FreeRDP User Manual

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Chapter 1

Introduction

1.1 References

FreeRDP Developer Manual[1]

FreeRDP Configuration Manual[2]

FreeRDP Testing Manual[3]

1.2 Help

FreeRDP - A Free Remote Desktop Protocol Implementation

See www.freerdp.com for more information

```
Usage: xfreerdp [file] [options] [/v:<server>[:port]]
```

Syntax:

```
/flag (enables flag)
/option:<value> (specifies option with value)
+toggle -toggle (enables or disables toggle, where '/' is a synonym of '+')
```

[1] https://github.com/awakecoding/FreeRDP-Manuals/blob/master/Configuration/FreeRDP-Developer-Manual.pdf?raw=true

[2] https://github.com/awakecoding/FreeRDP-Manuals/blob/master/Configuration/FreeRDP-Configuration-Manual.pdf?raw=true

[3] https://github.com/awakecoding/FreeRDP-Manuals/blob/master/Testing/FreeRDP-Testing-Manual.pdf?raw=true

```
/v:<server>[:port]      Server hostname
/port:<number>          Server port
/w:<width>              Width
/h:<height>             Height
/size:<width>x<height>  Screen size
/f                      Fullscreen mode
/bpp:<depth>            Session bpp (color depth)
/kbd:0x<layout id> or <layout name> Keyboard layout
/kbd-list               List keyboard layouts
/kbd-type:<type id>     Keyboard type
/kbd-subtype:<subtype id>   Keyboard subtype
/kbd-fn-key:<function key count>    Keyboard function key count
/admin                  Admin (or console) session
/multimon               Multi-monitor
/workarea               Work area
/t:<title>              Window title
+decorations (default:off)  Window decorations
/a                      Addin
/vc                     Static virtual channel
/dvc                    Dynamic virtual channel
/u:[<domain>\\]<user> or <user>[@<domain>]  Username
/p:<password>           Password
/d:<domain>             Domain
/g:<gateway>[:port]     Gateway Hostname
/gu:[<domain>\\]<user> or <user>[@<domain>] Gateway username
/gp:<password>          Gateway password
/gd:<domain>            Gateway domain
/app:||<alias> or <executable path> Remote application program
/app-name:<app name>    Remote application name for user interface
/app-icon:<icon path>   Remote application icon for user interface
/app-cmd:<parameters>   Remote application command-line parameters
/app-file:<file name>   File to open with remote application
/app-guid:<app guid>    Remote application GUID
+compression (default:off)  Compression
/shell                  Alternate shell
/shell-dir              Shell working directory
/audio-mode             Audio output mode
/mic                    Audio input (microphone)
/network                Network connection type
+clipboard (default:off)    Redirect clipboard
+fonts (default:off)    Smooth fonts (cleartype)
+aero (default:off)     Desktop composition
+window-drag (default:off)  Full window drag
+menu-anims (default:off)   Menu animations
-themes (default:on)    Themes
-wallpaper (default:on) Wallpaper
```

```
/gdi:<sw|hw>            GDI rendering
/rfx                    RemoteFX
/rfx-mode:<image|video> RemoteFX mode
/frame-ack:<number>     Frame acknowledgement
/nsc                    NSCodec
/jpeg                   JPEG codec
/jpeg-quality:<percentage>  JPEG quality
-nego (default:on)      protocol security negotiation
/sec:<rdp|tls|nla|ext>  force specific protocol security
-sec-rdp (default:on)   rdp protocol security
-sec-tls (default:on)   tls protocol security
-sec-nla (default:on)   nla protocol security
+sec-ext (default:off)  nla extended protocol security
/cert-name:<name>       certificate name
/cert-ignore            ignore certificate
/pcb:<blob>             Preconnection Blob
/pcid:<id>              Preconnection Id
/vmconnect:<vmid>       Hyper-V console (use port 2179, disable negotiation)
-authentication (default:on)    authentication (hack!)
-encryption (default:on)    encryption (hack!)
-grab-keyboard (default:on) grab keyboard
-mouse-motion (default:on)  mouse-motion
/parent-window:<window id>  Parent window id
-bitmap-cache (default:on)  bitmap cache
-offscreen-cache (default:on)   offscreen bitmap cache
-glyph-cache (default:on)   glyph cache
/codec-cache:<rfx|nsc|jpeg> bitmap codec cache
-fast-path (default:on) fast-path input/output
+async-input (default:off)  asynchronous input
+async-update (default:off) asynchronous update
/version                print version
/help                   print help
```

Examples:

```
xfreerdp connection.rdp /p:Pwd123! /f
xfreerdp /u:CONTOSO\\JohnDoe /p:Pwd123! /v:rdp.contoso.com
xfreerdp /u:JohnDoe /p:Pwd123! /w:1366 /h:768 /v:192.168.1.100:4489
xfreerdp /u:JohnDoe /p:Pwd123! /vmconnect:C824F53E-95D2-46C6-9A18-23A5BB403532 /v:192.168.1.

Clipboard Redirection: +clipboard

Drive Redirection: /a:drive,home,/home
Smartcard Redirection: /a:smartcard,<device>
Printer Redirection: /a:printer,<device>,<driver>
```

```
Serial Port Redirection: /a:serial,<device>
Parallel Port Redirection: /a:parallel,<device>
Printer Redirection: /a:printer,<device>,<driver>

Audio Input Redirection: /dvc:audin,sys:alsa
Audio Output Redirection: /vc:rdpsnd,sys:alsa

Multimedia Redirection: /dvc:tsmf,sys:alsa
USB Device Redirection: /dvc:urbdrc,id,dev:054c:0268
```

1.3 Command-Line Interface

As of FreeRDP 1.1, the command-line interface supports two syntaxes and a completely redesigned set of command-line options. Since this is a major change, backwards compatibility is still provided for the now deprecated old command-line interface.

FreeRDP uses the same command-line syntax and options as mstsc as a basis, allowing a consistent interface between RDP implementations. The mstsc help can be obtained by launching mstsc with the /? option:

On top of this basic set of options, FreeRDP provides a large selection of extended options to fit all needs possible. The result is a compatible and consistent RDP implementation which is much more flexible and extensible than the original. This is why FreeRDP is used on Windows, where mstsc is already available for free.

1.4 Syntax

FreeRDP supports two command-line syntaxes: the default windows-style syntax and the alternative posix-style syntax. This is made possible by a generic and highly reusable command-line parsing engine that is part of WinPR. On average, the windows-style syntax provides shorter command lines than the posix-style syntax. However, many users tend to prefer the posix-style syntax and may strongly dislike the windows-style syntax, which is why *both* syntaxes are supported. For the purpose of documenting FreeRDP, the windows-style syntax is preferred over the posix-style syntax.

