We will be reviewing Microsoft's Remote Desktop Services (RDS), which has undergone significant reworking since it was released as Windows 2008 Terminal Services. In the original release of Microsoft Windows 2008 Terminal Server the following components were included:

1. TS Server
    a. The updated version of Microsoft's Terminal Server (TS)
2. TS Session Broker
    a. The session broker is a server in a TS farm that load balances connections. It redirects incoming sessions to distribute user connections across the servers.
3. TS Gateway
    a. TS Gateway is essentially an SSL client proxy. It allows you to integrate SSL encryption to run the RDP connection over https. This eliminates the need to deploy a separate VPN solution when providing remote access.
4. TS Web
    a. Is a Web portal which presents the applications or desktops that users have access to.

5. RemoteApp
    a. Allows you to create RDP connection shortcuts which can be deployed as MSI's to install a shortcut that points to a TS based application but appears local to the client desktop.

Microsoft decided to rebrand this bundle "Remote Desktop Services" (RDS), and extend its capabilities to deliver virtual desktops as well. At the same time Microsoft made some changes to the Terminal Server Connection Access License or TS CAL. Virtual desktop platforms do not require a TS CAL as only a single connections is active when the user is connected. This is unlike the relationship between Microsoft TS Licensing and Citrix XenApp where you require both a TS CAL and a Citrix connection license (CCU) to use the service. VDI vendors bundle a proprietary connection or agent license that they charge for. This presents a bit of a challenge for Microsoft and provides a clearer understanding of why the changes were made. Rather than building a separate agent solution, they simply incorporated the TS CAL as the new remote desktop 'connection' license. This does present a few challenges related to how the technology works that we will talk about in the installation section. The new bundle is now offered with the following capabilities:

| Component | Details | Notes | Tested |
|---|---|---|---|
| RD Virtualization Host | A role service for the Microsoft Hyper-V Server platform. It allows the virtual desktops to be visible to the RD Session Host server. | The virtualization host is a windows 2008 R2 Hyper-V server | Yes |
| RD Connection Broker | Microsoft's Connection Broker which is essentially a TS Server. It is used as a proxy to pass the connection request to a virtual desktop. | The TS Session broker is installed in redirector mode to act as a proxy to a virtual desktop environment | Yes |

| RD Session Host | Formerly Microsoft's TS server | We installed the Connection Broker Service as a Role on the Hyper-V Server | Yes* |
| --- | --- | --- | --- |
| RD Web Access | Formerly TS Web Access.  RD Web Access provides the initial login page for the RDS environment | | Yes |

