

# Configuring XRemote

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Information in this chapter describes the X Windows system and how to configure the Cisco IOS software to support XRemote connections.

For a complete description of the commands referenced in this chapter, refer to the chapter “XRemote Configuration Commands” in the *Access Services Command Reference*. For information about establishing XRemote connections at the user EXEC level, refer to the “Connection Commands” chapter of the *Access Services Command Reference*.

## Cisco’s Implementation of XRemote

The X Window System, also called X, is a network-based graphics window system originally developed for workstations running UNIX. Cisco Systems, Inc. has developed an XRemote application that allows the XRemote capabilities of X terminals to run on the access server or router.

Previous window systems for terminals were *kernel-based* and therefore were closely linked to the operating system running on the workstation itself. They typically only ran on discrete systems, such as a single workstation. The X Window System is not part of any operating system, but instead, is composed of application programs. Thus, the X Window System enables flexible, graphics-based network computing across a wide range of operating systems and hardware platforms.

## X and the Client-Server Model

The underlying architecture of the X Window System is based on a *client-server* model. The system is split into two parts: *clients* and *display servers*. Clients are application programs that perform specific tasks, and display servers provide specific display capabilities and track user input. These two parts can reside on the same computer or can be separated over a network. In an X terminal environment, such as in NCD terminal implementations, the display server resides on the display station and the client resides on a host computer.

Because the X Windows System employs this client-server partitioning and is independent of both the hardware and operating environment, X terminal users can access different types of computers to simultaneously access several applications and resources in a multivendor environment. A user at an X terminal can run and display a calendar program on a VAX, a spreadsheet program on a PC, and a compiler on a workstation concurrently.

## How XRemote Works

XRemote is a protocol developed specifically to optimize support for the X Windows System over a serial communications link. Its compression and decompression algorithms are designed to handle bit-mapped displays and windowing systems.

There are two basic parts to XRemote:

- Server-side helper process
- Client-side helper process

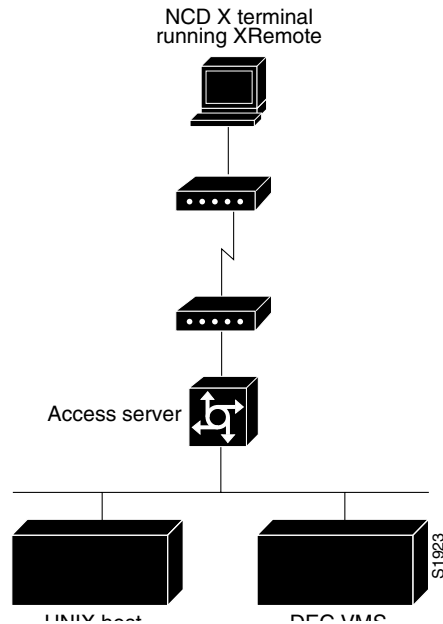
These two helper processes communicate with each other using the XRemote protocol. The client-side helper communicates with X clients using the standard X protocol. The server-side helper communicates with the server using the standard X Window System. The server-side helper might operate as part of the X server or it might be external and accessed across the network; for example, the server-side helper can operate in an access server or router at your house or work site. If the server-side helper is in the X terminal, it must have XRemote PROMs installed.

XRemote enables a user of a display station to run the X Window System via 9600-baud (and faster) modem connections with performance that is superior to using conventional serial protocols, such as Serial Line Internet Protocol (SLIP). An X display station must either implement XRemote or be connected to a network configuration that includes an access server or router.

## Connection Capability

The Cisco implementation of XRemote is fully compatible with the NCD XRemote protocol. Figure 36 illustrates an XRemote connection between an X terminal and an access server. In Figure 36, the server-side helper runs on the X terminal, and the client-side helper runs on the access server.

**Figure 36 XRemote Session from an X Display Server Running XRemote**



## Remote Access to Fonts

Remote access to fonts is provided in three ways:

- Using the industry-standard protocol for transporting X traffic over Transmission Control Protocol/Internet Protocol (TCP/IP) networks
- Using the Digital Equipment Corporation protocol for transporting X traffic over local-area transport (LAT) networks
- Using the Internet standard Trivial File Transfer Protocol (TFTP) for TCP/IP networks

A single XRemote user can use any combination of TCP/IP and LAT client connections and any combination of TFTP and LAT font access.

## XRemote Configuration Task List

To make a host connection using NCD's XRemote feature and the access server or router, complete the tasks in the following sections, as needed:

- Attach a Modem
- Set Up X Terminal Parameters
- Define a Font Server
- Select the Fonts
- Increase the Internal Buffer Size
- Set the Number of Font Loader Retries
- Monitor XRemote Activity

The following sections describe these tasks. See the end of this chapter for a configuration example.