There are three types of options possible:

```
/flag (enables flag)
/option:<value> (specifies option with value)
+toggle -toggle (enables or disables toggle, where '/' is a synonym of '+')
```

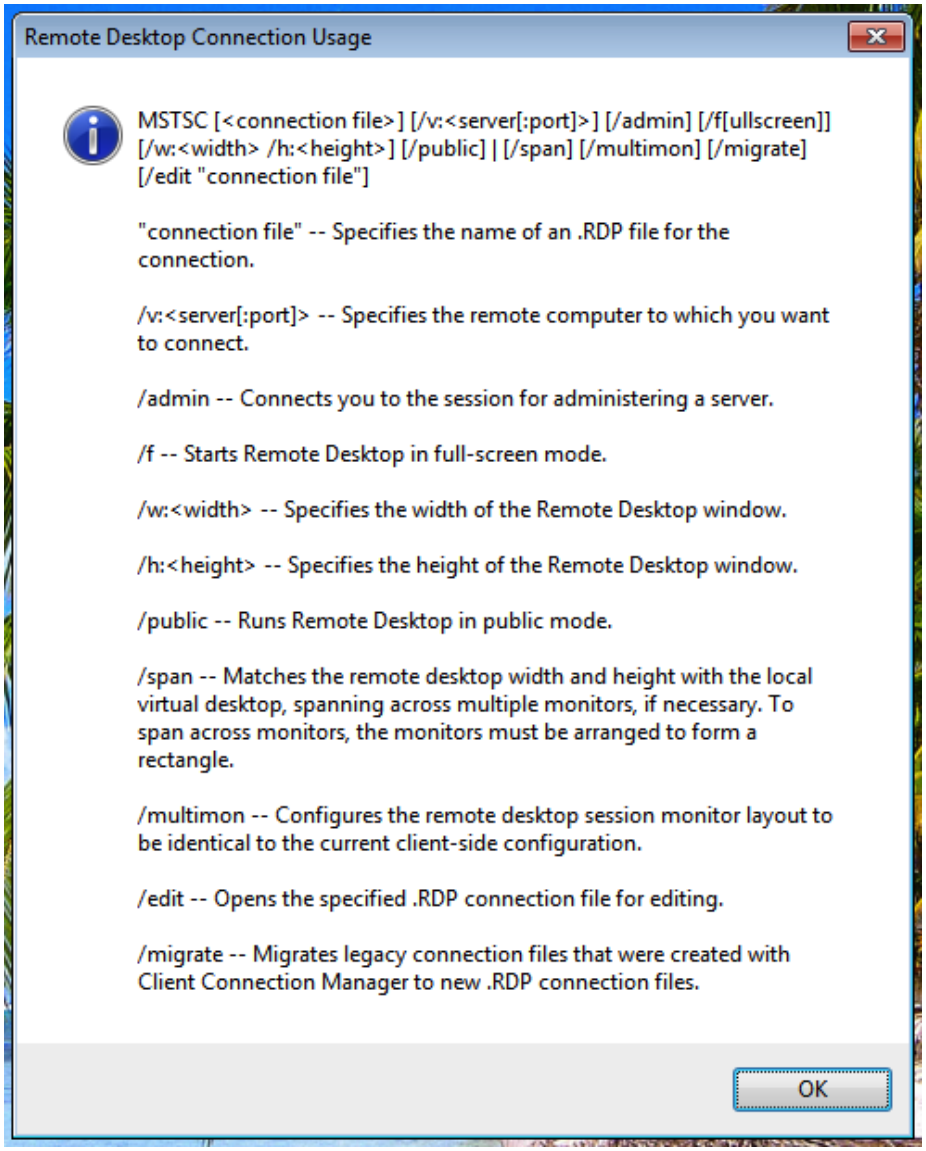


Figure 1.1: mstsc help

If we observe the following command line:

```
xfreerdp /f /bpp:32 /v:rdp.contoso.com +wallpaper -themes
```

/f is a flag which enables the fullscreen mode. /bpp:32 is the "bpp" option that specifies the color depth with a value of 32. /v:rdp.contoso.com is the "v" option for the target server with rdp.contoso.com as its value. +wallpaper is an option that enables the wallpaper toggle option. -themes is an option that disables the themes toggle option.

Enabling a toggle option can be done with both '+' and '/' for the sake of simplicity. This means that enabling the wallpaper can be done with "+wallpaper" or with "/wallpaper".

1.4.1 Alternate Syntax

The alternate syntax produces longer command lines on average, but may be more accessible to users who prefer a posix-style syntax. If this is your case, here is how the alternative syntax works:

```
--flag (enables flag)
--option:<value> (specifies option with value)
--enable-toggle --disable-toggle (enables or disables toggle)
```

Performing syntaxic substitutions on our example, the command line becomes:

```
xfreerdp -f --bpp 32 -v rdp.contoso.com --enable-wallpaper --disable-themes
```

The same command in the windows-style syntax uses 57 characters, while the posix-style syntax uses 75 characters. In this specific case, the windows-style syntax is approximately 25% shorter than the posix-style syntax.

1.4.2 Deprecated Options

If the deprecated command-line options are used, FreeRDP warns the user about the deprecation of these options and provides mapping from the old options to the new ones, simplifying migration:

```
xfreerdp -f -a 32 --enable-wallpaper --disable-themes rdp.contoso.com
WARNING: Using deprecated command-line interface!
-a 32 -> /bpp:32
-f -> /f
rdp.contoso.com -> /v:rdp.contoso.com
```

1.4.3 Common Pitfalls

Supporting two syntaxes along with automated detection of the deprecated options comes with certain pitfalls for the user. There are currently three possible cases for parsing the command line:

```
* New options, windows-style syntax
* New options, posix-style syntax
* Old options, posix-style syntax
```

The way parsing works is that FreeRDP attempts parsing the command line according to the three possible cases and counts the number of accepted options. The command line is then parsed again for real based on these results. Since the old options had restrictions on the positions of certain arguments like the target server that are not present, this difference is also used to facilitate proper detection of the syntax and options in use.

Since the command line is parsed according to only one syntax and option set at a time, one *cannot* mix syntaxes and options that belong to different cases. The following example shows incorrect mixing of the command-line syntaxes that will lead to incorrect parsing of some of the options:

```
xfreerdp /f --bpp 32 -v rdp.contoso.com +wallpaper -themes
```

A valid command line for the above example needs to be either one of the following:

```
xfreerdp /f /bpp:32 /v:rdp.contoso.com +wallpaper -themes
xfreerdp -f --bpp 32 -v rdp.contoso.com --enable-wallpaper --disable-themes
```

Another common mistake made by users migrating from the old options is to put the target server name as the last argument without an option name:

```
xfreerdp -f --bpp 32 --enable-wallpaper --disable-themes rdp.contoso.com
WARNING: Using deprecated command-line interface!
-f -> /f
rdp.contoso.com -> /v:rdp.contoso.com
```

The correct command would be:

```
xfreerdp -f --bpp 32 --enable-wallpaper --disable-themes -v rdp.contoso.com
```

With the new set of options, never forget to use “v” for the target server, otherwise your command line will be interpreted as using the deprecated interface.

1.4.4 Rationale

One may ask: why, oh why? Well, here's why:

The first easy answer is out-of-the-box compatibility with mstsc, but there's a lot more to it than just that.

One of the most annoying aspect of the posix-style syntax is that it uses the minus '-' sign to *enable* an option, preventing unambiguous usage of the same symbol to mean *disable*. Certain programs using a posix-style syntax do accept +/-, but you need to know which options can be toggled in such a manner beforehand. This can easily lead to confusion because one cannot know just by looking at the syntax if the minus '-' sign is used to enable or disable an option, as knowledge of the option type is required to make the distinction.

In order to unambiguously make use of the minus +/- as a way to toggle options, we need to use a symbol other than minus '-' to enable options. Since the windows-style syntax uses the slash '/' symbol instead, this problem is solved.

