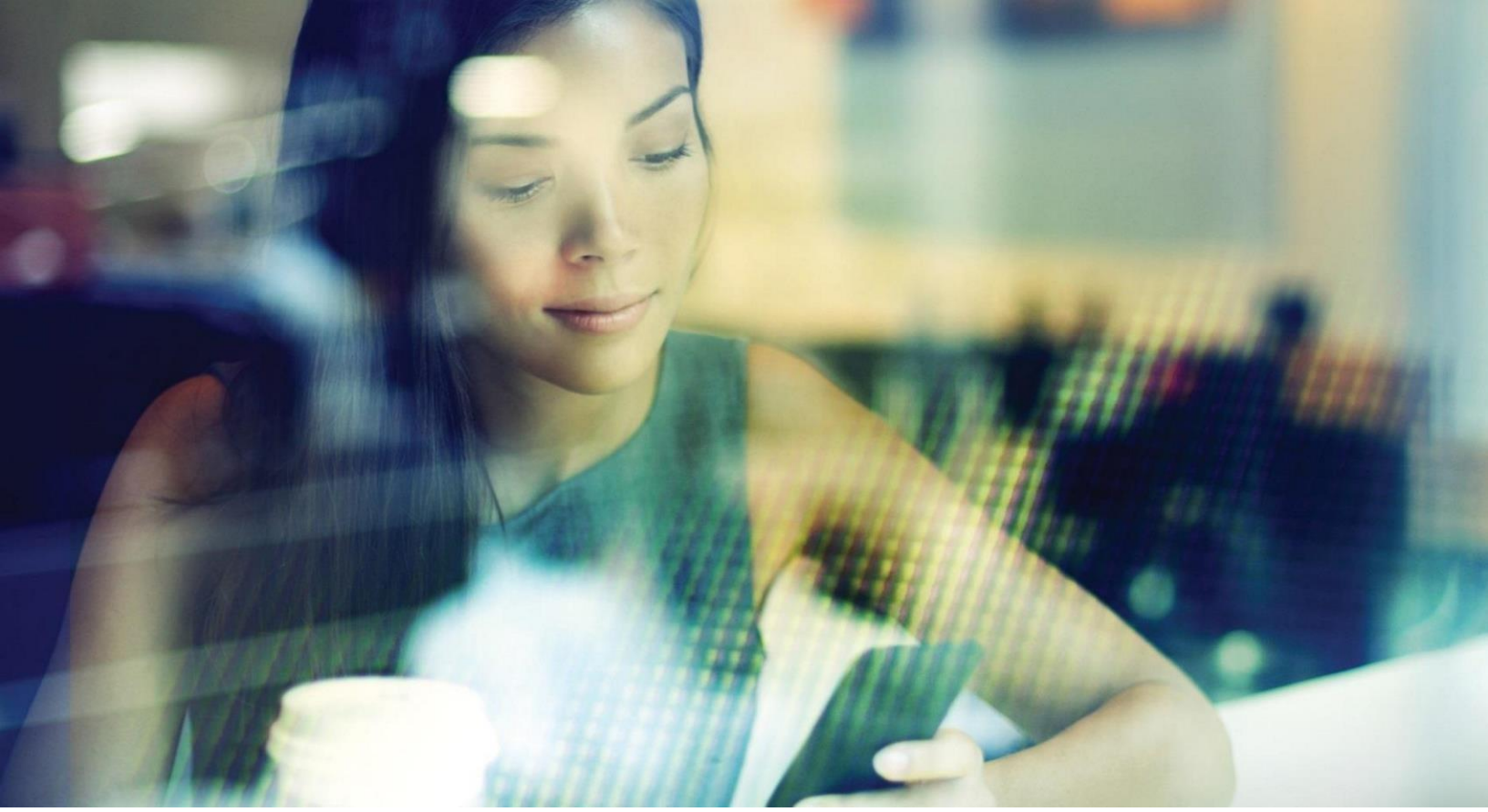


Citrix Receiver for Linux OEM Reference Guide

Version 13.6

Contents

About this document 4

Resources to aid customization 4

Tools 4

Citrix Receiver for Linux components 5

- About Citrix Receiver for Linux 5
- Components used by Citrix Receiver for Linux 5
- Command line utilities 6
- Authentication Manager 6
- Related components 6

Customize Citrix Receiver for Linux 6

- Customize a Citrix Receiver for Linux installation 6
- User Interface 9
- Customize the self-service UI 13
- UI Dialog library 20
- Security 21
- Multimedia 24
- Video 27
- Audio 34
- Performance 37

Experimental Features 43

- GStreamer audio 43

Reference Information 46

- Command Line utilities 46
- Configuration files 59
- Library files 97

Disclaimer

This document is furnished "AS IS". Citrix Systems, Inc. disclaims all warranties regarding the contents of this document, including, but not limited to, implied warranties of merchantability and fitness for any particular purpose. This document may contain technical or other inaccuracies or typographical errors. Citrix Systems, Inc. reserves the right to revise the information in this document at any time without notice. This document and the software described in this document constitute confidential information of Citrix Systems, Inc. and its licensors, and are furnished under a license from Citrix Systems, Inc. This document and the software may be used and copied only as agreed upon by the Beta or Technical Preview Agreement.

About Citrix

Citrix (NASDAQ:CTXS) is leading the transition to software-defining the workplace, uniting virtualization, mobility management, networking and SaaS solutions to enable new ways for businesses and people to work better. Citrix solutions power business mobility through secure, mobile workspaces that provide people with instant access to apps, desktops, data and communications on any device, over any network and cloud. With annual revenue in 2014 of $3.14 billion, Citrix solutions are in use at more than 330,000 organizations and by over 100 million users globally. Learn more at www.citrix.com.

Copyright © 2017 Citrix Systems, Inc. All rights reserved. Citrix, Citrix Receiver, and StoreFront are trademarks of Citrix Systems, Inc. and/or one of its subsidiaries, and may be registered in the U.S. and other countries. Other product and company names mentioned herein may be trademarks of their respective companies.

About this document

The purpose of this document is to support Original Equipment Manufacturers (OEMs) who integrate Citrix® Receiver™ for Linux® into their own or customers' deployments. The document helps you:

- Modify or replace the Citrix Receiver for Linux installation
- Customize the Citrix Receiver for Linux user interface
- Remove or replace Citrix Receiver for Linux libraries

There are two parts to this document: a set of task-based procedures for configuring Citrix Receiver, and tables of reference information for command-line utilities, .ini files, and library files.

This document is intended for developers of products that include Receiver for Linux. If you are planning to modify the user interface of Receiver for Linux, Citrix recommends that you read the entire manual.

The Citrix Product Documentation site contains the official product documentation for Citrix Receiver for Linux. This includes configuration instructions and known issues that may be useful when customizing this component.

Resources to aid customization

OEMs can make use of the following:

- Citrix Receiver for Linux, which is available for download from the Citrix website, http://www.citrix.com/.
- Two command-line utilities: storebrowse, and wfica:
    - storebrowse is equivalent to the deprecated pnabrowse utility. It queries Citrix StoreFront for virtual desktops and published applications.
    - wfica is the client engine that creates connections to the server and performs all of the functions of the connections.
- A series of .ini configuration files that allow you to customize the behavior of individual connections or users.
- Certain library files (.dll or .so files) that can be added to or removed from the default installation to enable or disable specific functionality.

Tools

If you choose to customize the appearance of Citrix Receiver for Linux, Citrix recommends doing so with the GTK or Qt development environment. No other specialized tools are required. However, the self-service UI requires libwebkitgtk and therefore requires GTK+.

Citrix Receiver for Linux components

This section describes the components that make up Citrix Receiver for Linux and describes how developers can configure the client. Typically, such configuration may be required when the user interface of Receiver for Linux is being replaced with a custom version

About Citrix Receiver for Linux

Citrix Receiver for Linux is a Linux application that provides access to a session running on a server. When the connection to the server is established, the user can access desktops and applications, and work with files in a way similar to working on a local computer.

Citrix Receiver for Linux displays the session on the Linux workstation screen, and is fully integrated with other Linux X applications. The workstation's mouse and keyboard can be used with applications in the usual way, and the user can set up key mappings to enter PC keys that are interpreted locally on the workstation.

Generally, the features in Citrix Receiver are performed by software, but it is possible to configure certain Citrix HDX features to take advantage of hardware or your own optimized implementation.

Components used by Citrix Receiver for Linux

Citrix Receiver for Linux contains the following files:

- selfservice - This program replaces the configuration manager, wfcmgr, and allows access to Citrix StoreFront or Program Neighborhood Agent services through the new self-service user interface (UI).
- storebrowse - This program is equivalent to the deprecated pnabrowse utility. It queries StoreFront or Program Neighborhood Agent services for virtual desktops and published applications and allows access to them.
- wfica - This program is the client engine that creates connections to the server and performs all of the functions of the connections.
- Configuration files - These files are designed like Windows .ini files and provide configuration information. The default files are located in the $ICAROOT/config/ directory. A user's .ini files are located in $HOME/.ICAClient.
- Keyboard mapping files - These files store the key mappings that allow Receiver for Linux to interpret keystrokes made on keyboards of various types and layouts.
- Library files - These shared library files control specific Receiver for Linux features such as security and smart card support.
- Background processes (daemons) - These provide functionality for several features such as StoreFront authentication, StoreFront connection, and USB redirection.
- Helper processes - These run when features such as HDX MediaStream Windows Media Redirection are active.
- Utilities - These are occasionally useful for checking system compatibility (hdxcheck.sh) or collecting information for Citrix Technical Support (lurdump), or installing new certificates (ctx_rehash).

Command line utilities

storebrowse replaces pnabrowse. The latter is still available and is documented as part of this release, but it is deprecated and does not support the new features in this release. Citrix does not recommend using pnabrowse, unless necessary, to create or customize connections.

icabrowse is no longer available and is not documented as part of this release.

Authentication Manager

Authentication Manager (AM) is a background process for Citrix Receiver that manages credentials with StoreFront.

A StoreFront server can at any time request credentials, which can take many forms. Authentication Manager is a long-lived daemon process that runs on the user device and is responsible for communicating with StoreFront. Authentication Manager can launch helper processes, when needed, to gather credentials from user input using the UI Dialog Library. The Service Record daemon manages the relationship between stores and Authentication Manager by supplying the latter with configuration information.

Storebrowse and selfservice communicate with Authentication Manager using a proprietary protocol.

Related components

Citrix Receiver deployments involve other Citrix components. These typically include XenDesktop, XenApp, StoreFront (which replaces Web Interface as the mechanism for publishing applications), and Secure Gateway or NetScaler® Gateway. Configuring and customizing these related components is not covered in this document. For information on each, see the Product Documentation site.

Customize Citrix Receiver for Linux

This section contains task-based procedures for customizing Citrix Receiver for Linux. Where possible, examples and context are provided as well as instructions for developing and configuring Citrix Receiver.

The following aspects can be customized:

- Installation
- User interface
- Security
- Multimedia
- Performance

Customize a Citrix Receiver for Linux installation

You can customize Citrix Receiver configuration before installation by modifying the contents of the package and then repackaging the files. Your changes will be included in every Citrix Receiver installed using the modified package.

To customize a Citrix Receiver for Linux installation

1. Expand the Citrix Receiver package file into an empty directory. The package file is called *platform.major.minor.release.build*.tar.gz (for example, linuxx86-13.4.0.10109380.tar.gz for the Linux/x86 platform).
2. Make the required changes to the Citrix Receiver package. For example, you might add a new SSL root certificate to the package if you want to use a certificate from a Certificate Authority that is not part of the standard Receiver installation. To add a new SSL root certificate to the package, see *Install root certificates on user devices.* For more information about built-in certificates, see *Configure and enable SSL and TLS on* the Product Documentation site.
3. Open the PkgID file.
4. Add the following line to indicate that the package was modified:

   ```
   MODIFIED=traceinfo
   ```

   Where *traceinfo* is information indicating who made the change and when. The exact format of this information is not important.

5. Save and close the file.
6. Open the package file list, platform/platform.psf (for example, linuxx86/ linuxx86.psf for the Linux/x86 platform).
7. Update the package file list to reflect the changes you made to the package. If you do not update this file, errors may occur when installing your new package. Changes could include updating the size of any files you modified, or adding new lines for any files you added to the package. The columns in the package file list are:

   - File type
   - Relative path
   - Sub-package (which should always be set to cor)
   - Permissions
   - Owner
   - Group
   - Size

8. Save and close the file.
9. Use the `tar` command to rebuild Receiver package file, for example:

   ```
   tar czf ../newpackage.tar.gz *
   ```

Configuration files

About the configuration files

To change advanced or less common session settings, you can modify Receiver's configuration files. These are read each time wfica starts. You can update various different files depending on the effect you want the changes to have.

Be aware that, if session sharing is enabled, an existing session might be used instead of a newly reconfigured one. This might cause the session to ignore changes you made in a configuration file.

Apply default to all Citrix Receiver users

If you want to change the default for all Citrix Receiver users, modify the module.ini configuration file in the $ICAROOT/config directory.

Note: You do not need to add an entry to All_Regions.ini for a configuration value to be read from module.ini, unless you want to allow other configuration files to override the value in module.ini. If an entry in All_Regions.ini sets a specific value, the value in module.ini is not used.

Apply changes to new Receiver users

If you want the changes to apply to all future new Receiver users, modify the configuration files in the $ICAROOT/config directory. For changes to apply to all connections, update wfclient.ini in this directory.

Apply changes to all connections for particular users

If you want the changes to apply to all connections for a particular user, modify the wfclient.ini file in that user's $HOME/.ICAClient directory. The settings in this file apply to future connections for that user.

Note: If an entry appears in more than one configuration file, a value in wfclient.ini takes precedence over a value in module.ini.

About the parameters in the files

The parameters listed in each file are grouped into sections. Each section begins with a name in square brackets indicating parameters that belong together; for example, [ClientDrive] for parameters related to client drive mapping (CDM).

Defaults are automatically supplied for any missing parameters except where indicated. If a parameter is present but is not assigned a value, the default is automatically applied; for example, if InitialProgram is followed by an equal sign (=) but no value, the default (not to run a program after logging in) is applied.

Precedence

All_Regions.ini specifies which parameters can be set by other files. It can restrict values of parameters or set them exactly.

For any given connection, the files are generally checked in the following order:

1. All_Regions.ini. Values in this file override those in:
    - The connection's .ica file
    - wfclient.ini
2. module.ini. Values in this file are used if they have not been set in All_Regions.ini, the connection's .ica file, or wfclient.ini but they are not restricted by entries in All_Regions.ini.

If no value is found in any of these files, the default in the Citrix Receiver code is used.

Note: There are exceptions to this order of precedence. For example, the code reads some values directly from wfclient.ini for security reasons, to ensure they are not set by a server.

User Interface

This topic guides you through the steps for customizing the Receiver user interface (UI) and Receiver connections. This might require you to modify configuration files, run command-line utilities with options that you specify, or develop plug-ins.

In addition to the information presented here, consult the *User experience* topics in the Receiver for Linux section on the Product Documentation site.

Citrix provides a set of graphics assets that you can use to modify the Citrix Receiver UI in this release. To obtain these assets and a specification to help with the modifications, contact the Citrix Ready team.

Customize Citrix Receiver using storebrowse

You can customize Receiver by wrapping your own UI around the storebrowse command-line utility.

When used with Citrix StoreFront, storebrowse is equivalent to the deprecated pnabrowse utility. storebrowse takes options on the command line and returns results to its standard output, launches sessions, and so on.

storebrowse uses the concept of a *resource name*. Unlike an application's display name, which can be duplicated, a resource name is unique. For example, there could be a Microsoft Outlook® display name in both an Office 2010 folder and an Office 2007 folder. Therefore, all operations such as launch take the resource name as the argument, and icons are stored with the resource name as the root of the file name. Resource names are long and not necessarily human readable, but result in efficient scripts.

When entering a server address, you can omit the https:// or http:// prefix. storebrowse first tests the supplied URL as an HTTPS address and then, if that fails, as an HTTP address. StoreFront servers are not supported with the http:// prefix.

You can use an IP address instead of a FQDN for HTTP connections to PNAgent servers.

You can enter the FQDN or e-mail address (providing E-mail Based Account Discovery is configured) to setup a StoreFront connection. For Program Neighborhood Agent setup the URL of the server is required. The FQDN of the of the PNAgent server may be used if the config.xml is located in the default place <FQDN>/Citrix/PNAgent/, you must enter the full URL to the config.xml if your PNAgent setup is non-default.

To understand the command-line options that you can use with storebrowse, see the *Reference information* section of this document.

Using storebrowse with PNA servers

When connecting to a Program Neighborhood Agent (PNA) server, you can use storebrowse as a replacement for pnabrowse. storebrowse differs from pnabrowse in the following respects:

- Support for Kerberos passwords is withdrawn; the -k option is no longer accepted.
- Support for the old icabrowse utility has been removed. That is, the -A, -u, -p, and -c options are no longer accepted. The -S option is accepted but is now used to show subscribed applications on StoreFront servers.
- When using the -U, -P, and -D options with Program Neighborhood Agent sites, the following notes must be considered. Citrix recommends that you do not use these options and instead let the system prompt users for their credentials:
    - Storebrowse launches a daemon process so that PNA credentials can be stored between calls. By default, this process terminates after one hour of the last call to storebrowse, at which point the credentials are deleted.
    - To configure a different timeout, create the file $ICAROOT/config/storebrowse.conf containing the required timeout in seconds followed by a new line. If the value zero is used, credentials are not stored for PNA sites (but the daemon process still runs).
    - You can terminate the daemon process early by calling storebrowse `--killdaemon`.
- Long versions of each option are now available. This allows scripts to be more readable. For example, --enumerate can be specified instead of -E.
- The -r option (long option --icaroot) now specifies the root directory of the Receiver installation.

Migrate to storebrowse

If you are migrating from a pnabrowse environment to a storebrowse one, the following information may help with any customizations that you make using that command-line utility:

- Adding and removing StoreFront stores is easy:
    - To add a store, users enter the URL of the StoreFront server or, if email-based account discovery is configured, they enter their email address. For information on email-based account discovery, see the StoreFront documentation in Citrix product documentation. The --addstore command writes to standard output that should be passed to all future storebrowse calls regarding this store.
- StoreFront stores can now be used as sources of applications and desktops. Users can perform all of these tasks with storebrowse. These are new except for the -E and -L options that were also present in pnabrowse:
    - Add (using -a), delete (-d), and list (-l) stores.
    - List all of the desktops and applications in a store (using -E), and list all of these that the user has subscribed to (-S).
    - Subscribe to an application (using -s), and launch it (-L).
    - Change a store's default gateway (using -g).