Architecture

What is interesting about Microsoft's solution is the ability to build "VDI in a box".  Because all of the necessary components roles and role services are built into a Windows 2008 R2 OS, you can deploy everything on a single host quite easily.  It is possible, to deploy a single Hyper-V host that has the additional roles required for Microsoft's VDI solution.  As we wanted to fully test this concept we adjusted our test architecture to deliver "VDI in a box" vs. a traditional Hyper-V SAN attached environment.   In this case we went with a single Windows 2008 R2 Server running the Hyper-V, Remote Desktop Services and Web Server role.
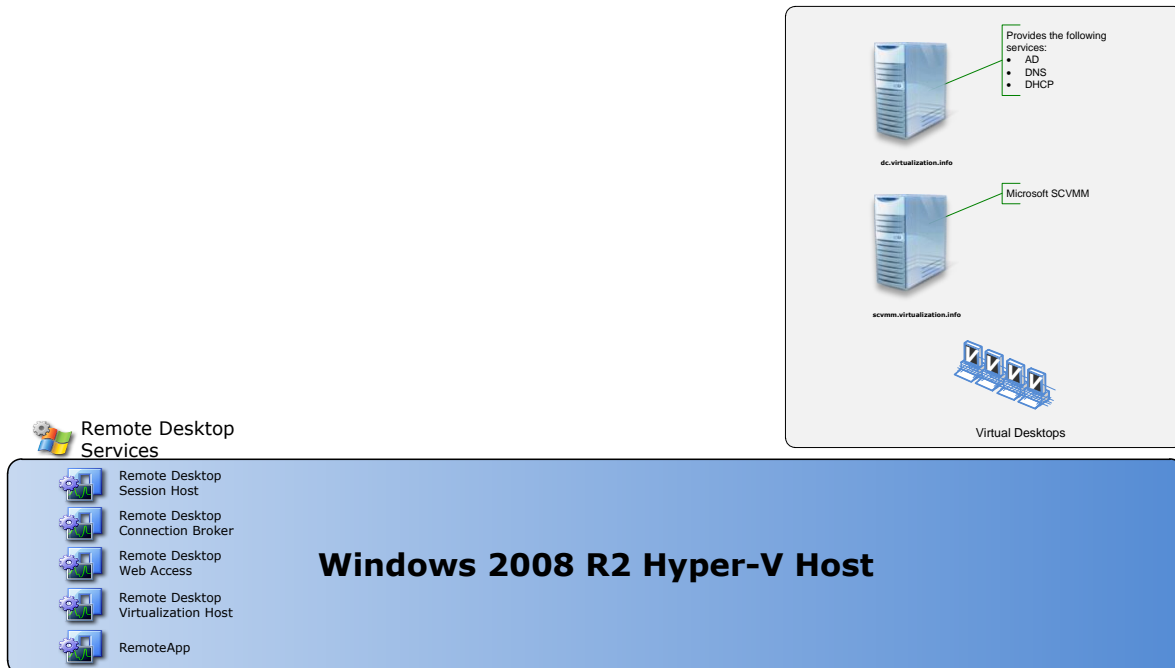
A few things regarding the architecture; Microsoft recommends that you deploy the latest version of RDS in a Windows 2008 R2 functional level domain.  In our testing we deployed it first to a Windows 2008 level domain and found that some of the attributes where missing in our AD until we went to the Windows 2008 R2 functional level.



For example the Personal desktop assignment is an additional tab that you can find on the properties of a user account in Windows 2008 R2 functional level domain.  It is not there when the AD server is configured for the Windows 2008 functional level.
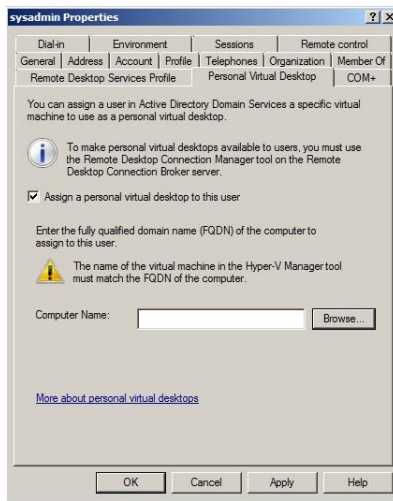


While it does not mean that you cannot install RDS into an active directory running at a lower level (i.e. we were able to use Powershell to view personal desktop associations), it definitely simplifies the operation.  In addition we also found several disparities with what was available in a traditional TS environment over a virtual desktop RDS deployment.  For example, Single Sign-On was supported when accessing a traditional TS server deployment, but not yet available for a virtual desktop environment. We also found that from an architecture perspective that when we went to apply policy to the environment that the ambiguity between the TS server settings and RDS virtual desktop specific settings were confusing until we were at the Windows 2008 R2 domain level.

One of the nice features RDS supports is pooled and the aforementioned personal desktops.  The difference is that pooled are not associated with any particular user while personal are explicitly assigned.

