

Intel® vPro™ Technology Use Case Reference Design

Enhanced Remote Repair with Microsoft* Windows* RE

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1 Preface

Starting with Windows* Vista, Microsoft* has included a bootable recovery environment called Windows Recovery Environment (WinRE) with their Windows operating systems. When a PC won't boot or Windows needs in-depth repairs, WinRE can be used to correct the situation. Coupled with Intel® Active Management Technology (Intel® AMT), these tasks can be performed remotely. This document outlines creating a WinRE .iso image for remote use with Intel® vPro™ technology. It also covers the basics of remote boot and access to WinRE.

1.1 Document Scope

This document covers the process of building WinRE and integrating basic services to aid in remote use. It also covers remotely booting WinRE and accessing. This document does not cover WinRE usage in details. For that information refer to the links in the Related Documentation section below.

1.2 Intended Audience

WinRE is a tool that aids in remote diagnostics and repair using Intel vPro technology. As such this document is intended for Information Technology (IT) professionals who desire to learn more about and deploy this type of use case.

1.3 Related Documentation and Software

The download package for this Use Case Reference Design and supporting files referenced in this document, can be found at the following link:

<http://communities.intel.com/docs/DOC-5095>

Technet – “Work with Windows PE”

[http://technet.microsoft.com/en-us/library/cc766387\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/cc766387(W.S.10).aspx)

Technet – “Windows Automated Install Kit”

[http://technet.microsoft.com/en-us/library/dd349343\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/dd349343(W.S.10).aspx)

Technet – Building WinRE guide

<http://technet.microsoft.com/en-us/library/dd744525%28WS.10%29.aspx>

Blogs with HowTos

<http://blogs.msdn.com/b/winre/>

WinRE Guide

<http://www.winre.windowsreinstall.com/index.htm>

Addition tasks with WinRE:

Enable Admin Account from WinRE.

<http://www.sevenforums.com/tutorials/102552-built-administrator-enable-winre.html>

2 Introduction

When a PC won't boot or Windows needs in-depth repairs, WinRE can be used to correct the situation. WinRE includes many useful tools that aide in or automate windows repair and backup image recovery. Further, WinRE is based on WinPE. As such, all WinPE functions such as mapping network drives, editing the registry, and so forth are also available in WinRE.

When coupled with Intel vPro technology's IDE Redirection, WinRE can be used remotely, from a help desk. This removes the need for a desk side visit in order to make use of WinRE.

This document covers building WinRE. There are two options. The first is to use WinRE with the default build, optionally adding LAN drivers. In this configuration, WinRE may be used remotely with any system that has Intel AMT 6 or greater and KVM Remote Control configured. The second option is to make modifications to WinRE to allow it to be used remotely from any system that has Intel AMT 2 or greater. Sections 3.1 and 3.2 cover these methods separately.

This document also covers the basics of remote boot and remote access to WinRE.

2.1 Requirements

Windows 7 Install DVD	The architecture (32 bit or 64 bit) must match your desired WinRE version
Help Desk Console	Any PC with Microsoft* Windows 7 or later.
Console PC	Any PC with Microsoft* Windows XP or later.
Managed Client with Intel vPro technology	<ul style="list-style-type: none"> • Intel AMT 2.0 or higher. • For KVM Remote Control - Intel AMT 6.0 or higher with Intel Integrated Graphics <p>Note: Document example uses an Intel® Desktop Board DQ67SW based system as an example.</p>

2.2 Process Overview

2.2.1 WinRE with KVM Remote Control

This process involves building a plain WinRE image. This is done by copying WinRE from the Windows 7 install media as documented by Microsoft. These steps will also help find and install proper LAN drivers if desired. Otherwise, there is nothing special beyond other documents that cover this process. This is one advantage of using WinRE with KVM Remote Control: everything works as is.

1. Download/Install Support Tools
 - Windows Automated Installation Kit (WAIK)
 - LAN Drivers (optional)
2. Use WAIK to build WinRE
 - Add drivers with WAIK (optional)
 - Build the .iso

2.2.2 WinRE without KVM Remote Control

This process involves adding a VNC server into WinRE. For this server to start automatically, LAN drivers and a startup script must be included.

