Deploying a Single Microsoft RemoteFX Server Step-by-Step Guide

Microsoft Corporation
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Abstract
This step-by-step guide walks you through the process of setting up a working virtual desktop using RemoteFX in a test environment.
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Deploying a Single Microsoft RemoteFX Server Step-by-Step Guide

About this guide

This documentation is preliminary and subject to change.

This step-by-step guide walks you through the process of setting up a working virtual desktop using RemoteFX accessible by using Remote Desktop Connection (RDC) in a test environment. During this process, you will create a test deployment that includes the following components:

- A Remote Desktop Virtualization Host (RD Virtualization Host) server using RemoteFX
- A RemoteFX-enabled virtual desktop

Related Documents

The following documents can assist you in configuring RemoteFX:

- [Hardware requirements for RemoteFX](http://go.microsoft.com/fwlink/?LinkId=191918)
- [Online help for configuring RemoteFX](http://go.microsoft.com/fwlink/?LinkId=192572)
- [Online help for configuring the RemoteFX 3D video adapter](http://go.microsoft.com/fwlink/?LinkId=192573)
- [What’s New in RemoteFX](http://go.microsoft.com/fwlink/?LinkId=192437)
- [Deploying RemoteFX for Personal Virtual Desktops Step-by-Step Guide](http://go.microsoft.com/fwlink/?LinkId=192429)
- [Deploying RemoteFX for Virtual Desktop Pools Step-by-Step Guide](http://go.microsoft.com/fwlink/?LinkId=192433)
- [Configuring USB Device Redirection with RemoteFX Step-by-Step Guide](http://go.microsoft.com/fwlink/?LinkId=192432)

Pre-Requisites

When implementing RemoteFX, the following things should be considered:

- The RemoteFX server and the RemoteFX-enabled virtual desktop must meet the RemoteFX hardware requirements. For more information about the hardware requirements when deploying RemoteFX, see the [Windows Server 2008 Technical Library](http://go.microsoft.com/fwlink/?LinkId=191918).
- Ensure that Hyper-threading is enabled in the BIOS of the RD Virtualization Host server.
- Per the Windows® 7 requirements, if you are using an x86-based virtual machine, you must configure at least 1024 megabytes of RAM. If you are using an x64-based virtual machine, you must configure at least 2048 megabytes of RAM.
• Ensure that you are running the matching build of Windows Server 2008 R2 with SP1 on the RemoteFX server, Windows 7 with SP1 on the virtual machine, and Windows 7 with SP1 on the client computer.

• Ensure that there is a LAN connection between the client and the RD Virtualization Host server.

• Ensure that Windows Aero is enabled on the RemoteFX-enabled virtual machines.

Technology review

Included as part of the RD Virtualization Host role service, RemoteFX enables the delivery of a full Windows client user experience to a range of client devices including rich clients, thin clients, and ultra-thin clients. RemoteFX delivers a rich user experience for Virtual Desktop Infrastructure (VDI) by rendering content on the server by using graphics processing units (GPUs) that are present on the server and shared across multiple virtual desktops. The RemoteFX experience renders a range of content including DirectX and all types of multimedia and is optimized for LAN-based networks.

Scenario: Deploying RemoteFX on a single server accessible by using Remote Desktop Connection in a test environment

We recommend that you first use the steps provided in this guide in a test lab environment. Step-by-step guides are not necessarily meant to be used to deploy Windows Server features without additional deployment documentation and should be used with discretion as a stand-alone document.

Upon completion of this step-by-step guide, you will have a virtual desktop with RemoteFX that can be connected to by using Remote Desktop Connection. You can then test and verify this functionality by connecting to the virtual desktop from a client computer as a standard user.

The test environment described in this guide includes three computers connected to a private network using the following operating systems, applications, and services:

<table>
<thead>
<tr>
<th>Computer name</th>
<th>Operating system</th>
<th>Applications and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTOSO-CLNT</td>
<td>Windows® 7 with Service Pack 1 (SP1)</td>
<td>Remote Desktop Connection</td>
</tr>
<tr>
<td>RDVH-SRV</td>
<td>Windows Server 2008 R2 with Service Pack 1 (SP1)</td>
<td>RD Virtualization Host, RemoteFX, Hyper-V</td>
</tr>
<tr>
<td>VD1-CLNT</td>
<td>Windows® 7 with Service Pack 1 (SP1)</td>
<td>Virtual machine</td>
</tr>
</tbody>
</table>
Step 1: Setting up the Infrastructure

This documentation is preliminary and subject to change.

