



User Manual

Version 0.9.9.o BETA III

December 15th, 2015

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Setup and installation

At least 2 machines are needed to operate spacedesk. These machines are connected via a network and running two different software programs:

1. The Primary Machine is a Windows PC, laptop or Surface Pro tablet. It runs the network display server program including the display device drivers. This allows to extend or duplicate the Windows Desktop to the screen of another machine over the network.
2. The Secondary Machine runs a small viewer program which acts as the secondary display. It can be one (or multiple) of the following:
 - Windows PC, laptop or Surface tablet (Personal View – Windows application)
 - Android tablet or phone (Basic View – Web Browser application)
 - Apple Mac, iPad or iPhone (Basic View – Web Browser application)
 - Windows Surface or phone

System requirements

At least 2 machines are needed to operate spacedesk. Both machines must be connected via a Local Area Network (LAN e.g. Ethernet, Wireless, etc.). TCP/IP protocol must be supported by the network.

Primary Machine (network display server)

- Windows PC, laptop or surface tablet
- Processor platform: x86 and x64 (ARM not supported)
- Memory: > 4GB RAM
- Operating systems: Windows 10 / 8.1 / 8 / 7 (aero - glass transparency look supported)
- Graphics adapter: Nvidia / AMD / Intel / Microsoft Basic Display
- WDDM 2.0 / 1.3 / 1.2 / 1.1
- DirectX 12, 11, 10, 9

Secondary Machine “Personal View” (network display client)

- Windows PC, laptop or surface tablet
- Processor platform: x86 and x64 (ARM not supported)
- Operating systems: Windows 10, 8.1, 8, 7
- DirectX 10
- DirectX WARP (Min. 800 MHz CPU / Min. 512MB RAM)

Secondary Machine “Basic View” (network display client)

Web browsers Chrome (> 16), Firefox (> 11), Safari (> 5.1) Internet Explorer (> 10), Opera (> 27) on any device or machine e.g.:

- PC, laptop and Surface (Windows)
- Mac (OSX)
- PC and laptop (Linux)
- iPad and iPhone (iOS 8)
- Android tablets and mobile phones (Android)
- Windows Phones (Windows Phone 8.1)

Network connection

Both computers must be connected via a network connection running the TCP/IP protocol. This connection can be wireless or via cable (e.g., 1394 Firewire, Ethernet cable used as “cross over” cable or connected to a network hub). If available, a cable is usually preferred. Cable typically delivers better performance than wireless networks.

Setup on Primary Machine

Install

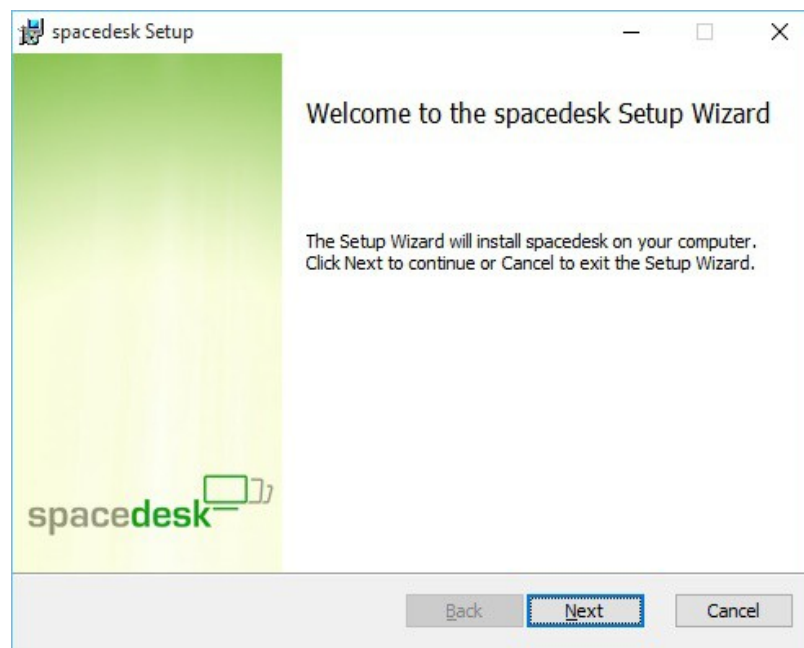
Step 1: Uninstall any previously installed versions

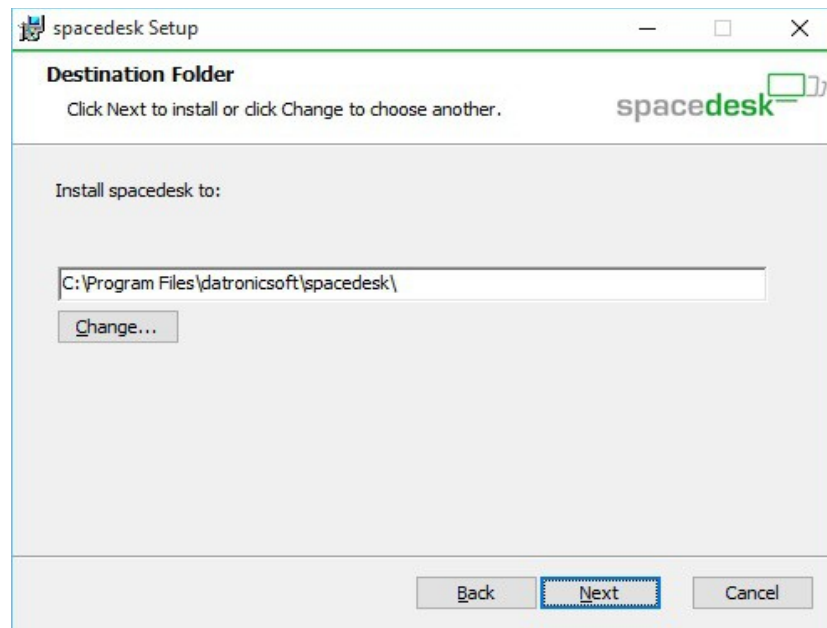
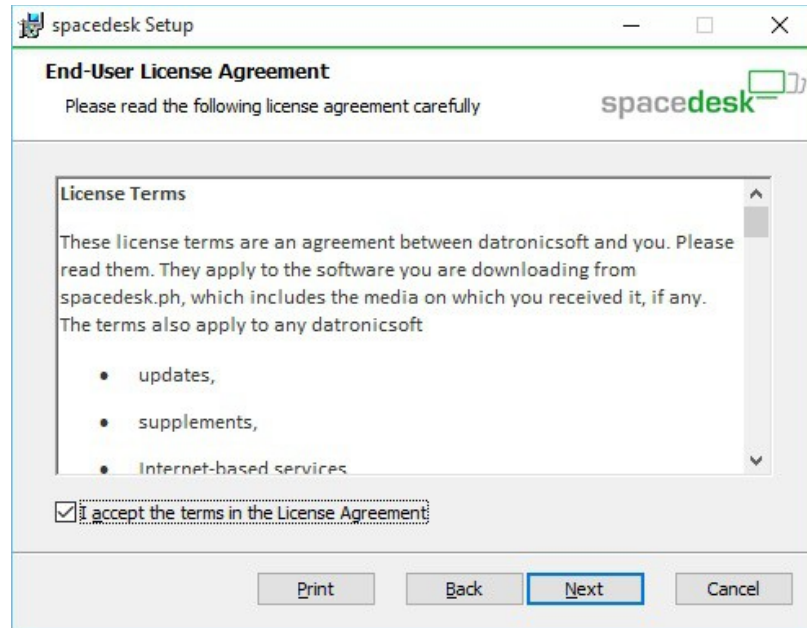
Before installing a new spacedesk version, uninstall any previous version. Skipping this step may result in driver conflict and improper operation. Uninstall of spacedesk can be done on Control Panel → Programs and Features.