- Subscribing to an application or desktop gives users control and reduces administration:
    - Once users are connected to the store, they can subscribe to desktops and applications in it; administrators do not have to handle subscriptions
    - Subscriptions are stored locally, in Receiver, when connecting to a Program Neighborhood Agent server but remotely when connecting to a StoreFront server.
- Logons are handled differently with storebrowse:
    - Authentication Manager prompts for credentials when necessary. Unlike pnabrowse, storebrowse lets Authentication Manager process logon prompts. Before you can use the -U, -P, and -D options, both the StoreFront server and the Citrix Receiver must be configured to allow the HTTP Basic authentication method. See *Storebrowse Classic Password Insertion for StoreFront* in the *Credential Insertion SDX*. Otherwise the client will prompt for credentials as normal. When the -U, -P, and -D options are used, the credentials are stored into Authentication Manager's Single Sign on (SSO) cache for subsequent authentications.

Storebrowse examples

Add a store

The following command lines are alternative ways of adding a store:

```
./util/storebrowse -a 'my.examplestore.net'  ./util/storebrowse --
addstore 'https://
my.secondexamplestore.net/Citrix/Second/discovery'
```

Adding stores with storebrowse serves two purposes: it defines which stores can be used by the self-service command, and it allows Service Record daemon, which is responsible for gateway management, to function correctly.

To add a store and cache SSO credential at the same time, use the following syntax:

```
./util/storebrowse -U username -D domain -P password -a
'my.examplestore.net'
```

Older versions of StoreFront (version 3.0 and the earlier versions) can require the user credentials when adding the store as they can be required to log on to the server.

If the store being added does not immediately require the user to authenticate, the given credentials are cached in the SSO container for later use.

The credentials stored in the SSO container are shared among storebrowse calls as long as they are not removed from the cache or as long as Authentication Manager is running, that is, terminating AM would clear the credential cache.

When a set of credentials have been inserted, they can be omitted in any subsequent usage of storebrowse that requires that same credentials.

When it adds a store, storebrowse displays the URL that you should use to specify that store.

List stores

The following command lines list stores.

```
./util/storebrowse -l
./util/storebrowse --liststores
```

The output from both of these list commands is identical and might be as follows:

```
'https://my.examplestore.net/Citrix/Store/discovery' 'Store'
'Store' '149397992' '"My Default
GW",https://my.defaultgateway.com' '"Alternative
Gateway",https://my.alternativegateway.com,"Alternative Gateway
2",my.alternativegateway2.com'

'https://my.secondexamplestore.net/Citrix/Second/discovery'
'Second' 'Store 2' '401460086' '"Alternative
Gateway",https://my.alternativegateway.com' '"My Default
GW",https://my.defaultgateway.com,"Alternative Gateway
2",my.alternativegateway2.com'
```

storebrowse lists stores in the following format, where \t is a Tab character.

```
'<Store URL>'\t'<Store Name>'\t'<Store Friendly
Name>'\t'<Unique Store ID>'\t'"<Current Gateway
Name>",<Current Gateway URL>'\t'"<Alternative Gateway 1 Unique
Name>",<Alternative Gateway 1 URL>, … "<Alternative Gateway n
Name>",<Alternative Gateway n URL>'
```

Delete a store

The following command lines delete a store:

```
./util/storebrowse -d fullStoreURL
./util/storebrowse --deletestore fullStoreURL
```

The store URL passed to the command must match the value shown by command:

`storebrowse -l`.

Deleting a store does not remove any credential from the SSO container, as that particular store might have been added without specifying SSO credentials, or the cached SSO credentials might still be required by any of the remaining stores.

To remove the credentials from SSO, use the specific command: `storebrowse -K`.

Enumerate apps/desktops

The following command enumerates the apps/desktops available on the specified StoreFront server:

```
./util/storebrowse -U username -D domain -P password -E fullStoreURL
```

The store URL passed to the command must match the value that was written to standard output when it was added. This can be shown by the command: `storebrowse -l`.

The credentials can be omitted if they have been already inserted in SSO by a previous storebrowse call.

Launch an app/desktop

The following command launches the given app/desktop published on the specified StoreFront server:

```
./util/storebrowse -U username -D domain -P password -L
appOrDesktopName fullStoreURL
```

The app/desktop name must match the value shown by `storebrowse -E`. The store URL must match the value that is shown by `storebrowse -l`.

The credentials can be omitted if they have been already inserted in SSO by a previous storebrowse call.

Remove the SSO credentials

The following command lines remove the most recent set of credentials stored in the SSO cache:

```
./util/storebrowse -K
./util/storebrowse --killdaemon
```

The command returns successfully even when no credentials are actually present in the internal credential cache.

Set a default gateway

The following example specifies the default gateway for a store. Gateways are points at which users outside an organization's firewall access a store. storebrowse (and the self-service UI) let you define the default gateway for a machine. For example, machines in two locations might access the same store through two different gateways.

```
./util/storebrowse --storegateway "Alternative Gateway"
'https://my.examplestore.net/Citrix/Store/discovery'
```

Enumerate resources on a Program Neighborhood Agent server

The following example command line enumerates all of the available resources on a Program Neighborhood Agent server. The server's URL is specified in the final argument. The command line outputs the default information and saves the 48-bit icon associated with the resource. The file name is part of the output.

```
storebrowse --enumerate --icons 48x https://my.example.net/
Citrix/Store/PNAgent/config.xml
```

Customize the self-service UI

You can customize the appearance of the self-service user interface (UI) in Citrix Receiver.

Note: For X1 connections the core self–selection interface is configurable on the server. For the now legacy green UI, it is still possible to modify it locally.

Because the legacy green UI is based on the Receiver for Web, you can use that component's customization interface to modify the UI. For example, you can rebrand the UI by creating a new skin based on an alternative CSS and your own images.

Note: You cannot customize the logon dialog boxes in this way. Use the Receiver UI dialog library instead. For more information, see *UI Dialog library*.

Typically, you customize the contents of the following subfolders of $ICAROOT/site. These contain the Receiver for Web code, which is rendered by the self-service UI as its interface:

- /contrib - Customizable JavaScript and CSS files, which are documented in the comments of each file
- /media - Icons and other graphics

The following subfolders also exist, but you are unlikely to need to customize these:

- /scripts - Third-party JavaScript files, an obfuscated JavaScript file, and localized strings.
- /css - Third-party CSS files and an obfuscated CSS file. You cannot edit the files named Default_*.*.
- /uiareas - Site images.

To help modify the self-service UI, you can run the underlying web code in a standalone mode using a web browser. This lets you use standard web tools (for example, Firebug for Firefox) to inspect and modify the site. To run it in standalone mode, load the site

`$ICAROOT/site/selfservice.html?standalone` in a browser.

For other information on customizations based on Receiver for Web, see CTX134791 and http://blogs.citrix.com/2012/06/06/customizing-receiver-for-web/.

In addition to the self-selection UI, it is also possible to rebrand some other screens. The Shared User Mode logon screen, the Offline Error screen and the Loading Spinner screen can be customized by modifying the site rendered by $ICAROOT/site/sum_screen/SharedUserMode.html, $ICAROOT/site/native/error.html, and $ICAROOT/site/native/loading.html respectively.

Preferences

The Preferences UI in Citrix Receiver is implemented as a separate binary, $ICAROOT/util/configmgr, which edits the configuration files, and gets and sets values using storebrowse. For complex customizations, you can replace configmgr.

Note: Many of the configuration options were available in wfcmgr, which is no longer available. For more information on them than is provided here, consult an earlier version of this document.

General page

The General page uses the `UseFullScreen=True/False` setting in the [Thinwire3.0] section of wfclient.ini, and the following storebrowse commands.

```
--configselfservice ReconnectOnLogon=True/False
```

The setting ReconnectOnLogon corresponds to the "Reconnect apps and desktop: When I start Receiver" preference, and determines whether the self-service UI tries to reconnect to all sessions, for a given store, immediately after logon to that store.

```
--configselfservice ReconnectOnLaunchOrRefresh=True/False
```

The setting ReconnectOnLaunchOrRefresh corresponds to the "Reconnect apps and desktop: When I start or refresh apps" preference, and determines whether the self-service UI tries to reconnect to all sessions when an application is launched or the store is refreshed.

Accounts page

The Accounts page uses the following storebrowse commands to add, remove and edit stores.

```
--addstore <store URL or e-mail>
--deletestore <store URL>
--storegateway <gateway name>
```

If you have multiple stores, use the following command to define which one is displayed when the user first starts Receiver.

```
./util/storebrowse --configselfservice
DefaultStore=<store URL>
```

File Access page

The File Access page uses the following settings in the [WFClient] section in wfclient.ini to add, remove, and change read-write access to mapped drives. Replace the ? (question mark) with the letter of the drive that you want to map.

Setting	Description
CDMAllowed=True/False	Enables the client drive mapping feature. Mapped drives only appear in a session if this setting is enabled.
DrivePath?=/a/path	Sets the path (including drive) that you want to map. For example, to map P: to /my/directory, configure this setting as follows: DrivePathP=/my/directory

DriveEnabled=True/False	Enables the specified drive.
DriveReadAccess=0/1/2	Gives read access to the specified drive. For more information on this, see Configuration files later in this document.
DriveWriteAccess=0/1/2	Gives write access to the specified drive. For more information on this, see Configuration files later in this document.

Mic and Webcam page

The Mic & Webcam page uses the setting `AllowAudioInput=True/False` in the [WFClient] section in wfclient.ini.

Flash page

The Flash page uses the `HDXFlashUseFlashRemoting` setting in the [WFClient] section in wfclient.ini.

Customize connections using the Platform Optimization SDK

Receiver connections can be customized by creating plug-ins to perform one or more of the following functions:

- Provide accelerated decoding of JPEG and H.264 data used to draw the session image
- Control the allocation of memory used to draw the session image
- Improve performance by taking control of the low-level drawing of the session
- Provide graphics output and user input services for OS environments that do not support X11

You can develop plug-ins for decoding independently of the other types listed, unless they also need to control memory allocation. To test any plug-ins that you develop, you may need to rename them and you must copy them to the Receiver installation directory.

Citrix Receiver supports additional plug-ins for accelerated audio and video codecs, but no SDK is provided for these in this release. Receiver can also be configured to use GStreamer for webcam and multimedia functions. These plug-ins are standard GStreamer components and are not covered in this document.

Important: Plug-in development in a non-X-Window system might require a specialized toolkit and customization of the UI dialog library in the Receiver.

The following tables describe the shared library files that you should be aware of when developing plug-ins with the Platform Optimization SDK. If Receiver cannot locate or use a file, the fallback file (where available) is used instead.

File	Purpose	Fallback file	Notes
ctxjpeg.so	Citrix decoder for JPEG images	libjpeg Version 6: ctxjpeg_fb.so libjpeg Version 8: ctxjpeg_fb_8.so	The fallback decoder files are used only in ARM environments; the Receiver provides its own built-in fallback JPEG decoder in x86 environments. If you develop your own decoder, you must call it ctxjpeg.so.
ctxh264.so	Citrix decoder for H. 264 images	ctxh264_fb.so	ctxh264.so decodes H.264 graphics only; HDX MediaStream for Windows Media and HDX MediaStream for Flash use different mechanisms to display H.264 video and movie content.
KVMEPlugin. so	Memory allocation	SOCX11plugin_COMPAT.so	The binary fallback file is only provided for ARM deployments. For x86 deployments, the source is available and can be compiled. **Note**: KVMEPlugin.so can also be used for screen drawing.

You can enable or configure some plug-ins using the following files (and additional system components). In these cases, no fallback files are employed and source files, for plug-in development, are not supplied.

File	Purpose	Notes
KVMEPlugin.so	Screen drawing	No fallback file is available, but a sample, SOCX11_plug.c, is included in this release. You can use this to develop a custom OpenGL implementation, for example. **Note**: KVMEPlugin.so is also used for memory allocation.

VORBIS.DLL	Decoder for nonspeech audio data	You can use these files for standard audio (not HDX MediaStream Windows Media or HDX MediaStream for Flash). **Important**: Do not replace these files. When customizing the standard audio decoder, replace the system libvorbis.so or libspeex.so library files instead. Any replacements must be API compatible.
SPEEX.DLL	Decoder for speech audio data	
gst_read, gst_read0.10, gst_read1.0	A GStreamer utility required for HDX RealTime Webcam Video Compression	The 0.10 versions are for use with GStreamer 0.10 and the 1.0 versions are for use with GStreamer1.0. During installation, links with the generic name are created to the versions which will be used. **Important**: Do not replace these files. For information on customizing these HDX features, see HDX RealTime Webcam Video Compression later in this document.
gst_play, gst_play0.10, gst_play1.0	A GStreamer utility required for HDX MultiStream Windows Media Redirection	
FlashContainer. bin	Provides support for HDX MediaStream Flash Redirection	For information on customizing this HDX feature, see Flash later in this document.

Plug-ins for H.264-based session graphics

For XenApp/XenDesktop 7.0-7.8, the preferred protocol for presenting the remote session's graphics uses a combination of H.264 and proprietary lossless graphics encoding. For maximum flexibility in exploiting on-chip decoders and hardware rendering support, plug-ins can take full control of the decoding, overlay, and rendering process.

The details of the interface for these plug-ins are documented as comments in the associated header file, H264_decode.h. A stub implementation is included in the H264_sample directory.

Plug-ins for accelerated JPEG decoding

All currently supported versions of XenDesktop and Citrix XenApp® for UNIX® can use JPEG to compress portions of the session image. Plug-ins that support hardware-accelerated JPEG decoding can improve graphics performance for sessions when not using H.264 session graphics.

Moreover, for XenApp/XenDesktop 7.9 and later, the preferred protocol for presenting graphics is a combination of JPEG and a proprietary lossless graphics format, similar to versions prior to 7.0.

Improvements in the server graphics encoding technology have resulted in a lower bandwidth profile, lower server CPU usage and higher overall visual quality than if H.264 were to be used for session graphics instead.

The details of the interface for these plug-ins are documented as comments in the associated header file, jpeg_decode.h. The sample code jpeg_sample demonstrates how wfica falls back when no accelerated plugin is available. It builds a plug-in called ctxjpeg_fb.so.

JPEG fallback is employed if necessary to ensure images are displayed efficiently on the user device. The following decoders are used in this order:

On ARM platforms:

- ctxjpeg.so
- ctxjpeg_fb_8.so if Version 8 of libjpeg is present
  - ctxjpeg_fb.so if Version 6 of libjpeg is present

On x86 platforms:

- ctxjpeg.so
  - the built-in decoder

Plug-ins for memory allocation

The following information may be useful if you want to hardware accelerate JPEG decoding, H.264 decoding, or screen drawing.
Hardware-accelerated plug-ins for H.264 or JPEG decoding may need to allocate memory buffers with special characteristics, for example using physically contiguous pages. A single plug-in component, KVMEPlugin.so, is used for both standard memory allocation and for drawing the session image. If you are using the plug-in for memory allocation, you must supply only two functions.

The header file for memory allocation plug-ins is mainloop.h. The two entry points that must be implemented are `special_allocate()` and `special_free()`. The example code is in the allocation_sample directory. Before using this code as a model for your own plug-in, pay careful attention to the comments in the code. Parts of it are present only for backward compatibility with decoder plug-ins that were developed for obsolete versions of Citrix Receiver.

Plug-ins for faster drawing in X11 environments

In some environments using X11, other drawing methods might be faster than the calls to `XShmPutImage()` that are used by default. You can implement KVMEPlugin.so using an alternative drawing method by providing the `draw()` entry point, which is used to send the session image to the screen. You can also provide the optional `draw_complete()` entry point. When these alternative entry points are used, you do not additionally have to implement the memory allocation functions.

The example code in the allocation_sample directory includes an implementation that is almost identical to the default drawing code.

Plug-ins for non-X11 environments

The Platform Optimization SDK includes a separate version of the Receiver engine called wfica_for_plugins. This is not linked with any X11 libraries. The program requires a version of KVMEPlugin.so that provides video output, mouse and keyboard input, and timer and event detection

services. The following features of the X11 version are not yet available in the separate version: clipboard, seamless windows, multimedia and Flash support.

Two example plug-in implementations are included:

- SDL_plugin contains an implementation based on the SDL library.
- FB_plugin contains a version based on Linux system calls and device files. It uses the raw frame buffer for display.

Support for environments that use Simple DirectMedia Layer (SDL) depends on how the library is built. Usually, X11 and frame buffer graphics are supported. To use frame buffer graphics, run the program from a text console as a superuser, or change the permissions on the /dev/fb0 and /dev/mice files and then run it. The frame buffer plug-in needs access to these device files.

