise inaccessible. Check your firewall configuration.

TCAC009 Unable to discover 2X ThinClient Server.

2X ThinClientOS was unable to identify the correct address for the 2X ThinClientServer. Please check that your network configuration has been correctly implemented according to the instructions in Chapter 3.

2X ThinClientOS Update

TCUP001 Unable to download latest package version.

No 2X ThinClientOS was uploaded to 2X ThinClientServer. This can be obtained as a ZIP file from:

http://downloads.2x.com/thinclientserver/

Please refer to the chapter entitled “Configuring 2X ThinClientServer”

TCUP002 Unable to download X11R6 package.

There seems to be an error while downloading the Video package for 2X ThinClientOS. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP004 Unable to download rootdisk package.

There seems to be an error while downloading the 2X ThinClientOS package. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP005 Unable to download minird package.

There seems to be an error while downloading the pre-boot image. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP006 Unable to download kernel package.

There seems to be an error while downloading the kernel package for 2X ThinClientOS. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP007 Failed to download one or more packages.

There seems to be an error while downloading one or more packages for 2X ThinClientOS. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP008 X11R6 package failed integrity check.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP010 Failed to overlay X11R6 package.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP014 Unable to access temporary filesystem.

2X ThinClientOS has run out of memory used during the update process.

TCUP015 Unable to mount X11R6 package.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP017 Unable to mount services package.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP018 Failed to overlay services package.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP019 Services package failed integrity check.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on the 2X ThinClientServer, a network transmission error, or lack of space on the 2X ThinClientOS.

TCUP020 Unable to download services package.

There seems to be an error while downloading the services package for 2X ThinClientOS. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCUP021 Server does not support your version of 2X ThinClientOS.

The current 2X ThinClientOS version is not supported by the current version of 2X ThinClientServer. Please upgrade your 2X ThinClientOS. It may also be possible to resolve this by downgrading 2X ThinClientServer to a release that can support your current version of 2X ThinClientOS.

TCUP022 Server is not supported by your version of 2X ThinClientOS.

The current 2X ThinClientOS version is not supported by the current version of 2X ThinClientServer. Please upgrade your 2X ThinClientServer. It may also be possible to resolve this by downgrading 2X ThinClientOS to a release that can be supported your current version of 2X ThinClientServer.

TCUP023 Unable to retrieve server version.

The server did not return the version number it is running. Please upgrade your 2X ThinClientServer to Version 2-rc3 or better. If you already running 2X ThinClientServer Version 2-rc3 or better, check that 2X ThinClientServer is running and that the network configuration procedures have been implemented correctly as described in Chapter 3.

TCUP024 2X ThinClientServer has insufficient licences to start your session.

2X ThinClientServer has run out of licences while setting up this client. Purchase additional licences to implement more thin clients

TCUP025 2X ThinClientServer licence has expired.

The licence for 2X ThinClientServer has expired. Please purchase a licence to continue using 2X ThinClientServer.

TCUP029 Unable to overwrite kernel with update.

An error has occurred while replacing kernel with a newer version. This may be due to lack of space on the 2X ThinClientOS or a corruption on the hard disk.

TCUP030 Unable to overwrite kernel with update.

An error has occurred while replacing a package with a newer version.

This may be due to lack of space on the 2X ThinClientOS or a corruption on the hard disk.

TCUP031 Unable to copy rootdisk update.

An error has occurred while copying new package version to disk. This may be due to lack of space on the 2X ThinClientOS or a corruption on the hard disk.

TCUP032 Unable to overwrite minird with update.

An error has occurred while replacing a package with a newer version.

This may be due to lack of space on the 2X ThinClientOS or a corruption on the hard disk.

TCUP033 Unable to overwrite services with update.

An error has occurred while replacing a package with a newer version.

This may be due to lack of space on the 2X ThinClientOS or a corruption on the hard disk.

TCUP034 Unable to remount media as read/write.

An error has occurred while trying to configure hard disk for read/write access. This may be due to a corruption on the hard disk.

TCUP035 Unable to remount media as read-only.

An error has occurred while trying to configure hard disk for read-only access. This may be due to a corruption on the hard disk.

TCUP036 Unable to download install package.

An error has occurred while trying to download package from the network. This may be due to a network transmission error or 2X ThinClientServer is no longer available.

2X ThinClientOS SNMP

TCSN001 SNMP executable not found.

There seems to be a corruption in the SNMP utility shipped with 2X ThinClientOS. Contact 2X Technical Support.

TCSN002 2X ThinClientServer not found.

A configuration file correctly processed at an earlier stage in the boot process is now unavailable. This circumstance is unexpected and is likely to be caused by a hardware failure. Contact your System Administrator.

TCSN003 SNMP configuration file not found.

There seems to be a corruption in the SNMP utility shipped with 2X ThinClientOS. Contact 2X Technical Support.

TCSN004 SNMP service failed to start.

There seems to be a corruption in the SNMP utility shipped with 2X ThinClientOS. Contact 2X Technical Support.

TCSN005 SNMP service failed to communicate with 2X ThinClientServer.