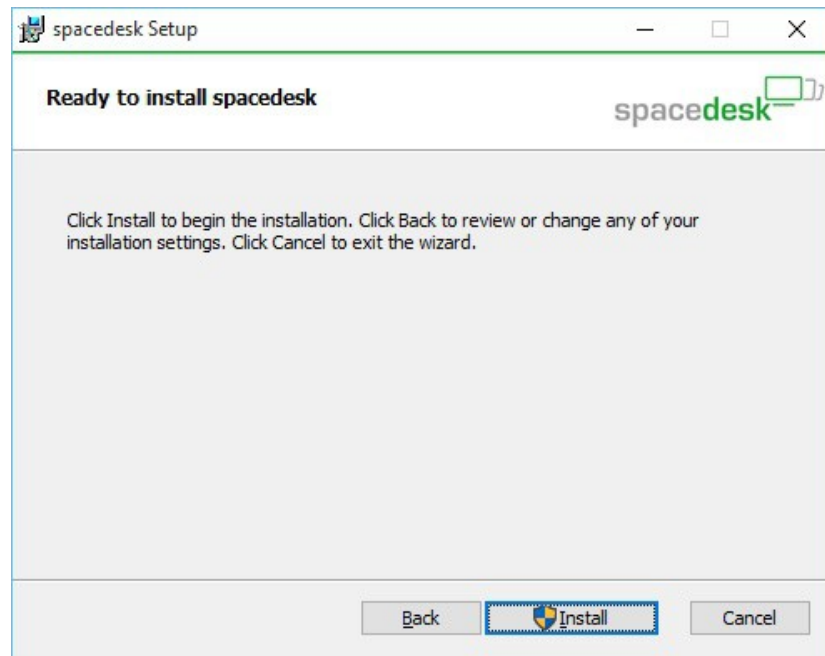
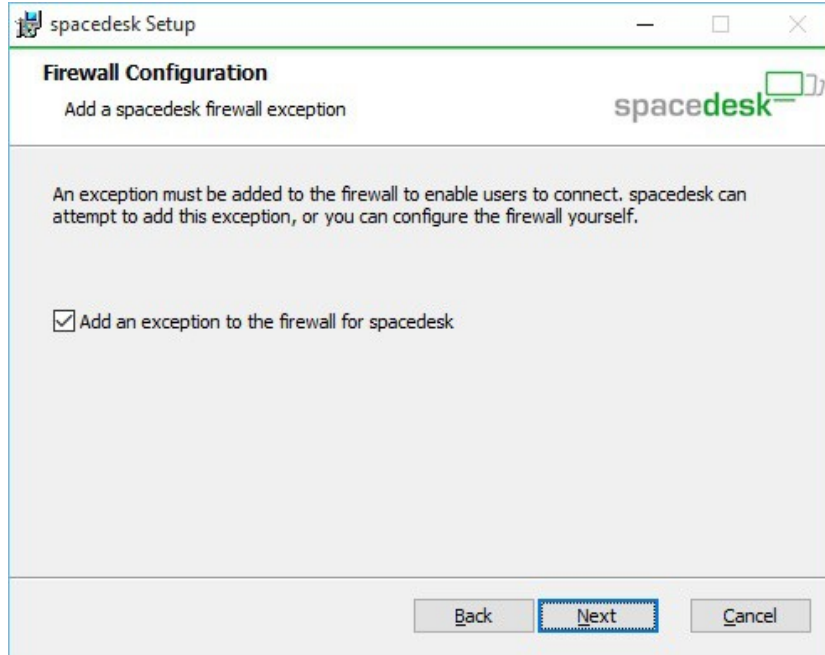
Step 2: Run the spacedesk setup installer

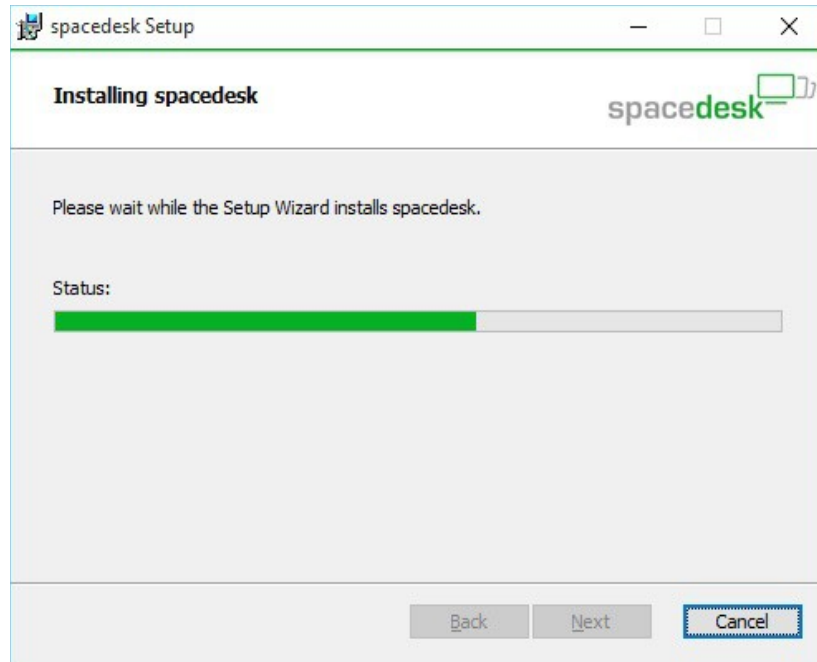
spacedesk_32_driver_099_BETA_III.msi for x86 platform

spacedesk_64_driver_099_BETA_III.msi for x64 platform









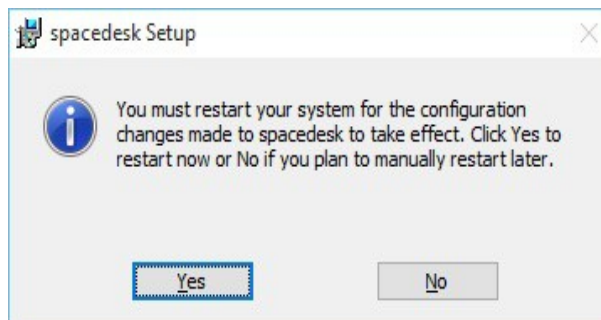
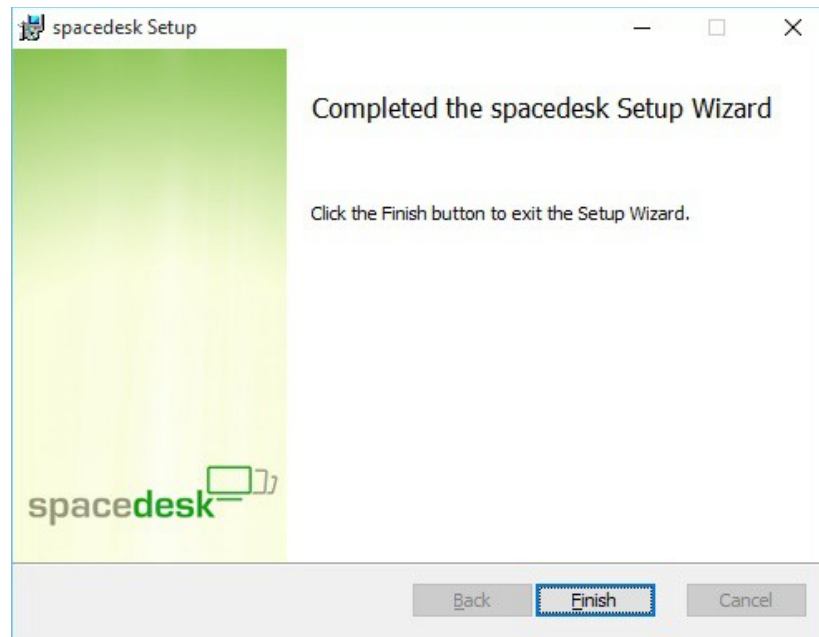
Step 3: Windows security confirmation of driver install

A "Windows Security" window will pop up. Select "install" to proceed with the setup.



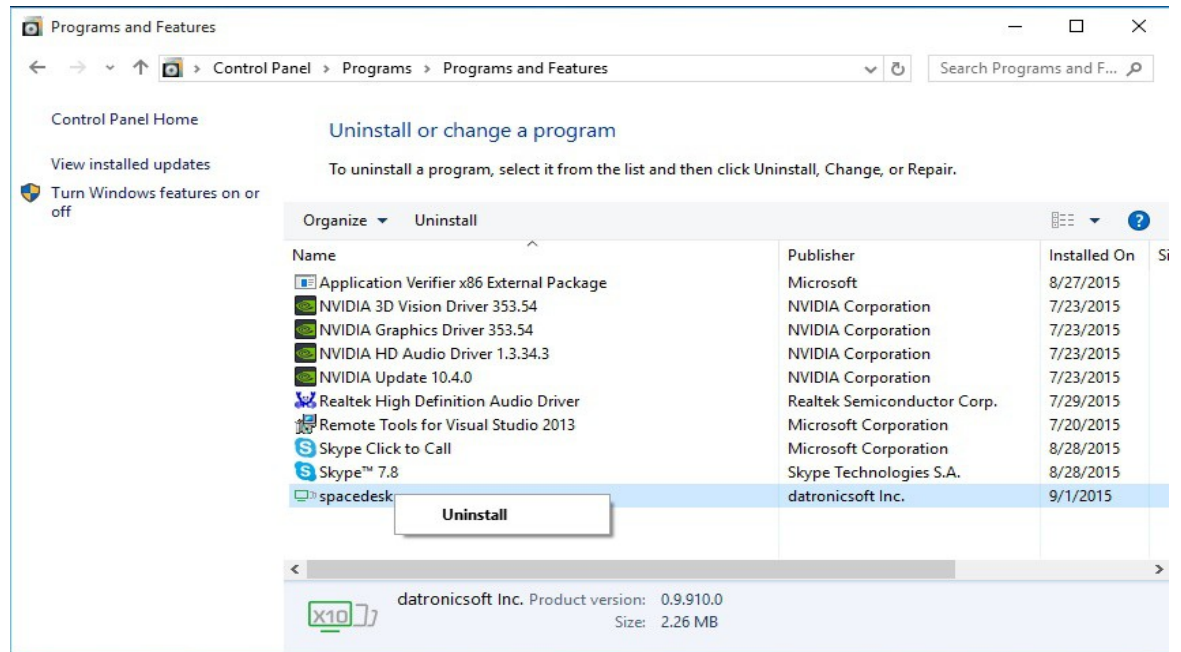
Step 4: Reboot

After the installation has completed, reboot the system.