The toggle options are very frequently used in FreeRDP, which is why it makes sense to use a syntax that keeps them short and readable. When you type options like –disable-themes multiple times a day and your command lines contain *many* such options, it is hard to argue against using the +/- notation.

One other strong aspect of the windows-style syntax is the usage of the colon as an option/value separator instead of a space. While this may require some adaptation for some users, it reduces the potential for ambiguity in the case of values that are lists. Most of the time, windows-style syntaxes encode lists as comma-separated values:

```
/list:item1,item2,item3
```

With regular posix-style syntax, the same list would be encoded this way:

```
--list item1 item2 item3 --
```

In the case of FreeRDP, lists are encoded in the same way regardless of the syntax in use, even if this diverges slightly from standard practice:

```
--list item1,item2,item3
```

The comma-separated list is used because it provides unambiguous encoding of a list: otherwise, there is no way of knowing where the list ends, which is which the regular posix-style syntax makes use of "–" as the end-of-list delimiter. The old set of FreeRDP options historically made use of this list encoding, and it definitely won't be missed by many users.

If even after reading this you can't get used to the windows-style syntax, simply make use of the posix-style syntax.

Chapter 2

Authentication

Sample Values:

- User: JohnDoe
- Domain: CONTOSO
- Password: Password123!
- Server: rdp.contoso.com

There simplest, unambiguous way of passing credentials at the command-line is with /u, /d and /p. The domain name is only needed if you connect using domain credentials:

```
xfreerdp /u:JohnDoe /d:CONTOSO /p:Password123! /v:rdp.contoso.com
```

The domain name can also be passed in the username using the same notation accepted by mstsc:

```
xfreerdp /u:CONTOSO\JohnDoe /p:Password123! /v:rdp.contoso.com
```

While the above notation is shorter, it has an unpractical side effect: the backslash is often, but not always, interpreted as an escape character. To avoid the problem, make sure the shell does not interpret the backslash as an escape character:

```
xfreerdp /u:CONTOSO\\JohnDoe /p:Password123! /v:rdp.contoso.com
xfreerdp "/u:CONTOSO\JohnDoe" /p:Password123! /v:rdp.contoso.com
```

From experience, most Linux shells will require such handling of the backslash character. However, there are certain cases like the Eclipse launcher which do not require it.

Alternatively, the User Principal Name (UPN) notation can be used:

```
xfreerdp /u:JohnDoe@CONTOSO /p:Password123! /v:rdp.contoso.com
```

This notation does not have the drawbacks of the backslash character, but introduces a potential conflict with usernames containing the '@' symbol and no domain name. This is frequently the case with the new Windows 8 Microsoft Accounts (a.k.a. Windows Live Accounts) which correspond to an email address. To work work around the ambiguity, precede the user name "john.doe@live.com" with a backslash:

```
xfreerdp /u:\john.doe@live.com /p:Password123! /v:rdp.contoso.com
```

Be careful to properly handle the backslash character as previously instructed.

Passwords entered as command-line arguments could potentially be seen by other users on the same system, so they are automatically hidden:

```
awake@workstation:~$ ps aux | grep freerdp
awake           22506   0.0  0.1  2502620  10236 s002  S+   11:10pm   0:01.00 xfreerdp /u:Jo
```

2.1 Credentials Prompt

If you omit entering credentials at the command-line, FreeRDP may prompt you for credentials depending on the negotiated protocol security level.

2.1.1 Protocol Security

RDP protocol security is confusing for many users because it strongly affects the way credentials can be prompted. There are three main security levels that can be negotiated:

- RDP Security (old encryption, old authentication)
- TLS Security (TLS encryption, old authentication)
- NLA Security (TLS encryption, NLA authentication)

Old Authentication

The old RDP authentication mechanism is very simple: the server presents the client with the Winlogon GUI, and the user can either automatically or manually enter the credentials. If you enter credentials prior to connecting to a server with the old authentication, they will be automatically on connection, saving you the trouble of typing them manually.

Old RDP authentication may be practical in the sense that you can get a remote Winlogon GUI without being authenticated on the server. This is however a design flaw which makes the RDP server vulnerable to a DDOS attack: since significant resources need to be allocated for the Winlogon GUI without being authenticated, a distributed denial of service attack could be performed by simply launching multiple unauthenticated connections. This is exactly why it is no longer possible to obtain such a GUI prior to authentication with newer security levels.

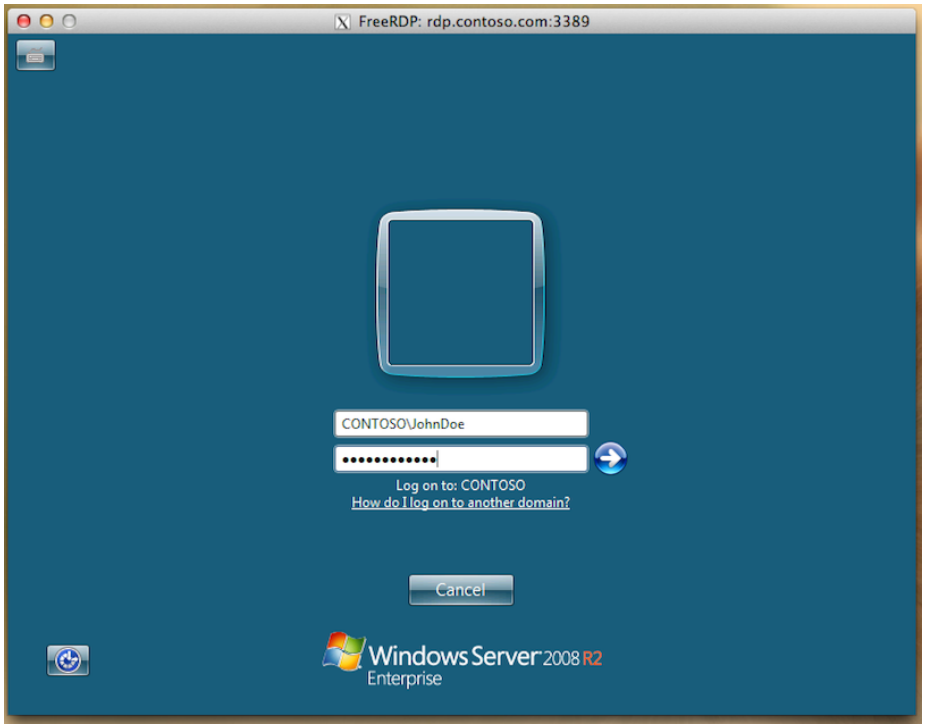


Figure 2.1: Winlogon GUI

Network Level Authentication (NLA)

Network Level Authentication (NLA) is required by default with servers starting with Windows Vista. With NLA, authentication is the very first thing that occurs over the wire, such that the server will only allocate resources and present a graphical interface to authenticated clients. It is also much more secure and provides strong defense mechanisms against Man-in-the-Middle (MITM) attacks.