An error has occurred when 2X ThinClientOS was being scanned by 2X ThinClientServer. This is caused by an error in the DHCP/DNS setting (for example: to an incorrect hostname or IP address) or else by a firewall restriction on the 2X ThinClientServer.

2X ThinClientOS Server Settings

TCSX001 No configuration was returned by 2X ThinClientServer.

2X ThinClientServer did not return any configuration data. Please check that 2X ThinClientServer is running, and that your network configuration has been correctly implemented according to the instructions in Chapter 3.

2X ThinClientOS Video

TCXE001 No banner was received from 2X ThinClientServer.

There seems to be an error while downloading the logon banner for 2X ThinClientOS. In the case of PXE booting this may be due to insufficient memory on the thin client. If you have performed a Hard Disk installation, this may be due to insufficient space.

TCXS001 Failed to start in graphical mode.

2X ThinClientOS failed to start graphics mode correctly. A VESA compatible video card is required to start in graphical mode. Please contact 2X Technical Support with the exact details of the Manufacturer and Model of the video card used as well as that of the monitor.

TCSX001 No configuration was returned by 2X ThinClientServer.

2X ThinClientOS failed to receive the required configuration file from the 2X ThinClientServer. This could be possible to a misconfigured server or a server mismatch. Please check that the 2X ThinClientServer and 2X ThinClientOS are installed correctly.

TCSX002 Video card driver corrupted.

The video card driver needed for the thin client has been downloaded incorrectly or is corrupted. In the case of CD booting, make sure that the CD was burnt correctly. In the case of HD booting, make sure the ThinClientOS is not running out of disk space. In case of PXE booting, make sure that enough ram is available for the ThinClientOS as described in the minimum requirements section.

TCSX003 Wrong number of parameters in config_device()

The video card has been initialized incorrectly with the wrong set of parameters. Follow the instructions to generate a debug log and send them to the 2X Support Centre.

TCSX004 Internal error.

Follow the instructions to generate a debug log and send them to the 2X Support Centre.

TCSX005 Wrong number of parameters in config_device_dual()

The video card has been initialized incorrectly with the wrong set of parameters. Follow the instructions to generate a debug log and

send them to the 2X Support Centre.

TCSX006 Internal error.

Follow the instructions to generate a debug log and send them to the 2X Support Centre.

TCSX007 No working configuration was found.

All possible video configurations have been attempted and no working configuration was found. Follow the instructions to generate a debug log and send them to the 2X Support Centre.

2X ThinClientOS Sessions

TCSP001 Missing session settings, aborting login session.

2X ThinClientServer failed to send one or more required settings. This could be caused by a network transmission error or 2X ThinClientServer is no longer available.

TCSP002 Failed top delete package cache.

An error has occurred while purging the package cache. This could be caused by a system corruption or failing hardware.

TCSP003 Package not available on CDROM.

A required package was not found on the CDROM media. This could be caused by a corrupted CD media or failing hardware.

TCSP004 Missing configuration files.

Required configuration file are no longer available on the system. This could be caused by a corrupted system or failing hardware.

TCSP005 Unable to remount media as read-only.

An error has occurred while trying to configure hard disk for read-only access. This may be due to a corruption on the hard disk.

TCSP006 Unable to download package from 2X ThinClientServer.

An error has occurred while downloading package from 2X ThinClientServer. This could be caused by a network transmission error or 2X ThinClientServer is no longer available.

TCSP007 Unable to remount media as read/write.

An error has occurred while trying to configure hard disk for read/write access. This may be due to a corruption on the hard disk.

TCSP008 Package failed integrity check.

A corruption has occurred in the package downloaded from 2X ThinClientServer. This may be due to an error in the file hosted on 2X ThinClientServer, a network transmission error, or lack of space on the hard disk.

TCSP009 Unable to mount package.

An error has occurred while loading the package into the system. This may be caused by a network transmission error or hardware failure.

TCSP010 Failed to overlay package.

An error has occurred while configuring the system with the new package. This may be caused by a system corruption or hardware failure.

TCSS001 Missing connection settings, aborting login session.

An error has occurred while provisioning settings to the 2X ThinClientOS. Either a corruption has occurred over the line or else there is some misconfiguration in the connection settings. Please double check your connection settings and associated protocol.

TCSS002 Your connection requires an NX session however the client is not available.

The 2X ThinClientOS you are using is designed for a different Terminal Server. Please contact your administrator to obtain a version of 2X ThinClientOS targeted for an NX session.

TCSS003 Your connection requires an RDP session however the client is not available.

The 2X ThinClientOS you are using is designed for a different Terminal Server. Please contact your administrator to obtain a version of 2X ThinClientOS targeted for an RDP session.

TCSS004 Your connection requires an ICA session however the client is not available.

The 2X ThinClientOS you are using is designed for a different Terminal Server. Please contact your administrator to obtain a version of 2X ThinClientOS targeted for an ICA session.

TCSS005 Your RDP session terminated abnormally.

A network error has occurred while connected to your Remote Session. This can be due to incorrect settings or else due to the session being interrupted from the Terminal Server. If this is not the case make sure that the thin client is not experiencing any memory corruption or network outages, or is out of disk space.

TCSS006 Your ICA session terminated abnormally.