Uninstall using Windows Control Panel

Uninstall of spacedesk can be done on Control Panel → Programs and Features.



Uninstall using .msi file

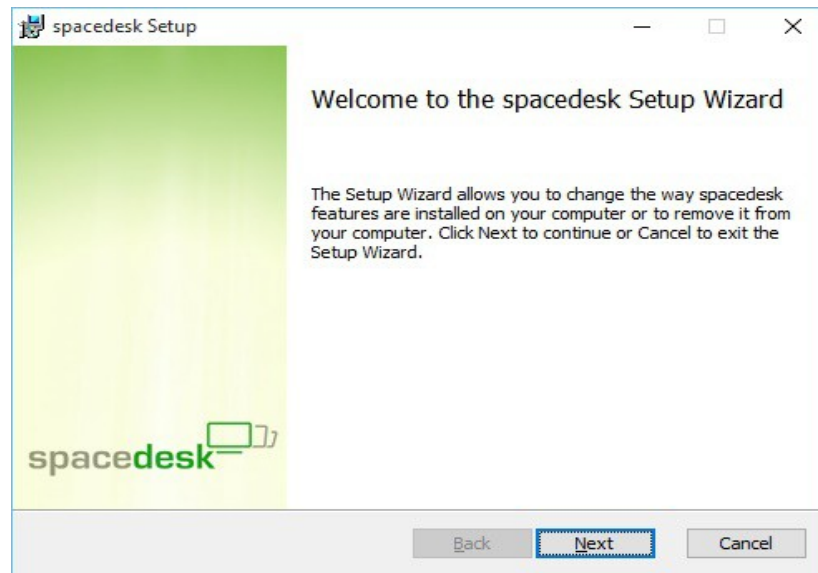
An alternative way to uninstall spacedesk is using the spacedesk msi installer file.

Step 1: Run the setup installer

Run the spacedesk Setup installer.

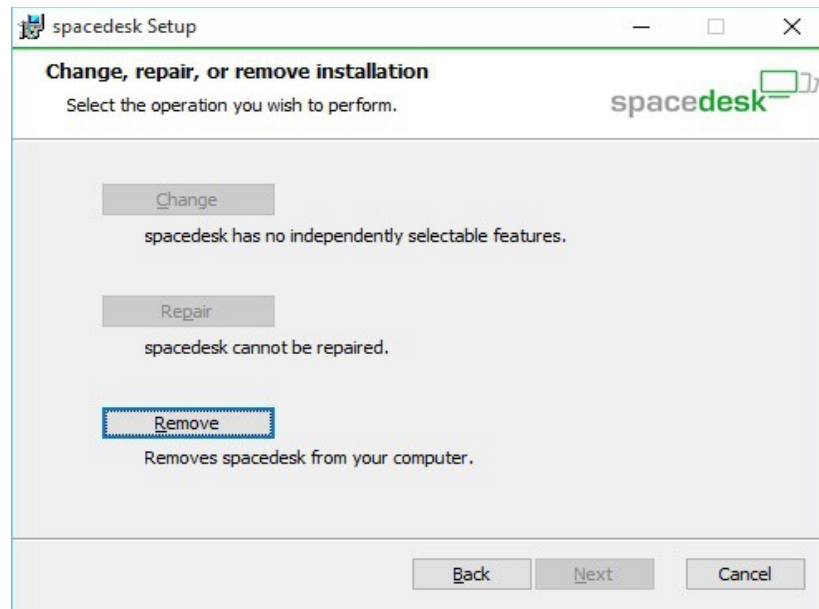
spacedesk_32_driver_099_BETA_III.msi for x86 platform

spacedesk_64_driver_099_BETA_III.msi for x64 platform

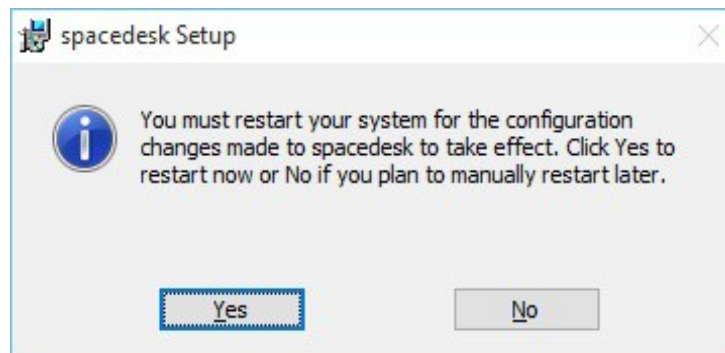


Step 2: Click the remove button

After the installation has completed, reboot the system.

**Step 3: Reboot**

After the uninstallation has completed, reboot the computer before proceeding with any other task.



Uninstall manually (expert mode – for troubleshooting only)

An alternative way to uninstall spacedesk is using the spacedesk msi installer file.

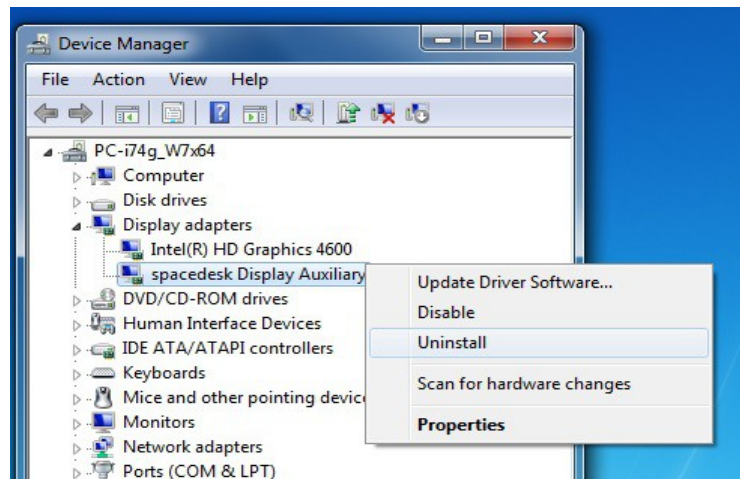
Step 1: Uninstall services

Run a Command Prompt (cmd.exe) "as administrator" and enter the two commands below:

```
sc delete spacedeskHookKmode
sc delete spacedeskService
```

Step 2: Uninstall spacedesk Display Auxiliary (for Windows 7 only)

For Windows 7 32bit and 64bit OS, manually uninstall the spacedesk Display Auxiliary on the Device Manager.



Step 3: Reboot

Reboot the system and ensure that the two registry keys below have been removed:
 HKEY LOCAL MACHINE\SYSTEM\CurrentControlSet\Services\spacedeskService
 HKEY LOCAL MACHINE\SYSTEM\CurrentControlSet\Services\spacedeskHookKmode

Step 4: Delete files

Delete all files listed in the appendix of this document underneath "File list".

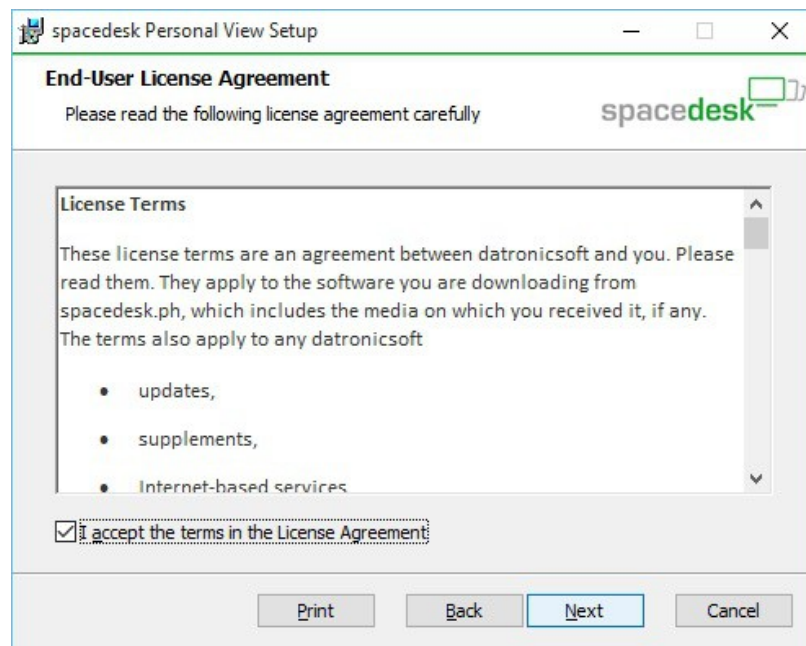
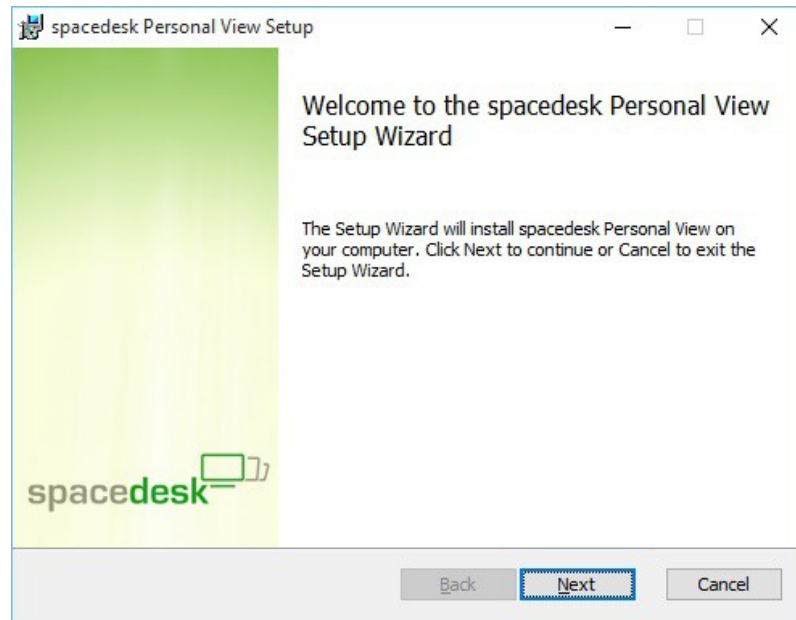
Setup on Secondary Machine