As Microsoft is reusing TS CAL's to cover VDI licensing without building a virtual desktop agent you need to make a number of changes to a virtual desktop in order to get it to work.  The RDS blog team has

created the scripts to simplify the process considerably.  They can be found here on Microsoft's script repository http://gallery.technet.microsoft.com/scriptcenter/en-us/site/search?f%5B0%5D.Type=RootCategory&f%5B0%5D.Value=remotedesktopservices.  One of the other considerations for deploying Microsoft's VDI is RDP version 7.1.  While it will support older versions, you need 7.1 running on the client access point in order to get all the features.  The number of changes required on the virtual desktop and the requirement for specific versions of RDP (although not mandatory) left us with the feeling that perhaps having software to install vs. configurations to adjust and verify might be a more straight forward approach.

There are only three tiers to Microsoft's solution if you incorporate the bundling of App-V.  There is an infrastructure Tier, which includes Systems Center Virtual Machine Manager (SCVMM), the virtual infrastructure management console, and Hyper-V, Desktop Management or Remote Desktop Services and Application Management provided by App-V.  Each tier has its own management solution (at acertain scale) but it is possible to combine RDS on a single Hyper-V server and use Server roles and role services to get centralized management for smaller environments.
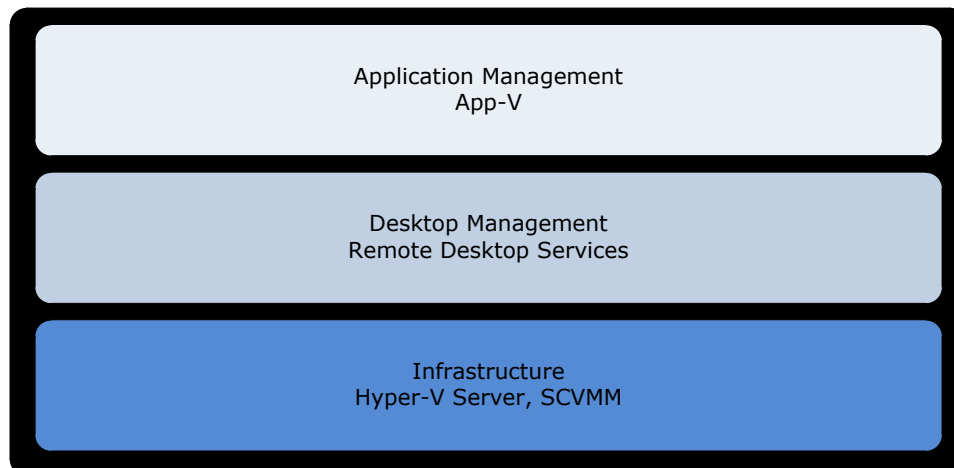


## Installation

The installation of the Roles and services are all pretty straight forward and can be done from server manager but you do have to keep some things in mind.  If you are deploying the service as a collection of virtual machines ensure that you sysprep everything before you add it to your Windows 2008 R2 functional level domain.  If you install the solution on your Hyper-V host server then you simply add all the required roles and services to the host.  If you do not, you do need to remember that the Hyper-V host needs to run the Remote Desktop Virtualization Host RDS service role.
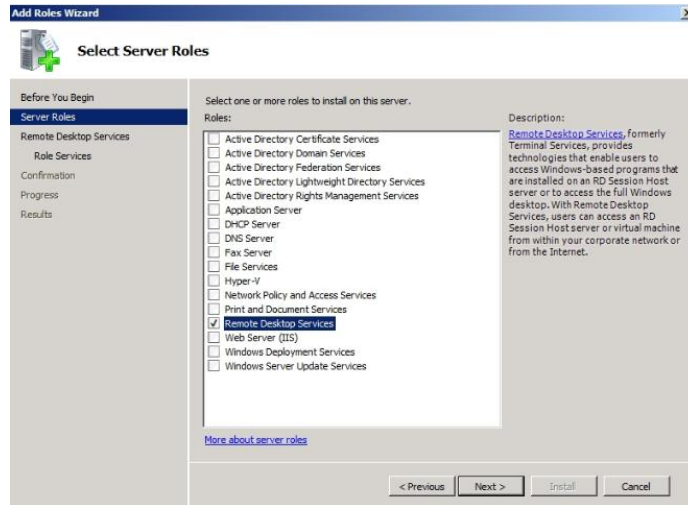
The Remote Desktop Virtualization Host role ensures that any virtual desktops are available to a RDS connection server to allow the configuration of pooled desktops. In addition, if you do decide to split the Remote Desktop Session host (TS Server) and Remote Desktop Web Access (TS Web) you will need to ensure that you add the RDS Web server to the TS Web Access Computers group on the RDS Session host. This ensures that the Web Server can query the applications available and display them on the web portal. Once you have installed all the necessary roles and services you still need to complete a number of configuration steps.