When NLA is negotiated, the complete credentials are needed at connection time, which is why FreeRDP will prompt for the missing information:

```
xfreerdp /u:JohnDoe /d:CONTOSO /v:rdp.contoso.com
connected to rdp.contoso.com
Password:
```

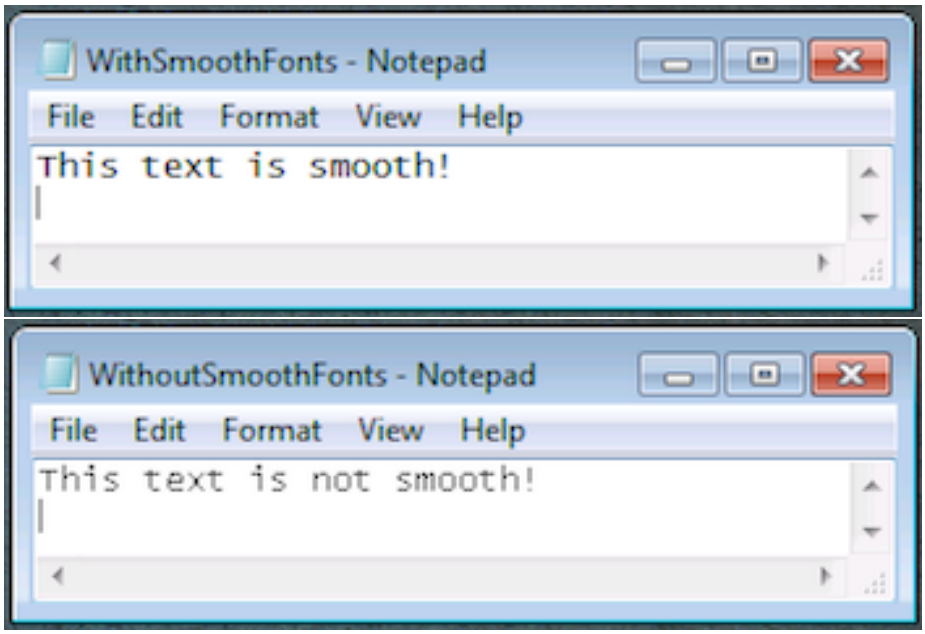
Chapter 3

Performance Flags

The RDP performance flags are used by the client to tweak certain remote graphical operations affecting the user experience. A good example is the wallpaper: drawing it requires sending a lot of data as opposed to filling it with black. Using the wallpaper is fast enough on the LAN, but it may negatively affect performance over a slower connection such as over a cellular network. The same principle applies for themes, fonts, menu animations, window dragging, etc.

3.1 Smooth Fonts

Disabled by default, enable with +fonts. Regular RDP fonts are drawn and encoded separately from images sent over the wire, but they have the drawback of not being very crisp and clear. Enabling smooth fonts means you get easier to read and clearer characters (ClearType), but they are sent as images, which may be slower.



3.2 Desktop Composition

Disabled by default, enable with +aero. This should not be confused with the desktop composition extension that redirects compositing calls for local rendering, a feature not supported by FreeRDP. This flag will only work in the few cases where compositing can be rendered over RemoteFX. As for now, this is only possible with Windows 7 SP1 on Hyper-V on Windows Server 2008 R2 SP1 with RemoteFX 3D.

3.3 Full Window Dragging

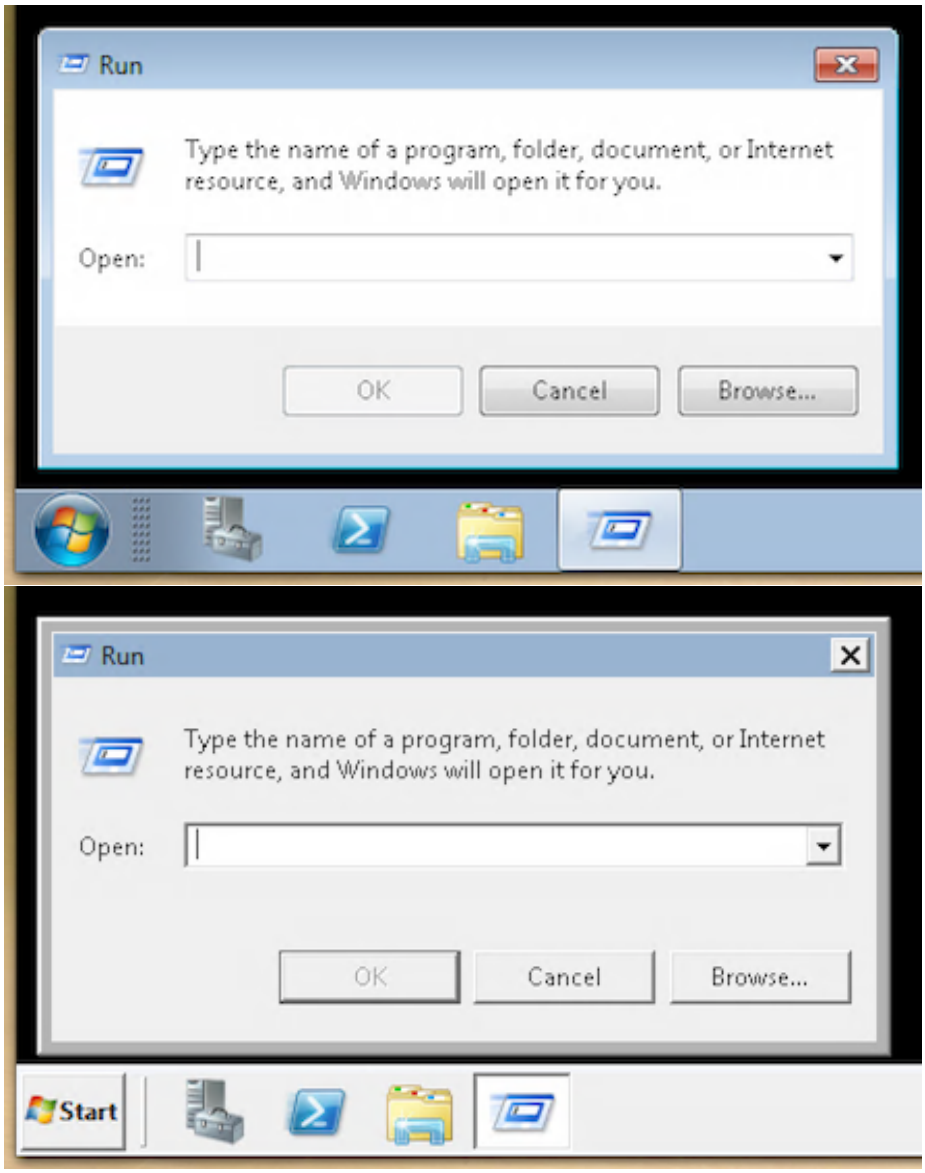
Disabled by default, enable with +window-drag. Dragging a window around is particularly intensive as it causes a lot of graphical updates (each time you move the window by one pixel, there is a large area of the screen that needs to be updated). To work around this problem, the server can draw the outline of the window as you drag it, and only draw the full window once you are done dragging it.

3.4 Menu Animations

Disabled by default, enable with +menu-anims. Just like window dragging, menu animations may cause a lot of successive graphical updates. Disabling it is a good idea.

3.5 Themes

Enabled by default, disable with -themes. Rich themes usually require operations with bitmaps, while a classic theme can often be drawn with simple and efficient operations using plain colors. Disabling themes is worth it if you can stand the look & feel.