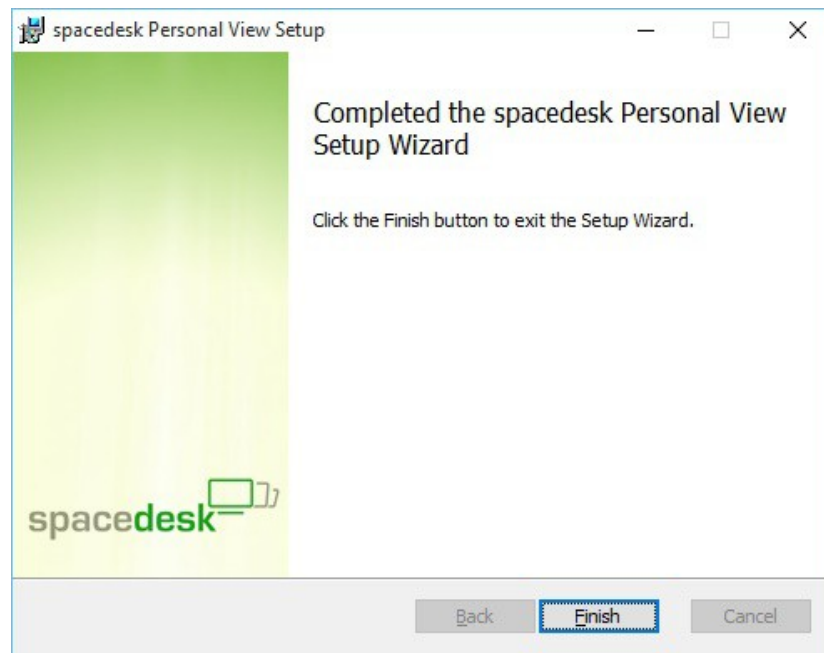
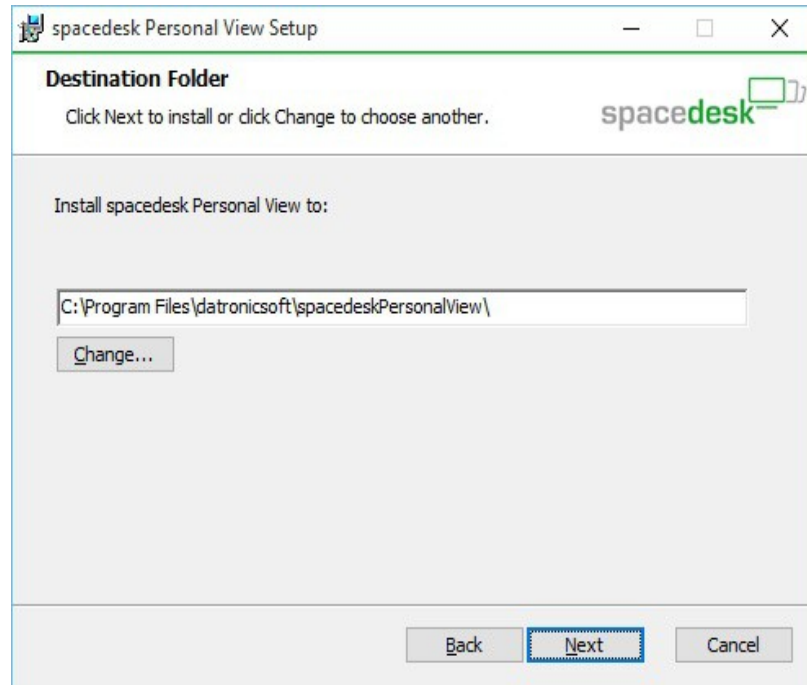
For spacedesk "Basic View", no setup installation is needed on the Secondary Machine. spacedesk "Basic View" operates with a standard web browser without any setup needed upfront.

Only spacedesk "Personal View" for Windows, needs setup installation on the Secondary Machine. spacedesk "Personal View" is a Windows application running on PC, laptop or Surface tablet. It can be installed as shown below

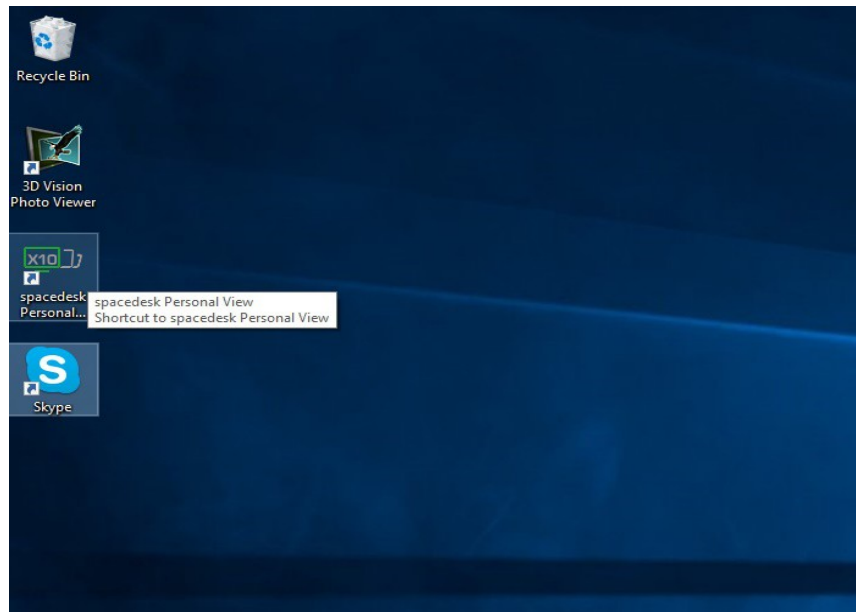
Install Personal View on Windows machine

Run the spacedeskPersonalView setup installer, spacedeskPersonalView.msi





After a successful installation of spacedesk Personal View a shortcut to the Personal View application is created on the desktop.



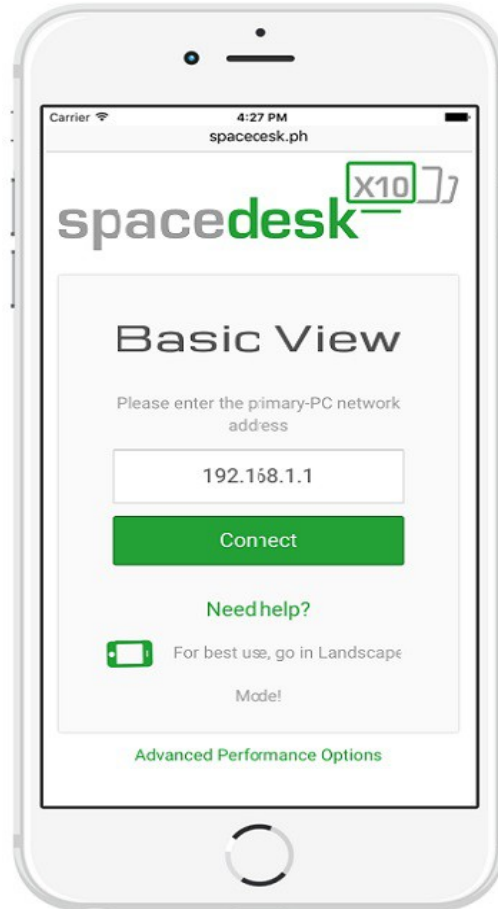
Uninstall

Uninstallation of spacedesk "Personal View" on Secondary Machine can be done on Control Panel → Programs and Features. Another way to uninstall spacedesk "Personal View" is by using the msi installer.