### Attach a Modem

In general, you can use any modem that provides acceptable performance for your application. The following guidelines apply to an XRemote operation using a modem (refer to the user manual for your modem for specific connection procedures):

- Attach cables and set up your modem for use with XRemote (access over asynchronous lines only), or cable the X terminal directly to the access server or router.
- Disable any error correction and compression features of the modem. Because XRemote implements its own compression and error correction, the modem's compression and error correction actually impair performance.
- If you must use a flow control mechanism, hardware flow control (such as RTS/CTS or DTR/DSR) is recommended. Software flow control (such as XON/XOFF) is discouraged.
- The modem should incur minimal delays in round-trip transmissions, even when transmitting small packets, and should be transparent to the data stream.
- The modem should provide true full-duplex transmission at 9600 baud or faster. Half-duplex modems are not suitable for use with XRemote.

Refer to the chapter "Configuring Terminal Lines and Modem Support" earlier in this publication for more information about configuring modems.

## Set Up X Terminal Parameters

The X Server for the X terminal and the network and serial parameters for the X terminal must be configured as described in the publications for the specific X terminal you are using. In general, the X terminal configuration determines the mode of operation for the terminal, the source of font information, and the source of remote configuration information (when applicable).

## Define a Font Server

To download fonts to the X terminal, perform the following task in global configuration mode:

Task	Command
Define a specific TFTP font server as the source for fonts.	<b>xremote tftp host</b> <i>hostname</i>

## Select the Fonts

The NCD terminal contains a small set of built-in fonts in local ROM. You should use these fonts because loading fonts over a serial line can increase application startup time. The default for an NCD terminal is to use built-in fonts, unless you log in using DECwindows over LAT. When using DECwindows over LAT, the standard DECwindows fonts are used automatically.

Perform the following two tasks to select fonts:

- Access Nonresident Fonts Using TFTP
- Select DECwindows Fonts

## Access Nonresident Fonts Using TFTP

When an X terminal application requests a font that is not stored in the terminal's ROM, the X terminal makes a request for a font file from the access server or router. The Cisco IOS software uses the Trivial File Transfer Protocol (TFTP) to load the font from the font server, and then passes the font to the X terminal using the XRemote protocol. The process of loading fonts from the access server or router to the X terminal can take 30 to 45 seconds, depending on the size of the font file.

An X server can display only the fonts it finds in the directories in its font path. The X server's default font path includes only the built-in fonts. To access fonts stored on a host, you must add the host's font directories to the X server's font path. To do this, use the UNIX command **xset** with the **fp+** argument to add fonts to the end of the server's font path.

For example, to allow your display station to access the 100 dots per inch (dpi) fonts found in the standard font directory, run the following command at the host system prompt:

```
host_prompt% xset fp+ /usr/lib/x11/ncd/fonts/100dpi
```

For more information, refer to the *NCDware XRemote User's Manual*.

## Select DECwindows Fonts

Downloading of fonts occurs automatically when you initiate a remote DECwindows login session using the EXEC **xremote lat** command. Instead of relying on TFTP to download the fonts, the fonts are read in via the LAT protocol.

If you want to use DECwindows fonts while running standard X applications on a UNIX host, you need to use the UNIX **xset** command or an application that issues an XSetFontPath request to set a font path. You might want to do this if you are primarily a TCP/IP user, but also run some DECwindows applications.

Execute **xset**, or the application to issue an XSetFontPath request, to set the following path:

*/LAT/SERVICE*

In this path, *SERVICE* is a LAT service name with DECwindows support; case is not significant.

When the Cisco IOS software sees a request for font files in that directory, it uses LAT instead of TFTP to access the specified service.

## Increase the Internal Buffer Size

When the X terminal requests that a font file be loaded, the Cisco IOS software must first load the font file into an internal buffer before passing it to the X terminal. The default value for this buffer is 70000 bytes, which is adequate for most font files, but the size can be increased as necessary for nonstandard font files.

To change the buffer size, perform the following global configuration task:

Task	Command
Set the buffer size used for loading font files.	<b>xremote tftp buffersize</b> <i>buffersize</i>

This task can be performed for both TFTP and LAT font access.

## Set the Number of Font Loader Retries

You might need to increase the number of times that the font loader tries to load the fonts. This is particularly important when the font servers are known to be heavily loaded.

To set the TFTP font loader, perform the following global configuration task:

Task	Command
Set the number of retries by the TFTP font loader.	<b>xremote tftp retries</b> <i>retries</i>

## Monitor XRemote Activity

To check the status of XRemote connections, perform one or more of the following tasks at the EXEC prompt:

Task	Command
Display current connections and monitor traffic.	<b>show xremote</b>
Display traffic and line statistics.	<b>show xremote line</b> <i>number</i>

### XRemote Configuration File Example

The following example illustrates how to specify IBM-1 as the host name of the TFTP font server, specify 7 retry attempts at accessing the server, and reduce the buffer size to 20,000 bytes.

```
xremote tftp host IBM-1
xremote tftp retries 7
xremote tftp buffersize 20000
```