3.6 Wallpaper

Enabled by default, disable with -wallpaper. The wallpaper may look pretty but it is a large image that compresses less efficiently than a plain color background. Disabling it reduce rendering time for the background, which is particularly noticeable at connection time and when minimizing windows.

Chapter 4

Input

Keyboard mapping is done on the remote end, so the local keyboard layout is ignored. Instead, a Windows keyboard layout id is provided at connection time to tell the server which keyboard layout to use.

FreeRDP accepts either the numerical keyboard id or the full name of the corresponding keyboard layout:

```
xfreerdp /v:rdp.contoso.com /kbd:US
xfreerdp /v:rdp.contoso.com /kbd:0x409

xfreerdp /v:rdp.contoso.com "/kbd:Canadian Multilingual Standard"
xfreerdp /v:rdp.contoso.com /kbd:0x11009
```

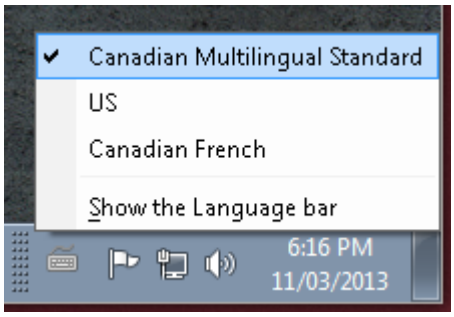


Figure 4.1: Language Bar

If no keyboard layout is specified, FreeRDP selects a keyboard layout based on local system settings. The Microsoft RDP server only accepts the keyboard layout on session creation: if you are reconnecting to an existing session, you will need to log out first.

The list of keyboard layout ids can be shown by using /kbd-list:

```
xfreerdp /kbd-list

Keyboard Layouts
0x00000401  Arabic (101)
0x00000402  Bulgarian
0x00000404  Chinese (Traditional) - US Keyboard
0x00000405  Czech
0x00000406  Danish
0x00000407  German
0x00000408  Greek
0x00000409  US
....
```

One can search for his own keyboard layout by combining the above command with grep:

```
xfreerdp /kbd-list | grep "Canadian"
0x00000C0C  Canadian French (legacy)
0x00001009  Canadian French
0x00011009  Canadian Multilingual Standard
```

4.1 Keyboard Layouts

Id	Name
0x00000401	Arabic (101)
0x00000402	Bulgarian
0x00000404	Chinese (Traditional) - US Keyboard
0x00000405	Czech
0x00000406	Danish
0x00000407	German
0x00000408	Greek
0x00000409	US
0x0000040A	Spanish
0x0000040B	Finnish
0x0000040C	French

0x0000040D	Hebrew
0x0000040E	Hungarian
0x0000040F	Icelandic
0x00000410	Italian
0x00000411	Japanese
0x00000412	Korean
0x00000413	Dutch
0x00000414	Norwegian
0x00000415	Polish (Programmers)
0x00000416	Portuguese (Brazilian ABNT)
0x00000418	Romanian
0x00000419	Russian
0x0000041A	Croatian
0x0000041B	Slovak
0x0000041C	Albanian
0x0000041D	Swedish
0x0000041E	Thai Kedmanee
0x0000041F	Turkish Q
0x00000420	Urdu
0x00000422	Ukrainian
0x00000423	Belarusian
0x00000424	Slovenian
0x00000425	Estonian
0x00000426	Latvian
0x00000427	Lithuanian IBM
0x00000429	Farsi
0x0000042A	Vietnamese
0x0000042B	Armenian Eastern
0x0000042C	Azeri Latin
0x0000042F	FYRO Macedonian
0x00000437	Georgian

0x00000438	Faeroese
0x00000439	Devanagari - INSCRIPT
0x0000043A	Maltese 47-key
0x0000043B	Norwegian with Sami
0x0000043F	Kazakh
0x00000440	Kyrgyz Cyrillic
0x00000444	Tatar
0x00000445	Bengali
0x00000446	Punjabi
0x00000447	Gujarati
0x00000449	Tamil
0x0000044A	Telugu
0x0000044B	Kannada
0x0000044C	Malayalam
0x0000044E	Marathi
0x00000450	Mongolian Cyrillic
0x00000452	United Kingdom Extended
0x0000045A	Syriac
0x00000461	Nepali
0x00000463	Pashto
0x00000465	Divehi Phonetic
0x0000046E	Luxembourgish
0x00000481	Maori
0x00000804	Chinese (Simplified) - US Keyboard
0x00000807	Swiss German
0x00000809	United Kingdom
0x0000080A	Latin American
0x0000080C	Belgian French
0x00000813	Belgian (Period)
0x00000816	Portuguese
0x0000081A	Serbian (Latin)

0x0000082C	Azeri Cyrillic
0x0000083B	Swedish with Sami
0x00000843	Uzbek Cyrillic
0x0000085D	Inuktitut Latin
0x00000C0C	Canadian French (legacy)
0x00000C1A	Serbian (Cyrillic)
0x00001009	Canadian French
0x0000100C	Swiss French
0x0000141A	Bosnian
0x00001809	Irish
0x0000201A	Bosnian Cyrillic

4.2 Keyboard Layout Variants

Id	Name
0x00010401	Arabic (102)
0x00010402	Bulgarian (Latin)
0x00010405	Czech (QWERTY)
0x00010407	German (IBM)
0x00010408	Greek (220)
0x00010409	United States-Dvorak
0x0001040A	Spanish Variation
0x0001040E	Hungarian 101-key
0x00010410	Italian (142)
0x00010415	Polish (214)
0x00010416	Portuguese (Brazilian ABNT2)
0x00010419	Russian (Typewriter)
0x0001041B	Slovak (QWERTY)
0x0001041E	Thai Pattachote
0x0001041F	Turkish F

0x00010426	Latvian (QWERTY)
0x00010427	Lithuanian
0x0001042B	Armenian Western
0x00010439	Hindi Traditional
0x0001043A	Maltese 48-key
0x0001043B	Sami Extended Norway
0x00010445	Bengali (Inscript)
0x0001045A	Syriac Phonetic
0x00010465	Divehi Typewriter
0x0001080C	Belgian (Comma)
0x0001083B	Finnish with Sami
0x00011009	Canadian Multilingual Standard
0x00011809	Gaelic
0x00020401	Arabic (102) AZERTY
0x00020405	Czech Programmers
0x00020408	Greek (319)
0x00020409	United States-International
0x0002041E	Thai Kedmanee (non-ShiftLock)
0x0002083B	Sami Extended Finland-Sweden
0x00030408	Greek (220) Latin
0x00030409	United States-Dvorak for left hand
0x0003041E	Thai Pattachote (non-ShiftLock)
0x00040408	Greek (319) Latin
0x00040409	United States-Dvorak for right hand
0x00050408	Greek Latin
0x00050409	US English Table for IBM Arabic 238_L
0x00060408	Greek Polytonic
0xB0000407	German Neo

4.3 Keyboard Input Method Editors (IMEs)

Id	Name
0xE0010404	Chinese (Traditional) - Phonetic
0xE0010411	Japanese Input System (MS-IME2002)
0xE0010412	Korean Input System (IME 2000)
0xE0010804	Chinese (Simplified) - QuanPin
0xE0020404	Chinese (Traditional) - ChangJie
0xE0020804	Chinese (Simplified) - ShuangPin
0xE0030404	Chinese (Traditional) - Quick
0xE0030804	Chinese (Simplified) - ZhengMa
0xE0040404	Chinese (Traditional) - Big5 Code
0xE0050404	Chinese (Traditional) - Array
0xE0050804	Chinese (Simplified) - NeiMa
0xE0060404	Chinese (Traditional) - DaYi
0xE0070404	Chinese (Traditional) - Unicode
0xE0080404	Chinese (Traditional) - New Phonetic
0xE0090404	Chinese (Traditional) - New ChangJie
0xE00E0804	Chinese (Traditional) - Microsoft Pinyin IME 3.0
0xE00F0404	Chinese (Traditional) - Alphanumeric

Chapter 5

Redirection

5.1 Drive Redirection

To redirect all drives, use /drives:

```
xfreerdp /v:rdp.contoso.com /drives
```

On Windows, each drive has a letter and is redirected individually. On Linux, the root directory (/) is redirected, which is equivalent to redirecting all drives.