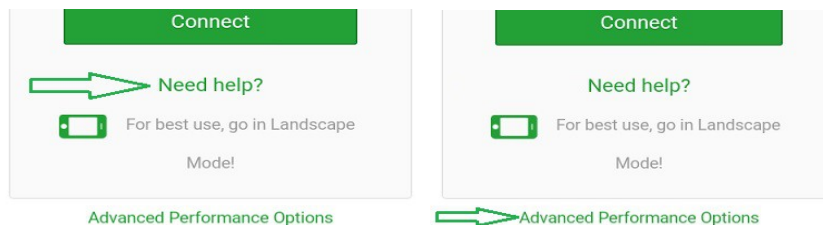
spacedesk operation

Connecting a display by Basic View

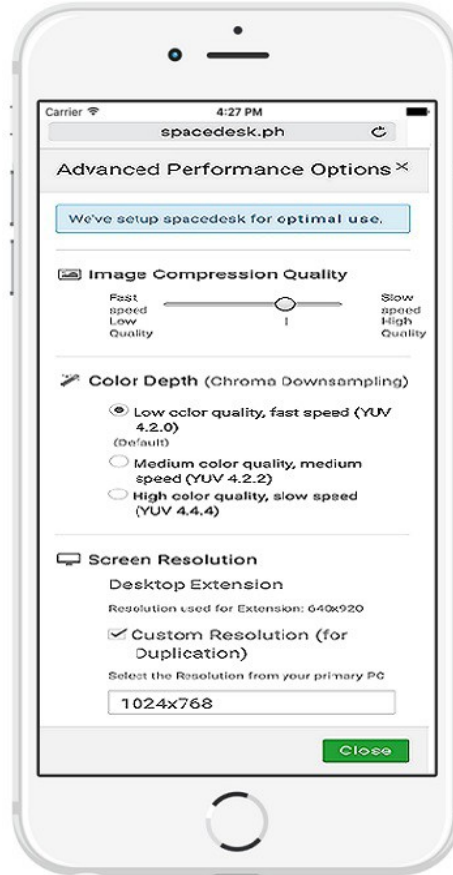
Step 1: To connect via Basic View, a Windows PC or other device such as smartphone, tablet, iPad, etc. can be used as secondary machine. The device needs a web browser (e.g. Google Chrome, etc) installed. Go to “<http://www.spacedesk.ph/basicview/>” (careful – case sensitive)



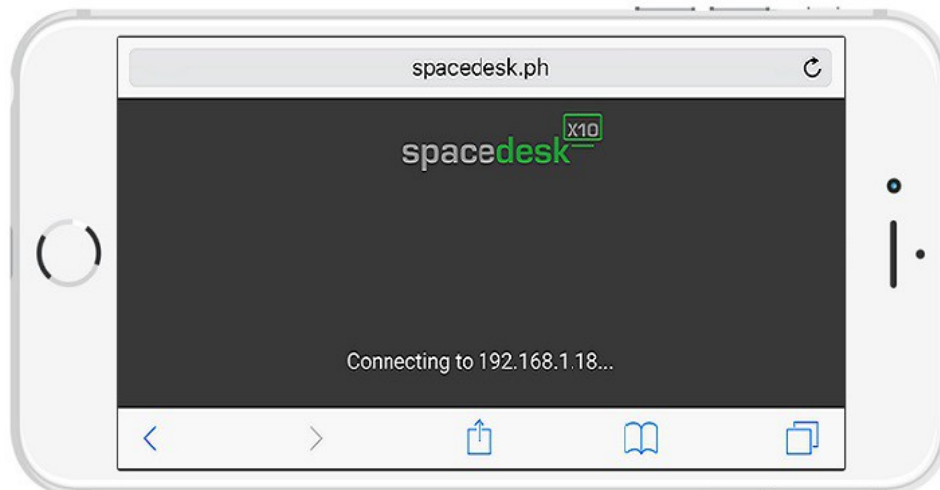
Step 2: Type the IP address of primary machine where the spacedesk server is installed. To get the IP Address of the primary machine click the “Need Help?” button below the Connect button.



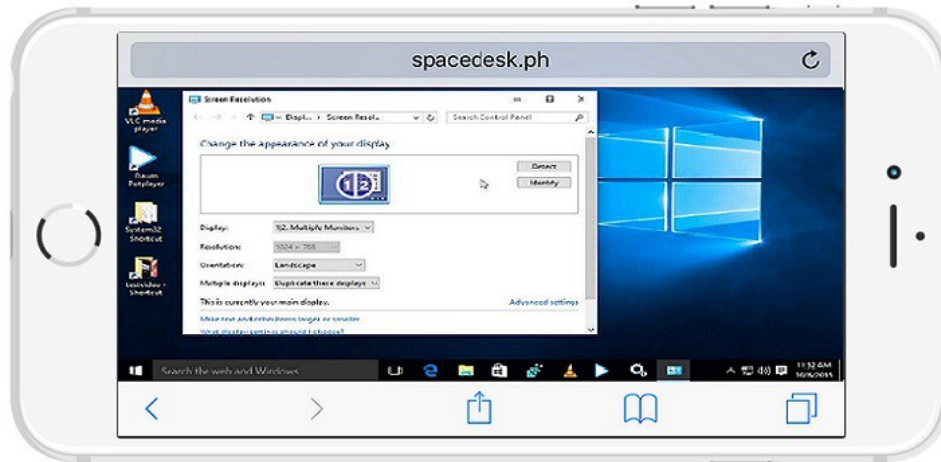
While the “Advanced Options” button allows the user to choose the advanced settings of the Basic View, such as the desired appearance whether in full screen or windowed, the scaling type, compression quality to adjust the image quality and the color depth type for the color quality of the image. (see the definition of color depth type on Performance tuning section of this manual)



Step 3: Type the server's IP address on the spacedesk Basic View to start the connection.



Note: At this point, connection was successfully established and spacedesk Basic View can now “extend” or “duplicate” the display of the primary PC.

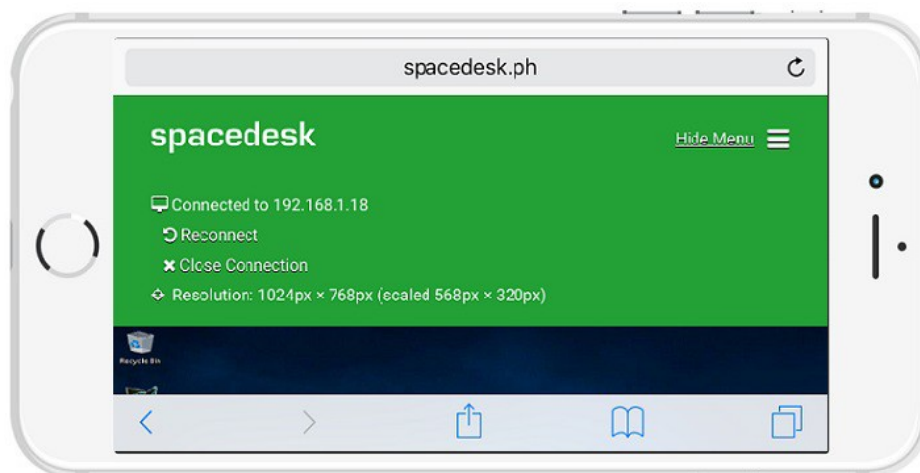


Step 4: In case the screen of the device automatically goes off and needs to tap the screen, it can be easily set on the device's settings to prevent from screen timeout from happening frequently.

On Android, for example just go to Settings → Display → Screen Timeout then set to its maximum (e.g. 30 minutes).

On iPhone or iPad, just go to Settings → General → Auto-Lock then set to its maximum (e.g. 5 minutes) or set it to “Never” so it will be turned off temporarily.

Step 5: Once connected, the user can be able to reconnect or disconnect the basic view properly by selecting the “Show Menu” option at the upper right corner of the view.



Off-line option for Basic View

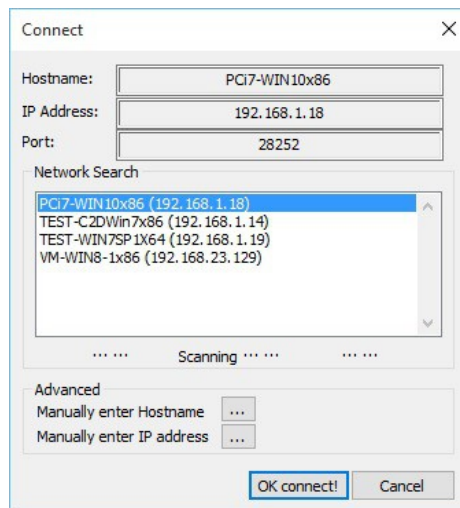
The spacedesk Basic View web page can now be saved and used off-line (even without internet connection). If you already use spacedesk Basic View before, please refresh using Ctrl-F5 keys after opening Basic View (this ensures that everything is updated). Then follow the instructions below:

- For Google Chrome browser, use the the menu "Tools" and select "Add to taskbar".
- For Mozilla Firefox browser, just save the page as a local file.
- For Microsoft Internet Explorer browser, use the the menu "Tools" and select "Add site to apps"