To prepare your virtual desktop using RemoteFX test environment, you must complete the following tasks:

- Configure the Remote Desktop Virtualization Host (RD Virtualization Host) server (RDVH-SRV)
- Configure the client computer (CONTOSO-CLNT)

Use the following table as a reference when setting up the appropriate computer names, operating systems, and network settings that are required to complete the steps in this guide.

**Important**
Before you configure your computers with static Internet Protocol (IP) addresses, we recommend that you first complete Windows product activation while each of your computers still has Internet connectivity. You should also install any available critical security updates from [Windows Update](http://go.microsoft.com/fwlink/?LinkID=47370).

<table>
<thead>
<tr>
<th>Computer name</th>
<th>Operating system requirement</th>
<th>IP settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTOSO-CLNT</td>
<td>Windows 7 with SP1</td>
<td>IP address: 10.0.0.3 Subnet mask: 255.255.255.0</td>
</tr>
<tr>
<td>RDVH-SRV</td>
<td>Windows Server 2008 R2 with SP1</td>
<td>IP address: 10.0.0.4 Subnet mask: 255.255.255.0</td>
</tr>
</tbody>
</table>

### Configure the RD Virtualization Host server (RDVH-SRV)

To configure the RD Virtualization Host server, you must:

- Install Windows Server 2008 R2 with SP1.
- Add the Hyper-V server role.
- Configure TCP/IP properties.
- Install the graphics card driver.

First, install Windows Server 2008 R2 with SP1 on a stand-alone server.

**To install Windows Server 2008 R2 with SP1**

1. Start your computer by using the Windows Server 2008 R2 with SP1 product CD.
Note
You can also install Windows Server 2008 R2 and then upgrade to Windows Server 2008 R2 with SP1 by using the Windows Server 2008 R2 with SP1 update package.

2. When prompted to select the operating system you want to install, click Windows Server 2008 R2 Enterprise (Full Installation), and then click Next.

Note
Using RemoteFX with Windows Server 2008 R2 with SP1 Standard and Hyper-V editions are also supported.

3. When prompted for a computer name, type RDVH-SRV.
4. Follow the rest of the instructions that appear on your screen to finish the installation.

Next, add the Hyper-V server role.

To add the Hyper-V server role
1. Log on to RDVH-SRV with the RDVH-SRV\Administrator account.
2. Open Server Manager. To open Server Manager, click Start, point to Administrative Tools, and then click Server Manager.
3. Under Roles Summary, click Add Roles.
5. On the Select Server Roles page, select the Hyper-V check box, and then click Next.
6. On the Introduction to Hyper-V page, click Next.
7. On the Create Virtual Networks page, select the check box next to Local Area Connection, and then click Next.
8. On the Confirm Installation Selections page, click Install.
9. When the installation finishes, click Close.
10. Click Yes to restart the computer. The computer may restart twice. This is expected behavior.

Next, configure TCP/IP properties so that RDVH-SRV has an IPv4 static IP address of 10.0.0.4.

To configure TCP/IP properties
1. Log on to RDVH-SRV with the RDVH-SRV\Administrator account.
2. Click Start, click Control Panel, click Network and Internet, click Network and Sharing Center, click Change adapter settings, right-click Local Area Connection, and then click Properties.
3. On the Networking tab, select the Internet Protocol Version 4 (TCP/IPv4) check box, and then click Properties.
4. Click Use the following IP address. In the IP address box, type 10.0.0.4. In the Subnet mask box, type 255.255.255.0.
Important
This IP address should be assigned to the virtual network adapter.

5. Click OK, and then close the Local Area Connection Properties dialog box.

Finally, install the graphics card driver by using a driver supplied by the graphics card manufacturer.

To install the graphics card driver
1. Download the latest graphics card driver installation file from the manufacturers Web site.
2. Install the driver on to the RD Virtualization Host server and then restart the computer.