Microsoft does provide several prompts and related information on what needs to be completed under the Remote summary pages of the various role services to step you through what needs to be completed. It is clear though, that this ease of setup does not extend yet down to the virtual desktops themselves as several manual or scripted changes are required to make them ready.
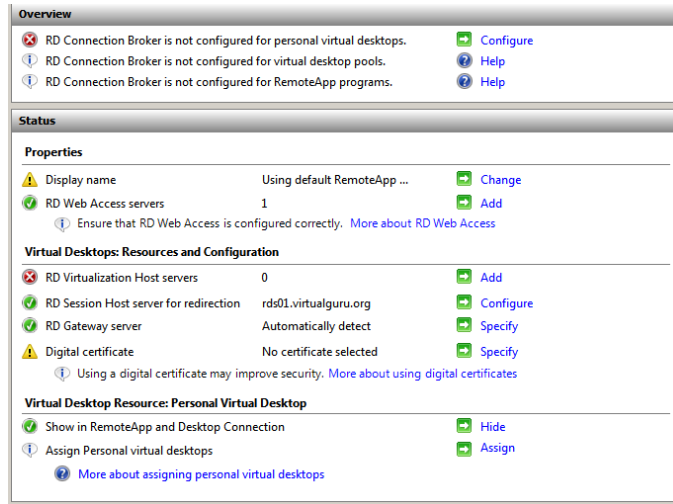


Once you have everything properly setup you can assign personal desktop as an Active Directory user attribute or you can create a Pool of virtual desktops. You can setup a desktop pool from within the Remote Desktop Connection Manager.
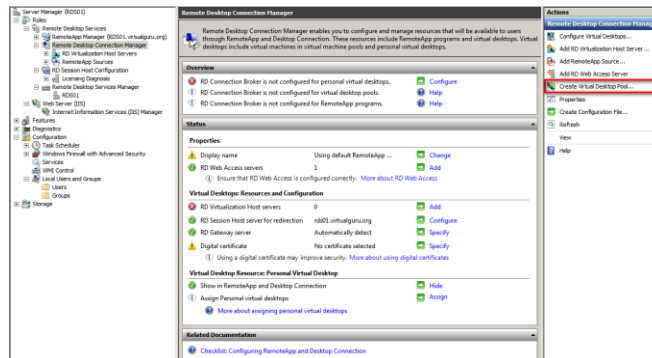
## Features & Functionality

### Integration into the iPad

We decided to see whether the WYSE Pocket cloud might work in an RDS VDI environment. Unfortunately the WYSE Pocket cloud only allows us to specify a single IP or Name for an RDP connection.  We could still make it work over wireless using DNS round-robin to our desktop pool but we really were starting to stretch the boundaries and bypass the Connection broker in the process.