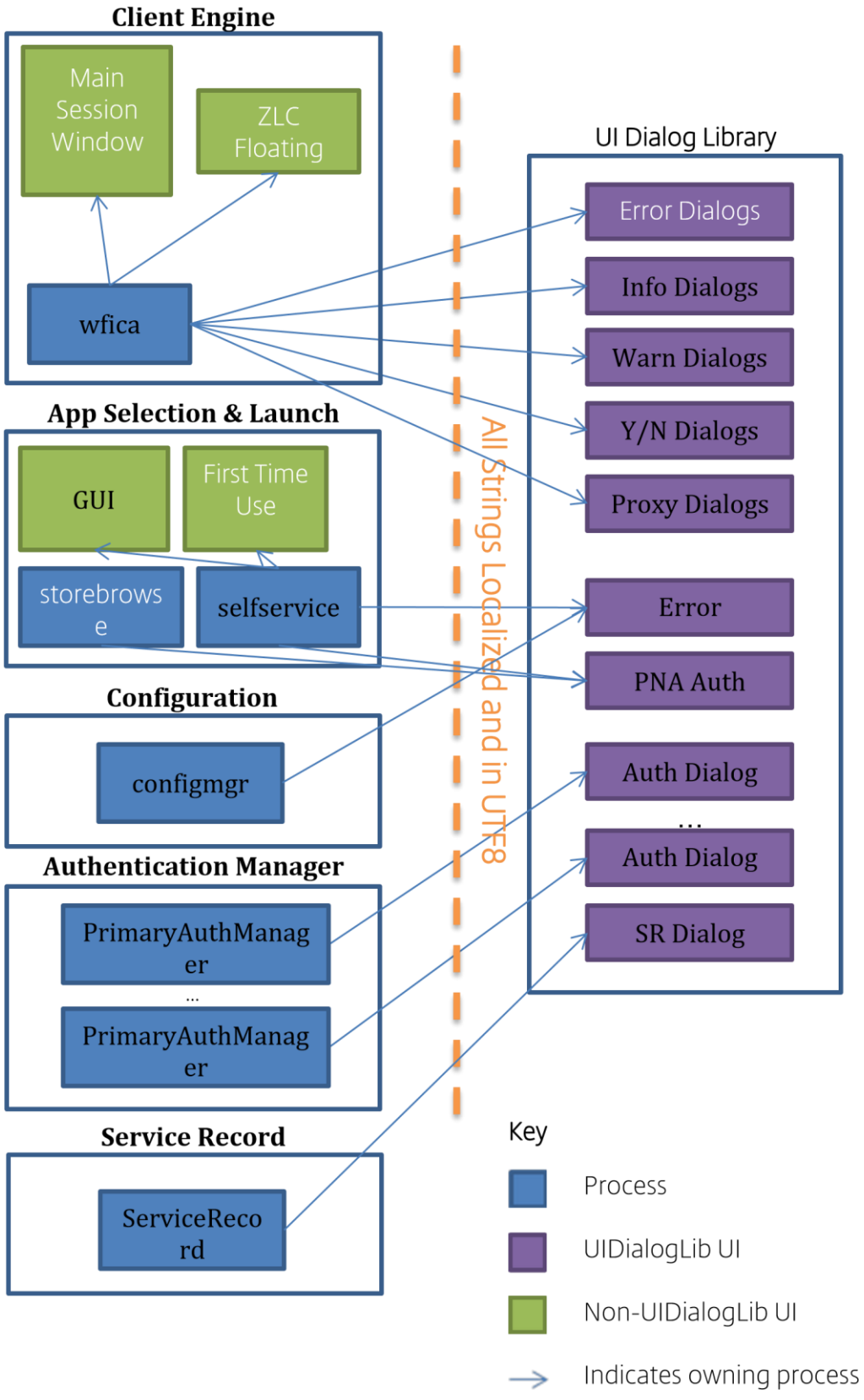
UI Dialog library

For alternative windowing systems to X Windows and their toolkits, you can develop customized dialogs using the Receiver for Linux UI dialog library described in this topic. The library is a C interface that can represent dialogs containing a selection of widgets: labels, text boxes, check boxes, radio buttons, combo boxes, multi-select combo boxes, buttons, expanders, hyperlink, scrolled view, selection table, and button box. The library is loaded as a shared object file (UIDialogLib.so).

The UI dialog library is used for most of the dialogs that are displayed by Receiver for Linux processes, including the X11-based wfica. The processes storebrowse, AuthManager, PrimaryAuthManager, and ServiceRecord use it for their entire user interface (UI). By reimplementing the library, you can replace the UI of these essential processes with a toolkit of your choosing. Except for dialogs, the remaining processes (self-service, configmgr, and X11 wfica binaries) require GTK+ for other aspects of their UI, and therefore cannot be used with a different implementation of the library than the GTK+ implementation provided with Receiver.

However, all of their functionality is available in the storebrowse command-line utility and the configuration files. The graphic on the following page represents the library's architecture and use by Receiver components. Note that two further utilities, Connection Center and xcapture are completely dependent on X11 and are not shown on this graphic.

For further documentation and examples to aid implementation of the API, refer to the Platform Optimization SDK.



Security

Certificates

StoreFront sites use the HTTPS protocol. This is non-configurable.

Citrix Receiver recognizes a certificate as being from the correct certificate authority if a root certificate is installed in the $ICAROOT/keystore/cacerts directory and $ICAROOT/keystore/intcerts contains any intermediate certificates that are not provided by the server.

To use SSL or TLS, you need a root certificate on the user device that can verify the signature of the Certificate Authority on the server certificate. By default, Receiver supports the following certificates.

Certificate	Issuing Authority
Class4PCA_G2_v2.pem	VeriSign Trust Network
Class3PCA_G2_v2.pem	VeriSign Trust Network
BTCTRoot.pem	Baltimore Cyber Trust Root
GTECTGlobalRoot.pem	GTE Cyber Trust Global Root
Pcs3ss_v4.pem	Class 3 Public Primary Certification Authority
GeoTrust_Global_CA.pem	GeoTrust
DigiCertGlobalRootCA.pem	DigiCert Global Root CA

You are not required to obtain and install root certificates on the user device to use the certificates from these Certificate Authorities. However, if you choose to use a different Certificate Authority, you must obtain and install a root certificate from the Certificate Authority on each user device.

Important: Citrix Receiver does not support keys of more than 4096 bits. You must ensure that the Certificate Authority root and intermediate certificates, and your server certificates, are a maximum of 4096 bits long.

Note: Citrix Receiver for Linux 13.0 uses c_rehash from the local device. 13.1 onwards uses the `ctx_rehash` tool as described in the following steps.

Use a root certificate

If you need to authenticate a server certificate that was issued by a certificate authority and is not yet trusted by the user device, follow these instructions before adding a StoreFront store.

1. Obtain the root certificate in PEM format.

Tip: If you cannot find a certificate in this format, use the openssl utility to convert a certificate in CRT format to a .pem file.

2. As the user who installed the package (usually root):
    a. Copy the file to $ICAROOT/keystore/cacerts.
    b. Run the following command as the user who installed the package:

```
$ICAROOT/util/ctx_rehash
```

Use an intermediate certificate

If your StoreFront server is not able to provide the intermediate certificates that match the certificate it is using, or you need to install intermediate certificates to support smart card users, follow these steps before adding a StoreFront store.

1. Obtain the intermediate certificate(s) in PEM format.

Tip: If you cannot find a certificate in this format, use the openssl utility to convert a certificate in CRT format to a .pem file.

2. As the user who installed the package (usually root):
    a. Create the $ICAROOT/keystore/intcerts directory.
    b. Copy the file to $ICAROOT/keystore/intcerts.
    c. Run the following command as the user who installed the package:

```
$ICAROOT/util/ctx_rehash
```

Smart Cards

To configure smart card support in Receiver for Linux, you must have the StoreFront services site configured to allow smart card authentication.

Note: Smart cards are not supported with the XenApp Services site for Web Interface configurations (formerly known as PNAgent), or with the "legacy PNAgent" site that can be provided by a StoreFront server.

Citrix Receiver for Linux supports smart card readers that are compatible with PCSC-Lite and smart cards with PKCS#11 drivers for the appropriate Linux platform.

Citrix Receiver loads the OpenSC libraries automatically. Installation of the libraries allows the use of OpenSC supported cards without further configuration. If this fails, or you require a different PKCS#11 driver to ensure Citrix Receiver locates the PKCS#11 driver, store the location in a configuration file using the following steps.

1. Locate the configuration file: `$ICAROOT/config/AuthManConfig.xml`.

2. Locate the line `<key>PKCS11module</key>` and add the driver location to the element `<value>` immediately following the line.

Note: If you enter a file name for the driver location, Citrix Receiver finds that file in the `$ICAROOT/PKCS#11` directory. Alternatively, you can use an absolute path beginning with `"/"`.

To configure the behavior of the Receiver for Linux on smart card removal, update the `SmartCardRemovalAction` in the configuration file using the following steps:

1. Locate the configuration file: `$ICAROOT/config/AuthManConfig.xml`.
2. Locate the line `<key>SmartCardRemovalAction</key>` and add 'noaction' or 'forcelogoff' to the `<value>` element immediately following the line.

The default behavior is 'noaction'. No action is taken to clear credentials stored and tokens generated with regards to the smart card on the removal on the smart card. The 'forcelogoff' action clears all credentials and tokens within StoreFront on the removal of the smart card and disconnects all associated sessions.

For more information about configuring smart card support on your servers, see the *XenApp and XenDesktop* documentation on the Product Documentation site.

Once smart card support is enabled for both the server and Receiver, you can use smart cards for the following purposes:

- Smart card logon authentication. Use smart cards to authenticate users to Citrix XenApp servers.
- Smart card application support. Enable smart card-aware published applications to access local smart card devices.

Smart card data is security sensitive and must be transmitted over a secure authenticated channel, such as SSL/TLS.

Smart card support has the following prerequisites:

- Your smart card readers and published applications must be PC/SC industry standard compliant.
- You must install the appropriate driver for your smart card.
- You must install the PC/SC Lite package.
- You must install and run the pcscd Daemon, which provides middleware to access the smart card using PC/SC.
- The root certificate for the smart card certificate must be correctly installed in `$ICAROOT/keystore/cacerts`, and any required intermediate certificate installed in `$ICAROOT/keystore/intcerts`.

Important: If you are using the SunRay terminal with SunRay server software Version 2.0 or later, you must install the PC/SC SRCOM bypass package, available for download from http://www.sun.com/.

Multimedia

This section contains information on customizing the way that Receiver processes:

- Graphics
- Video
- Audio

Graphics

XenDesktop and XenApp are based on different technologies, send different protocols to Receiver, and therefore require different configurations. Citrix recommends that you test Receiver with both of these products while you develop your solution.

Configure H.264 support

Receiver supports the display of H.264 graphics, including HDX 3D Pro graphics, that are served by XenDesktop 7. This support uses the deep compression codec feature, which is enabled by default. The feature provides better performance of rich and professional graphics applications on WAN networks compared with the JPEG codec.

Follow the instructions in this topic to disable the feature (and process graphics using the JPEG codec instead). You can also disable text tracking while still enabling deep compression codec support. This helps to reduce CPU costs while processing graphics that include complex images but relatively small amounts of text or non-critical text.

Important: To configure this feature, do not use any lossless setting in the XenDesktop Visual quality policy. If you do, H.264 encoding is disabled on the server and does not work in Receiver.

To disable deep compression codec support

In wfclient.ini, set H264Enabled to False. This also disables text tracking.

To disable text tracking

With deep compression codec support enabled, in wfclient.ini set TextTrackingEnabled to False.

To disable small frames support

The small frames feature allows efficient processing when only a small portion of the screen changes over time (for example, when a cursor flashes on an otherwise stable background). This procedure only works with XenDesktop 7.1 onwards and overrides the equivalent setting in the Citrix Receiver for Linux SDK.

In wfclient.ini set SmallFramesEnabled to False.

Improve graphics performance with the Platform Optimization SDK

Using the Platform Optimization SDK, you can improve graphics performance (by accelerating the decoding of images, by controlling how memory is allocated when drawing an image, and so on). For information on this, see Customize connections using the Platform Optimization SDK in the Graphics section of this document.

Advanced graphic configurations

You can adjust how Receiver is configured to process graphics that are rendered on the server. Typically, these are bitmaps that are encoded using the JPEG protocol.

Input and output color formats

Most JPEGs are sub-sampled in YUV 4:2:0 format. However, the server can also send images in 4:4:4 format. Citrix Receiver expects ctxjpeg.so to output decoded JPEGs in 32-bit BGRX format, with the Blue component being the most significant eight bits.

The protocol used by Receiver does not restrict JPEG types, with the following exceptions:

- The protocol does not support JPEG2000
- The protocol does not use lossless JPEG
- The protocol does not use arithmetic encoding unless your ctxjpeg.so plugin indicates support for this in the decoder structure.

The protocol use sequential encoding, rather than progressive or hierarchical encoding.

Citrix recommends sequential encoded, Huffman-compressed YUV 4:2:0 or YUV 4:4:4 images for hardware or DSP acceleration.

You can operate in the correct color format while decoding, to avoid the need to carry out color space conversion. However, this can be CPU-intensive and it may be more efficient to carry out the color space conversion in the hardware or DSP as a separate step.

Custom memory allocation

You can adjust the memory allocation for graphics processing in:

- JPEG output buffers
- JPEG input buffers (also known as the *compressed image cache*)
- The session LVB
- Off-screen surfaces

If you develop a custom allocation mechanism, it replaces shared memory. A sample, SOCX11_plug.c, is included in this release.

Sending decoded bitmaps to Xserver

You can hook the LVB allocation (source image data) function. When a frame is ready to be displayed, Citrix Receiver uses XShmPutImage to copy the LVB to screen. You may also need to hook the XShmPutImage function. If this is not convenient, alternative solutions (for example, using a non-atomic display) are available but they might degrade performance.

Calls to the Citrix Receiver constructor body

You can use the function pointer initialization for entry functions. This is in jpeg_decode.h. If

GCC is used, the Citrix Receiver library can use the `__attribute ((constructor))` attribute to perform initialization. An example implementation of the JPEG SDK, defined in jpeg_decode.h, is available on request.

Advantages of CTXJPEG abstraction

In addition to hardware acceleration, abstracting CTXJPEG has these advantages:

- You can fully optimize JPEG decoding.

- You can allocate *special memory* for decoding purposes, which eliminates unnecessary memory copies and increases performance.
- You can save CPU. If you do not implement CTXJPEG, Receiver uses CTXJPEG_FB which in turn uses libjpeg, or libjpeg-turbo if NEON is available, to decode bitmaps. This means that JPEGs are decoded using software, which can be CPU intensive and can reduce performance (unless you provide API-compatible hardware replacements for either library).

Video

Flash

Citrix recommends that you develop your own Adobe Flash plug-in and that Flash files are played on an X Window system. For the ARM platform, you can obtain the necessary Flash libraries optimized from your Adobe scaling partner. Contact Adobe for more information on this.

Important: This feature is not supported on 64-bit or ARM hard float (armhf).

HDX MediaStream Flash Redirection

The Citrix feature HDX MediaStream Flash Redirection uses a Citrix plug-in to send Flash content on websites to user devices. This lets Flash content run locally provided that Adobe Flash Player is installed on the device.

The requirements for this feature are as follows:

- The NPAPI Flash plug-in and its dependent libraries must be present on the user device. A browser is not required but might be a convenient if it includes these plug-in and libraries.
- All NPAPI functions in the Flash plug-in must be Version 0-22 or earlier.
- The standard Flash function NPError Flash_EnforceLocalSecurity is required. A dummy function implementation that only returns NPERR_NO_ERROR should suffice as a minimum.
- Flash videos with resolutions less than 250 pixels in either the x or y dimension are rendered on the server by design.
- In some cases, HDX MediaStream Flash Redirection might only work when gliblc 2.10 is installed on the user device.

Citrix Receiver searches in the following locations for the Citrix Flash plug-in, libflashplayer.so:

- /usr/lib/browser-plugins/
- /usr/lib/flashplugin-installer/
- /usr/lib/adobe-flashplugin/
- /usr/lib/mozilla/plugins/
- /usr/lib/opera/plugins/
- /usr/lib/flash-plugin/
- /usr/lib/firefox/plugins/
- /usr/lib/flashplugin-nonfree/
- $ICAROOT

If the plug-in is found in multiple locations, the plug-in with the latest version number is used by the HDX MediaStream Flash Redirection feature. If the plug-in is present in a different location, you can create a link to the location at $ICAROOT (the directory where Receiver for Linux is installed by default) using this command:

```
ln -s <target flash plugin location> libflashplayer.so
```

FlashContainer.bin runs on the device when the feature is active.

Test your Flash plug-in

Test your plug-in in the environment in which it will be used.

To check that Flash content is being rendered correctly on the user device, right-click in the Flash window. The Flash context menu displayed should appear similar to the native Linux Flash context menu.

You can also run the following command on the device to verify Flash content is being correctly rendered:

```
ps -ef | grep -i FlashContainer
```

Output similar to the following should be displayed:

```
1000 6272 6240 0 15:41 pts/6 00:00:00 sh - c

/home/user/installation/icaclient/FlashContainer.bin

/tmp/Ctx1504387638977556438624 0
/tmp/Ctx5646687127620733126240 6240 0

1000 6273 6272 8 15:41 pts/6 00:00:02
```

Troubleshoot your Flash plug-in

You can collect trace logs to help debug your Flash plug-in. Run the following command and then test the feature using Citrix Receiver:

```
cat > $HOME/HDXFlash.ini <<EOM [Tracing]

# enable/disable file tracing
File=1

# hex value

Flags=0x0FFFFFFF

# dec value
Level=9
```

```
EOM
```

The following logs are created in the /tmp directory:

- CtxFlash_FlashContainer.bin_*<PID>*.log for the FlashContainer.bin process
- CtxFlash_wfica_*<PID>*.log for the wfica process

For more information on troubleshooting Flash, refer to CTX134786. If necessary, consider using HDX Windows Media Redirection instead of Flash. This is robust in different environments.

HDX MediaStream Windows Media Redirection

The HDX MediaStream Windows Media Redirection feature redirects audio and video content from the Microsoft® Media Foundation platform on the server to a local media player on the user device. Citrix Receiver uses a GStreamer pipeline to run streamed multimedia content on the device.

If a video codec is not available on the device or is not supported by HDX MediaStream Windows Media Redirection, it is processed by the server's media player. In these cases, video is delivered as serverrendered bitmaps through the graphics virtual channel.

Depending on the audio quality settings, if an audio codec is not available on the device or is not supported by this feature, it is encoded on the server and sent to the device through the audio virtual channel.

If any of the following are missing, rendering takes place on the server:

- On the server - DirectShow or MediaFoundation components
- On the user device - GStreamer components
- On the user device - Appropriate entries in MediaStreamingConfig.tbl

HDX MediaStream Windows Media Redirection supports flow control and frame dropping because Receiver uses the GStreamer flow control mechanism for connections to XenDesktop.

Supported media players and formats

Supported media players, container formats, video codecs, and audio codecs are documented in CTX125211.

In addition, MediaStreamingConfig.tbl is a configurable text-based translation table that is located in $ICAROOT/config in the installation directory. This lists supported formats. Edit MediaStreamingConfig.tbl to add or remove support for client-side rendering of media formats using the HDX MediaStream Windows Media Redirection feature. To locate the GUID of a media format in MediaStreamingConfig.tbl, use the verbose option

`SpeedScreenMMAVerbose=True` in the [WFClient] section of wfclient.ini or in All_Regions.ini, and collect output from stdout for wfica.