Important
Ensure that you download and install the latest driver for the graphics card that is installed in the RemoteFX server. Do not rely on the graphics card driver that is included with Windows Server 2008 R2.

Install and configure the Remote Desktop Connection client computer (CONTOSO-CLNT)
To configure CONTOSO-CLNT, you must:
• Install Windows 7 with SP1.
• Configure TCP/IP properties.

To install Windows 7 with SP1
1. Install Windows 7 with SP1.
2. Follow the instructions that appear on your screen, and when prompted for a computer name, type CONTOSO-CLNT.

Next, configure TCP/IP properties so that CONTOSO-CLNT has a static IP address of 10.0.0.3.

To configure TCP/IP properties
1. Log on to CONTOSO-CLNT with a user account that is a member of the local Administrators group.
2. Click Start, click Control Panel, click Network and Internet, and then click Network and Sharing Center.
3. Click Change adapter settings, right-click Local Area Connection, and then click Properties.
4. On the Networking tab, click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
5. Click Use the following IP address. In the IP address box, type 10.0.0.3, and in the Subnet mask box, type 255.255.255.0.
6. Click OK, and then close the Local Area Connection Properties dialog box.
Step 2: Configuring the Virtual Desktop

This documentation is preliminary and subject to change.

In this step, you will install and configure the virtual machine that will be used as a virtual desktop.

Use the following table as a reference when setting up the appropriate computer name, operating system, and network settings that are required to complete the steps in this guide.

<table>
<thead>
<tr>
<th>Computer name</th>
<th>Operating system requirement</th>
<th>IP settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VD1-CLNT</td>
<td>Windows 7 with SP1</td>
<td>IP address: 10.0.0.13 Subnet mask: 255.255.255.0</td>
</tr>
</tbody>
</table>

Install the virtual desktop computer (VD1-CLNT)

To configure the virtual machine that will be used as a virtual desktop, you must install Windows 7 with SP1 on the virtual machine, and then configure TCP/IP properties.

To install Windows 7 with SP1

1. Log on to RDVH-SRV as a member of the local Administrators group.
2. Insert the Windows 7 with SP1 product DVD into the DVD drive on the RDVH-SRV server.
3. Open Hyper-V Manager. To open Hyper-V Manager, click Start, point to Administrative Tools, and then click Hyper-V Manager.
4. Right-click RDVH-SRV, point to New, and then click Virtual Machine.
5. On the Before You Begin page, click Next.
6. In the Name box, type vd1-clnt and then click Next.
7. On the Assign Memory page, in the Memory box, type 1024 if you are using a 32-bit version of Windows 7 with SP1. If you are using a 64-bit version of Windows 7 with SP1, type 2048.
8. Click Next.
9. On the Configure Networking page, in the Connection box, select Local Area Connection – Virtual Network, and then click Next.
10. On the Connect Virtual Hard Disk page, in the Name box, type vd1-clnt, in the Size box, type 30 and then click Next.
11. On the Installation Options page, click Install an operating system from a boot
CD/DVD-ROM drive.
12. In the Physical CD/DVD drive box, select the DVD drive that contains Windows 7 with SP1, and then click Next.
13. On the Completing the New Virtual Machine Wizard page, review the installation options, and then click Finish.
14. In the Virtual Machines area, right-click vd1-clnt, and then click Connect.
15. On the Action menu, click Start to start the installation of Windows 7 with SP1.
16. During the installation of the virtual machine, specify vd1-clnt as the name of the computer.

Finally, configure TCP/IP properties so that VD1-CLNT has a static IP address of 10.0.0.13.

▶ To configure TCP/IP properties
1. Log on to VD1-CLNT as a member of the local Administrators group.
2. Click Start, click Control Panel, click Network and Internet, and then click Network and Sharing Center.
3. Click Change adapter settings, right-click Local Area Connection, and then click Properties.
4. On the Networking tab, click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
5. Click Use the following IP address. In the IP address box, type 10.0.0.13. In the Subnet mask box, type 255.255.255.0.
6. Click OK, and then close the Local Area Connection Properties dialog box.