1. Disable Virus Scan and Intrusion Detection System (IDS) during this process.
This may not be required, but is recommended as some Virus Scanners and IDSs will block VNC server from being installed.
2. Download/Install Support Tools
 - Windows Automated Installation Kit (WAIK)
 - LAN Drivers
 - VNC Server
3. Use WAIK to build WinRE
 - Add drivers with WAIK
 - Add VNC server
 - Modify startup scripts
 - Build the .iso

3 Build WinRE

3.1 For Use with KVM Remote Control

This chapter and its subsections step you through creating the WinRE .iso image file for use with Intel vPro technology based systems using KVM Remote Control. Before beginning, decide what architecture (32 bit or 64 bit) will be used for WinRE. WinRE should match the architecture of the OS installed on the Managed Client with Intel vPro technology. As such, it may make sense to follow these steps twice so that a 32 bit and 64 bit WinRE are available for either case.

Note: the Windows 7 install media used must match your choice here. In other words, if you want to build a 32 bit WinRE you must use a 32 bit Windows 7 install media.

3.1.1 Obtain the Files

Download the necessary files as described in the following subsections.

3.1.1.1 WAIK for Windows* 7

Click the link below to obtain the Windows Automated Installation Kit for Windows 7.

<http://www.microsoft.com/downloads/details.aspx?familyid=696DD665-9F76-4177-A811-39C26D3B3B34&displaylang=en>

This results in an .iso file. Mount it (Virtual CloneDrive is a nice tool for mounting .iso files) or burn it to a CD and insert the CD.

Install the WAIK with default options (select **Windows AIK Setup** from the CD's default GUI menu).

3.1.1.2 LAN Drivers for Windows 7

WinRE does not require LAN drivers to function. However, adding them will allow for access to network shares and other network resources while troubleshooting. As such, it is recommended that you add LAN drivers.

LAN Drivers for Intel vPro technology based systems are backward compatible, thus you only need to install the latest driver for the latest version of Intel vPro technology in your WinRE image. Also, since WinRE is a lightweight OS, you don't need any extra OEM specific tools. As such, we're recommending that you use the latest Windows 7 driver version from the newest Intel vPro technology capable Intel® Desktop Board. At this time, Intel Desktop Board DQ67SW is the recommended board in this document. Follow the link below and search for DQ67SW.

<http://downloadcenter.intel.com/>

Note that when newer Intel vPro technology based systems come out (i.e., Intel AMT 8.0), you will want to revise your image with newer drivers to support the newer Intel vPro technology.

Follow the steps below:

1. Once the drivers are downloaded, they need to be extracted as follows.
2. Install 7 Zip from <http://www.7-zip.org/>.
3. Right-click on the downloaded file (for example, **ProWin64.exe**). A menu is displayed.
4. Choose **7Zip -> Extract File**.
5. Extract to c:\LANtemp as shown below.

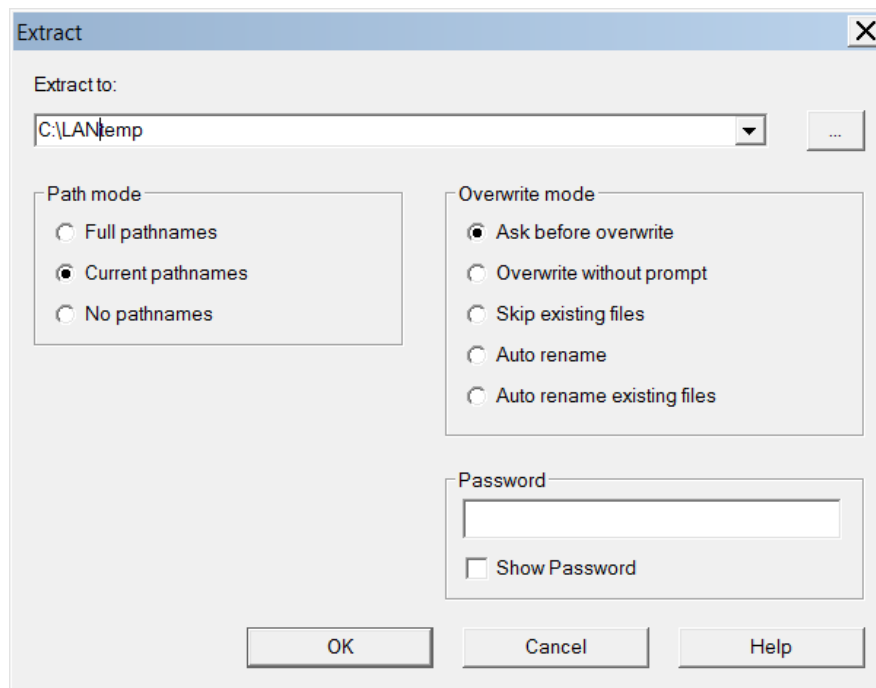


Figure 1: The Extract Dialog

6. Copy the file to the proper location depending on architecture:
 - For 32 bit, copy C:\LANtemp\PRO1000\Win32\NDIS62 to c:\drivers\lan\32
 - For 64 bit, copy C:\LANtemp\PRO1000\Winx64\NDIS62 to c:\drivers\lan\64

3.1.2 Obtain a base Windows RE Image

The Windows 7 install media contains a base image for WinRE. This image is stored as a .wim (Windows Image) file. Basically this file is a compressed image taken from a hard drive. Included in the Windows Automated Installation Kit (WAIK) are tools for manipulating .wim files and building .iso images. In this step we obtain the base WinRE image and the iso build environment.