A network error has occurred while connected to your Remote Session. This can be due to incorrect settings or else due to the session being interrupted from the Terminal Server. If this is not the case make sure that the thin client is not experiencing any memory corruption or network outages or is out of disk space.

TCSS007 Unable to logoff user from session.

A network error has occurred while connected to your Remote Session. This can be due to incorrect settings or else due the session being interrupted from the Terminal Server. If this is not the case make sure that the thin client is not experiencing any memory corruption or network outages or is out of disk space.

TCSS008 Your NX session terminated abnormally.

A network error has occurred while connected to your Remote Session. This can be due to incorrect settings or else due the session being interrupted from the Terminal Server. If this is not the case make sure that the thin client is not experiencing any memory corruption or network outages or is out of disk space.

TCSS009 Empty password is not permitted in an NX session.

An empty password is not permissible to establish a valid session to 2X TerminalServer. Please supply credentials with a valid username and the respective valid, non-empty, password.

TCSS010 Your connection requires a local desktop however the window manager is not available.

A required component to configure your system as a local desktop is missing. This could be caused by a corrupted package.

TCSS011 Your connection requires RDP published applications however the client is not available.

A required component to access RDP publish applications is missing. This could be caused by a corrupted package.

TCSS012 Your desktop session terminated abnormally.

An error has occurred during the desktop session. This could be caused by a corrupted system or faulty hardware.

TCSS013 Your connection requires ICA published applications however the client is not available.

A required component to access ICA publish applications is missing. This could be caused by a corrupted package.

TCSS014 Missing thin client settings, aborting login session

2X ThinClientServer failed to send one or more required settings. This could be caused by a network transmission error or 2X ThinClientServer is no longer available.

TCSS015 Missing session settings, aborting login session

2X ThinClientServer failed to send one or more required settings. This could be caused by a network transmission error or 2X ThinClientServer is no longer available.

TCSS016 Invalid credentials to logon to 2X managed desktop.

The credentials used to populate the 2X managed desktop were invalid. Please check that the proper credentials are used.

TCSS017 An error has occured to populate the 2X managed desktop.

The list of published applications has caused an error in creating the appropriate 2X managed desktop. Reduce the list of published applications to identify which is the problem.

TCSS018 No published applications are available.

The user has no published applications available from the Terminal Server farm. Please check the applications provisioning for the particular user.

2X ThinClientServer (Linux) Post-Install

TCIN001 The useradd utility cannot be found under /usr/sbin. Please check!!

The “useradd” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN002 The groupadd utility cannot be found under /usr/sbin. Please check!!

The “groupadd” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN003 The sed utility cannot be found under /bin. Please check!!

The “sed” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN004 The find utility cannot be found under /usr/sbin. Please check!!

The “find” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN005 The ldconfig utility cannot be found under /usr/sbin. Please check!!

The “ldconfig” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN006 The awk utility cannot be found under /usr/sbin. Please check!!

The “awk” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN007 The ifconfig utility cannot be found under /usr/sbin. Please check!!

The “ifconfig” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN008 The netstat utility cannot be found under /usr/sbin. Please check!!

The “netstat” executable was not found in one of the standard locations. Please adjust your installation to include this executable, or, alternatively, if this executable is located in a different path, create a symlink to this executable in one of the standard locations.

TCIN012 The following options are not supported by your useradd utility: <*option list*>

The “useradd” executable found on your system does not support one or more of the options –g, -d, -c, -s. 2X ThinClientServer installation cannot proceed. Please adjust your installation to include an updated version of this executable that supports all these options.

TCIN013 The following options are not supported by your sed utility: <*option list*>

The “sed” executable found on your system does not support one or more of the options –I, -e. 2X ThinClientServer installation cannot proceed. Please adjust your installation to include an updated version of this executable that supports all these options.

TCIN014 ERROR: The FQDN and the local hostnames resolve to different IPs.

The local hostname and this machine’s Fully Qualified Domain Name resolve to different IP Addresses. The network configuration needs to be corrected to resolve this issue to ensure correct operation.

To check:

hostname (Returns local hostname)

hostname -f (Returns FQDN)

pinging both should return same IP.

TCIN015 ERROR: The resolved IPs are not bound to any physical interfaces or local hosts.

This machine's hostname resolves to an IP Address that is not assigned to any of the local Network Interfaces. The Network Configuration is incorrect and must be resolved.

TCIN020 ERROR: Could not resolve both local and FQDN hostnames.

Both the local hostname and the FQDN could not be resolved. Please specify at least the local hostname.

TCIN021 Cannot install mysql databases. Please check error log file /tmp/2Xmysql_install_db.log

The post-install script could not install the mysql databases necessary to store configuration information. 2X ThinClientServer installation cannot proceed. The log file indicated will provide further details to identify the issues affecting your server relevant to this error to assist in resolving the issue.

TCIN022 Error in importing schema.sql, please check that file/database exists!!

The post-install script could not import the "schema.sql" file. Either the script can no longer read the file "schema.sql" installed during installation, or the script can no longer find the database "thinclient" installed during installation. Contact 2X Technical Support.