Configure the virtual machine for Remote Desktop Services
To configure the virtual machine for Remote Desktop Services, you must do the following:
- Enable Remote Desktop
- Add the local Administrator user account to the local Remote Desktop Users security group

First, you must enable Remote Desktop.

▶ To enable Remote Desktop
1. Log on to VD1-CLNT as a member of the local Administrators group.
2. Click Start, right-click Computer, and then click Properties.
3. Click Remote settings.
4. Under Remote Desktop, click Allow connections only from computers using Remote Desktop with Network Level Authentication (more secure), and then click OK.
Finally, you should add the local Administrator user account to the local Remote Desktop Users security group.

To add the local Administrator user account to the local Remote Desktop Users security group
1. Log on to VD1-CLNT as a member of the local Administrators group.
2. Click Start, and then click Control Panel.
3. Click System and Security, click Administrative Tools, and then double-click Computer Management.
4. Expand Local Users and Group, and then click Groups.
5. Right-click Remote Desktop Users, and then click Add to Group.
6. Click Add, and then in the Select Users, Computers, Service Accounts, or Groups dialog box, type Administrator and then click OK.

Important
All user accounts, including user accounts in the local Administrators security group, who will be connecting to the virtual desktop must be a member of the local Remote Desktop Users security group. This requirement does not apply to user accounts that are also in the Domain Admins security group.

Step 3: Installing and Configuring RemoteFX
This documentation is preliminary and subject to change.
In this step, you will do the following:
• Enable RemoteFX.
• Install the RemoteFX 3D video adapter on the virtual desktop.
First, you must enable RemoteFX on the RDVH-SRV computer.

To enable RemoteFX
1. Log on to RDVH-SRV with a user account that is a member of the local Administrators group.
2. Open Server Manager. To open Server Manager, click Start, point to Administrative Tools, and then click Server Manager.
3. Under the Roles Summary heading, click Add Roles.
5. On the Select Server Roles page, select the Remote Desktop Services check box, and then click Next.
7. On the Select Role Services page, select the RemoteFX check box. The Core Services check box will be automatically selected and installed when RemoteFX is installed.

8. On the Confirm Installation Selections page, verify that the RD Virtualization Host role service will be installed, and then click Install.

9. On the Installation Results page, you are prompted to restart the server to finish the installation process. Click Close, and then click Yes to restart the server.

10. After the server restarts and you log on to the computer with a user account that is a member of the local Administrators group, the remaining steps of the installation finish. When the Installation Results page appears, confirm that installation of the RD Virtualization Host role service succeeded, and then close Server Manager.

   Note
   You may see warnings on the Installation Results page. For the purposes of this guide, these warnings can be ignored.

Finally, install the RemoteFX 3D video adapter on the virtual desktop.

To install the 3D video adapter

1. Shut down the VD1-CLNT virtual desktop.
2. Open Hyper-V Manager. To open Hyper-V Manager, click Start, point to Administrative Tools, and then click Hyper-V Manager.
3. Under Virtual Machines, right-click vd1-clnt, and then click Settings.
4. Click Add Hardware.
5. In the Select the devices you want to add box, click RemoteFX 3D Video Adapter, and then click Add.

   Important
   You can also choose the maximum number of monitor and maximum monitor resolution. For the purposes of this guide, we will use the default settings. For more information on the amount of dedicated video memory required for a maximum number of monitors and a maximum resolution, see the Hardware Requirements topic (http://go.microsoft.com/fwlink/?LinkId=191918) on the Windows Server 2008 R2 Technical Library.

6. Click OK to add the 3D Video Adapter.
7. Under Virtual Machines, right-click vd1-clnt, and then click Start.
8. Under Virtual Machines, right-click vd1-clnt, and then click Connect.
9. Log on to the VD1-CLNT computer as a member of the local Administrators group.
10. The RemoteFX 3D Video Adapter driver will install. When you dialog box asking you to restart the computer appears, Restart Now.

   Important
   After the virtual machine restarts, you will see a black screen on the virtual
machine console with the message “Video Remoting was disconnected. The virtual machine is using the 3D video adaptor which is not supported by the Virtual Machine Connection console”. This is expected. You will not be able to log into the virtual machine from the Virtual Machine Connection. You will be able to remote into the virtual machine using an account that is a part of the Remote Desktop Users group on the virtual machine.