### Multi-Monitor

Microsoft introduced multi-monitor support in RDP 6.X (mstsc.exe /span or /multimon).  With RDP 7.X you can enable multiple monitors just by selecting it from within the Remote Desktop Connection.
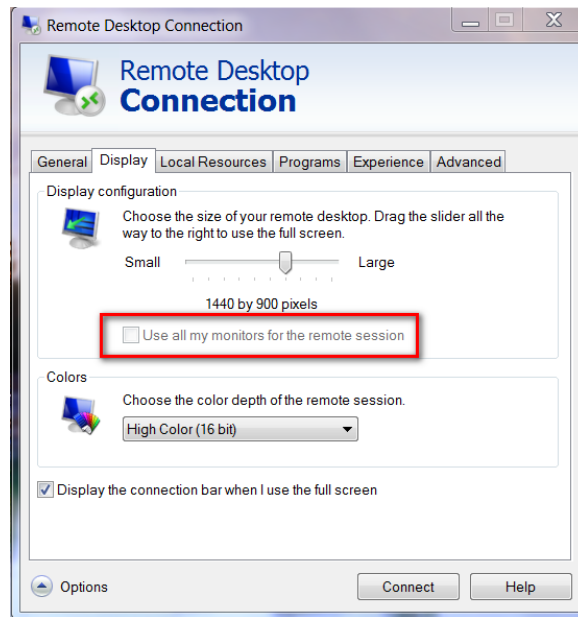


### Multi-Media

When you install the RD Session Host you can select the options to install the components required for multi-media redirection.  By installing the components you can allow certain audio and video formats to be run on the client computer vs. the virtual desktop.
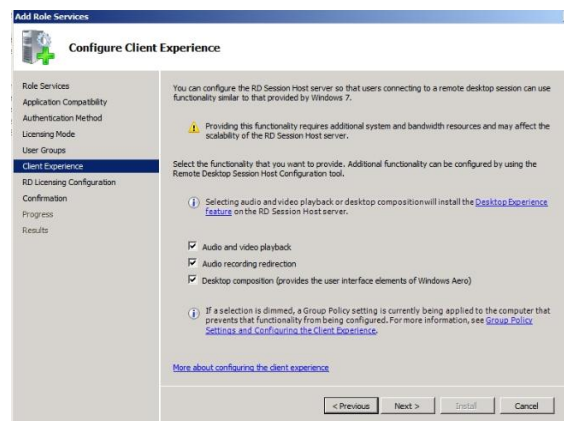
To redirect the media format to the local client simply expand the options on the Remote Desktop Connection and go to the Local Resources settings. Under Remote audio you will see a settings button. This will allow you to determine where the media is played and also to enable audio recording.



The condition of course for any client side redirection of media is that the client must have the necessary decoders to play the content. Most Windows Media Player formats (WMA,WMV, MP3, etc.) will redirect successfully if you have configuring everything properly.

## Printing & USB Redirection

Microsoft has developed RemoteFX to simplify printing, enhance the display and eliminate driver dependencies for supporting a variety of USB based devices in a VDI environment. Many hardware vendors are shipping servers that support Remote FX however it requires Extended Page Tables (EPT) on Intel CPUs and Nested Page Tables (NPT) on AMD CPUs. The generic term for this support is Second-Level Address Translation (SLAT) capabilities on the processor. In addition you will need to install a Graphical Processor Unit (GPU) to enhance display, such as ATI FIrePro or NVIDIA graphic adapter cards (You can run more than one GPU but they must be identical on the host server). Once you have the hardware you will need to install Windows Server 2008 R2 with SP1 (SP1 is available as a release candidate).
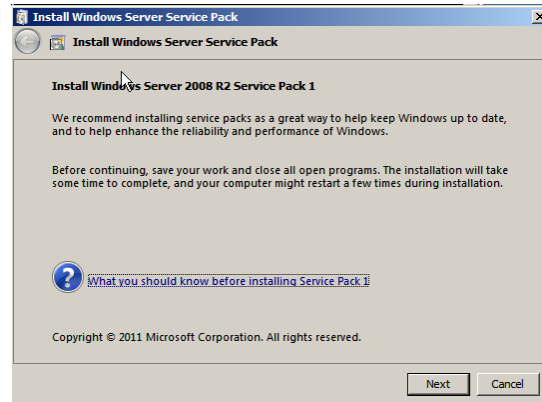
Once you do that you need to install the Remote Desktop Services role (Hyper-V will install if it was not already installed) and then add a Role Service; Remote Desktop Virtualization Host. When you select the Remote Desktop Virtualization Host you will see an option to add RemoteFX as well. After this is done an additional item gets added as an option to the hardware profile of your virtual machines; the RemoteFX 3D Video Adapter.