To redirect the user home directory as a drive, use /home-drive:

```
xfreerdp /v:rdp.contoso.com /home-drive
```

This is convenient if the user "JohnDoe" wants to redirect only "/home/JohnDoe" instead of the root directory ("/").

5.2 Serial Redirection

To redirect a serial device, you must first identify the corresponding device file. If you are using a USB to serial adapter, the device usually shows up as /dev/ttyUSB0.

In most cases, the device representing the serial device will not be usable with user permissions. You can either chown or chmod the device or do it cleanly with udev rules.

```
xfreerdp /serial:COM3,/dev/ttyUSB0 /v:rdp.contoso.com
```

It might be confusing at first, but the redirected serial ports will not appear in the device manager. Instead, open a command prompt and type:

```
>change port /query
AUX = \DosDevices\COM1
COM1 = \Device\Serial0
COM2 = \Device\Serial1
COM3 = \Device\RdpDrPort\;COM3:2\tsclient\COM3
GLOBALROOT =
```

In this above listing, /dev/ttyUSB0 is redirected as COM3.

You need to manually map the remote COM port to a local COM port:

```
net use COMx: \\tsclient\COMy
```

Where x is a COM port available on the server and y is a COM port available on the client.

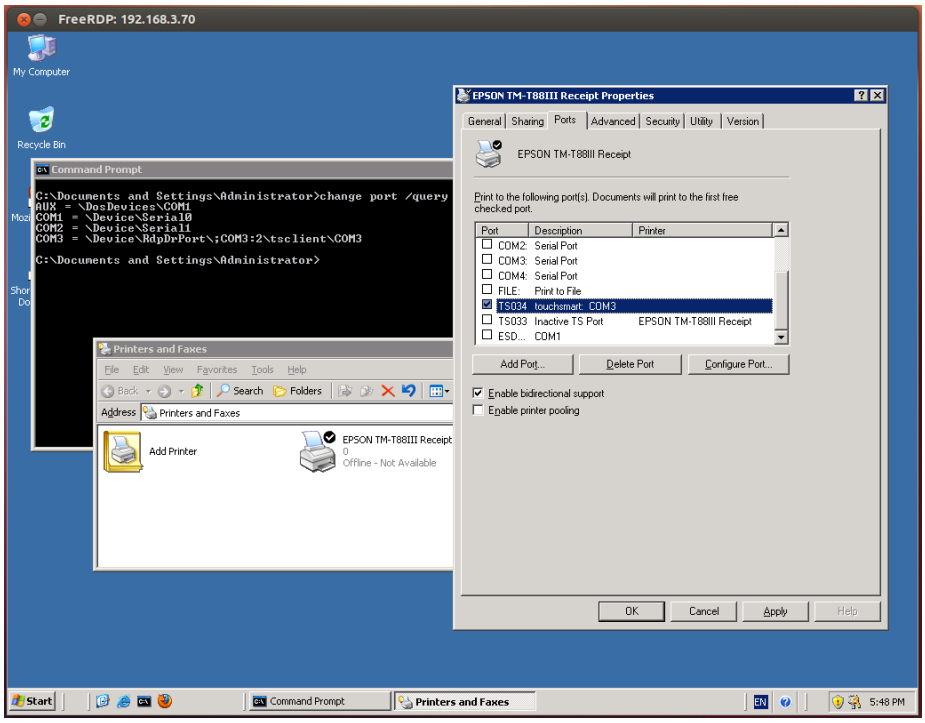


Figure 5.1: FreeRDP Serial Redirection

5.3 Parallel Redirection

To be expanded.

5.4 Smartcard Redirection

To be expanded.

5.5 Printer Redirection

To redirect all printers, use /printer:

```
xfreerdp /v:rdp.contoso.com /printer
```

On Linux and UNIX systems, CUPS is the printing backend used. An easy way to test printing without a physical printer is to install CUPS-PDF[1], a simple CUPS pdf printer.

Under normal circumstances, if your printer is properly configured with CUPS on the client, it should be picked up by FreeRDP and redirected properly. If you are looking for recommendations on a printer which works well with major operating systems (Windows, Linux, Mac OS X) the HP LaserJet Pro P1606dn is a good choice.

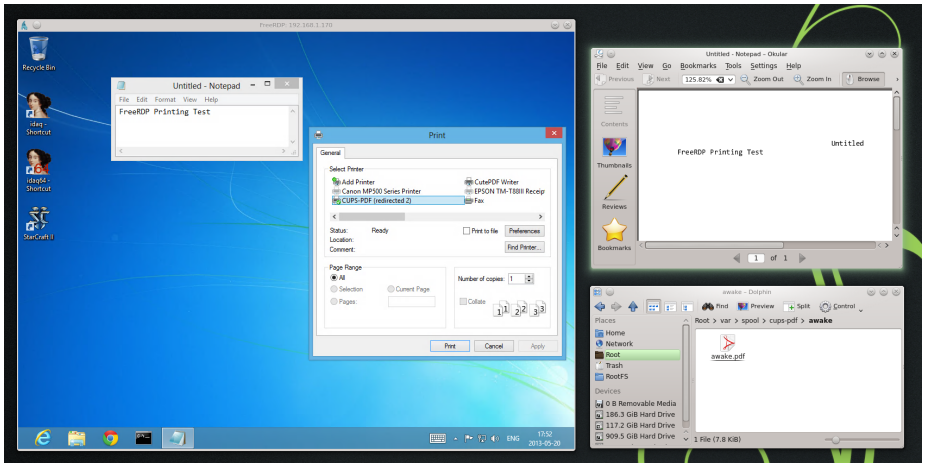


Figure 5.2: FreeRDP Printer Redirection

[1] http://www.cups-pdf.de/

5.6 Clipboard redirection

To enable clipboard redirection, use /clipboard:

```
xfreerdp /v:rdp.contoso.com /clipboard
```

While clipboard redirection is supported in remote desktop mode, it is not yet supported with RemoteApp due to certain technical challenges.

5.7 Audio Playback

To enable sound redirection, use /sound:

```
xfreerdp /v:rdp.contoso.com /sound
```

To select a specific sound subsystem, use the sys: parameter:

```
xfreerdp /v:rdp.contoso.com /sound:sys:alsa
xfreerdp /v:rdp.contoso.com /sound:sys:pulse
```

If you experience occasional sound skipping, you may try adjusting the sound latency with the latency: parameter:

```
xfreerdp /v:rdp.contoso.com /sound:latency:400
```

A short latency will give better audio and video synchronization but will have a shorter buffering time, which makes sound skipping more likely.