Step 4: Verifying RemoteFX for Virtual Desktops Functionality

This documentation is preliminary and subject to change.

To verify the functionality of the virtual desktop deployment, you will log on as the local Administrator and connect to the virtual desktop with RemoteFX by using Remote Desktop Connection.

To connect to the virtual desktop

1. Log on to CONTOSO-CLNT as the local Administrator user account.
2. Click Start, type mstsc.exe, and then press ENTER.
3. Click Options, and then click the Experience tab.
4. In the Choose your connection speed to optimize performance box, click LAN (10 Mbps or higher).
5. Click the General tab.
6. In the Computer box, type vd1-clnt, and then click Connect.
7. When prompted, enter the credentials for the local Administrator account on the VD1-CLNT computer, and then click OK.
8. As an optional step, verify that Event ID 2 in the Microsoft-Windows-RemoteDesktopServices-RdpCoreTS/Admin event source was written to the event log with the following text “Remote Desktop Protocol will use RemoteFX module to connect to the client computer. RemoteFX module is being used based on the server configuration, client configuration, and network connection.”. This event is written when a client is connected to the RDVH-SRV computer by using RemoteFX.

Important

RemoteFX is optimized for the LAN. You must select the LAN connection type to get a session that uses RemoteFX. If you select any other connection type, your session will not be optimized for the LAN and will not use the RemoteFX 3D adapter.

You have successfully deployed and demonstrated the functionality of RemoteFX by using the simple scenario of connecting to a virtual desktop with RemoteFX by using Remote Desktop
Connection. You can also use this deployment to explore some of the additional capabilities of RemoteFX through additional configuration and testing.

## Step 5: Configuring RemoteFX for an Optimal Experience

This documentation is preliminary and subject to change.

In this step, you will do the following:

- Configure the experience index for connections using RemoteFX.
- Enable Windows Aero on the virtual desktop.

First, set the experience index for connections using RemoteFX by using Local Group Policy Editor.

### To set the experience index for connections using RemoteFX

1. Log on to the VD1-CLNT computer as a member of the local Administrators group.
2. Click **Start**, and in the **Search programs and files** box, type `gpedit.msc` and then press **ENTER**.
3. Navigate to **Computer Configuration\Policies\Administrative Templates\Windows Components\Remote Desktop Services\Remote Desktop Session Host\Remote Session Environment**.
4. Double-click **Set experience index for connections when using RemoteFX**.
5. Select the **Enabled** option.
6. In the **Screen capture rate (frames per second)** box, click **Highest (best quality)**, and then click **OK**.
7. Restart the VD1-CLNT computer.

### Important

Due to a known issue, changing this group policy from the default value is a temporary step recommended for the optimal experience. The procedure above simplifies the process by informing you how to apply the group policy from within the virtual machine. However, the recommended way to apply group policy continues to be using Group Policy Management Console.

Next, enable Windows Aero within the VD1-CLNT computer.

### To enable Windows Aero

1. Log on to VD1-CLNT as a member of the local Administrators group.
2. Right-click on the desktop.
3. Click **Personalize**, and in the **Change visuals and sounds on your computer** box, select one of the themes shown under the **Aero Themes** heading.
4. Verify that window transparency is enabled, and then close the window.

Important
Due to a known issue when using Windows Server 2008 R2 with SP1 Beta build, you may see screen artifacts when Windows Aero is turned off. It is recommended that you always keep Windows Aero enabled in the RemoteFX-enabled virtual machine.

Appendix A: Frequently Asked Questions

This documentation is preliminary and subject to change.

Frequently Asked Questions

Why is the virtual machine connection console disconnected when RemoteFX is enabled?
In Windows 7, 3D adapters are only accessible in the console session and not in the remote session. Due to this limitation, Remote Desktop Services is unable to serve a remote session that has access to the RemoteFX 3D adapter. To work around this issue, the console session is remoted to the user. Since two console sessions cannot exist, the virtual machine connection console is disconnected. If for some reason the system falls back to standard VGA, the virtual machine connection console is reconnected.