Configure HDX MediaStream Windows Media Redirection

The following settings are located in module.ini in this release.

Item	Description
SpeedScreenMMAClosePlayerOnEOS=*Boolean*	Closes gst_play at the end of a media clip. This ensures only one gst_play process runs at a time. Default=False.
SpeedScreenMMAGstPlayKillAtExit=*Boolean*	Lets Receiver stop any gst_play processes that do not exit within a specified timeout period. Default=True.
SpeedScreenMMAGstPlayExitTimeout=*integer*	Period of time, in seconds, allowed for gst_play processes to exit before being terminated. Default=20.
SpeedScreenMMARebaseTimestampsOnSeek=*Boolean*	Enables rebasing of timestamps to a positive value following seek. Default=True.
SpeedScreenMMAStopOverlayHandlingEvents=*Boolean*	If set to False, fixes potential issues with videos not playing in the correct location or at the correct size, not resizing properly, or with the video window remaining black, but causes an issue where, after the mouse pointer has disappeared in full-screen Windows Media Player, it does not return when the mouse is moved. If set to True, corrects the mouse-pointer issue. Default=False.

Configure flow control

You can enable or disable flow control for HDX MediaStream Windows Media Redirection using XenDesktop policies. Flow control is enabled by default on the user device. To disable flow control on the device, set `SpeedScreenMMAFlowControlV3=False` in All_Regions.ini. This also disables frame dropping.

Troubleshoot HDX MediaStream Windows Media Redirection

To debug this feature on the user device, set SpeedScreenMMAVerbose=On in the [WFClient] section of the appropriate .ini file. To debug GStreamer behavior, see http://gstreamer.freedesktop.org/data/doc/gstreamer/head/gstreamer/html/gst- running.html.

Tip: GStreamer logging can adversely affect performance. Try finding a GStreamer trace that provides the necessary logging information, and then limit logging to that trace.

For information on troubleshooting this feature, see CTX104912.

HDX RealTime Webcam Video Compression

HDX RealTime Webcam Video Compression is the default mechanism for video conferencing applications. The video input is provided by the webcam to the user device and the application runs on the server. This feature lets webcam input on the device communicate with the application on the server.

You can specify how Receiver encodes webcam data. Both H.264 and Theora codecs are supported. By default, Theora encoding is enabled.
Important: To ensure this feature works, install any appropriate webcam drivers on the user device.

Theora encoding

Citrix Receiver uses a GStreamer element to encode webcam output on the user device using the Theora codec. This is theoraenc and is included in GStreamer's Base Plugins collection.

The following GStreamer pipeline is used for Theora encoding with HDX RealTime Webcam Video Compression: v4l2src > ffmpegcolorspace > videoscale > capsfilter > theoraenc > appsink

By default, the resolution for the webcam output window is set to CIF/SIF(625): 352 × 288 and the frame rate is set to 15.

H.264 encoding

Citrix Receiver encodes webcam output in the H.264 format by choosing a pipeline in this order:

1. HDXH264CaptureBin > appsink - Receiver uses this option if you create and configure an HDXH264CaptureBin plug-in that is responsible for capturing and transcoding the webcam data. You might want to do so if the performance of GStreamer is unacceptable or if your chip has video acceleration capabilities.
2. appsrc > appsink - Receiver uses this option if the webcam supports H.264 and outputs H.264 data directly. It also requires HDXH264EnableNative to be set.
3. v4l2src > encodebin > appsink - Receiver uses this option if the webcam produces uncompressed output. The GStreamer elements that process this include v4l2src, which obtains data from the webcam's video driver, and encodebin, which constructs a GStreamer pipeline for the H.264 encoder element that is present on the user device.
4. v4l2src > jpegdec > encodebin > appsink - Receiver uses this option if the webcam produces JPEG output rather than H.264 or another uncompressed format. This pipeline is not very efficient because it adds a decode step, jpegdec.

In each case, GStreamer Version 0.10.31 or any later release in the 0.10 series must be available on the user device.

If you choose a pipeline that uses encodebin and this cannot find the H.264 encoder, Theora encoding is used.
To configure H.264 support

1. If required, create an HDXH264CaptureBin.
2. In the [WFClient] section of the appropriate configuration file, set the following:
    a. HDXH264InputEnabled - Set to True. By default, this is False, which enables Theora encoding.
    b. HDXH264CaptureBin - If you created a plug-in, enter its name. By default, this is empty.
    c. HDXWebCamWidth and HDXWebCamHeight - Set the width and height that define the webcam resolution. By default, HDXWebCamWidth is 352 pixels and HDXWebCamHeight is 288 pixels.
    d. HDXWebCamFramesPerSec - Specify the preferred frame rate. By default, this is 15 frames per second.
    e. HDXWebCamDevice - Enter the webcam name. By default, this is /dev/video0.

About the HDXH264CaptureBin plug-in

HDXH264CaptureBin is the customized plug-in that captures and transcodes webcam data, and that you create. The plug-in sends data to the GStreamer appsink plug-in, which has its capabilities set as follows:

```
caps_h264 = gst_caps_new_simple ("video/x-h264",
   "stream-format", G_TYPE_STRING, "byte-stream",
   "width", G_TYPE_INT, width,
   "height", G_TYPE_INT, height,
   "framerate", GST_TYPE_FRACTION, rate_num, rate_denom,
   "bpp", G_TYPE_INT, 16,
   "depth", G_TYPE_INT, 16,
   "endianness", G_TYPE_INT, G_BYTE_ORDER, NULL);
gst_app_sink_set_caps(GST_APP_SINK(appsink), caps_h264);
```

Where `rate_num` is the value of HDXWebCamFramesPerSec in the configuration file, and `rate_denom` is fixed at 1.

If you create a plug-in, its capabilities must match these.

The plug-in must support a readable property, source, which returns the source element v4l2src. If multiple webcams are connected, this requirement ensures that a specific one can be selected.

The plug-in must support the properties device, num-buffers, and do-timestamp, as follows:

```
GObject *source;

/* get the source element from CaptureBin*/
```

```
g_object_get(G_OBJECT(Capture in),
      "source", &source,
      NULL);

 // Set device properties on source i.e. v4l2src
 g_object_set(source,
      "device", device,
      "num-buffers", num_buffers,
      "do-timestamp", TRUE,  NULL);

 g_object_unref (source);
```

For all other information on HDX RealTime Webcam Video Compression, see CTX132764.

Troubleshoot HDX RealTime Webcam Video Compression

To help debug the HDX RealTime Webcam Video Compression feature, you can wrap gst_read. The resulting script captures the standard output and error streams, stdout and stderr, and places them in /tmp/gst_read.log.

Run the commands in this procedure as the user who installed the client (usually, root).

1. From the util directory run the following command:

   ```
   mv gst_read gst_read.bin
   ```
2. Create a new file gst_read with the following lines:

   ```
   #!/bin/bash

   $ICAROOT/util/gst_read.bin -d $@ >/tmp/gst_read.log 2>&1
   ```

Important: Set $ICAROOT here even if you use the default location /opt/Citrix/ICAClient. If you do not, the script fails.

3. Set the file to be executable by running the following command:

   ```
   chmod +x gst_read
   ```

You can use gst_read by itself to check that it can access the webcam. For example, this reads 20 video buffers from the webcam and then plays them back in a window.

```
gst_read -b 20
```

Apply custom properties to GStreamer elements for H.264 webcam support

In some configurations, you might need to apply custom properties to elements in the GStreamer pipeline. In these cases, Receiver tries to load a GStreamer preset called `Profile Citrix HDXH264WebCam` from .prs files that are stored in $ICAROOT/config/gstpresets (for GStreamer 0.10.36 or later) or in the default GStreamer location (for earlier versions).

For details of the .prs files' format, refer to your GStreamer documentation.

Webcams with native H.264 support

Because of the high bandwidth that is generated with the default settings on some webcams, native H.264 is turned off by default in Citrix Receiver. To enable support, configure the following setting in wfclient.ini:

```
HDXH264EnableNative=True
```

Audio

Audio input and output

Audio input consists of audio coming from the microphone on the user device that is redirected to an application on the server. This is mainly used with Voice-over-Internet-Protocol (VoIP) applications.

Audio output consists of any audio that is not redirected to the user device using HDX MediaStream Windows Media Redirection or HDX MediaStream Flash Redirection. For example, audio from a serverrendered application such as Microsoft Outlook or audio from serverrendered media.

Configure Speex or Vorbis

If you are using standard audio (not HDX MediaStream Windows Media or HDX MediaStream for Flash), you can configure Citrix Receiver to process audio data using either the Speex or Vorbis codec. Speex is designed for speech audio data. Vorbis is designed for other types of audio data. Citrix Receiver uses the SPEEX.DLL library file to process Speex data and VORBIS.DLL to process Vorbis data.

When connections to virtual resources are negotiated (after installation during session start up), the server negotiates the codec to use with Citrix Receiver. The codec that is chosen depends on your configuration of the AudioBandwidthLimit setting. This specifies the audio bandwidth limit and, by extension, the audio quality for the connection.

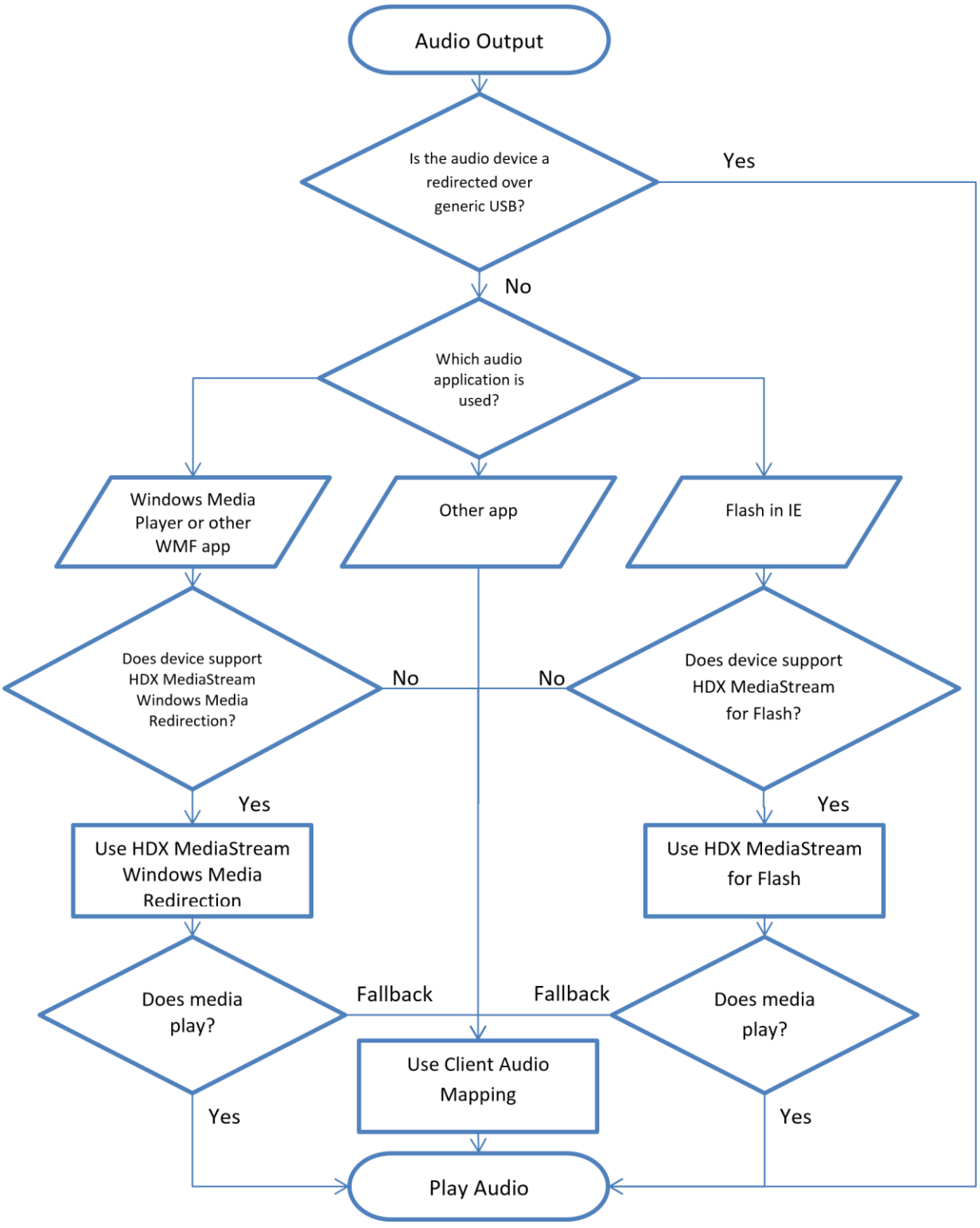
To configure Receiver to use Speex or Vorbis

Set AudioBandwidthLimit in the [WFClient] section of the appropriate.ini file or in the ICA file as follows:

- 0 specifies the bandwidth as high and means the Vorbis codec is used
- 1 specifies the bandwidth as medium and means the Speex codec is used
- 2 specifies the bandwidth as low and means the Speex codec is used

Which audio feature is used at runtime

The following diagram illustrates how different audio features are used at runtime. Receiver chooses the feature based on the audio application that runs on the user device, and whether the correct codecs and plug-ins are available on it. Standard audio is used as a fallback if these are missing.



In this graphic, note the following:

- WMF - This stands for Windows Media Foundation.
- Other app - Other applications include the VLC Media Player and Audacity.
- Does device have GStreamer? - The presence of GStreamer is checked during installation. This determines if HDX MediaStream Windows Media can be used.

Consider GStreamer audio

GStreamer audio is an experimental feature. Consider using it in your deployment but be aware of the limitations in doing so. For information on this feature, see GStreamer audio later in this document.

Enable audio input

You can enable standard audio input in two ways:

- With the HDX RealTime feature. Set `AllowAudioInput=True` in the [WFClient] section.
- With HDX MediaStream for Flash.

Test audio

To test whether audio is being rendered on the server, run an audio file in another player other than Windows Media Player, one which does not use Windows Media Foundation.

Configure audio latency correction

If you have an Advanced Linux Sound Architecture (ALSA) implementation of VDCAM, you can control how audio latency in Receiver connections is processed. The audio redirection feature can detect periods of client overload and any delays in audio output. When client overload is detected, audio temporarily runs at a higher latency to increase the smoothness of the audio output. In periods of client stability, any excess latency is discarded to improve synchronization.

In the [ClientAudio] section of module.ini, enable the feature by setting AudioLatencyControlEnabled to True. The default setting are recommended so this is sufficient to enable the feature.

Advanced settings:

The audio latency control aims for latency to stay in the range above the lower band set by PlaybackDelayThresh and below AudioMaxLatency under normal conditions. In situations where audio throughput is insufficient the latency is raised by AudioTempLatencyBoost above the lower band. This boost provides more buffering to allow smooth although slightly more delayed audio. Once the period of insufficient audio throughput has ended the latency is corrected back to the normal levels. The last

setting is the AudioLatencyCorrectionInterval which defines how often in milliseconds Receiver tries to correct the latency.

- PlaybackDelayThresh, specify the initial level of output buffering in milliseconds. Receiver tries to maintain this level of buffering throughout a session's duration. (Default 150ms).
- AudioMaxLatency, specify the maximum latency in milliseconds to allow before Receiver attempts to discard audio data. (Default 300ms).
- AudioTempLatencyBoost, sets the amount by which the higher latency band is above the lower. (Default 300ms)
- AudioLatencyCorrectionInterval, specify how often we want to attempt to correct the latency in milliseconds. (Default 300ms)

Performance

Memory

In environments where limited memory is a problem, you can minimize the amount of memory used by Citrix Receiver with the following parameters.

Item	Description
ClientToServerNormalPowerOf2=*integer*	Compression buffer size for reducer versions 2 and 3. Default=0 if data compression off, default=16 if on.
ServerToClientNormalPowerOf2=*integer*	Expansion buffer size for reducer versions 2 and 3. Default=0 if data compression off, default=18 if on.
Tw2CachePower=*integer*	Sets the size of the Thinwire 2 bitmap cache. Setting this lower than 19 (512KB cache) or higher than 25 is ineffective. The default value is calculated dynamically to be 1.25 times the screen image size at the preferred color depth.

You can also control the allocation of memory used to draw the session image by creating a plug-in with the Platform Optimization SDK. For information on this, see Customize connections using the Platform Optimization SDK in the Graphics section of this document.

Kiosk mode

You can configure a user device to start up in *kiosk mode*, in which Receiver starts automatically in fullscreen mode when a user logs on to the device. This can be useful if users do not need to interact with the local operating system (OS) or any local applications. In this access scenario, Citrix Receiver effectively replaces the local OS, allowing the user to interact with virtual desktops and applications as if they were local. Together with the clearing of caches and credentials that Citrix Receiver performs, this lets you to use workstations as thin clients.

The user scenario in kiosk mode is:

1. The user starts their terminal.
2. A startup UI is displayed with just one object, a Log On button.
3. The user clicks the button and is prompted for credentials.
4. Citrix Receiver starts the self-service UI in full-screen mode.
5. The user starts one or more applications.
6. When they have finished working at the terminal, the user clicks Preferences > Log Off.
7. Citrix Receiver clears its application caches, Authentication Manager clears the user's credentials and disconnects sessions.
8. Citrix Receiver closes the self-service UI and redisplays the startup UI, ready for the next user.

Set up kiosk mode

Setting up kiosk mode involves configuring the self-service UI as follows.

Important: If a terminal user needs to interact with the local OS or any local applications, do not make the window full-screen (FullscreenMode=1). In this scenario, or if you want the self-service UI windows to be displayed maximized and undecorated (FullscreenMode=2), Receiver does not cover the entire screen, so the user can interact with the environment in possibly unwanted ways. You should therefore take further steps to prevent this.