To take advantage of the RemoteFX USB support from the client, you enable a RemoteFX USB Device Redirection Policy and Enable Allow "RDP redirection of other supported RemoteFX USB devices from this computer" (The new policy is visible after you install SP1 on a Windows 2008 R2 Active Domain server).

Once this policy is updated on the client side you will see an additional RemoteFX option within the Remote Desktop Connection tool on the client.

## Latency
The latency testing tested the RDP protocol version 7.X over 100 ms and latency and higher the video of the results can be found here [http://www.youtube.com/watch?v=c1QSWUcU3h0].

## Conclusion
In an attempt to be fair to the products we compare we wanted to stipulate a few categories for comparison. We have divided these between core and nice to have features.

Core features; with today's desktop challenges you need a base set of features available in your Virtual Desktop Infrastructure (VDI) product. While the solutions have evolved to provide many features, I would argue that a core feature set should be available in mature VDI solution. We define these as:

- Hypervisor; as VDI is not necessarily the most cost effective way to deliver applications, bundling the hypervisor as part of the solution definitely adds value.

  Microsoft does include the Hyper-V platform in both the VDI standard and premium suite. Both options include Hyper-V Server 2008 R2 as the virtualization platform for hosting desktops and System Center Virtual Machine Manager (SCVMM) for centralizing management of the virtual infrastructure.

- Application Virtualization; Do I have an option to virtualize applications to reduce the overhead in deploying, updating and patching applications?  How flexible is the solution and does it come with any limitations?

  Perhaps the most mature of all the application virtualization solutions is App-V.  In addition Microsoft has taken steps to enhance its value in virtual desktop environment.  For example, with App-V 4.6 rather than having the App-V cache localized to each virtual desktop you can have a single cache shared for all VDI instances.

- Advanced Image management; Microsoft does mention using snapshotting to ensure that the virtual desktops are in a consistent clean state but this is available in most virtual infrastructure platforms.  We would not consider this advanced image management although integrating other Systems Center features might get you close, there is nothing designed specifically for the purpose incorporated into RDS.

- User Data

  Microsoft's solution is to use windows based profiles.  While Microsoft has made user profiles better in Windows 7 and Windows 2008 there is no additional capabilities designed to enhance a virtual desktop environment.

- Flexibility; does the solution restrict my options or tie me to a single vendor solution?

  While the traditional TS server portion of RDS can run on anything the virtual desktop piece is tied closely to the Hyper-V platform.  Personal desktops can be any desktop in the Active Directory but pooled virtual desktops are only available when a Hyper-V host is running the RDS Virtualization Host services role.

  Deployment & Management; How straight forward is the product to deploy and manage.  How much technology do I need to understand and implement to get all the features I have purchased in the bundle?

  While some aspects of the deployment are simple others are not yet automated.  In addition the ideal environment requires RC2 functional level (although not mandatory) which may restrict some customers from taking advantage of RDS.  In Microsoft's defense, they currently do not recommend RDS as appropriate for large enterprise but instead defer to their strategic partners like Citrix or Quest to handle enterprise scale VDI environments.

- Offline Mode; Does the suite include this capability?

  No

- Multi-tenancy; Does Microsoft provide anything to enable isolation of one VM from another

  No

Microsoft is aggressively developing their message and capabilities around virtualization. Along with a more cohesive message we are seeing the products align and integrate. RDS is in transition from traditional server based computing solution to a comprehensive VDI option which incorporates TS and virtual desktops. While the virtual desktop pieces lack some maturity, RDS is becoming a point of consideration in medium and small organizations looking for a cost effective VDI solution.