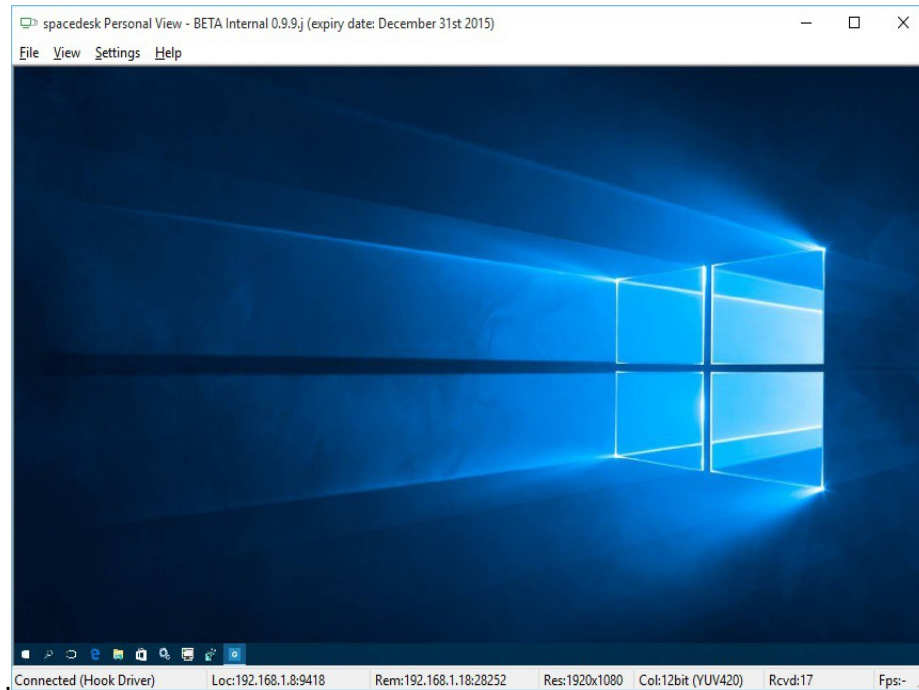
Connecting a display by Personal View

Step 1: Run the shortcut of “spacedesk Personal View.exe” located on the desktop of the secondary machine.

Step 2: The “Connect” menu dialog box of the “spacedesk Personal View.exe” running in the secondary machine allows the user to choose the computer name with its corresponding IP Address in the Network Search box of the machine running a spacedeskService.



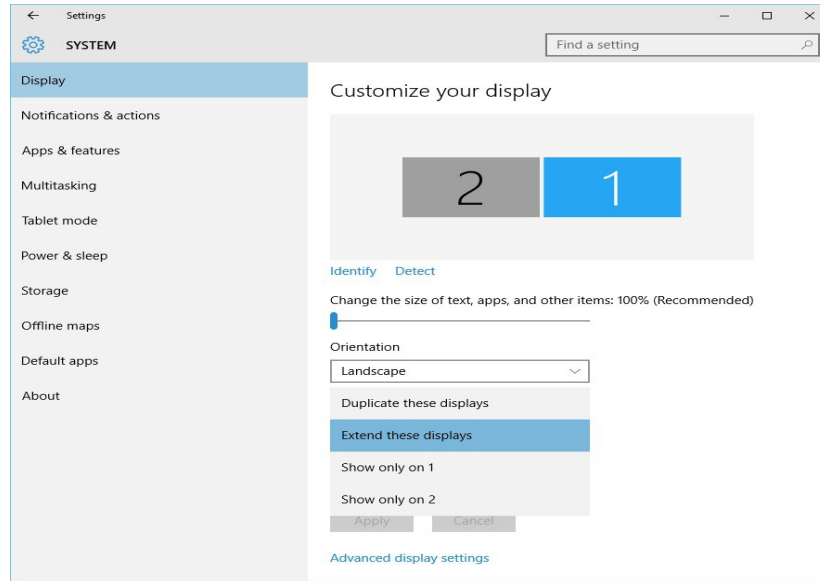
Note: At this point, connection was successfully established and spacedesk Personal View is now able to “extend” or “duplicate” the display of the primary PC depending on the mode (Desktop Extension or Desktop Duplication) that was previously selected by the user



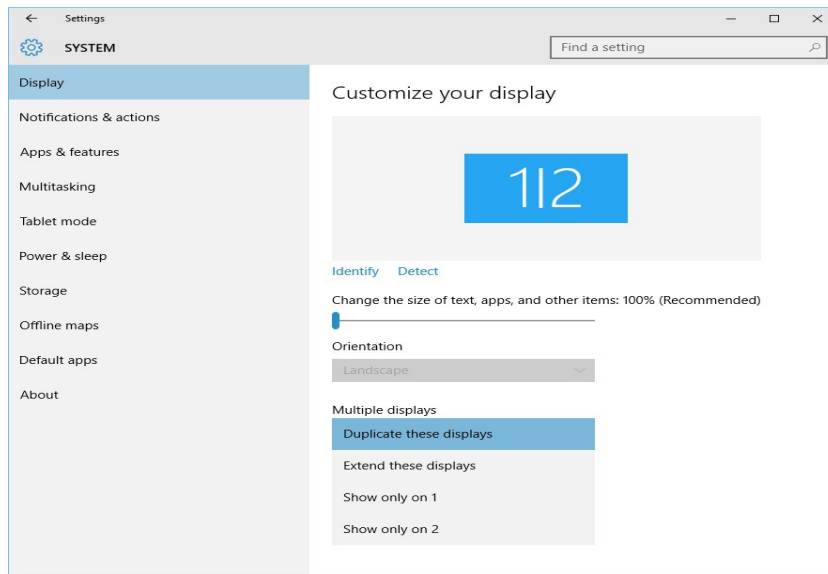
Step 3: To enable Full screen mode of the application just select View → Full screen or press “Alt + Enter” key or just by double clicking the viewer screen. Upon entering the full screen mode it will prevent the client from switching to display-off or the screensaver application as long as the login screen display on resume is disabled. To exit from full screen mode just press the “Esc” or “Alt + Enter” key or double click it again.

Display Control Panel for selecting desktop extension or desktop duplication (mirror)

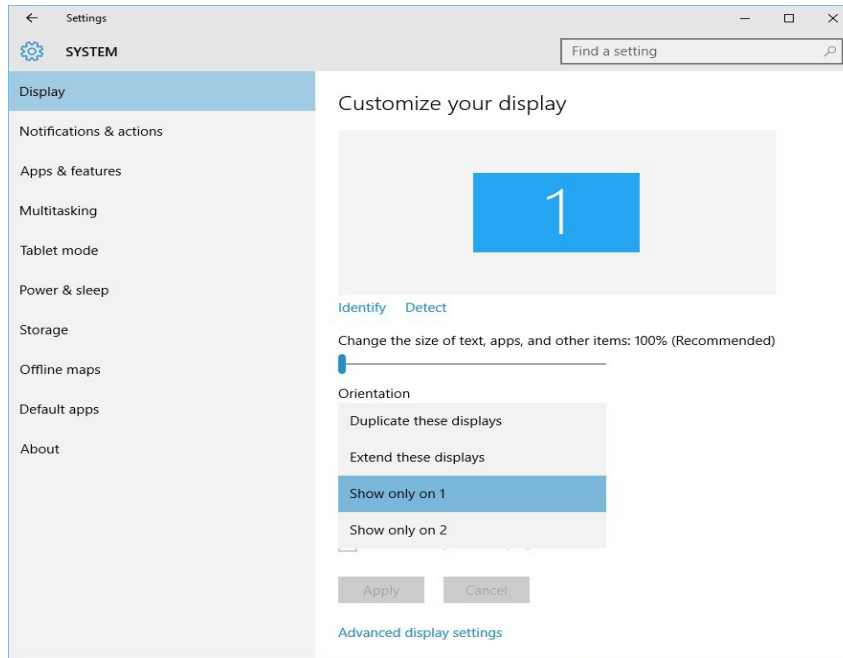
Right Mouse Click on Desktop → context menu “Screen Resolution” leads to Display Control Panel. Display Control Panel can be used to change display resolutions and to verify proper operation. During Desktop Extension the following status should be shown:



During Desktop Duplication (Mirror) the following status should be shown:

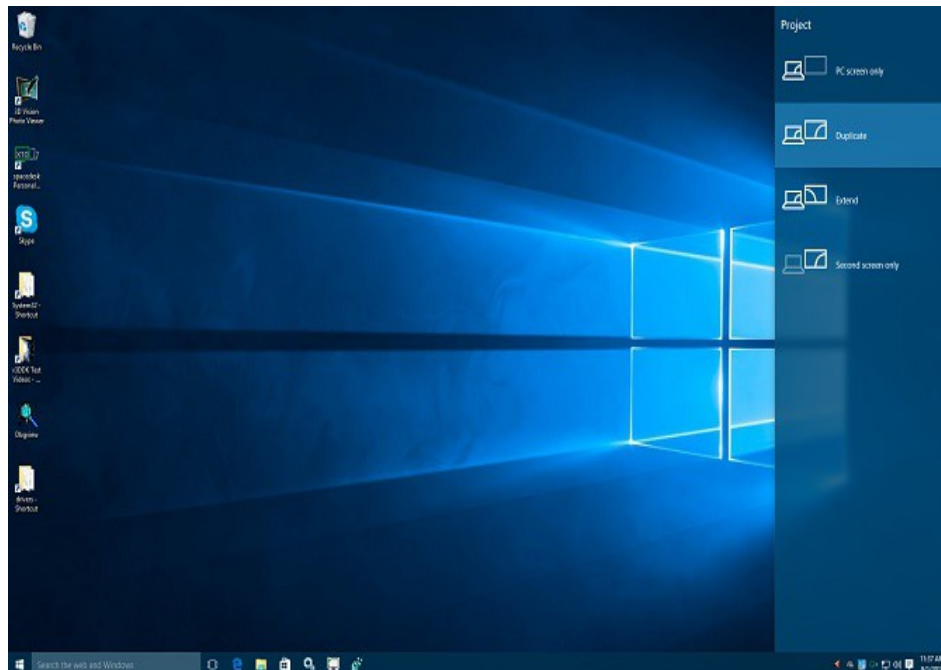


During Single Output (Second Screen Only) the following status should be shown:



Display Switch for selecting desktop extension and desktop duplication (mirror)

Display Switch (Windows logo + P) can also be used to change modes

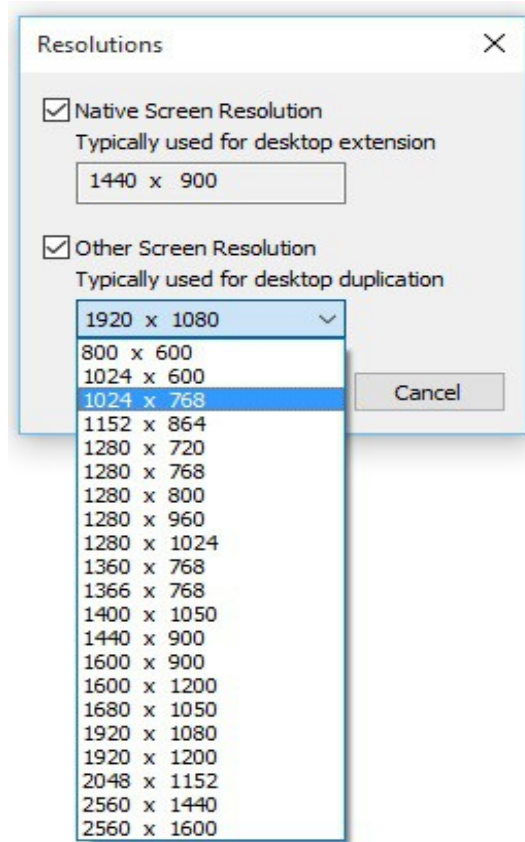


Configuration settings

Below a few configuration settings to adjust spacedesk operation to individual needs.

Screen resolution

The “Resolutions” dialog box of the spacedesk Personal View Settings allows the users to use up to two resolutions. The client's native resolution can be enable and use by checking the box of “Native Screen Resolutions”.Then the user can also add another resolution by selecting one of the typical screen resolutions on the combo box.



Automatic Reconnect

The “Automatic Reconnect” option of the spacedesk Personal View Settings allows the user to enable an automatic reconnection of the personal view to the server machine in case of sudden disconnection from system sleep or hibernate or from any kind of unwanted disconnection.

Full screen upon Connect

The “Full screen upon Connect” option on spacedesk Personal View Settings will enable the automatic switching to full screen mode upon connecting to the server.

Performance tuning

The following variables are influencing display performance:

- Network bandwidth
- Screen Resolution
- Color depth
- Image compression

Network bandwidth

The faster the network, the faster the display performance. Cable networks tend to have better performance than wireless networks. The fastest option is always a direct connection via network cable, e.g. a Gigabit Ethernet.

Currently minimum reasonable network bandwidth needed by spacedesk BETA ranges around 50 Mbit/sec. Substantial improvements including support of slower networks are planned for the first release version.

Screen resolution

The lower the resolution of the networked display screen, the faster the display performance.

Color depth and image compression

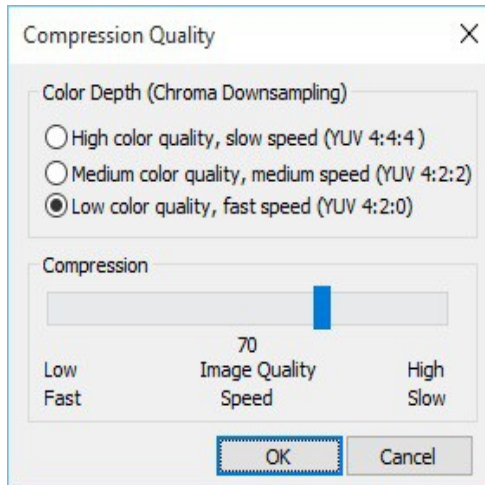
spacedesk uses image compression to improve display performance. This mechanism reduces image size before transferring images over the network. The spacedesk image compression algorithm is lossy. It reduces quality and color depth of the image

On fast networks, color depth and image quality can be kept very high while still achieving good performance.

On slow networks, color depth and image quality need to be reduced to achieve good performance.

spacedesk performance settings

The “Compression Quality” dialog box of the spacedesk Personal View Settings allows the user to reduce color depth by Chroma Downsampling and adjusts the compression quality to find the ideal image quality and performance speed.



YUV 4:4:4 - No reduction of color information. High quality of screen image but, performance intensive. Can only be used on very fast networks

YUV 4:2:2 - Reducing the color information by 1/3 (from 24 bit to 16bit) reducing color quality of screen image and improving performance.

YUV 4:2:0 - Reducing the color information by 50% (from 24 bit to 12bit) to achieve best possible performance.

The color loss caused by the above mechanism typically not very much noticeable for the human eye, especially when there is a lot of motion on the screen (e.g. playing a video). Thus YUV:4:2:0 is the default setting which can apply to many user applications.

The compression setting can be varied between 100 (no compression) and 0 (maximum possible compression). The default value is 70 which still tends to show a clear enough and detailed enough image for many user applications.

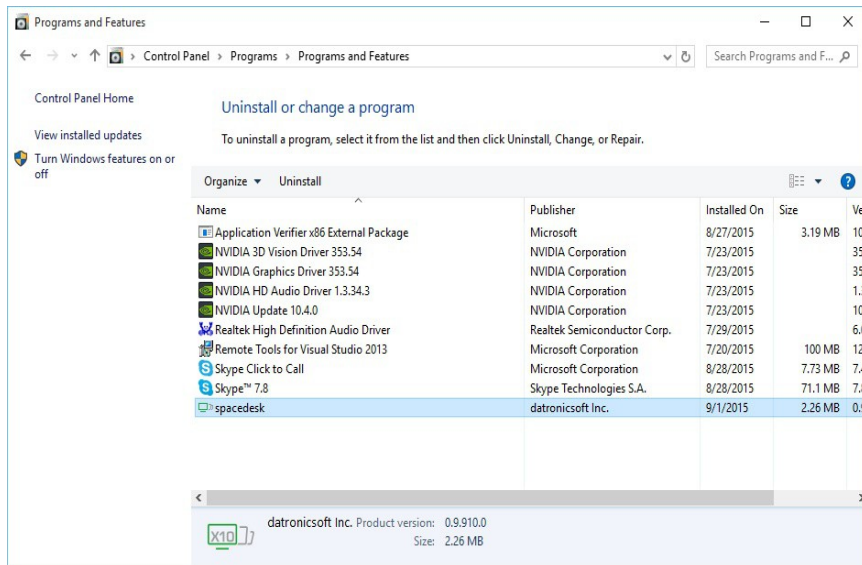
Appendix

Troubleshooting

Primary Machine

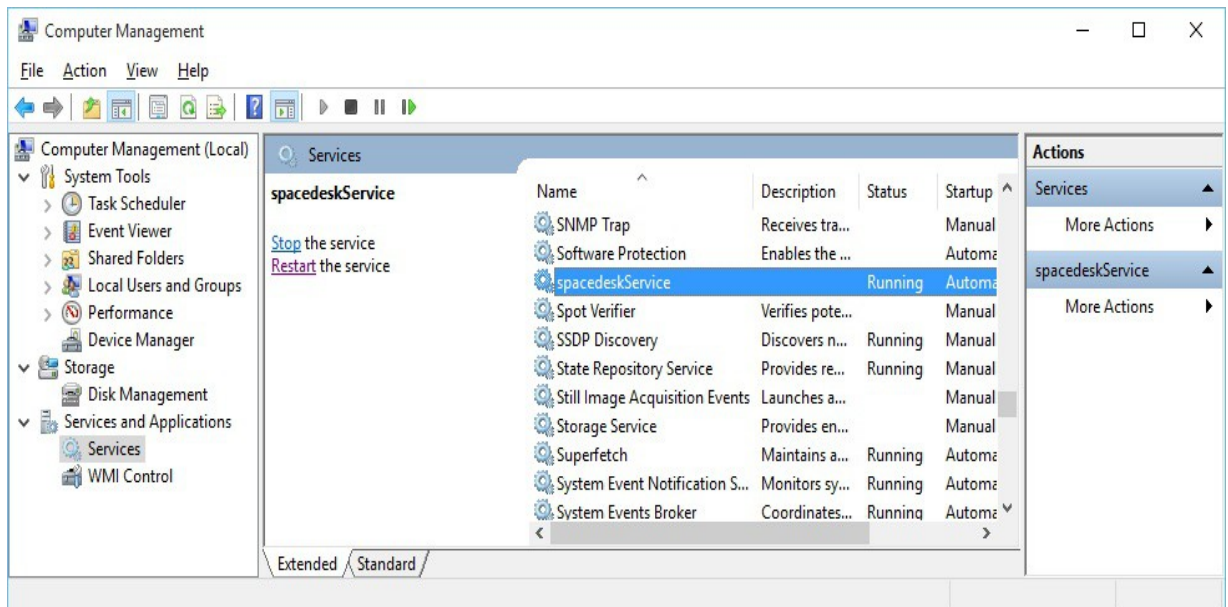
Step 1: Check installed versions

First, make sure that the most recent version is properly installed.