1. Set the desired values for the following settings. These are located in .ICAClient/ cache/Stores/StoreCache.ctx:

Setting	Value	Notes
SharedUserMode	Boolean (True or False)	Indicates whether Shared User Mode is enabled. This allows the self- service UI to use one system user account for multiple users by removing user data from the device when users log off or close the UI. Default=False
FullscreenMode	Integer	Indicates whether and how the self-service UI window should appear full-screen: 0=the window is not displayed full-screen; 1=the window is displayed full- screen; 2=the window is displayed maximized and undecorated, which does not mask the desktop environment's taskbar. This can be useful as users can launch seamless applications. Default=0 (not full- screen).
SelfSelection	Boolean (True or False)	Used to disable the search box and the selfselection panel. Note that this is used only by the legacy green UI. The self-selection panel appears on the left of the self-service UI when you click + (the plus sign). Disabling these UI elements prevents users from subscribing to extra applications. Default=False

These settings can alternatively be set using the `storebrowse -c` option or by editing the template file as described elsewhere in this topic.

2. Modify the device's start up sequence so it starts up into the Receiver UI.

Alternatives ways to configure the self-service UI for kiosk mode

Instead of editing the self-service UI settings for kiosk mode in StoreCache.ctx, you can alternatively use the storebrowse option `--configselfservice` (or, in short form, `-c`). This may be more convenient than editing the .ctx file directly.

To display the SharedUserMode setting, run:

```
./util/storebrowse --configselfservice SharedUserMode
```

To edit the SharedUserMode setting, run:

```
./util/storebrowse --configselfservice SharedUserMode=True
```

Note: The `-c` command is also used by configmgr (the Prefences UI).

Before any user has launched the self-service UI, you can also configure the settings by editing the default StoreCache.ctx-template file in $ICAROOT/config/. This file is renamed StoreCache.ctx and copied to users' .ICAClient/cache/Stores/ directory when selfservice or storebrowse are first launched. Editing the template lets you enable settings such as SharedUserMode and FullscreenMode for anyone who uses the system after your edits are saved.

Other considerations for Kiosk mode

You can enable automatic redirection of USB devices that are connected when the session starts by setting
"DesktopApplianceMode=True" in the "[WFClient]" section of module.ini. For more information about USB redirection, see *Configuring USB support* in Citrix Product Documentation.

Multi-threading

It can be useful to multi-thread connections to the Citrix Receiver in environments that contain multiple processors. Multi-threading support is on by default but you can turn it off.

By default, the Thinwire (Graphics) and Audio virtual channels each run in their own thread. You can configure this using the following settings in module.ini:

```
[Thinwire3.0]

UseThread={TRUE, FALSE} // Set to "TRUE" by default
ThreadQueueSize=65536  // Thread data queue size in bytes



[ClientAudio]
UseThread={TRUE, FALSE} // Set to "TRUE" by default
ThreadQueueSize=32768  // Thread data queue size in bytes
```

A larger queue means that more buffering takes place and results in increased latency but less risk of data starvation.

Monitor real-time performance

The following procedure applies to Receiver deployments involving XenApp or XenDesktop 7. It uses Citrix End User Experience Monitoring to monitor the following aspects of Citrix Receiver performance, in real time, in a desktop group:

- 2D graphics
- Playback of HDX MediaStream Windows Media
- Network data received within the session (except for UDP audio data)
- CPU used by the wfica program instance

Important: This monitoring feature is designed for OEM's in-house testing not for administrator's use in customer deployments

1. On the user device, browse to the Receiver installation location by typing `cd /opt/Citrix/ICAClient` where `/opt/Citrix/ICAClient` is the installation location.
2. Run the following command:

```
wfica –rm <options> <ICA file>.ica
```

Where `<options>` are any of the following options, and `<ICA file>.ica` is the connection you want to monitor. Options are case sensitive but can be provided in any order and in any combination, except for `D`, which is required to display results. Alternatively, you can:

- Set the environment variable WFICA_OPTS to "-rm <options>"
- Kill all AuthManagerDaemon selfservice storebrowse
- Use selfservice or storebrowse to launch a session as usual

Option	Description
D	Displays real-time data on screen.
I	Logs data to file. This creates ica_instr.csv under $HOME directory. The same file is always used for logging, and is overwritten automatically if a new session is launched.

Option	Description
f	Frame rate (frames per second)
s	Screen response time
c	CPU usage
o	Data sent (kb per second)
d	Data received (kb per second)
j	JPEG decoding rate
r	RLE decoding rate
e	Direct Decode rate for JPEG
t	Text tracking rates for additions, deletions, H.264 objects, and lossless text
g	GStreamer frame rate overlay (frames per second) if HDX Windows Media Redirection is used
v	H.264 decoding rate

For example, the command `wfica -rm Dcf launch.ica` displays real-time CPU usage and frame rates for the connection created by launch.ica.

The performance data is displayed in an ICA Metrics dialog box.

Important: Click Reset in the dialog box to clear all parameters before starting each new test.

Monitor audio input and output using HDX Monitor or Perfmon

You can use HDX Monitor or Perfmon to monitor audio input to and output from the Virtual Delivery Agent (part of any XenDesktop deployment). Note that configuration details for these two monitoring components vary depending on the audio feature that is being used.

CPU frequency governor

The CPU frequency governor is an operating system component that allows the clock speed of processors to be adjusted on the fly.

On some systems (for example, ARM devices), the CPU frequency governor can influence the performance of Receiver. Specifically, you might notice that the frame rate alternates between low and high repeatedly when a 720p host-rendered video is played, or when some other, equally intensive activity is performed.

Furthermore, in *ondemand* mode the CPU frequency can change dynamically, based on the system load. In some cases, the frequency appears to be miscalculated in a given time period, resulting in a lower frequency being momentarily set. A low frame rate therefore results during that period.

Check that your CPU frequency governor functions correctly, or enforce a *performance* setting if consistent performance is required.

Flow control

With XenDesktop 7, Receiver can throttle session performance based on two factors, the available serverto-client bandwidth and the client processing load. With XenDesktop 7.1, this feature lets you control performance using a third factor, the client-to-server bandwidth. Client processing load is especially important for maintaining an optimal user experience on low performance user devices by allowing a server of higher performance to match the devices' capabilities by dynamically adjusting its Thinwire frame rate. This avoids overloading devices, which in turn reduces session latency.

In XenDesktop 7 this feature is disabled by default on the server, but in Version 7.1 it is enabled by default so, depending on the performance capabilities of your user devices, you may want to disable it in Citrix Receiver.

Note: This feature is separate to the flow control feature for HDX MediaStream Windows Media Redirection, which is described elsewhere in this document.

To disable flow control in Receiver

In wfclient.ini, set FlowControlEnabled to False in the [WFClient] section.

Experimental Features

GStreamer audio

Switch to GStreamer audio

You can switch between your existing implementation and an implementation based on GStreamer, as follows.

Note: GStreamer 0.10.25 (or a later 0.10 version) is required, including its "plugins-good" package.
Important: Be aware that GStreamer audio has limitations that are described elsewhere in this section.

If wfica encodes or decodes audio using CPU, VDCAM.DLL is normally loaded. In a GStreamer implementation, ensure that VDGSTCAM.DLL is loaded instead by editing the [ClientAudio] section of module.ini to include the appropriate driver name:

- VDCAM.DLL - DriverName=VDCAM.DLL
- VDGSTCAM.DLL - DriverName=VDGSTCAM.DLL

If VDGSTCAM is used for audio output, gst_aud_play passes the encoded audio stream to GStreamer with the correct codec information to decode the stream. For audio input, gst_aud_read reads the encoded audio stream from GStreamer.

The input and output pipelines are as follows:

- Speex audio input - autoaudiosrc > audioconvert > speexenc > appsink
- Vorbis audio input - autoaudiosrc > audioconvert > vorbisenc > oggmux > appsink
- Speex audio output - appsrc > speexdec > audioconvert > autoaudiosink
- Vorbix audio output - appsrc > oggdemux > vorbisdec > audioconvert > autoaudiosink

Optimize GStreamer audio

If you have set up Citrix Receiver to use the GStreamer framework, you can modify how audio is processed by it using the following settings in the [ClientAudio] section of the appropriate configuration file.

Before using this procedure, you should be familiar the GStreamer SDK, including the concepts of audio sinks and audio sources.

Reduce GStreamer startup time by setting:

- GSTAudioSinkName - This is the GStreamer element that you want to use as the sink for audio. By default, this is autoaudiosink, the automatically detected audio sink.
- GSTAudioSrcName - This is the GStreamer element that you want to use as the source for audio. By default, this is autoaudiosrc, the automatically detected audio source.
- In GSTSpeexBufferingLatency, specify the amount of additional output buffering when rendering audio in Speex format. The default is 50 ms.
- In GSTVorbisBufferingLatency, specify the amount of additional output buffering when rendering audio in Vorbis format. The default is 150 ms.

Configure GStreamer in non-default locations

If GStreamer is installed in a non-default location (for example, /gstreamer), you must make the following changes in addition to adjusting the configuration file.

1. Allow $ICAROOT/util/gst_play to link with GStreamer:

```
ldconfig /gstreamer/lib
```

2. In $ICAROOT, rename selfservice to selfservice.real.
3. Create a shell script wrapper called selfservice and set an environment variable that GStreamer uses to locate its plug-ins:

```
#!/bin/sh  export

GST_PLUGIN_SYSTEM_PATH=/gstreamer/lib exec

/opt/Citrix /ICAClient/selfservice.real $@
```

Note: You can also create a similar wrapper for storebrowse.

GStreamer audio limitations

Bear the following limitations in mind when implementing GStreamer audio.

armhf platform

No GStreamer processes run on the user device on the ARM hard float (armhf) platform. As a result, the features GStreamer audio and HDX Windows Multimedia Redirection, which rely on GStreamer, are not supported on this platform unless you are running Ubuntu 12.10 or later.

Recording

Audio input is not always functional on some user devices. Symptoms include an inability to record more than once or twice, an inability to record any input, and distorted input. There is no known workaround for this issue.

Pausing and resuming

Some audio software does not stop and restart the audio device when users pause, and then try to restart, playback. The software might also not issue any data to the device during silence. Both of these symptoms prevent new audio data from being played. Use the following setting to mitigate this problem.

In the [ClientAudio] section of module.ini, set GSTUseNoClock to True. This disables the built-in clock in GStreamer.
A disadvantage of using this setting is that any gaps in the audio that are caused by network outages result in permanently increased latency, since they are no longer detected.

Alternatives to GStreamer audio

The advantages of using GStreamer audio can in some cases be achieved in other ways:

- Playback in a separate thread - GStreamer lets you decode and play audio in a new process on a separate CPU. You can also achieve this without using GStreamer by ensuring that VDCAM.DLL, rather than VDGSTCAM.DLL, is loaded.
- Hardware acceleration - GStreamer lets you encode and decode audio using hardware. You can also achieve this without GStreamer by replacing the supplied libvorbis.so or libspeex.so library files with your own. Any replacements must be API-compatible.

Reference Information

This section includes the following:

- Command line utilities
- Configuration files
- Library files
- Scripts

Command Line utilities

wfica

You can use a connection file simply by typing its name after `wfica` without any of the options below.

To	Type
Specify the custom connection to use from the Connection file. Note: With the new self-service UI, you cannot set up a custom connection in this way.	`-desc` *`description`*
	`-description`
Specify a desktop file.	`-desktop` *`filename`*
Specify a connection file.	`-file connection_filename`
Set alternative protocol file. This enables the use of an alternative module.ini.	`-protocolfile` *`filename`*
Set alternative client configuration file. This enables the use of an alternative wfclient.ini.	`-clientfile` *`filename`*
Display a different name for Receiver, specified by name, wherever that name appears. The default name is the device name. However, if you use a Sunray device, the default name is derived from the device's MAC address. This is overridden by the ClientName entry in .ICAClient/wfclient.ini, which is itself overridden by issuing the - clientname option.	`-clientname` *`name`*

To	Type
Show this list of parameters.	`-help`
Display version information.	`-version`
Show error numbers and string.	`-errno`
Set the location of Receiver installation files. This is equivalent to setting the ICAROOT environment variable.	`-icaroot` *`directory`*
Suppress connection dialogs.	`-quiet`
Enable key logging.	`-keylog`
Set session geometry.	`-geometry WxH+X+Y`
Set color depth.	`-depth <4 | 8 | 16 | 24 | auto>`
Set monitor spanning.	`-span [h][o][a| mon1[,mon2[,mon3,mon4]]]`
Use private color map.	`-private`
Use shared color map.	`-shared`
Specify a string to be added to a published application.	`-param` *`string`*
Specify the UNIX path to be accessed through client drive mapping by a published application.	`-fileparam` *`unixpath`*
Specify a user name.	`-username`
Specify a disguised password.	`-password`
Specify a clear text password.	`-clearpassword "`*`clear password`*`"`
Specify a domain.	`-domain`

To	Type
Specify an initial program.	`-program`
Specify a directory for the initial program to use.	`-directory` *`directory`*
Turn on sound.	`-sound`
Turn off sound.	`-nosound`
Set drive mapping overrides. These are of the form A$=path, where path can contain an environment variable (for example A$=$HOME/tmp). This option must be repeated for each drive to be overridden. For the override to work, there must be an existing mapping, though it need not be enabled.	`-drivemap` *`string`*

storebrowse

The following table documents the options that you can use with the storebrowse utility.

Option	Description	Notes
`-L, --launch`	Specifies the name of the published resource to which you want to connect. This launches a connection to a published resource. The utility then terminates, leaving a successfully connected session.	

Option	Description	Notes
`-E,` `--enumerate`	Enumerates the available resources.	By default, the resource name, display name, and folder of the resource are displayed. Additional information can be displayed, by using the `--details` option.
`-e,` `--listerrorcodes`	Lists error codes.	
`-S,` `--subscribed`	Lists the subscribed resources.	By default, the resource name, display name, and folder of the resource are displayed. Additional information can be displayed using the `-- details` option.

-M, --details Use in conjunction with the -E or -S option.	Selects which attributes of published applications are returned. This option takes an argument that is the sum of the numbers corresponding to the required details: Publisher(0x1), VideoType(0x2), SoundType(0x4), AppInStartMenu(0x8), AppOnDesktop(0x10), AppIsDesktop(0x20), AppIsDisabled(0x40), WindowType(0x80), WindowScale(0x100), and DisplayName(0x200). CreateShortcuts(0x100000) can be used in conjunction with -S, -s, and -u to create menu entries for subscribed applications. RemoveShortcuts(0x20000 0) can be used with -S to delete all menu entries.	Some of these details are not available through storebrowse. If this is the case, the output is 0. Values can also be expressed in decimal as well as hexadecimal (for example, 512 for 0x200).
-v, --version	Writes the version number of storebrowse to the standard output.	

Option	Description	Notes
`-?, -h, --help`	Lists the usage for storebrowse.	An abbreviated version of this table is displayed.
`-U, --username`	Passes the user name to the server.	These options work with Program Neighborhood Agent sites and StoreFront sites. When used with a StoreFront site, the site must be configured to support HTTP Basic authentication, otherwise, these options are ignored.
`-P, --password`	Passes the password to the server.	
`-D, --domain`	Passes the domain to the server.	
`-r, --icaroot`	Specifies the root directory of the Citrix Receiver for Linux installation.	If not specified, the value is taken from the ICAROOT environment variable or determined at run time.
`-i, --icons` Use in conjunction with the `-E` or `-S` option.	Fetches desktop or application icons, in PNG format, of the size and depth given by the `best` or `size` argument. If the `best` argument is used, the best sized icon available on the server is fetched. You can convert this to any size required. The `best` argument is the most efficient for storage and bandwidth, and can simplify scripting. If the `size` argument is used, an icon is fetched of the specified size and depth. In both cases, icons are saved in a file for each of the resources that the -E or -S option returns.	The `best` argument creates an icon of the form <resource name>.png. The `size` argument is of the form WxB, where W is the width of the icon (all icons are square, so only one value is needed to specify the size), and B is the color depth (that is, the number of bits per pixel). W is required but B is optional. If it is not specified, icons of all available image depths are fetched for that size. The files that are created are named <resource name>_WxWxB.png.

Option	Description	Notes
`-u, --unsubscribe`	Unsubscribes the specified resource from the given store.	
`-s, --subscribe`	Subscribes the specified resource from the given store.	If you use a different Receiver, subscriptions on Program Neighborhood Agent servers are unavailable.

Important: The unique gateway

Option	Description	Notes
`-d, --deletestore`	Deregisters a store with the Service Record daemon.	
`-c, --configselfservice`	Gets and sets the self- service UI settings that are stored in StoreCache.ctx. Takes an argument of the form `<entry[=value]>`. If only entry is present, the setting's current value is printed. If a value is present, it is used to configure the setting.	Example: `storebrowse --configselfservice SharedUserMode=True` Important: Both entry and value are case sensitive. Commands that use this option will fail if the case is different to the documented case of the setting itself (in StoreCache.ctx).
`-C, --addCR`	Reads the provided Citrix Receiver (CR) file, and prompts the user to add each store.	The output is the same as –a, but might contain more than one store, separated by newlines.
`-K, --killdaemon`	Terminates the storebrowse daemon process.	All credentials and tokens are purged. The SSO credentials inserted last are also removed.

storebrowse return codes

Error number	Description
0	NO_ERROR
5	INVALID_ARGUMENTS
6	IO_ERROR
7	UNKNOWN_ERROR
37	CANNOT_LOAD_LIBRARY
150	SERVER_CERTIFICATE_NOT_TRUSTED
235	UNABLE_TO_ADD_STORE
236	CANT_UNSUBSCRIBE_NOT_TRUSTED
237	STORE_NOT_FOUND
238	PASSWORD_EXPIRED_OR_MUST_CHANGE
247	RESOURCE_NOT_RECOGNISED
248	INVALID_CREDENTIALS
249	ENUMERATION_FAILURE
253	NO_URL_SPECIFIED
254	MISSING_ARGUMENTS
255	EXEC_FAILED

Pnabrowse

Important: The pnabrowse utility is deprecated but can still query Program Neighborhood Agent sites for lists of servers and published resources, and lets you connect to a published resource. Citrix discourages the use of pnabrowse because it prevents users from accessing StoreFront stores; use storebrowse instead. storebrowse can prompt for credentials from both sites and stores. The -U, -P and -D options only work with Program Neighborhood Agent sites.

An optional argument of pnabrowse specifies the server to connect to. This may be either:

- The name of the XenApp server, for options -S and -A.
- The URL of the server running a Program Neighborhood Agent site, for options -E and -L.

The pnabrowse utility returns an exit value indicating success or failure, and can use the following options with XenApp.