5.8 Audio Recording

To enable audio input (recording), use /microphone:

```
xfreerdp /v:rdp.contoso.com /microphone
```

To select a specific sound subsystem, use the sys: parameter:

```
xfreerdp /v:rdp.contoso.com /microphone:sys:alsa
xfreerdp /v:rdp.contoso.com /microphone:sys:pulse
```

5.9 Multitouch Input

Multitouch redirection was introduced in RDP8 and is therefore only supported with Windows 8 and Windows Server 2012 servers. If you have a multitouch display, you can enable true multitouch redirection using /multitouch:

```
xfreerdp /v:rdp.contoso.com /multitouch
```

RDP8 multitouch is meant for *direct* touch devices like multitouch displays and not *dependent* touch devices like multitouch trackpads.

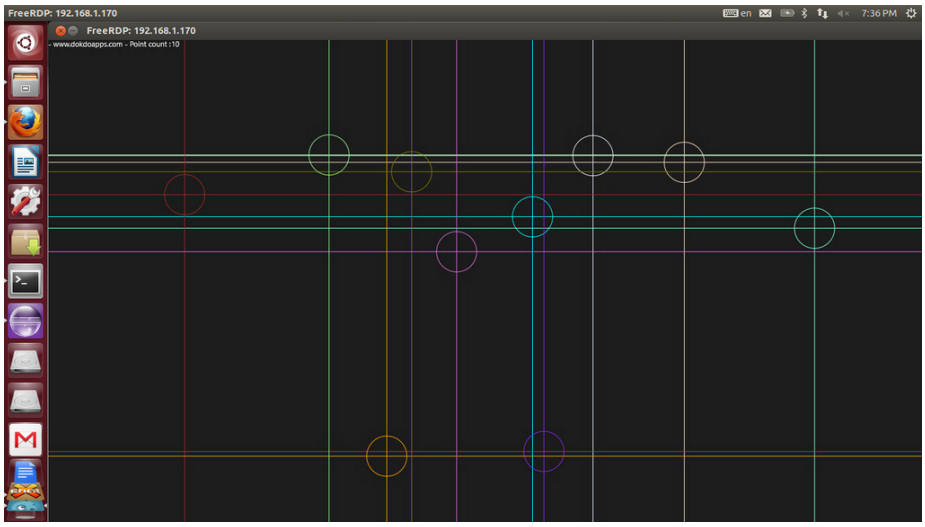


Figure 5.3: FreeRDP Multitouch Input

Chapter 6

Registry Settings

FreeRDP supports configuration through registry keys using the WinPR Registry API. On Windows, the native Windows registry is used. On other platforms, WinPR uses a simple .reg file.

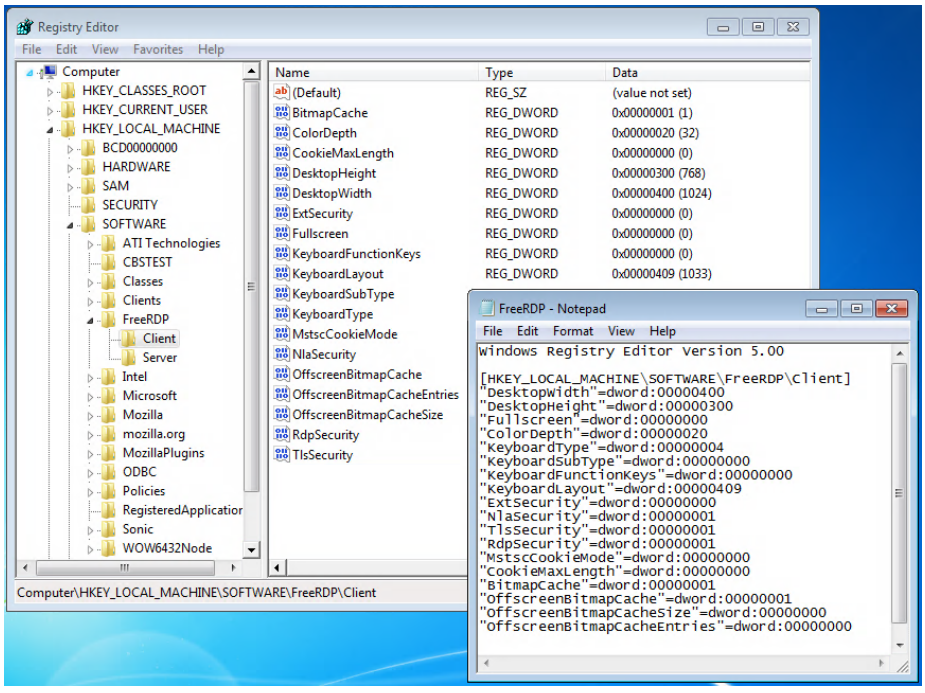


Figure 6.1: FreeRDP Windows Registry Settings

Most settings are found under [HKEY_LOCAL_MACHINE\Software\FreeRDP]

and [HKEY_LOCAL_MACHINE\Software\WinPR]. On Windows, use regedit.exe to edit the registry settings. On other operating systems, WinPR looks for a file called /etc/winpr/HKLM.reg. This file is in the .reg file format and can be edited manually with a text editor. On Windows, .reg files can be obtained by exporting a section of the registry in regedit.exe. To do so, right-click the key in the left pane and select Export. The resulting .reg file is shown in the above screenshot. This textual file can then serve as a template for non-Windows usage.

On non-Windows systems, the /etc/winpr folder usually needs to be created manually. It is recommended to restrict permissions to this folder due to the sensitive nature of certain configuration settings. Current FreeRDP registry settings are all under HKEY_LOCAL_MACHINE, the registry hive meant for system-wide configuration. In the future, user-specific settings may be added under HKEY_LOCAL_USERS, but this has not been done yet.

```
sudo mkdir /etc/winpr
sudo nano /etc/winpr/HKLM.reg
```

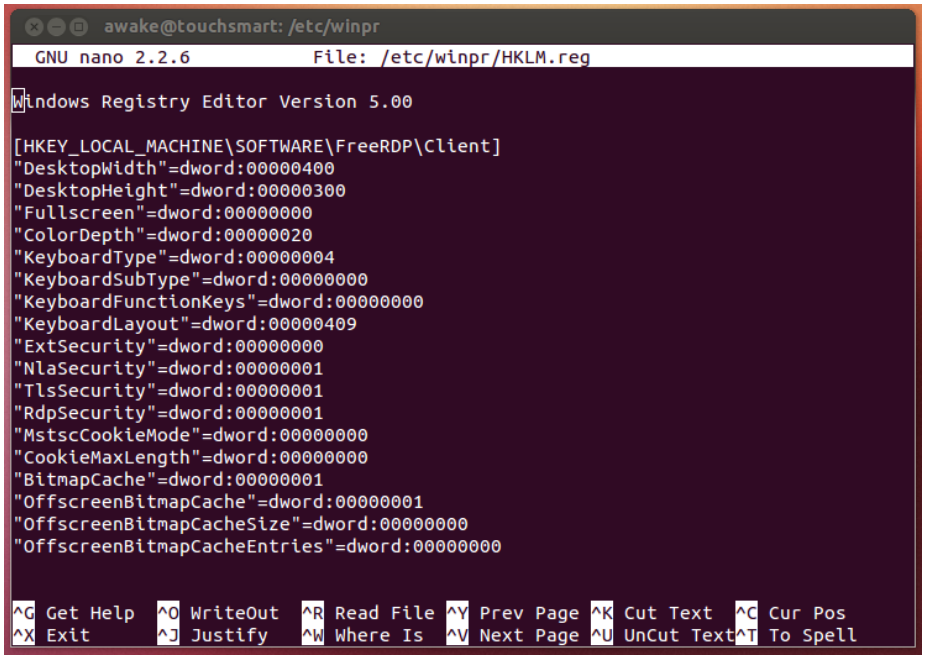


Figure 6.2: FreeRDP Linux Registry Settings

6.1 .reg File Format

The .reg file format is normally used for exporting and exporting registry settings, and is well described in the Microsoft Knowledge Base Article 310516[1]. It begins with a line containing the file format name and version number, followed by an empty line:

```
Windows Registry Editor Version 5.00
```