1. Click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. For 32 bit, type **copy c:\winre**.
3. For 64 bit, type **copy amd64 c:\winre**.
4. Insert Windows 7 Install Media. Be sure the architecture (bitness) matches your desired WinRE version; 32 or 64 bit. When you see <w7_cd> substitute the drive letter that holds your Windows 7 install media.
5. At the command prompt type **imagex.exe /export /boot <w7_cd>:\sources\boot.wim 2 c:\winre\winre.wim "Windows Recovery Environment"**
6. Type **copy c:\winre\winre.wim c:\winre\ISO\sources\boot.wim**.

Boot.wim is the image file you will be using. Winre.wim will remain unused. It is available in case you need to start over for any reason. Do not accidentally use winpe.wim.

3.1.3 Add Tools and Drivers to the Image

Follow the steps below to add tools and drivers to the image.

3.1.3.1 Mount the Image

Files with a .wim extension can be mounted. This means that all files in the .wim file are temporarily copied to a location on the local hard drive. Once there, the files can be manipulated, added to or removed. When image is unmounted, all changes can be written back to the image.

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. Mount the image:

```
Dism /mount-WIM /wimfile:c:\winre\ISO\sources\boot.wim /index:1
/mountdir:c:\winre\mount
```

3.1.3.2 Add Drivers

Follow the steps below to add the drivers. If you do not wish to include LAN drivers, skip this section.

3.1.3.2.1 For 32 bit

Add LAN driver:

```
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\32\e1k6232.inf
```

```
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\32\e1c6232.inf
```

Note: adjust the path to point to the bolded file.

3.1.3.2.2 For 64 bit

Add LAN driver:

```
Dism /image:C:\winre\ mount /Add-Driver /driver:C:\drivers\lan\64\e1k62x64.inf
```

```
Dism /image:C:\winre\ mount /Add-Driver /driver:C:\drivers\lan\64\e1c62x64.inf
```

Note: adjust the path to point to the bolded file.

3.1.3.3 WinRE Startup Script

1. Delete c:\winre\iso\boot\bootfix.bin.
2. Create c:\winre\mount\windows\system32\winpeshl.ini with a text editor like Notepad and make it look like this:

```
[LaunchApps]
"%windir%\system32\cmd.exe /C %windir%\system32\startnet.cmd"
%SYSTEMDRIVE%\sources\recovery\recenv.exe
```

3.1.3.4 Unmount the Image

The commands below will unmount the image. You can either commit the changes made to the image or discard the changes and start over. Both options are provided below.

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. To save changes and unmount, enter:

```
Dism /unmount-WIM /mountdir:c:\winre\mount /commit
```

OR

To discard changes and unmount (so you can start over), enter:

```
Dism /unmount-WIM /mountdir:c:\winre\mount /discard
```

3.1.4 Create the .iso Image

Follow the steps below to create the ISO image:

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. Type `oscdimg -n -bc:\winre\etfsboot.com c:\winre\iso c:\winre\winre.iso`.

The resulting .iso file is your WinRE boot disc. If you wish, you may burn it to a CD and boot your vPro system from a CD drive to test it.

3.2 For Systems Without KVM Remote Control

This chapter and its subsections step you through creating the WinRE .iso image file for use with Intel vPro technology based systems that are not using KVM Remote Control. Before beginning, decide what architecture (32 bit or 64 bit) will be used for WinRE. WinRE should match the architecture of the OS installed on the Managed Client with Intel vPro technology. As such, it may make sense to follow these steps twice so that a 32 bit and 64 bit WinRE are available for either case. Note: the Windows 7 install media used must match your choice here. In other words, if you want to build a 32bit WinRE you must use a 32 bit Windows 7 install media. Also, the steps for the RealVNC Server must be run on the same architecture as the desired WinRE. In other words, if you want a 64 bit WinRE with a VNC Server, the technician PC (where the steps for RealVNC are performed) must be running Windows 7 64 bit.

3.2.1 Obtain the Files

Download the necessary files as described in the following subsections.

3.2.1.1 WAIK for Windows 7

Click the link below to obtain the Windows Automated Installation Kit for Windows 7.