TCIN023 Could not start mysql server. Please check error log file /var/opt/2X/thinclientserver/mysql/data/'hostname'.err

The post-install script could not start the mysql database engine necessary to store configuration information. 2X ThinClientServer installation cannot proceed. The log file indicated will provide further details to identify the issues affecting your server relevant to this error to assist in resolving the issue.

TCIN025 Could not update database to latest revision. Please check error log file /var/opt/2X/thinclientserver/mysql/data/'hostname'.err

The post-install script could not update the mysql databases necessary to store configuration information. 2X ThinClientServer installation cannot proceed. The log file indicated will provide further details to identify the issues affecting your server relevant to this error to assist in resolving the issue.

TCIN028 The previous installation did not finish successfully. Please remove it before trying again.

The post-install script identified a previous broken installation. It will be necessary to uninstall the previous version prior to attempting a new installation.

TCIN030 The sanity of a previous installation cannot be checked. Try to upgrade, but if you have problems, uninstall and try again.

The post-install script was unable to confirm whether the previous installation found is sane. 2X ThinClientServer installation will proceed, but it is possible that the procedure will be unsuccessful. If so, it will be necessary to uninstall this instance prior to attempting a new installation.

TCIN031 Old configuration files cannot be found. Please uninstall previous installation and try again.

The post-install script coud not locate the configuration files relevant to the previous installation – the upgrade procedure cannot proceed. It will be necessary to uninstall the previous version prior to attempting a new installation.

2X ThinClientServer (Linux) Post-Configuration

TSCS001 Cannot install mysql databases. Please check error log under /var/opt/2x/thinclientserver/mysql/data/'hostname'.err

The configuration script was unable to create the necessary mysql databases. 2X ThinClientServer configuration cannot proceed. The log file indicated will provide further details relevant to this error to assist in resolving the issue.

TSCS002 Could not start mysql server. Please check error log under /var/opt/2x/thinclientserver/mysql/data/'hostname'.err

The configuration script was unable to start the mysql server. 2X ThinClientServer configuration cannot proceed. The log file indicated will provide further details relevant to this error to assist in resolving the issue.

TSCS003 Error in importing initdb.sql, please check that file/database exists!!

The configuration script could not import the “initdb.sql” file. Either the script can no longer read the file “initdb.sql” installed during installation, or the script can no longer find the database “thinclient” installed during installation. Contact 2X Technical Support.

TSCS004 Could not connect to Master Server. Please re-enter connection information.

The configuration script could not connect to the Master Server on the specified IP address. Re-enter the correct connection information for the Master Server.

Firewall Issues:
Please note that for a 2X ThinClientServer to connect to the Master Server successfully, it will be necessary to ensure that TCP connections on port 3306 to the Master Server can be established.

TSCS005 Could not import the 2X ThinClientServer database schema. Please check that the file ‘schema.sql’ exists under ‘<installation directory>/sql’.

The configuration script could not import the “schema.sql” file while re-configuring 2X ThinClientServer. Either the script can no longer read the file “schema.sql” installed during installation, or the script can no longer find the database “thinclient” installed during installation. Contact 2X Technical Support.

TSCS007 ERROR: Make sure the SELinux utilities selinuxenabled, getenforce, and runcon are installed on your system..

The executables “selinuxenabled”, “getenforce”, and “runcon” were not all found in one of the standard locations. The configuration script requires that these executables are all available. Please adjust your installation to include these executables, or, alternatively, if the executables are located in a different path, create symlinks to these executables in one of the standard locations.

TSCS010 ERROR: The SELinux utility audit2allow is not installed on your system. Please check!

The executable “audit2allow” was not found in one of the standard locations. The configuration script requires that this executable is available. Please adjust your installation to include this executable, or, alternatively, if the executable is located in a different path, create a symlink to this executable in one of the standard locations.

TSCS011 ERROR: Policy `<policy>` **sources could not be installed. Make sure that you have internet connectivity and check file /tmp/2xyuminstall.log.**

The configuration script was unable to download and install the SELinux policy sources necessary to implement the changes necessary for 2X ThinClientServer.

13. Advanced Configuration

2X ThinClientServer Configuration Options

When diagnosing issues with 2X ThinClientServer, 2X ThinClientOS, or actual Thin Clients, it is possible to set configuration options to override certain behaviour, allowing the Administrator to circumvent potential pitfalls.

These options are activated or deactivated by adding lines in the text file (creating it if necessary):

…/conf/options.conf

…located under the "htdocs" folder containing the Management Console installation. In a typical Windows scenario, the full path would be:

"C:\Program Files\2X\ThinClientServer\apache2\htdocs\conf\options.conf"

This is the list of settings available:

1. DOMAIN_MODE_2003=1

   The default behaviour in terms of passing credentials via the Windows Terminal Server Login is as follows:

   Username is passed in the format <user>@<domain> only if…

   - <domain> is longer than 15 characters; or
   - <user> is longer that 20 characters; or
   - DOMAIN_MODE_2003=1 is set

   This option can be set to force the system to ALWAYS pass the username in <user>@<domain> format.