Option	Description
-S	List servers, one per line.
-A	List published applications, one per line.
-m	Used in conjunction with -A, this expands the information returned about published applications to include Publisher, Video Type, Sound Type, AppInStartMenu, AppOnDesktop, AppIsDesktop, AppIsDisabled, Window Type, WindowScale, and Display Name.
-M	Used in conjunction with -A, this selects individual columns of information returned about published applications. It takes an argument (1-1023) which is the sum of the numbers corresponding to the required details: Publisher(1), Video Type(2), Sound Type(4), AppInStartMenu(8), AppOnDesktop(16), AppIsDesktop(32), AppIsDisabled(64), Window Type(128), Window Scale(256), and DisplayName(512).
-c	When appended to option -A, create files specifying the minimum information the client engine needs to connect to published applications; for example, application name, browse server, window resolution, color depth, audio, and encryption settings. File names are formatted as follows: /tmp/xxx_1.ica, /tmp/xxx_2.ica where xxx is replaced by the decimal process identifier for the pnabrowse process.
-d	Used in conjunction with -L to specify the XDG desktop file.
-e	Shows error numbers.

-i	Include paths to files containing icon images for published applications in the output from option -A. Either .xpm or .png files are returned depending on the use of the size (WxB) option: -i returns 16x16 icons in XPM format at 4 bits per pixel -iWxB returns WxW icons in PNG format at B bits per pixel
-f	Include Citrix XenApp folder names for published applications in the output from option -A.
-u	Specify a user name for authenticating the user to a proxy server.
-p	Specify a password for authenticating the user to a proxy server.

The following options provide Citrix XenApp (Program Neighborhood Agent) Service functionality and can be used with both XenApp and XenDesktop.

Option	Description
-E	Invoke Citrix XenApp and enumerate all published resources. If you specify both -E and -L, the last option on the command line takes effect. The utility then terminates, possibly leaving a connection open. For each resource the following details are written to standard output, enclosed in single quotation marks and separated by tab characters: Name: The display name from the Access Management Console Application Properties dialog box.

Option	Description
	Folder: The Program Neighborhood folder from the Access Management Console Application Properties dialog box. Type: Either Application or Content. Icon: The full path name of an .xpm format icon file.
-L	Specify the name of the published resource to which you want to connect. This invokes Citrix XenApp and launches a connection to a published resource. If you specify both -E and -L, the last option on the command line takes effect. The utility then terminates, possibly leaving a connection open.
-N	Specify a new password. This option must be used with existing credentials and is valid only when the existing password has expired, as indicated by the exit code 238: PASSWORD_EXPIRED_OR_MUST_CHANGE.
-P	Specify a password for authenticating the user to the server running the Web Interface or the server running the Citrix XenApp (Program Neighborhood Agent) Service.
-U	Specify a user name for authenticating the user to the server running the Web Interface or the server running the Citrix XenApp (Program Neighborhood Agent) Service.
-D	Specify a domain for authenticating the user to the server running the Web Interface or the server running the Citrix XenApp (Program Neighborhood Agent) Service.
-WD	Disconnects all active sessions for the user.
-WT	Terminates all sessions for the user.
-Wr	Reconnects to all disconnected sessions for the user.

Option	Description
-WR	Reconnects to all sessions (active or disconnected) for the user.
-k	Use an existing Kerberos ticket to authenticate, rather than user name, password, and domain. This requires configuration of the client and server. For more information, see the *Using Kerberos with Citrix Receiver for Linux* documentation.

The following common options are used:

Option	Description
-q	Quiet mode; do not print error messages.
-r	Include raw icon data for published applications in the output from options - E or -A.
-V	Displays version details.
-h	Print a usage message listing the options.
-?	Print a usage message listing the options.

Exit Status values

The command-line utilities storebrowse and pnabrowse report exit status values to indicate success or failure. If problems arise, these values give guidance on possible error causes and their meanings, and are listed in the following table. Note that some error conditions may result in different exit values depending on which part of the code detects them.

Value	Description
0	Success
1-242	These error codes are associated with common error messages. Run pnabrowse -errno for a list of these messages.

Value	Description
246	Citrix XenApp has reported an error. See the text written to standard output for more information on this error.
247	A published resource has not been recognized.
248	Invalid credentials.
249	Failed to enumerate servers.
250	Failed to make a directory.
251	Failed to load an .ini file.
252	No Web Interface server was specified.
253	No Program Neighborhood Agent server was specified.
254	A parameter is missing
255	Execution failed

When pnabrowse fails to change a password, the exit code can be useful in diagnosing the problem. For example:

```
0 SUCCESS

4 E_MISSING_ARG

63 E_NOT_ALLOWED WI configuration prohibits change

65 E_NOT_SUPPORTED Could be seen if :-

-    WI config requires "direct connection" (=Kerberos),
     but couldn't load Kerberos library
-    Support is not compiled into client - might see it
     with pre 11.114 version
-    Trying to change a Novell password
```

```
74 E_NEW_PASSWORD_INVALID

248 EX_INVALID_CREDENTIALS
255 EX_EXEC_FAILED Some problem with the server changing
the password, such as it hasn't expired.
```

Configuration files

For any given connection, the configuration files are checked in a specific order. For details,

see Configuration files earlier in this document. wfclient.ini

This .ini file contains a section for parameters specific to the Receiver user interface (UI), such as version number and desired resolution.

In Version 10.x and later of Receiver for Linux, for each entry in wfclient.ini, there must be a corresponding entry in All_Regions.ini for the setting to take effect. In addition, for each entry in the [Thinwire3.0], [ClientDrive], and [TCP/IP] sections of wfclient.ini, there must be a corresponding entry in canonicalization.ini for the setting to take effect. See the All_Regions.ini and canonicalization.ini files in the $ICAROOT/config/ directory for more information. Parameter syntax

Boolean parameters use Yes, True, 1, or On to indicate TRUE. Any other values, including No, False, 0, or Off, are interpreted as FALSE.

For all parameters, spaces are significant and values are case-sensitive.

Parameters marked as ignored are not currently used by the client, but can be reserved for future use, redundant, or used by other clients; for example, Win32 or Macintosh. In the last case, the parameter is read by the client but the result is discarded.

Default values are embedded into the client program itself. Fixed values are set by the unmodified .ini configuration files.

In the following table, the parameters are listed alphabetically within each section of the file.

Item	Description
[WFClient]	The engine uses this section. It contains default session oriented parameters.
AllowAudioInput=boolean	To enable the webcam and audio input for connections, you must ensure this parameter is set to True; otherwise, it overrides the setting for the EnableAudioInput parameter in appsrv.ini. Default=False
AllowMultiStream=boolean	To enable multiple streams to be used when connecting to a multi stream ICA enabled server, you must ensure this parameter is set to True. Default=False

Item	Description
ApplySucConnTimeoutToDesktops=boolean	Works with the SucConnTimeout setting. Ensures that the setting SucConnTimeout is honored by virtual desktops as well as virtual applications. When ApplySucConnTimeoutToDesktops is applied to desktops, repeated clicks open multiple sessions, but you can set SucConnTimeout to a suitable timeout and run a custom script in between the desktop launches. Default=False
AutoResponse=integer	Specifies a bitmapped value that enables automatic response to user prompts (such as dialog boxes). The values are as follows: 1: log message to standard error output; 2: exit program whenever that choice is offered. Default=0 (wait for user response).
BalanceShiftKeys=boolean	Corrects the server when it attempts to change the state of the client keyboard's locking shift key. Default = True
BalancedShiftMask=integer	Uses a bit mask to control the response to attempted changes of individual locking shifts: Scroll=1; Num=2; Caps=4. Setting BalanceShiftKeys=true is equivalent to BalancedShiftMask = 7. Overrides BalanceShiftKeys when set. No default value.
BufferLength=integer	Input buffer length. Default=2048
BypassSetLED=boolean	Prevents virtual applications running macros multiple times. When a virtual application runs a macro on one of the LED key presses (that is, on the Caps Lock, Number Lock, or Scroll Lock key), the application expects the key state to be sent once. However, the macro runs multiple times and sends the state each time. Default=False
CGPAllowed=[On|Off]	Enables or disables Common Gateway Protocol (CGP), the underlying mechanism that provides HDX Broadcast session reliability. Disabling CGP can be useful when debugging this feature. Do not use this setting to configure the feature permanently for users. Use server policies instead. Default=On

Item	Description
CGPAddress=string	Address and port for CGP connection. The address is usually '*' to indicate that the same address should be used as if CGP is not used. For example,'*:1111' will set the port to 1111. Default="*:2598"
CGPSecurityTicket=boolean	Specifies whether CGP security ticket is to be used, when traversing a Secure Gateway. Default=Off
ClientComm=[On|Off]	Determines if Client COM Port Mapping is on. Default=On
ClientName=string	Allows client name to be overridden; normally this is obtained from the system. Default=none (no override)
ClientPrinterList=string	Allows specified named printers to be used; for example, lp1:laser1:lp2. No default (look in /etc/printcap if UsePrintcap is true; or run 'lpstat -a')
ClientUnicodeEnabled=boolean	Client can use UNICODE. Default=True
ComPort1...99=string	COM port device name. No default
ConnectionBar=integer	Enables the pulldown Connection Bar ("Desktop Viewer") in nonseamless sessions. Default=0 (Disabled)

ConnectionBarDisplayChar=string	Specifies an alternative keyboard shortcut char for displaying the Desktop Viewer accessibility menu. This can be any of the values F1-F12, Minus, Plus, Tab, or Pause as listed in the '[Hotkey Keys]' section of $ICAROOT/config/module.ini. Remember to add this entry to both All_Regions.ini. Default=Pause
ConnectionBarDisplayShift=string	Specifies an alternative keyboard shortcut shift for displaying the Desktop Viewer accessibility menu. This can be any of the values Alt, Ctrl, Shift, Alt+Ctrl, Alt+Shift, Ctrl+Shift, and Alt+Ctrl+Shift as listed in the '[Hotkey Shift States]'section of $ICAROOT/config/module.ini. Remember to add this entry to both All_Regions.ini. Default=Alt+Ctrl
CRBrowserCommand=string	Indicates the command used to request the display in an existing browser or start a new browser from those listed. This command is executed after appending the URL. Default= nslaunch firefox, mozilla, iceweasel

Item	Description
CRBrowserPath=string	Server to client content redirection browser path. No default. Use $PATH Obsolete.
CREnabled=boolean	Server to client content redirection enabled. Default=True
CRPlayerCommand=string	Server to client content redirection media player command. Default=realplay %s Obsolete.
CRPlayerPath=string	Server to client content redirection media player path. No default. Use $PATH Obsolete.
CursorStipple=hex_integer,hex_integer	Defines a stipple pattern in cursor masks to replace inversion regions in Windows cursors. Default=aaaa,5555
DefaultPrinter=string	Print queue to be used as the default printer in the Citrix XenApp session. For more information, see Receiver for Linux on the Product Documentation site.
DefaultPrinterDriver=string	Printer driver to be used for the default printer in XenApp sessions on Windows. For more information, see Receiver for Linux on the Product Documentation site..
DeferredUpdateMode=boolean	Enables batched updates from the Local Video Buffer (LVB) to the screen. The LVB is used when seamless windows or SpeedScreen Latency Reduction are in use, and for 256-color connections when specified by the UseSDLVB parameter. Default=False
DisableClientAutoQuit=boolean	Quit client on disconnect. Ignored.
DisableCtrlAltDel=boolean	Disable requirement for Ctrl+Alt+Delete event to start logon to a Windows server.

Item	Description
	Default=On. Must be Off for smart card logons.
DisableSound=boolean	Disables Windows alert sounds. Default=False
DriveEnabledA…Z=boolean	True if drive is mapped. Default=False
DrivePathA…Z=string	UNIX file path for client drive mapping. No default.
DriveReadAccessA...Z= [0|1|2]	0=full access, 1=no access, 2=ask user. Default=0
DriveWriteAccessA…Z= [0|1|2]	0=full access, 1=no access, 2=ask user. Default=0
DynamicCDM=[On|Off]	Enabled Dynamic Client Drive Mapping. Default=On
DynamicCDMDirs=string	Comma-separated list of directories to monitor for newly mounted file systems. No default
EchoShiftKeys=boolean	To improve the behavior of a Windows application that attempts to manipulate the keyboard shift key state. Default=False
EnableAudioLRVolume= boolean	Specifies that the client audio accepts the left and right volume control set by server. Default=True
EnableAudioPlaybackRate=boolean	Specifies that the client audio accepts the playback rate control set by server. Default=True
EnableAudioVolume=boolean	Specifies that the client audio accepts the volume control set by the server. Default=True
EnableICC=boolean	Enables inter-client communication features used by seamless session sharing and Connection Center. Default=True

Item	Description
EnableOSS=boolean	Allows off-screen drawing surfaces to be used when constructing the image to be displayed. This reduces flicker. Default=True
EnableSessionSharingClient=boolean	Sends session sharing requests to other ICA sessions on the same X display. Default=False
EnableSessionSharingHost=boolean	Accepts session sharing requests from other ICA sessions on the same X display. Default=False
EnableSSOnThruICAFile= boolean	Allow ICA file to turn on single sign-on. Default=False
ForceLVBMode=boolean	Ensures that the Local Video Buffer (LVB) is used. Default=False
ForceRedrawOnReset= boolean	Force server to redraw after a Thinwire reset. This may be needed to clean-up the screen on entry or exit from Shadowing. Default=True
HBCCapMB	Sets the cap of the hot bitmap cache. This value is also used when BatchDecoding is enabled and replaces BatchDecodeCacheSize. Default=48
HDXoverUDP= string	Transport protocol On – Use UDP and do not fall back to TCP on failure Off – Use TCP Preferred – Try UDP first and fall back to TCP on failure Default=Off.
udtMSS= integer	UDT maximum segment size in bytes. Default = 1500.
udtRCVBUF=integer	Receive flow window * (udtMSS-28) in bytes. Default = 0.
udtSNDBUF=integer	Send flow window * (udtMSS-28) in bytes. Default = 0.

udtUDPRCVBUF=integer	SO_RCVBUF value passed to underlying UDP socket. Default = 0.
udtUDPSNDBUF=integer	SO_SNDBUF value passed to underlying UDP socket. Default = 0.
udtIFlightFlagSize=integer	Buffer count related to in-flight data. Default = 0.
udtNSGHAFTimeout=integer	NetScaler Gateway high-availability failover timeout. Default = 0.
HDXWebCamDebug= boolean	Enables the gst_read debug option. Default=False
HDXWebCamDelayTime= integer	The period of time, in milliseconds, to wait before opening a webcam during a session. Default=2000ms
HDXWebCamDelayType= integer	Determines whether or not to delay the opening of a webcam during a session. 0=do not delay opening, 1=if last close was less than delay time, delay by time remaining, 2=always delay. Default=1
HDXRTMEWebCamLaunchDelayTime=integer	Determines the delay, in milliseconds, to wait at startup before the webcam can be activated, to allow the RTME plugin a chance to grab the camera (if installed). Default = 45000ms

Item	Description
HDXWebCamDevice=string	Location of the webcam device. Default=/dev/video0
HDXWebCamEnabled= boolean	Enables webcam support if AllowAudioInput is also true. Default=True
HDXWebCamFramesPerSec=integer	Frame rate requested from a webcam. Default=15
HDXWebCamGStDebug= string	Comma-separated list of GStreamer debug options. No default
HDXWebCamHeight= integer	Height of image requested from a webcam. Default=288
HDXWebCamFramesPerSecDenominator=integer	Denominator of a fraction specifying the frame rate requested from webcam. The numerator is HDXWebCamFramesPerSec. Default=1
HDXWebCamQuality= integer	Theora quality requested from a webcam, within a range of 1-63. Default=16
HDXWebCamWidth= integer	Width of image requested from a webcam. Default=352
HoldComPortsOpen= boolean	Determines whether the client holds system serial ports open for session duration. Default=False
Hotkey1...12Char=[F1...F12]	Function key to use for mapping keyboard shortcut sequence ALT+Fn.
HotKey1...12Shift=string	Shift state to get keyboard shortcut mapping for Alt+Fn; for example, ALT+CTRL.

Item	Description
HowManySkipRedrawPerChange =integer	The maximum number of successive palette changes that can follow one another closely without a redraw. Default=9
HttpBrowserAddress=string	Server name or IP address used for HTTP browsing. Default=ica
HttpBrowserAddress2...14= string	Server names or IP addresses for business failover. No default
ICAKeepAliveEnabled= boolean	Monitors reception of data from the ICA host and assumes the connection has failed if a request packet fails to produce a response. Default=TransportReconnectEnabled setting
ICAKeepAliveInterval= integer	The interval, in milliseconds, for checking on data received when ICAKeepAliveEnabled is set. Disconnection occurs if the connection is idle for the specified period and if no response is received during this time after a request. Default=10000
IgnoreErrors=integer list	A comma-separated list of the error numbers to be ignored by the client. No default
IgnoreFileChangeSize= boolean	Stops time-out copying large files to floppies. Default=False
IgnoreShutdownErrors= boolean	Error messages are not shown during session shutdown when this is enabled. Default=True
KeyboardDescription= string	Description of keyboard mapping.

Item	Description
	Default=Automatic (User Profile)
KeyboardLayout=string	Keyboard layout from module.ini. Default=none
KeyboardMappingFile= string	Name of file in $ICAROOT/keyboard. Default=automatic.kbd
KeyboardTimer=integer	Keyboard event flush interval. Default=0ms
KeyboardType=string	Selects a keyboard type code to be sent to the server. The value should be one of the strings in the [KeyboardType] section of module.ini.
LastComPortNum=integer	Last COM port device number used. Default=0
MapMouseButton2= boolean	Treats the middle mouse button the same as the right button. Default=False
MouseDoubleClickHeight= integer	Mouse double-click height in pixels. Default=4
MouseDoubleClickTimer= integer	Mouse double-click time. Default=500ms
MouseDoubleClickWidth= integer	Mouse double-click width in pixels. Default=4
MouseMap=string	Mouse button remapping: a string of up to ten of the letters X, B, W, C. M, with an optional unsigned integer parameter, each specifying an action for a mouse button: X - ignore; B - send a (possibly different) button to the server; W - send a vertical scroll wheel up/down event H - send a horizontal scroll wheel left/right event

Item	Description
	C - send an ASCII character with left- control down M - as for C, but only to Windows servers, otherwise send the button. Buttons have the "natural" numbering, so the middle of three main buttons is 2, not 3 as MS have it. The default, "BBBW1WH1HB4B5", is good for Linux/Unix clients with X11, where wheels are presented as buttons 4-7. An alternative string for those who hate to have to touch the keyboard for cut and paste: "BM118BW1WH1HM99M120". For Windows servers, Ctrl-V, C and X are available on buttons 2, 8 and 9. (Button 2 is normally "Paste PRIMARY" in X11.
MouseScrollAmount= integer	Sets the amount moved for each scroll wheel click. Default=120
MouseTimer=integer	Mouse event flush interval in milliseconds or zero. Default=0
MouseWheelMapping= integer,integer	Mouse buttons whose down events are treated as a mouse wheel motion in the ICA protocol. Default=4,5
MouseXButtonMapping =integer,integer	Specifies mouse buttons that should be mapped as additional buttons X1 and X2. Default=8,9
MSLocaleNumber= hex number	The Microsoft locale identifier to send to the server. These numbers are identical to the low 16-bits of the corresponding keyboard layout numbers.