<http://www.microsoft.com/downloads/details.aspx?familyid=696DD665-9F76-4177-A811-39C26D3B3B34&displaylang=en>

This results in an .iso file. Mount it (Virtual CloneDrive is a nice tool for mounting .iso files) or burn it to a CD and insert the CD.

Install the WAIK with default options (select **Windows AIK Setup** from the CD's default GUI menu).

3.2.1.2 LAN Drivers for Windows 7:

LAN Drivers for Intel vPro technology based systems are backward compatible, thus you only need to install the latest driver for the latest version of Intel vPro technology in your WinPE image. Also, since WinPE is a lightweight OS, you don't need any extra OEM specific tools. As such, we're recommending that you use the latest Windows 7 driver version from the newest Intel vPro technology capable Intel® Desktop Board. At this time, Intel Desktop Board DQ67SW is the recommended board in this document. Follow the link below and search for DQ67SW.

<http://downloadcenter.intel.com/>

Note that when newer Intel vPro technology based systems come out (i.e., Intel AMT 8.0), you will want to revise your image with newer drivers to support the newer Intel vPro technology.

Follow the steps below:

1. Once the drivers are downloaded, they need to be extracted as follows.
2. Install 7 Zip from <http://www.7-zip.org/>.
3. Right-click on the downloaded file (for example, **ProWin64.exe**). A menu is displayed.
4. Choose 7Zip -> Extract File.
5. Extract to c:\LANtemp as shown below.

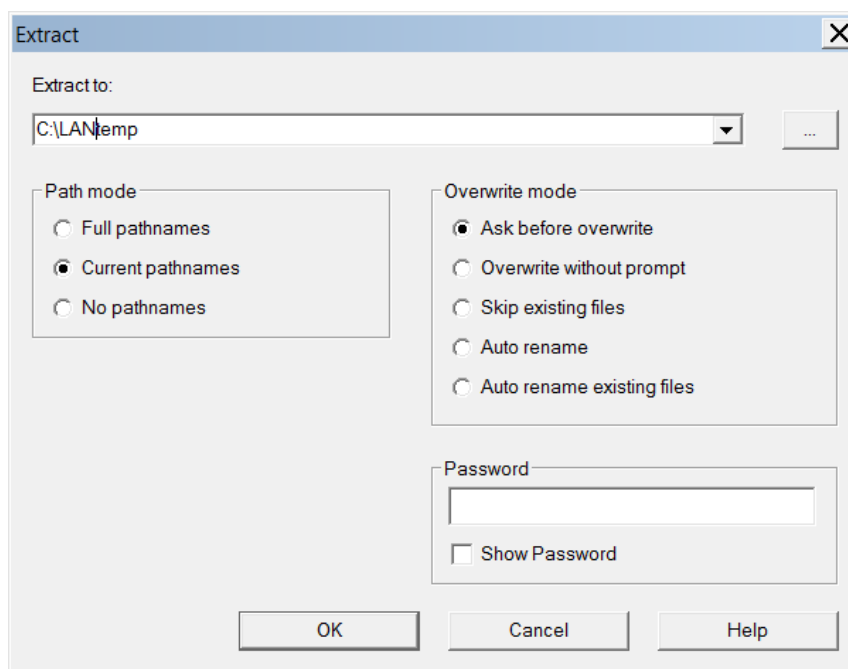


Figure 2: The Extract Dialog (Repeated)

6. Copy the file to the proper location depending on architecture:
 - For 32 bit, copy **C:\LANtemp\PRO1000\Win32\NDIS62** to **c:\drivers\lan\32**.

- For 64 bit, copy **C:\LANtemp\PRO1000\Winx64\NDIS62** to **c:\drivers\lan\64**.

3.2.1.3 VNC Server and Viewer

Obtain files for VNC server

For 32 bit:

Be sure to perform these steps on a 32 bit version of Windows 7.

1. Create a directory **c:\vnc**.
2. Download RealVNC Viewer Free Edition:
<http://realvnc.com/products/free/4.1/index.html>
3. Install RealVNC Viewer and Server – On the “Select additional tasks” screen, uncheck “Register and configure VNC server...” and “Start the VNC Server in Service-Mode”.
4. Configure RealVNC Server (**Start -> Programs -> RealVNC -> VNC Server 4 (User-Mode) -> Configure User Mode Settings**).
 - Be sure to set a VNC Password of 8 characters.
 - Unless a local user will be present, do not set “Prompt local User...”
 - Leave everything else default
5. Run **Regedit** as an **administrator**.
6. Goto **[HKEY_CURRENT_USER\Software\RealVNC]**.
7. Right-click and select **Export**.
8. Save as **c:\vnc\settings.reg**.
9. **copy all files from c:\Program Files\RealVNC\VNC4*.*** to **c:\vnc**
10. Delete **Unins000.*** and **vncviewer.exe** from **c:\vnc**