Registry "keys" correspond to the folders in the registry hierarchy. A key can have subkeys or values. Each value in the registry is strongly typed. Common types are REG_DWORD, REG_BINARY, and REG_SZ.

Here is a sample .reg file containing a test key with a subkey, and values of type REG_DWORD, REG_BINARY and REG_SZ:

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Test]
"DwordValue"=dword:0000007b
"StringValue"="this is a string"

[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Test\Subkey]
"BinaryValue"=hex:aa,bb,cc,dd,ee,ff
```

6.1.1 REG_DWORD (Integer)

REG_DWORD is a double word, or a 32-bit unsigned integer. It is used for numbers and also for boolean values. If the value is to be interpreted as boolean, 0 is considered FALSE and non-zero is considered TRUE. REG_DWORD values are formatted as 8 hexadecimal characters, so make sure to write a value in base 16 and not in base 10 when editing manually. In this case, 0000007b is hexadecimal for 123 in decimal.

6.1.2 REG_SZ (String)

REG_SZ is a text string. Windows exports unicode strings as REG_BINARY.

6.1.3 REG_BINARY (Binary Data)

REG_BINARY is either raw data or a unicode string. It is exported as a list of hexadecimal values separated by commas.

[1] http://support.microsoft.com/kb/310516

6.2 Client Settings

`[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Client]`

Value	Type	Description
DesktopWidth	Integer	Default desktop width (/w)
DesktopHeight	Integer	Default desktop height (/h)
Fullscreen	Boolean	Toggle Fullscreen mode (/f)
ColorDepth	Integer	Default color depth (/bpp)
KeyboardType	Integer	Default keyboard type (/kbd-type)
KeyboardSubType	Integer	Default keyboard subtype (/kbd-subtype)
KeyboardFunctionKeys	Integer	Default keyboard function keys (/kbd-fn-key)
KeyboardLayout	Integer	Default keyboard layout id (/kbd)
ExtSecurity	Boolean	Extended security (/sec-ext)
NlaSecurity	Boolean	Toggle NLA security (/sec-nla)
TlsSecurity	Boolean	Toggle TLS security (/sec-tls)
RdpSecurity	Boolean	Toggle Standard RDP security (/sec-rdp)
MstscCookieMode	Boolean	Toggle connection cookie truncation to 9 characters
CookieMaxLength	Integer	Maximum connection cookie length for truncation
BitmapCache	Boolean	Toggle bitmap cache (/bitmap-cache)
OffscreenBitmapCache	Boolean	Toggle offscreen bitmap cache (/offscreen-cache)
OffscreenBitmapCacheSize	Integer	Offscreen bitmap cache size
OffscreenBitmapCacheEntries	Integer	Offscreen bitmap cache entry count
GlyphCache	Boolean	Toggle glyph cache (/glyph-cache)

`[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Client\BitmapCacheV2]`

Value	Type	Description
NumCells	Integer	Number of cells in bitmap cache
Cell0NumEntries	Integer	Number of entries in bitmap cache cell 0

Cell0Persistent	Boolean	Toggle persistence for bitmap cache cell 0
Cell1NumEntries	Integer	Number of entries in bitmap cache cell 1
Cell1Persistent	Boolean	Toggle persistence for bitmap cache cell 1
Cell2NumEntries	Integer	Number of entries in bitmap cache cell 2
Cell2Persistent	Boolean	Toggle persistence for bitmap cache cell 2
Cell3NumEntries	Integer	Number of entries in bitmap cache cell 3
Cell3Persistent	Boolean	Toggle persistence for bitmap cache cell 3
Cell4NumEntries	Integer	Number of entries in bitmap cache cell 4
Cell4Persistent	Boolean	Toggle persistence for bitmap cache cell 4
AllowCacheWaitingList	Boolean	Allow bitmap cache waiting list

`[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Client\GlyphCache]`

Value	Type	Description
SupportLevel	Integer	Glyph cache support level
Cache0NumEntries	Integer	Number of entries in glyph cache cell 0
Cache0MaxCellSize	Integer	Glyph cache cell 0 maximum size
Cache1NumEntries	Integer	Number of entries in glyph cache cell 1
Cache1MaxCellSize	Integer	Glyph cache cell 1 maximum size
Cache2NumEntries	Integer	Number of entries in glyph cache cell 2
Cache2MaxCellSize	Integer	Glyph cache cell 2 maximum size
Cache3NumEntries	Integer	Number of entries in glyph cache cell 3
Cache3MaxCellSize	Integer	Glyph cache cell 3 maximum size
Cache4NumEntries	Integer	Number of entries in glyph cache cell 4
Cache4MaxCellSize	Integer	Glyph cache cell 4 maximum size
Cache5NumEntries	Integer	Number of entries in glyph cache cell 5
Cache5MaxCellSize	Integer	Glyph cache cell 5 maximum size
Cache6NumEntries	Integer	Number of entries in glyph cache cell 6
Cache6MaxCellSize	Integer	Glyph cache cell 6 maximum size
Cache7NumEntries	Integer	Number of entries in glyph cache cell 7
Cache7MaxCellSize	Integer	Glyph cache cell 7 maximum size

Cache8NumEntries	Integer	Number of entries in glyph cache cell 8
Cache8MaxCellSize	Integer	Glyph cache cell 8 maximum size
Cache9NumEntries	Integer	Number of entries in glyph cache cell 9
Cache9MaxCellSize	Integer	Glyph cache cell 9 maximum size
FragCacheNumEntries	Integer	Number of entries in glyph fragment cache
FragCacheMaxCellSize	Integer	Glyph fragment cache cell maximum size

`[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Client\PointerCache]`

Value	Type	Description
LargePointer	Boolean	Large pointer support
ColorPointer	Boolean	Color pointer support
PointerCacheSize	Integer	Pointer cache size

6.3 Server Settings

`[HKEY_LOCAL_MACHINE\SOFTWARE\FreeRDP\Server]`

Value	Type	Description
ExtSecurity	Boolean	Extended security
NlaSecurity	Boolean	Toggle NLA security
TlsSecurity	Boolean	Toggle TLS security
RdpSecurity	Boolean	Toggle Standard RDP security
CertificateFile	String	Absolute path to x509 certificate file
PrivateKeyFile	String	Absolute path to x509 key file