Item	Description
	Always be tried before the configuration file is checked. Default=""
PointerClickTime=integer	Specifies the length of time after a mouse click that the client allows attempts by the server to move the pointer, overriding the effect of PointerGrabTime. Default=1000 (milliseconds)
PointerGrabTime=integer	Specifies the length of time after mouse movement that the client ignores attempts by the server to move the pointer. This is for echo suppression. Default=750 (milliseconds)
ReaderStatusPollPeriod= integer	Smart card status polling period. Default=5000ms
Realm_abc=ANY.COM	Causes Windows domain abc to be mapped to Kerberos realm ANY.COM when changing an expired password. The default action is to map to uppercase (ABC).
SessionReliabilityTTL= integer	Client-Side CGP timeout - the period of time in seconds during which the client will attempt a CGP reconnection. Default=180
SetTWIFocus=boolean	Propagates local focus changes for seamless windows to the server. Default=False Note that the default setting for versions earlier than 8.2 is True.
ServerDoesMultiMod= boolean	Should be set when the client's X11 server accurately reflects physical motion of notionally locking shift keys (Caps Lock, Scroll Lock, and Num Lock). Some (non-Linux) X servers treat these keys as though they really locked, halving the number of events reported. Default=True

Item	Description
ShadowPointer=boolean	Passes mouse pointer-positioning commands to the X server. Default=True
SkipRedrawPerPaletteChange =boolean	Enables batching of redraw requests following palette changes. This reduces flickering when an application changes the palette rapidly. It is only relevant in 256 color mode when shared colors or a TrueColor visual are used. It is ignored if Session-Depth Local Video Buffer (SDLVB), the default, is used. Default=Off
SmallFramesEnabled= boolean	Controls the use of small, non-H. 264, rectangle updates in H.264 mode. Ignored unless TextTrackingEnabled is true. Default=True
SoftwareMouse=boolean	Hides the OS mouse pointer when it is in the session window, and causes wfica to draw the mouse image itself. Not effective in Seamless sessions. Default=False
SpeedScreenMMAAudioEnabl ed=boolean	Enables HDX MultiStream Windows Media Redirection support for compressed audio data. Default=True
SpeedScreenMMAFlowContro lV3=boolean	Enables Version 3 flow control for HDX MultiStream Windows Media Redirection support when used with suitable servers. Default =True
SpeedscreenMMAForceAspect Ratio= boolean	Sets the force_aspect_ratio property for the GStreamer image sink element. Default=False
SpeedscreenMMAGSTCheck= boolean	When enabled, checks for GStreamer support. Default=False
SpeedScreenMMASecondsToB uffer= integer	Number of seconds of multimedia data that the server expects to be buffered in the client. Default=10

Item	Description
SpeedScreenMMAStopOverlayHandling Events=boolean	Stops GStreamer overlay from handling X events. This avoids a problem with mouse movements not ending Windows Media Player's full screen mode properly. Note, however, that this may cause problems with the size of the video window. Default=True
SpeedScreenMMAVerbose=boolean	Enables logging of format information for audio and video streams in the Citrix HDX MultiStream Windows Media Redirection channel. Default=False
SpeedScreenMMAVideoEnabled=boolean	Enables HDX MultiStream Windows Media Redirection support for compressed video data. Default=True
SSLEnable=boolean	Controls the use of SSL for TCP connections that do not specify their own value. Default=False
SSLInTitle=boolean	Controls whether or not the SSL strength indicator is shown in a session window's title bar. Default=On
SSOnUserSetting=boolean	Allows UseLocalUserAndPassword to be trusted in appsrv.ini. Default=False
StopOnUnmap=boolean	Commands the server to stop sending screen updates when the session window is iconified. Default=True

Item	Description
SucConnTimeout=integer	Works with the ApplySucConnTimeoutToDesktops setting. Specifies the number of seconds to wait for a recently started session to become available for session sharing. When ApplySucConnTimeoutToDesktops is applied to desktops, repeated clicks Delaunch multiple sessions, but you can set SucConnTimeout to a suitable timeout and run a custom script in between the desktop launches. Default=20 Note: To revert to the behavior in versions before Receiver for Linux 13.0, and allow a separate session launch for each click, set SucConnTimeout to 0.
SunRayClientName=string	Specifies the prefix part of a SunRay client name with URL escape characters. This allows trailing spaces, represented by %20. The remaining part of the client name is based on the Ethernet address of the SunRay terminal. Default=SunRay-
TcpBrowserAddress=string	Server name or IP address to use for browsing. No default. Use broadcast.
TcpBrowserAddress2...15= string	Controls the protocol used to locate the ICA host for the connection. This is a default value for connections that do not specify it individually.
TCPRecvBufferSize=integer	Similar to TCPSendBufferSize except that it sets the receive buffer size. No default.
TCPRecvBufferSizeNoFlow=integer	Similar to TCPRecvBufferSize except that it is used only when TCPRecvBufferSize is not set and the server does not support flow control. When flow control is supported and TCPRecvBufferSize is not set, the kernel is allowed to control the buffer size. Default: 60
TextTrackingEnabled= boolean	Controls the use of optimized lossless text overlays in H.264 mode. Default=True
TransportReconnectDelay= integer	Time in seconds to wait for the network to recover before automatic reconnection starts. Default=30

Item	Description
TransportReconnectEnabled= boolean	Enables automatic reconnection of sessions when the network connection to the ICA host is lost. Default=True
TransportReconnectOptions=integer	Specifies options for automatic reconnection. Add 1 to show a dialog box during reconnection, and 2 to remove session windows when reconnection starts. Default=3
TransportReconnectRetries=integer	Specifies how often to retry automatic reconnection. Default=3
TWICleanupTimer=integer	Period in milliseconds of a watchdog timer that prevents corruption of Seamless window after a window moves or resizes. Default = 50
TWICoordinateWinPosition=boolean	Seamless windows: try to force repositioning of a server window after a server-controlled move has positioned it outside the work area. Recommended only when using outline move on the server, and the behavior may be sensitive to the local window manager. Default = Off
TWIFlashMethod=integer	Sets the method to handle a "flash window icon" command for a Seamless window. The value is formed by adding selection of the following numbers: 1- use the _NET_WM_STATE_DEMANDS_ATTENTION request to the Window Manager; 2- set the Urgency bit in the WM_HINTS window property; 4- rudely attempt to force the window to the top of the stack; 8- standard-violating last ditch method: use the overrideredirect attribute to force the window to the top of the stack. Default = 3
UnixPrintCommand=string	Command format used to print files. Default="lpr -P\"%s\""
UpdateTime=integer	Time in milliseconds between batched Local Video Buffer (LVB) updates. Default=100. Note that this value is used only if your server does not control updates.
UseAlternateAddress= boolean	Uses alternate address for firewall connections. Default=False
UseIconWindow=boolean	Uses a window rather than a pixmap for the icons of session windows. This is required for strict CM compliance, but note that many window managers do not show icons correctly if this is set to True. Default=False

Item	Description
UseLocalIM=boolean	Uses the local X input method to interpret keyboard input. This is supported only for European languages. Default=True
UseLocalUserAndPassword=boolean	Enables Kerberos authentication for the current connection (see also SSOnUserSetting and EnableSSOThruICAFile). Default = False
UsePrintcap=boolean	Allows Receiver for Linux to look for printers in /etc/printcap. Default=False
UserVisualClass=string	Allow user-specified X visual class. Value is PseudoColor, TrueColor, or Grayscale. No default.
UserVisualID= hexadecimal integer	Uses this X visual, if possible, for session windows. No default.
Version=integer	Fixed value=2, overrides value in appsrv.ini, ignored.
WindowManagerHeightAllowance=integer	Estimated height in pixels of window manager top and bottom frames. Default= 60
WindowManagerWidthAllowance=integer	Number of pixels to allow for Window Manager decoration. Default=20
WpadHost=string	Specifies the URL to query for the automatic proxy detection configuration file. Default= http://wpad/wpad.dat
XmlAddressResolutionType =[DNS-Port | IPv4-Port]	Controls the form used for the ICA host location. Using DNSPort (the default) may help a connection to pass through an addresstranslating firewall.
XmsReserve=integer	Default=0. Ignored
[Thinwire3.0]	Thinwire Virtual Driver configuration.

Item	Description
ApproximateColors= boolean	Default color approximation setting. Default=False
BypassWindowManager= boolean	Creates all seamless windows with the override-redirect attribute, so that they are ignored by the local window manager. Default=False
DesiredColor=integer	[1|2|4|8|15] (1 = 4 bit (16 colors), 2 = 8 bit (256 colors), 4 = 15 bit, 8 = 24 bit, 15 chooses the greatest depth that the hardware supports. If the option is not present in the ICA file, a value from [Thinwire3.0] is used, with a final built-in default value of 15.
DesiredHRES=integer	Default horizontal window dimension. Default=640
DesiredVRES=integer	Default vertical window dimension. Default=480
DisableXRender=boolean	Disables the use of the X11 Render extension required for color cursors. Default=False
ForceEmbeddedColormapSwitch =boolean	Forces sessions that are embedded in a web page to use a private colormap. Default=False
IgnoreXErrors=string	Comma separated list of entries such as m.n/ p meaning ignore error code p on X protocol request with major type m and minor type n. No default.
InstallColormap=boolean	Installs the colormap when an override- redirect seamless window gains focus. Default=True
LargeCacheSizeInK=integer	Large cache size in KB. Default=2048

Item	Description
LocalWMDecorations= boolean	Allows the X window manager to decorate seamless windows. Default=False
PersistentCacheMinBitmap=integer	Minimum size of bitmap for caching. Default=8192 bytes
PersistentCachePath=string	Location of persistent cache. Default=”Cache”
PersistentCacheSize=integer	Persistent cache size in KB. Default=0
RedrawTimer=integer	Time delay (milliseconds) before a new screen update is requested after copying multiple obscured screen regions. Default=1000
ScreenPercent=integer	Percentage of screen to use. Default=-1. Only values 1-100 are used.
Tw2CachePower=integer	Sets the size of the Thinwire 2 bitmap cache. Attempting to set this lower than 19 (512 KB cache) or higher than 25 is ineffective. The default value is calculated dynamically to be 1.25 times the screen image size at the preferred color depth.
TWIMoveResizeHideWindowType=integer	Controls the method used for hiding server-side windows when moving or resizing client side seamless windows that are controlled by a window manager. 1 hides server-side windows by minimizing them. 2 hides server-side windows by moving them to the bottom right corner, outside the screen. Default=1. Other values are invalid.
TWISetFocusBeforeRestore=boolean	Sets the focus on server-side windows before restoring them. This is a workaround for an issue with virtual Java applications. Default=False

Item	Description
TWIWSHideWindowType= integer	Controls the method used for hiding server-side windows when switching between client-side workspaces. 1 hides server-side windows by minimizing them. 2 hides server-side windows by moving them to the bottom right corner, outside the screen. Default=1. Other values are invalid.
TwTotalOssSizePowerOf2= integer	Sets the maximum size of off-screen drawing surfaces used by the X server. (See EnableOSS). Default=24, meaning 16 MB.
XFree86ShapeFixLevel= hexadecimal integer	Highest version number of XFree86 X servers that require a workaround when using the SHAPE extension. Default=40200001 (Version 4.2.1)
RelativeMouse=int	Sends relative (incremental) mouse position reports, if the server offers this feature. Valid values: 0 - Off; 1 - Under keyboard control; disabled when focus is lost, initially off; 2 – Automatically enabled when session has keyboard focus; 3 - Under keyboard control, initially on; 4 – Enabled when the mouse pointer is hidden, under keyboard control. Default is Off.

RelativeMouseMap=int	Bitmap-encoded policy for the relative mouse. The value is formed by adding the following values: 1 - keyboard control is enabled; 2 - enable when a session starts; 4 - enable when a session gains keyboard focus; 8 - disable when a session loses keyboard focus; 16 - enable when the server hides the mouse cursor; 32 - disable when the server shows the mouse cursor. Default is set by the RelativeMouse value.

RelativeMousePointerFeedback=boolean	Accepts all mouse-positioning commands from a server when using Relative Mouse. That keeps the pointer positions synchronized between client and server with XenDesktop 7.11 and later when the round-trip time is short. It may cause problems otherwise. Default is True
RelativemouseOnChar= string	Keystroke to enable Relative Mouse Default is "F12"
RelativeMouseOnShift= string	Modifier keys used with RelativemouseOnChar Default is "Ctrl"
RelativemouseOffChar= string	Keystroke to enable Relative Mouse. Default is "F12"
RelativeMouseOffShift= string	Modifier keys used with RelativemouseOffChar Default is "Ctrl+Shift"
SpeedScreenMMAEnablePlaybin2=boolean	Enables GStreamer playbin2 support, falling back to playbin if disabled. Default = True
SSONDetected=boolean	A boolean setting enabled when Single Sign-on is being used Default=False
UseLocalUserAndPassword=boolean	Enables Kerberos authentication for all connections. Default = False

EnableSSOThruICAFile= boolean	Allows UseLocalUserAndPassword to be trusted in ICA files, default=False. Note that this is always trusted in ICA files obtained by PNAgent.
SSLCertificateRevocationCheckPolicy=string	Accepted values: NoCheck, CheckWithNoNetworkAccess, FullAccessCheck, FullAccessCheckAndCRLRequired Default=CheckWithNoNetworkAccess
SSLCRLParentDir=string	An existing directory in which a "crls" sub-directory might be created to hold Certificate Revocation Lists. Default=CheckWithNoNetworkAccess. This option is only read from $HOME/.ICAClient/wfclient.ini. Environment variables can be expanded.
MinimumTLS=string	The lowest version of the TLS protocol that can be used: 1.0, 1.1 or 1.2. The '.' may be omitted. Default=1.0
MaximumTLS=string	The highest version of the TLS protocol that can be used: 1.0, 1.1 or 1.2. The '.' may be omitted. Default=1.2
ProxyPort=integer	Port number for proxy. If present, it overrides any port value in ProxyHost. Default=0
ProxyHost=string	Name of proxy server (The optional ":port" is only used if ProxyHost is not set) Default=""

module.ini

This file contains a comprehensive listing of parameters used to select and configure the communications stack modules. The section headings identify the target module by name. The stack element types are:

- Transport Drivers (TD) - manage the communications connection.
- Protocol Drivers (PD) - manage intermediate data stream filters.
- WinStation Drivers (WD) - manage the presentation data stream.
- Virtual Drivers (VD) - manage ICA protocol extensions.

These elements are all loaded depending on the user configuration and the required stack relationships. The transport driver is loaded first, then protocol drivers, the WinStation driver, and virtual drivers. Each of the supported types has a section that describes the module name and default parameters. Most parameters in this file are defaults. They can be overridden by equivalent entries in appsrv.ini, an ICA file or All_Regions.ini.

Parameter syntax

Boolean parameters use Yes, True, 1, or On to indicate TRUE. Any other values, including No, False, 0, or Off, are interpreted as FALSE.

For all parameters, spaces are significant and values are case-sensitive.

Those marked as ignored are not currently used by the client, but can be reserved for future use, are redundant, or are used by other clients; for example, Win32 or Macintosh. In the last case, the parameter is read by the client but the result discarded.

Default values are embedded into the client program itself. Fixed values are set by the unmodified .ini configuration files.

Note: The values in module.ini are not affected by those in All_Regions.ini in the same way that values from other configuration files are. This is because the same permissions are required to change both files.

In the following table, the parameters are listed alphabetically within each section of the file.

Item	Description
[WFClient]	This section is used by the engine. It contains default session oriented parameters.
AllowWriteOpenToROF= boolean	Emulates Microsoft Windows behavior by allowing files on a readonly disk to be opened for writing. Default=True
AttemptCrossPlatformSessionReuse =boolean	Allows a seamless published application launched from one system to run in an ICA session originally started from a different system. The two systems must use the same X display. Default=False
AllowMultiStream=boolean	Uses multi-stream ICA. Default=FALSE
ContentRedirectionScheme=scheme1, scheme2	Defines a list of schemes for server to client content redirection. Server-client content redirection allows administrators to specify that URLs in a published application are opened using a local application. Each scheme is defined by its own section.
DeferredUpdateMode= boolean	Enables an efficient algorithm for updating seamless windows. Default=False
DesktopApplianceMode= boolean	Enables unconditional attaching of USB devices. When Off devices are only candidates for remote control when the session has the keyboard focus. Default=Off
EnableSessionSharingClient= boolean	When launching a seamless published application, search for an existing ICA session that can run it. Default=False

Item	Description
EnableSessionSharingHost=boolean	Allow independently launched seamless published applications to run in the same ICA session. Default=False
HostLookupTimeout= integer	Time-out (in seconds) for calls to gethostbyname(). Used only on Solaris. Default=5
KeyPassthroughEscapeChar=string	Key for the keyboard command to disable the transparent keyboard mode. Default=F2
KeyPassthroughEscapeShift=string	Keyboard shift for the keyboard command to disable the transparent keyboard mode. Default=Ctrl
PrinterQueryRefreshTime=integer	Maximum time in seconds to cache list of available printer queues. Default=60
ReplaceOverlineWithTilde=boolean	Treat overline key as tilde. Used only when Japanese keyboard layout is selected. Default=False
ServerToClientPowerOf2=integer	Controls the buffer size for the compression method used in MetaFrame 1.0. Default=15
TransparentKeyPassthrough=string	Enables keyboard shortcut sequences defined by the local Windows manager in the session. Keywords are: Local, Remote, FullScreenOnly. Default=FullScreenOnly

Item	Description
UseSystemCharacterConversion=boolean	Uses CHARICONV.DLL in preference to CHARCONV.DLL for character encoding conversions. Default=True
Version=2	Fixed value; overrides value in appsrv.ini. Ignored.
[ICA 3.0]	Client module configuration
AllowShared16Colors= boolean	Enables colormap entry sharing for 16- color.
BufferLength2=integer	High performance buffer length. Default=5000
ClientAudio=boolean	Enables client audio mapping. Default=On
ClientComm=boolean	Enables serial port mapping. Default=On
ClientDrive=boolean	Enables client drive mapping. Default=On
ClientPrinterQueue= boolean	Enables printer queue mapping. Default=On
Clipboard=boolean	Enables the clipboard. Default=On
ICACTL=boolean	Enables the ICA control channel. Default=On
MaxRequestSize2=integer	High performance buffer request size. Default=4116
MaxWindowSize2=integer	High performance buffer window. Default=62500
MultiMedia=boolean	Enables HDX MediaStream Multimedia Acceleration.