If you need to access the virtual machine from the Virtual Machine Manager console, you can shut-down the virtual machine, remove the RemoteFX 3D adapter and restart the virtual machine.

How can I tell whether my GPU has sufficient video memory?
You can verify whether your GPU card has sufficient video memory as follows:
1. Right click your desktop, and then click Screen Resolution.
2. Select Advanced Settings. The Adapter tab displays the Dedicated Video Memory.

How can I tell whether my Remote Desktop session is using RemoteFX?
There are several ways you can confirm that your Remote Desktop session is using RemoteFX:
- Check the event log inside the virtual machine. Event ID 2 in the Microsoft-Windows-RemoteDesktopServices-RdpCoreTS/Admin event source is written to the event log with the following text “Remote Desktop Protocol will use RemoteFX module to connect to the client computer. RemoteFX module is being used based on the server configuration, client configuration, and network connection.”
- If the Start Menu shows the Shut Down button, you are using RemoteFX. If you are not using RemoteFX, Log off will appear on the Start Menu.
Are multiple GPUs supported on a single RemoteFX server?
A maximum of 4 GPUs per server are supported on a single RemoteFX server. However, the GPUs in the server must be identical. Multiple GPUs from different vendors installed in the same RemoteFX server is not supported.

Note
Any GPUs with an XDDM driver must be disabled. This includes onboard management adapters used for KVM over IP. For Windows Server 2008 R2 during SP1 Beta, the onboard adapter must be disabled in the BIOS.

Troubleshooting

An error occurred while attempting to start the selected virtual machine(s): Failed to Power on with Error ‘Unspecified error’
It is likely that you are attempting to start RemoteFX virtual machines on a server that does not have a SLAT-enabled processor.

An error occurred while attempting to start the selected virtual machine(s): Microsoft Synthetic 3D Display Controller failed to power on.
It is likely that you are attempting to start more virtual machines than your GPU can support. Look in the event log on the host and verify whether there is an event indicating the server has insufficient GPU resources to start the requested virtual machine.

An error occurred while attempting to start the selected virtual machine(s)
If the virtual machine fails to start after enabling the RemoteFX 3D video adapter, ensure the following things:
- You have downloaded and installed the latest driver from the GPU vendor’s website.
- You have disabled any GPUs with an XDDM driver. This includes onboard management adapters used for KVM over IP. For Windows Server 2008 R2 during SP1 beta, the onboard adapter must be disabled in the BIOS.

Unable to remote into the virtual machine once the Virtual GPU is installed: Connection was denied because the user account is not authorized for remote login.
All users (even users who are part of the Administrators group on the virtual machine) who need to remote into a virtual machine with a 3D video adapter need to be members of the Remote Desktop Users group.
Performance using my RemoteFX virtual desktop is slow

Ensure that Hyper-threading is enabled in the BIOS on your RD Virtualization Host server. RemoteFX is optimized for usage over a LAN connection. Ensure that you are using at least a 10 MBps connection with less than 20 milliseconds of latency between the client computer and the virtual machine. If your LAN connection is sufficient, verify that you have set the RemoteFX screen capture rate to the highest (best) value by using Group Policy. Finally, ensure that Windows Aero is configured on the RemoteFX-enabled virtual machines. There is a known issue in the Beta build of Windows Server 2008 R2 with SP1 where the performance may be poor in a RemoteFX session when Windows Aero is not enabled.

I see artifacts on my RemoteFX-enabled virtual desktop

Ensure that you have enabled the Windows Aero experience on the RemoteFX virtual machines. There is a known issue on the Beta build of Windows Server 2008 R2 with SP1 where you may see screen artifacts when Windows Aero is disabled.

My RemoteFX-enabled session falls back to a single monitor session

The RemoteFX 3D adapter supports a fixed set of resolutions. Your RemoteFX-enabled session may fall back to a single monitor session if one of the following things happens:

- If you request a resolution that is not supported, you will get a single monitor RemoteFX-enabled session at a lower supported resolution.
- If you request a resolution that is higher than the maximum resolution assigned to that virtual desktop, your session will fall back to a single monitor lower resolution session.