14. Minimum Specifications for 2X ThinClientOS

Minimum Supported Specifications: PXE Booting

- CPU: 200MHz Pentium with MMX Instructions
- RAM: 64Mb
- HDD: none
- CDROM: none

Minimum Supported Specifications: CD Booting

- CPU: 200MHz Pentium with MMX Instructions
- RAM: 32Mb
- HDD: none
- CDROM: CD Reader

Minimum Supported Specifications: HDD / Flash Booting

- No swap partition will be created if at least 64Mb RAM is available:
  - CPU: 200MHz Pentium with MMX Instructions
  - RAM: 64Mb
  - HDD: 32Mb
  - CDROM: none (except required for installation)

- A swap partition will be created if less that 64Mb RAM is available:
  - CPU: 200MHz Pentium with MMX Instructions
  - RAM: 32Mb
  - HDD: 64Mb
  - CDROM: none (except required for installation)

    Please note that using a Flash disk in a scenario that required a swap partition will damage the Flash disk. A Flash disk can handle only a limited number of rewrites, and will therefore fail very quickly if used in a swap partition scenario.

14. Legacy DHCP configuration

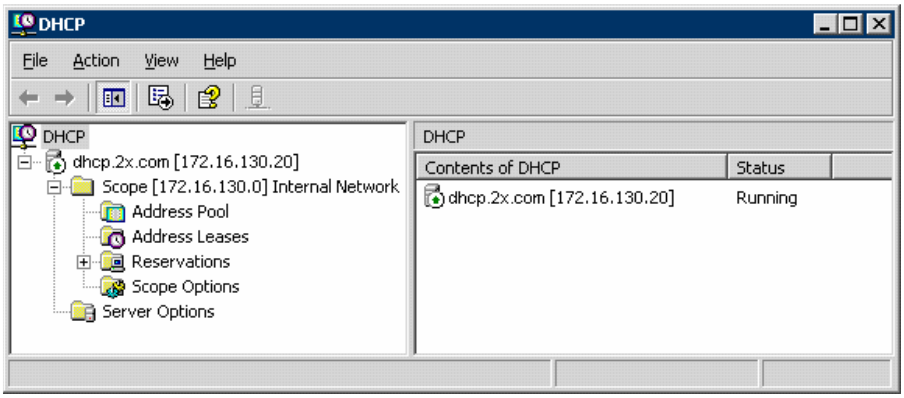
Preparing the DHCP server

If you will NOT be booting ANY thin clients over the network, you can proceed directly to Part B.

Part A – Booting over the Network

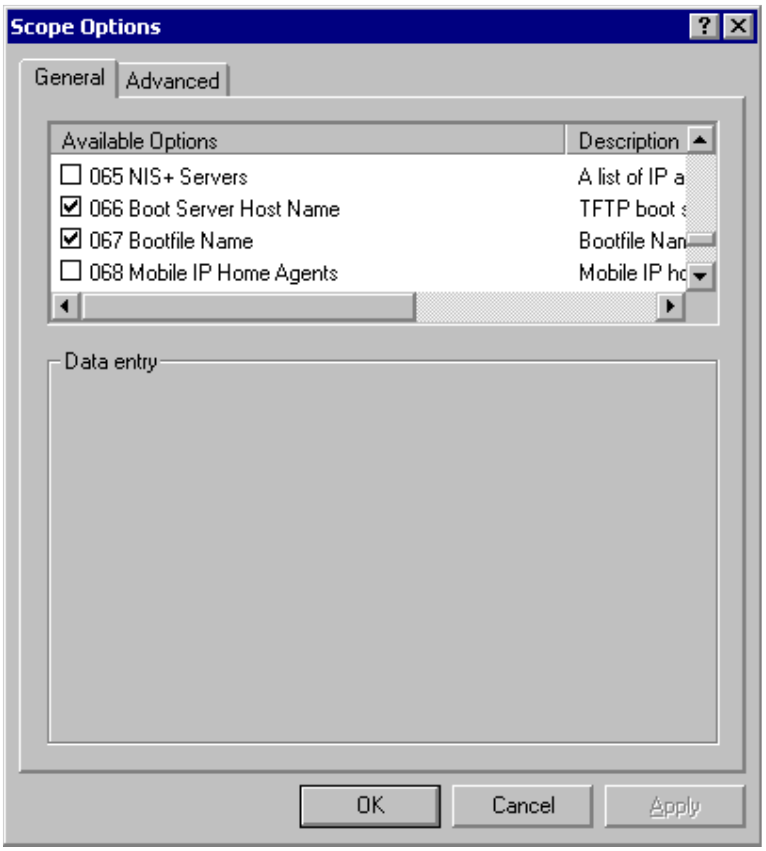
If your thin client will be booting via PXE or Etherboot, you have to configure your DHCP server to tell the thin clients where the TFTP server is located in order to download 2X ThinClientOS:

1. If you are running a Windows DHCP server, go to Start > Administrative Tools > DHCP on the DHCP server. The DHCP configuration will start.



Screenshot 75: DHCP administration utility

2. Right-click the 'Scope > Scope Options' node and select "Configure options…". If you have multiple subnets, be sure to select the scope options of the subnet in which you wish to use 2X ThinClientServer.