Item	Description
	Default sets to On during installation if GStreamer is installed.
SmartCard=boolean	Enables smart card support. Default=On
ThinWire3.0=boolean	Enables Thinwire. Default=On
TWI=boolean	Enables seamless VD. Default=On
UserExperience=boolean	Enables performance information. Default=On
VirtualDriver=string list	Comma-separated list of VDs to load.
WindowSize2=integer	High performance window size. Default=4102 bytes
ZL_FONT=boolean	Enables latency reduction font VD. Default=On
ZLC=boolean	Enables latency reduction VD. Default=On
[TransportDriver]	This section lists all of the sections in module.ini that define transport settings.
TCP/IP=	Fixed null value.
[TCP/IP]	Transport driver configuration.
BrowserRetry=integer	Number of attempts to locate data collector, which acts as master browser. Default=3
BrowserTimeout=integer	Number of milliseconds to wait before retry. Default=1000
Encrypt=boolean	Turns on basic encryption. Default=Off. Fixed value=On

Item	Description
ICAPortNumber=integer	Server port to use for ICA connection. Default=1494 from the Internet Assigned Numbers Authority (IANA)
ProtocolSupport= string list	Protocol drivers to load, fixed value=Rframe, Encrypt.
OutBufCountClient= integer	Number of client output buffers to allocate. Default=6
OutBufCountClient2= integer	High performance client buffer count. Default=42
OutBufCountHost=integer	Number of server output buffers to allocate. Default=8
OutBufCountHost2= integer	High performance server buffer count. Default=42
OutBufLength=integer	Size of output buffer. Default=512. Fixed value=530 bytes.
OutBufLength2=integer	High performance buffer length. Default=530 bytes
RFrame=boolean	Turn on reliable framing. Default=Off. Fixed value=On.
[XenDesktop]	Parameters specifically for connection to XenDesktop, particularly for full-screen sessions.
[RFrame]	Reliable framing protocol driver configuration, no parameters.

Item	Description
[EncryptionLevelSession]	This section specifies the encryption protocol for each level of encryption. EncryptionLevelSession in appsrv.ini defines the level used by each connection. Each encryption protocol is defined by corresponding drivers specified in module.ini.
Basic=Encrypt	Fixed value.
RC5 (128 bit - Login	Fixed value.
Only)=EncRC5-0 RC5 (40 bit)=EncRC5-40	Fixed value.
RC5 (56 bit)=EncRC5-56	Fixed value.
RC5 (128 bit)=EncRC5-128	Fixed value.
[Encrypt]	Encryption protocol driver configuration.
DriverName=PDCRYPT1.DLL	Fixed value.
[EncRC5-0]	Encryption protocol configuration.
DriverName=PDCRYPT2.DLL	Fixed value.
[EncRC5-40]	Encryption protocol configuration.
DriverName=PDCRYPT2.DLL	Fixed value.
[EncRC5-56]	Encryption protocol configuration.
DriverName=PDCRYPT2.DLL	Fixed value.
[EncRC5-128]	Encryption protocol configuration.
DriverName=PDCRYPT2.DLL	Fixed value.
[Reliable]	Reliable transport protocol driver. Ignored.
[Compress]	Compression protocol driver configuration. Ignored.
[Framing]	Framing protocol driver configuration. Ignored.
[Modem]	Async protocol driver configuration. Ignored.

Item	Description
[Thinwire3.0]	Thinwire virtual driver configuration, overridden by parameters in wfclient.ini.
[Clipboard]	Clipboard virtual driver configuration.
ClipboardAllowed= boolean	Enables the clipboard channel. Default=True
[ClientDrive]	Client drive mapping virtual driver configuration.
AllowSymlinkTraversalOutsideMap=boolean	Allows the following of symlinks outside the mapped root of the client drive mapping host. Default=False
CacheDisable=boolean	Disable cache. Default=False
CacheTimeout=integer	Cache time-out (seconds). Default=600
CacheTimeoutHigh= integer	Cache time-out for times greater than 18 hours. Default=0
CacheTransferSize=integer	Amount of data to transfer per operation. Default=0 (ICA buffer size)
CacheWriteAllocateDisable=boolean	Disable cache for write operations. Default=False
CDMReadOnly=boolean	Allow only read-only access to client filesystems. Default=False
DesktopFolder=path	Sets the desktop directory for the Special Folder Redirection feature. No default.
DocumentsFolder=path	Sets the documents directory for the Special Folder Redirection feature.

Item	Description
	No default.
MaxRequestSize=integer	For flow management. Fixed value=1046 bytes.
MaxWindowSize=integer	Window size for flow management. Fixed value=6276 bytes.
SFRAllowed=boolean	Enables the Special Folder Redirection option. Default=False
TranslateCDMFileNames= boolean	The file names passed through the CDM channel are translated into the character encoding of the receiving system, in both directions. Default=True
[ClientPrinterQueue]	Client printer mapping virtual driver configuration.
MaxWindowSize=integer	Maximum window size for flow management. Fixed value=1024 bytes.
MFPrintCommand=string	Command to use for Universal Printer Driver (UPD) printing. Default=lpr -P
UnicodeEnabled=boolean	Enable UNICODE printer names. Default=True
UnixPrintCommand=string	Command to use for non-UPD printing. Default=lpr -l -P
WindowSize=integer	Write window size for flow management. Fixed value=512 bytes.

Item	Description
[ClientAudio]	Client audio mapping virtual driver configuration.
AckDelayThresh=integer	Max time (in milliseconds) between sending "resource free" message if any resources free. Default=350
AudioBufferSizeMilliseconds=integer	Audio buffer size, in ms. Default=200 ms
AudioDevice=string	Audio device name. Linux default=default, SPARC default=/dev/audio. No default for other platforms.
AudioLatencyControlEnabled=boolean	Enables latency control. Default=False
AudioMaxLatency=integer	Sets the maximum latency (in ms) before trying to discard audio data. Default=300 ms
AudioLatencyCorrectionInterval=integer	Defines how often to correct the latency (in ms). Default=300 ms
AudioTempLatencyBoost= integer	Sets the higher latency band (in ms) above the lower PlaybackDelayThresh band. Default=300 ms
CommandAckThresh= integer	Number of free client command buffers causing a "resource free" message to be sent to the server. Default=10
DataAckThresh=integer	Number of free client data buffers causing a "resource free" message to be sent to the server. Default=10
DriverName=VDCAM.DLL	Fixed value.

MaxDataBufferSize= integer	Maximum size of each data buffer. Default=2048 bytes
NumCommandBuffers= integer	Number of client buffers to use for audio commands. Default=64
PlaybackDelayThresh= integer	Delay (in ms) between being asked to start audio playback and actually starting audio playback in order to build up a backlog of sound. Default=150
[AudioConverter]	Audio format converter configuration.
DriverName=ClientAudCvt	Fixed value.
[AudioConverterList]	Audio format converter configuration.
Converter0= ADPCMConverter	Fixed value.
NumConverters=1	Fixed value.
[ADPCMConverter]	Audio format converter configuration.
DriverName= ADPCM_Module	Fixed value.
NumDataBuffers=integer	Number of client audio data buffers. Default=32

Item	Description
[ClientComm]	Client COM port mapping virtual driver configuration.
CommPollSize=string	Use asynchronous polling. Default=Off
CommPollWaitInc=integer	See CommPollWaitIncTime. Default=1
CommPollWaitIncTime= integer	Time (in ms) polling will poll before slowing by the number of milliseconds defined in CommPollWaitInc. Default=20
CommPollWaitMax= integer	Slowest COM port polling rate. Default=500 ms
CommPollWaitMin= integer	Time (in milliseconds) to delay after receiving data. Default=1
CommWakeOnInput= boolean	Uses the client's event loop to wake up immediately when serial port data is available to be read. Used only when CommPollSize=True. Default=True
WindowSize=integer	Window for flow management. Default=1024 bytes
[TWI]	Seamless parameters.
DriverName=VDTWIN.DLL	Fixed value.
[ZLC]	Zero latency parameters.
DriverName=VDZLC.DLL	Fixed value.
[ZL_FONT]	Zero latency font parameter.
DriverName=VDFON30W.DLL	Fixed value.
[ICACTL]	ICA control channel parameters.
[KeyboardLayout]	List of possible keyboards supported.

Item	Description
keyboardname=locale	Keyboard name; for example, British, German, US, and NT locale identifier. Fixed value.
[KeyboardType]	List of supported keyboard types.
keyboardtype=identifier	One keyboard type entry for each supported keyboard type.
[SmartCard]	Smart card virtual driver configuration.
DriverName=VSCARD.DLL	Fixed value.
PCSCCodePage=integer	Code page that must be used for communication with smart cards and readers. Default=0. A value of zero means use the default code page for the language used by the client.
PCSCLibraryName=string	File name of PC/SC shared library for smart card access. Default=libpscsclite.so
SmartCardAllowed=boolean	Allows access to smart card devices on the client machine. Default=True
[Hotkey Shift States]	Fixed values for keyboard shortcut masking.
(none)=0	Fixed value.
Alt=2560	Fixed value.
Ctrl=1280	Fixed value.
Shift=3	Fixed value.
Alt+Ctrl=3840	Fixed value.
Alt+Shift=2563	Fixed value.
Ctrl+Shift=1283	Fixed value.
Alt+Ctrl+Shift=3843	Fixed value.

Item	Description
[Hotkey Keys]	Fixed scan code values for keyboard shortcut keys.
(none)=0	Fixed value.
F1...F12=112...123	Fixed values.
Minus=12	Fixed value.
Plus=13	Fixed value.
Tab=16	Fixed value.
[File Type Associations]	This section lists the names of applications together with the file name extensions of their data files. It is used to construct the File Associations properties menu on clients with CDE support, and when the client is configured to use static file type associations.
[Scheme]	Defines the type of scheme for this section, for example [Browser] or [Player]. For more information, see the ContentRedirectionScheme parameter in module.ini.
AcceptURLType=type1, type2	The types of URL accepted by a given scheme, for example http, https.
Command=string	The command that runs the executable used for server to client redirection. No default.
Path=string	Search path for the executable used for server to client redirection. No default.
PercentS=integer	Number of "%s" occurrences in the command used for server to client redirection.
RejectURLType=type1, type2	The types of URL rejected by a given scheme.

Item	Description
[HeimdalKerberos]	This section contains information about the Heimdal implementation of Kerberos.
LIBKCP=string	The library to use for changing expired passwords using Heimdal Kerberos. Default=libkcph.so
[MITKerberos]	This section contains information about the MIT implementation of Kerberos.
LIBKCP=string	The library to use for changing an expired password using MIT Kerberos. Default=libkcpm.so
PrinterFlowControl=boolean	Enables flow control in the printing channel, usually only used with UnixPrintCommand when the command is blocked. Default = Off

reg.ini

reg.ini contains Citrix XenApp configuration settings. It is written by pnabrowse so it does not exist immediately after a typical installation. reg.ini provides initial values to pnabrowse that you can override through command-line arguments.

Important: reg.ini works with pnabrowse only. It has no effect on the deployments involving storebrowse or selfservice.

You may prefer to have a password in reg.ini, because this file has restricted read permission, rather than have it appearing on the command line. To do this, change

`lastSavePassword=REG_DWORD:0` to `lastSavePassword=REG_DWORD:1`, and append the password using basic encryption to `lastPassword=REG_SZ:`.

This allows pnabrowse to run without the -P option. To do this, you must also omit the - U and D options. pnabrowse continues to be governed by config.xml and therefore may reset these entries if the Web Interface does not have the authentication method properties set to allow the user to save the password.

Other configuration files

The $ICAROOT/config/ directory also contains several other .ini files, including All_Regions.ini, canonicalization.ini, regions.ini, Trusted_Region.ini, Unknown_Region.ini, and Untrusted_Region.ini. These files offer administrators an alternative way to configure the client settings described in previous sections. The files also allow administrators to configure client selective trust, a security feature that restricts the characteristics of an ICA session depending on the server to which the client connects.

For more information, see the configuration files in the $ICAROOT/config/ directory.

Library files

You can disable specific functionality from Citrix Receiver for Linux by removing the appropriate shared library file (.dll or .so file) from a client installation. The following table describes these libraries.

File	Location	Description
ADPCM.DLL	/opt/Citrix/ICAClient	Provides support for low quality audio if Speex is not available.
AUDALSA.DLL	/opt/Citrix/ICAClient	Provides ALSA backend for the Client Audio Mapping Virtual Channel.
AUDOSS.DLL	/opt/Citrix/ICAClient	Provides OSS backend for the Client Audio Mapping Virtual Channel.
CHARICONV.DLL	/opt/Citrix/ICAClient	Provides character conversion functionality using the facilities of the standard system libraries. An alternative version, CHARCONV.DLL, is available for embedded system environments that lack the necessary library support. Note that Citrix recommends you do not remove this library without replacing it with the alternative.
ctxusb	/opt/Citrix/ICAClient	Helper utility for Generic USB redirection.
ctxh264.so	/opt/Citrix/ICAClient	Decoder for H.264 images.
ctxh264_fb.so	/opt/Citrix/ICAClient	Fallback decoder for H.264 images.
ctxjpeg.so	/opt/Citrix/ICAClient	Decoder for JPEG images.
ctxjpeg_fb.so	/opt/Citrix/ICAClient	Fallback decoder for JPEG images when Version 6 of libjpeg is present. This decoder also supports libjpegturbo.

File	Location	Description
ctxjpeg_fb_8.so	/opt/Citrix/ICAClient	Fallback decoder for JPEG images when Version 8 of libjpeg is present.
ctxusbd	/opt/Citrix/ICAClient	Daemon process for Generic USB redirection.
ctx_usb_isactive	/opt/Citrix/ICAClient	Helper utility for Generic USB redirection.
FlashContainer.bin	/opt/Citrix/ICAClient	Provides support for Flash redirection.
gst_play	/opt/Citrix/ICAClient/uti l	A GStreamer utility required for HDX Windows Multimedia Redirection.
gst_read	/opt/Citrix/ICAClient/uti l	HDX RealTime Webcam Video Compression requires GStreamer 0.10.25 (or a later 0.10.x version), including the distribution's "plugins-good" package; or GStreamer 1.0 (or a later 1.x version), including the distribution's "plugins-base," "plugins-good," "plugins-bad," "plugins-ugly," and "gstreamer-libav" packages. If GStreamer is not included in your Linux distribution, you can download it from http://gstreamer.freedesktop.org.
libAMSDK.so	/opt/Citrix/ICAClient/lib	SDK used for communications between Receiver and Authentication Manager. This is required for connections using storebrowse or selfservice, but not pnabrowse.
libcrypto.so	This is a system library.	Cryptographic functions used to authenticate to NTLM proxies. Can be downloaded from http:// www.openssl.org/.

File	Location	Description
libproxy.so	/opt/Citrix/ICAClient	Contains functionality for using proxies and functionality for Citrix SSL Relay, which provides endto-end Secure Sockets Layer/ Transport Layer Security (SSL/TLS) encryption between specific servers and clients.
libcoreavc_sdk.so	/opt/Citrix/ICAClient/lib	The library required by ctxh264_fb.so.
libgstflatstm.so	/opt/Citrix/ICAClient/util	The GStreamer plug-in required for HDX MultiStream Windows Media Redirection.
libkcph.so	/opt/Citrix/ICAClient/lib	Provides password change support for pnabrowse using Heimdal Kerberos.
libkcpm.so	/opt/Citrix/ICAClient/lib	Provides password change support for pnabrowse using MIT Kerberos.
new_store	/opt/Citrix/ICAClient/util	A helper script used by npica.so to handle CR files.
npica.so	/opt/Citrix/ICAClient	Plug-in for web browsers that are compatible with Netscape software.
PDCRYPT1.DLL	/opt/Citrix/ICAClient	Contains basic Citrix encryption functionality. Citrix recommends that you do not remove this library.

File	Location	Description
PDCRYPT2.DLL	/opt/Citrix/ICAClient	Contains functionality for Citrix Secure ICA, which encrypts information sent between servers and clients.
SPEEX.DLL	/opt/Citrix/ICAClient	Provides preferred support for low and medium quality audio.
UIDialogLib.so	/opt/Citrix/ICAClient/lib	Allows creation of customized dialogs including for non-X Windows systems. See UI Dialog library earlier in this document.
VDFLASH2.DLL	/opt/Citrix/ICAClient	Provides support for Flash redirection.
VDCAM.DLL	/opt/Citrix/ICAClient	Provides support for bi-directional audio using Client Audio Mapping.
VDGUSB.DLL	/opt/Citrix/ICAClient	Provides support for Generic USB redirection.
VDGSTCAM.DLL	/opt/Citrix/ICAClient	Provides an experimental GStreamer based implementation of Client Audio Mapping.
VDMM.DLL	/opt/Citrix/ICAClient	Contains functionality for HDX MultiStream Windows Media Redirection.
VDSCARD.DLL	/opt/Citrix/ICAClient	Contains functionality for smart card support. The support is based around the PC/SC standard, to which any deployment of Receiver for Linux involving smart cards must adhere.
VORBIS.DLL	/opt/Citrix/ICAClient	Provides preferred support for high quality audio.