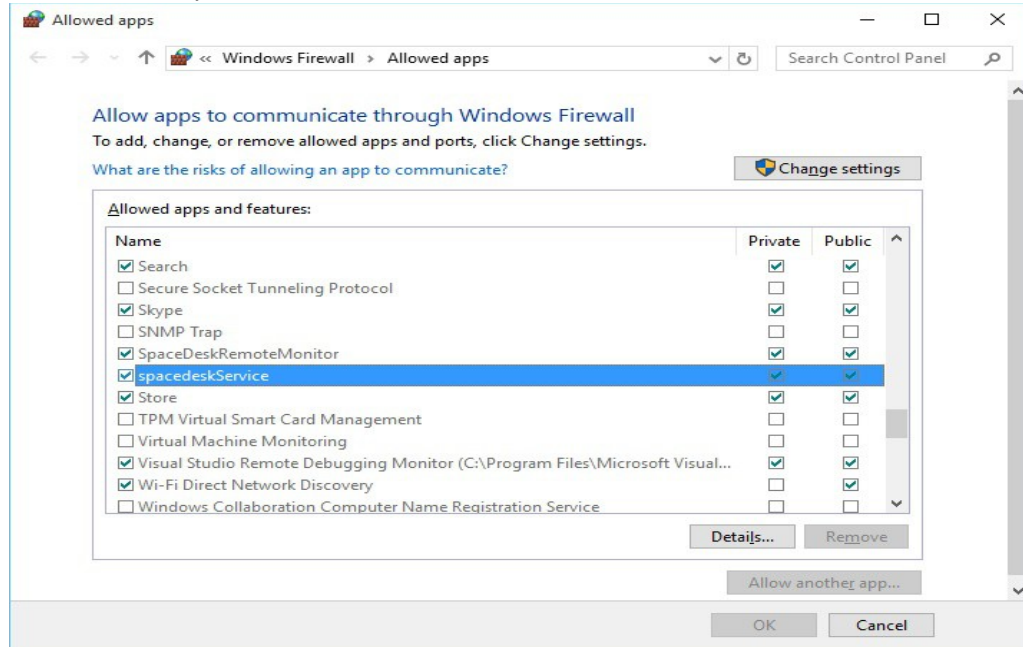
Step 2: Check if service is operating

Make sure that spacedesk service is started.



Step 3: Check if Windows Firewall is open for spacedeskService.exe

Check the firewall if spacedeskService.exe is allowed on private or public network. Open Control Panel → Windows Firewall → Allow an app through Windows Firewall, allow another app then browse for spacedeskService.exe located at “C:\Windows\System32” folder.



Step 4: Ping Test

If spacedesk Personal View Application cannot plug the Virtual Display Monitor try to ping test the IP address of another machine to verify if it is reachable across the local network.

A ping test is done to confirm if the machine is successfully connected to a network. Using the Command prompt, type “ping 192.168.x.x”, and check if it will get a reply from the other machine that will indicate that it is also connected to a same network.

```

C:\Users\PCi7-User>ping 192.168.1.27

Pinging 192.168.1.27 with 32 bytes of data:
Reply from 192.168.1.27: bytes=32 time=3ms TTL=128
Reply from 192.168.1.27: bytes=32 time<1ms TTL=128
Reply from 192.168.1.27: bytes=32 time<1ms TTL=128
Reply from 192.168.1.27: bytes=32 time<1ms TTL=128

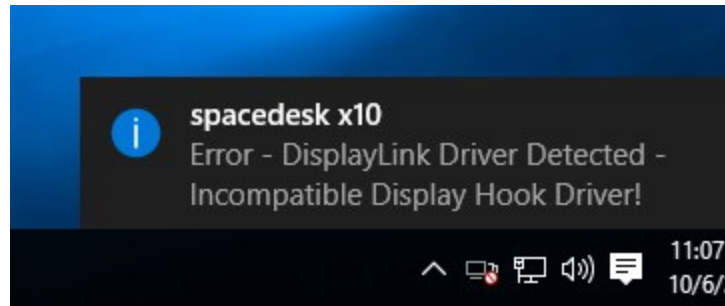
Ping statistics for 192.168.1.27:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 0ms

C:\Users\PCi7-User>

```

Step 5: Check if any other incompatible Display Hook Driver is installed.

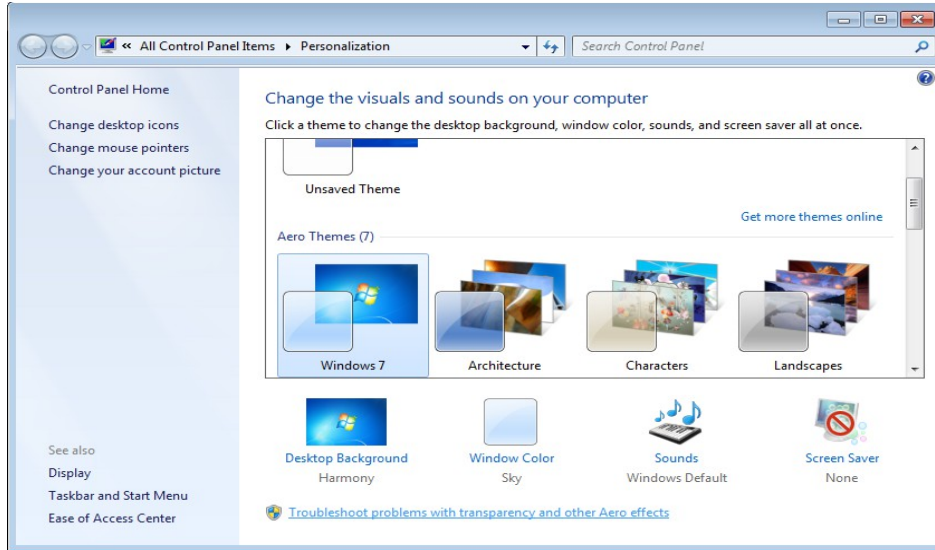
spacedesk is not compatible with other Display Hook Drivers (e.g. DisplayLink USB display, OSBase USB display , MCT Display Service and zero client drivers, etc.). Before starting to use spacedesk, make sure that any other other Display Hook Drivers are uninstalled. Otherwise, spacedesk will not operate and an info bubble pop up on the System Tray menu as shown below:

**Step 6: Clear Display Settings.**

In case a previous version of spacedesk was installed, it is recommended to Clear the existing Display Settings on primary pc that may prevent spacedesk from working properly. After a successful installation of latest spacedesk version make sure to right-click the spacedesk Tray icon then select the “Clear Display Setting” before trying to connect with personal view/basic view.

**Step 7: Transparent effect Aero “Glass Look” is disabled (for Windows 7 only)**

Select “Troubleshoot problems with transparency and other Aero effects”. Under some circumstances setup is disabling Aero “Glass Look”. Only clicking the link on the screen shot below enables it again.



Step 8: Start Windows in safe mode.

If the installation of spacedesk has caused a problem (e.g. unable to start windows anymore , black screen on main monitor, etc.) it is recommended to boot into safe mode.

Windows 7 safe mode: Press and hold f8 key upon computer restart and before the windows logo appeared. Then in advanced boot option screen use the arrow keys to select the safe mode option then press Enter key.

Windows 8/8.1/10 safe mode: There are 2 ways to go to Startup Setting:

- a) Press Shift + Restart button then a Startup Settings screen will appear,
- b) If Automatic Repair shows upon restart a boot menu will appear click Troubleshoot → Advanced Option → Startup Settings.

Press Restart button, after pc restart use number/function keys to select the corresponding number to enable the safe mode.

Secondary Machine

Step 1: Check the browser version for Basic View.

If the spacedesk Basic View is unable to connect, check the version of the web browser and make sure that it is updated. If the secondary machine is a smartphone or tablet device the browser and OS needs to be most recent versions supporting websockets

Step 2: Reset the Personal View settings in the registry.

If the latest spacedesk Personal view is not connecting anymore while an older version works, it is recommended to reset the personal view settings. Just open the registry editor by searching for the keyword "regedit". Then go to HKEY_CURRENT_USER → Software then delete the "datronicsoft" registry key, then try to connect again.

Note: If these troubleshooting procedures does not solve your problem please contact our spacedesk support at <http://www.spacedesk.ph/contact>.

File list

Primary Machine

Files on all systems

Windows\System32\drivers\spacedeskHookKmode.sys

Windows\System32\spacedeskHookLdr.dll

Windows\System32\spacedeskService.exe

Windows\System32\spacedeskServiceTray.exe

Windows\System32\v3DDKAuxiliary.dll

Files on 64 bit systems only

Windows\SysWOW64\spacedeskHookLdr.dll