Screenshot 76: DHCP scope options

3. In the scope options dialog, browse down to '066 Boot Server Host Name' and enter the IP address of your TFTP/2X ThinClientServer machine (these will be different ONLY if you are using a third-party TFTP server).
4. Browse to the '067 Bootfile Name' option and enter a String Value of 'pxelinux.0'.

Firewall Issues:
Please note that for a DHCP Server to provide TCP/IP settings to the Thin Client successfully, it will be necessary to ensure that: *1. UDP connections on port 67 to the DHCP Server can be established.* *2. UDP connections on port 68 to the Thin Client can be established.* *Please note that for a 3rd Party TFTP Server to serve 2X ThinClientOS to Thin Clients successfully, it will be necessary to ensure that UDP connections on port 69 to the 3rd Party TFTP Server can be established.*

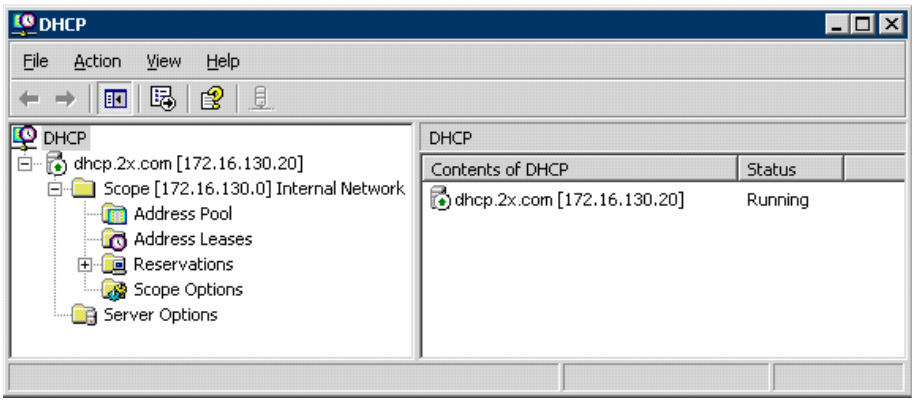
Part B – Booting from media

The 2X ThinClientOS has the capability to locate the 2X ThinClientServer in one of 2 ways:

a. using DHCP

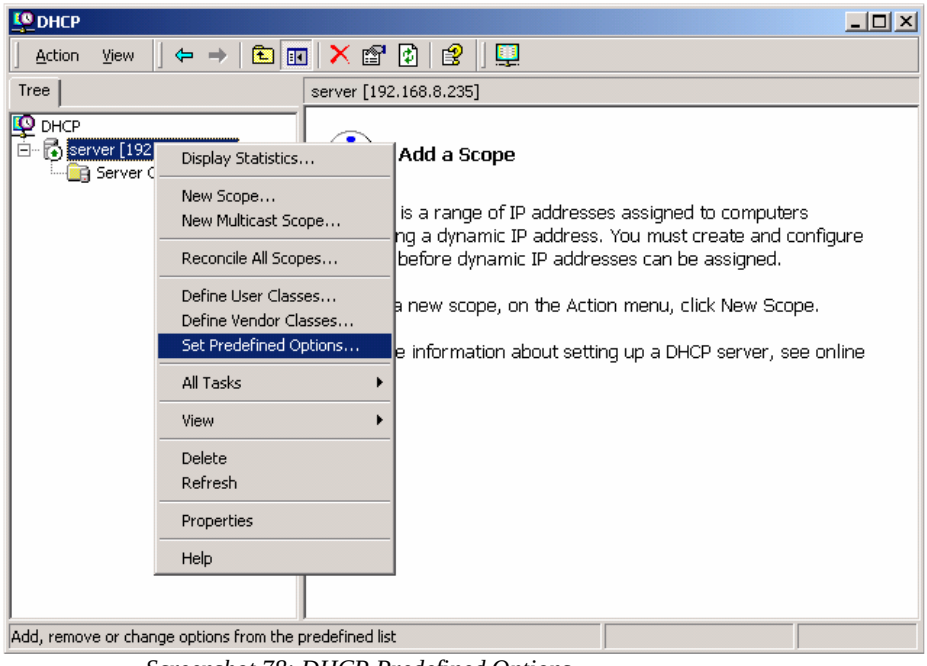
b. using DNS

a. using DHCP



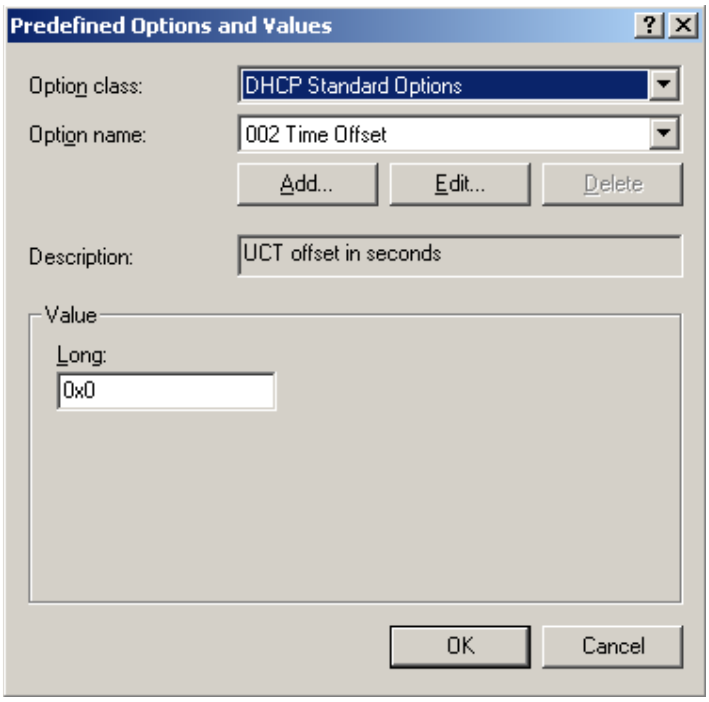
Screenshot 77: DHCP administration utility

1. If you are running a Windows DHCP server, go to Start > Administrative Tools > DHCP on the DHCP server. The DHCP configuration will start.



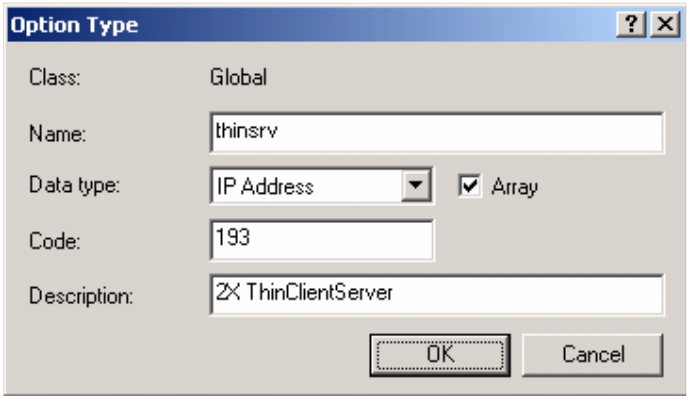
Screenshot 78: DHCP Predefined Options

2. Right-click on DHCP server and select "Set Predefined Options..."



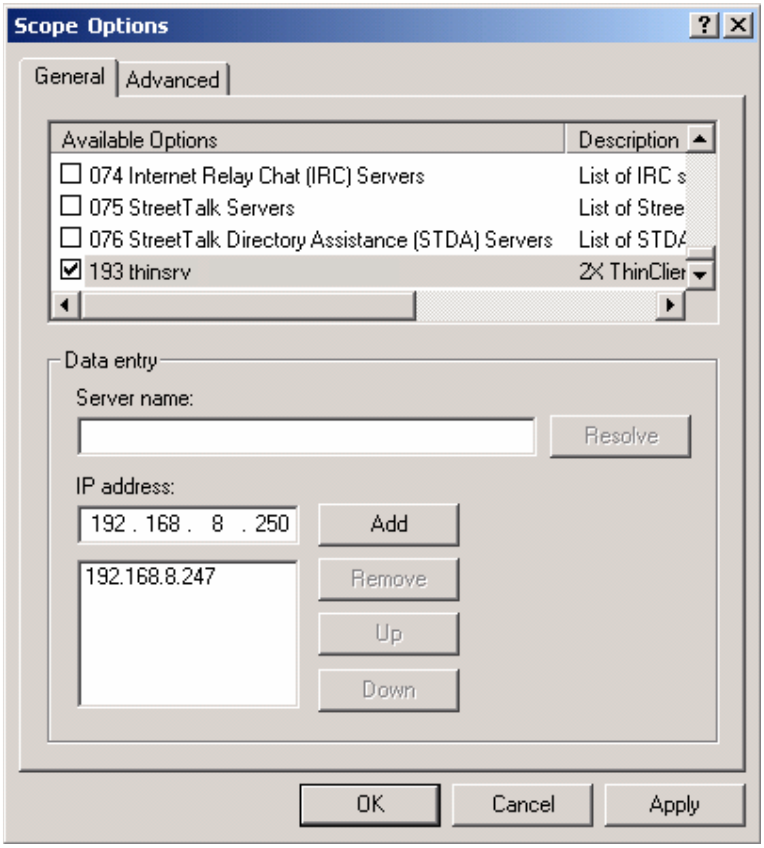
Screenshot 79: Predefined Options dialog

3. In the Predefined options dialog, choose option class "DHCP Standard Options" and click the "Add" button.



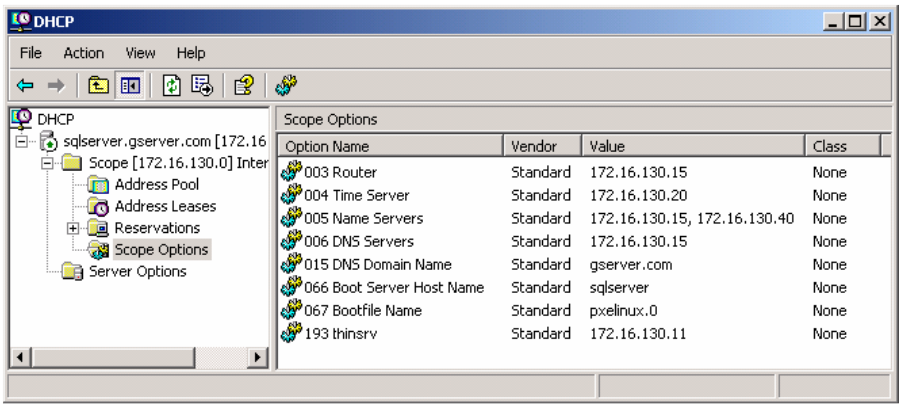
Screenshot 80: Option Type dialog

4. You will need fill in the followings values in the Option Type dialog:
   - "Name:" field type "thinsrv"
   - "Data type" field choose "IP Address" and tick the "array" checkbox
   - "Code" field type "193"
   - "Description" field type "2X ThinClientServer".



Screenshot 81: Option Type dialog

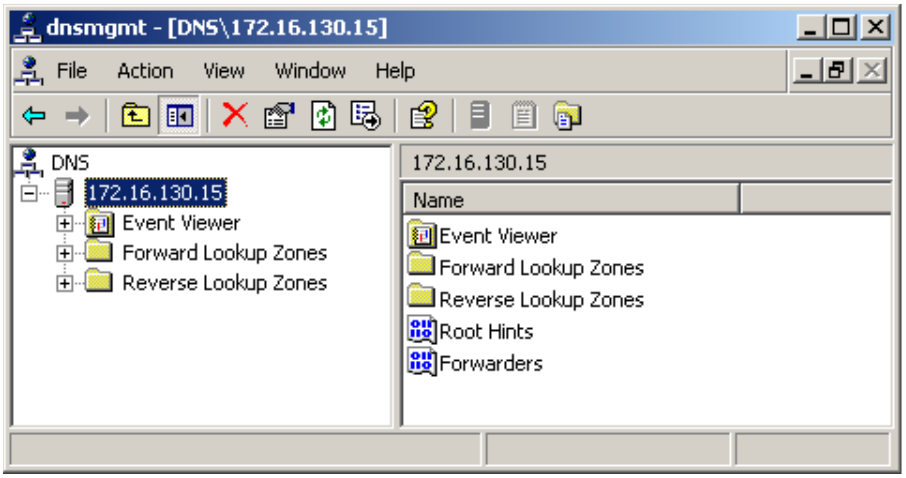
Click OK. The server options should now look as shown in the screenshot. Click OK to exit the dialog.



Screenshot 82: DHCP scope options correctly configured

5. In the main DHCP administrator application, the right pane should show the Scope Options as in the screenshot above.

b. using DNS



Screenshot 83: DNS configuration

1. If you are running the Microsoft Windows DNS server service, go to Start > Administrative Tools > DNS. The DNS configuration will start.
2. Go to the node Forward Lookup Zones and highlight your domain (for example, internal.2x.com).
3. Right-click and select 'New Host (A) ...' to create a new ‘A’ record.
4. Enter 'thinserver', and the IP address of the 2X ThinClientServer machine. Click 'Add Host' to enter the record. Note: Ensure that the DNS suffix assigned to the machine by the DHCP server matches the domain selected in ‘2’ above.

5. You can confirm that the previous 4 steps have been performed correctly by executing, from a command prompt:

   `ping thinserver.internal.2x.com`

   …(replacing "`internal.2x.com`" with the domain selected in step '2' above).

   If the ping command does NOT receive a response, please review the above steps carefully and identify where you could have made an error with the configuration steps.

6. If the ping command receives a response, you are ready to proceed to the next step.

Firewall Issues:
Please note that for a DNS Server to resolve host and domain names successfully, it will be necessary to ensure that TCP connections on port 53 to the DNS Server can be established.

Step 2: Preparing the DNS server (optional)

If one or more of your thin clients will be booting from CD-Rom or hard disk, you have to configure an 'A' record in your DNS server called 'thinserver', which points to the 2X ThinClientServer machine. Please consult the documentation of the DNS software that was shipped with your Linux distribution.

Step 3: Preparing the DHCP server

If your thin client will be booting via PXE or Etherboot, you have to configure your DHCP server to tell the thin clients where the TFTP server is located in order to download 2X ThinClientOS. To do this you will need to add the highlighted settings in the configuration file for your DHCP server. We are providing a sample configuration which you can use as a template. The text in gray is required to enable PXE booting with 2X ThinClientServer. The text in red should be replaced with the IP address of where the 2X ThinClientServer is installed. The text in blue should be replaced with the IP address of where the TFTP server is installed. All IP addresses and ranges should be changed appropriately for your network.

```
option domain-name "2x.com";
option domain-name-servers 192.168.0.1;
option routers 192.168.0.1;
option thinsrv code 193 = array of ip-address;

ddns-update-style none;
default-lease-time 3600;

subnet 192.168.0.0 netmask 255.255.255.0 {
  range 192.168.0.128 192.168.0.254;
  default-lease-time 3600;
  max-lease-time 172800;
  option thinsrv 192.168.0.10;
  option routers 192.168.0.1;
  next-server 192.168.0.10;
  option tftp-server-name "192.168.0.10";
  # required by Intel PXE-2.1
  server-identifier 192.168.0.10;
```

```
  filename "/pxelinux.0";
}
```

Alphabetical Index