For 64 bit:

At the time of this writing, RealVNC does not have a free version that will run in a 64 bit WinPE. However, their enterprise version works. The first step is to get a license for it. Contact RealVNC for more information. Note: you may use a 30 day trial license for testing. However, there is no way to fully automate the start up of the VNC Server in WinPE without a full license. Once you have a license, follow these steps. Be sure to perform these steps on a 64 bit version of Windows 7.

1. Create the directory **c:\vnc**.
2. Download RealVNC Enterprise Edition.
<http://www.realvnc.com/products/enterprise/>.
3. Install RealVNC Enterprise Edition. Choose options to exclude the mirror driver and printer driver. When prompted, cancel the license key entry. All other options may be left default.

4. Upon completion of installation, a VNC Server (Service Mode) dialog will appear. Use it to configure the VNC server as follows:
 - a) Click **Options**.
 - b) Set **When VNC Viewers Connect** to **Do Nothing**.
 - c) Set **Authentication** to **VNC Password**.
 - d) Click **Configure**.
 - e) Set the VNC Password. Be sure it's exactly 8 characters. This will be the password you use when connecting via VNC to your WinPE. Click **OK**.
 - f) Leave everything else default.
 - g) Click **OK**.
5. Close the VNC Server (Service Mode) Window.
6. Copy the following files from "**c:\Program Files\RealVNC\VNC4**" to "**c:\vnc**"
 - Logmessages.dll
 - Saslib.dll
 - Vncconfig.exe
 - Winvnc4.exe
 - Wm_hooks.dll
7. Run **Regedit** as an **administrator**.
8. Go to **[HKEY_LOCAL_MACHINE\Software\RealVNC]**.
9. Right-click and select **Export**.
10. Save as c:\vnc\settings.reg.

Obtain files for SOL driver

Note: SOL driver allows VNC Server script to notify the remote user after the VNC Server has started. This is recommended, but not required.

1. Download the latest AMT driver for the latest Executive Series Intel Desktop board from <http://downloadcenter.intel.com/>. At the time of this writing, the board of choice is Intel Desktop Board DQ67SW.
2. Right click on the downloaded file (e.g., MEI_ALLOS_7.1.10.1065_PV.exe) and choose **7Zip -> Extract....**
3. Save the file as **c:\MEI**.
4. Create a folder **c:\drivers\SOL**.
5. Copy **c:\mei\drivers\sol\mesrl.inf** and **mesrle.inf** to **c:\drivers\SOL**.
6. Open **c:\drivers\SOL\mesrl.inf** in a text editor like Notepad.
7. Find the **[Intel.NTx86.6.0]** section and edit it to look like this:

```
[Intel.NTx86.6.0]
; Windows Vista
;AMT 7
%URL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_3B67&CC_0700"
%URL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_1C3D&CC_0700"
```



```

;AMT 6
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_3B67&CC_0700"
;AMT 5
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E07&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E17&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E27&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E37&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E97&CC_0700"
;AMT 4
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A47&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A57&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A67&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A77&CC_0700"
;AMT 3
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29B7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29C7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29D7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29E7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29F7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28B7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28C7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28D7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28E7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28F7&CC_0700"
;AMT 2.5
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A07&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A17&CC_0700"
;AMT 2
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2987&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2997&CC_0700"

```

8. Open c:\drivers\SOL\mesrle.inf in a text editor like Notepad.
9. Find the [Intel.NTamd64] section and edit it to look like this:

```

[Intel.NTamd64]
;AMT 7
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_3B67&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_1C3D&CC_0700"
;AMT 6
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_3B67&CC_0700"
;AMT 5
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E07&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E17&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E27&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E37&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2E97&CC_0700"

```

```
;AMT 4
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A47&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A57&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A67&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A77&CC_0700"
;AMT 3
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29B7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29C7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29D7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29E7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_29F7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28B7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28C7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28D7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28E7&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_28F7&CC_0700"
;AMT 2.5
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A07&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2A17&CC_0700"
;AMT 2
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2987&CC_0700"
%SRL_DeviceDesc% = ComPort, "PCI\VEN_8086&DEV_2997&CC_0700"
```

Create the VNC Server Start script

1. Create a text file named `c:\vnc\vncsvr.cmd` in a text editor like Notepad.
2. Edit the file to look like this. Note for 64 bit only: replace `%VNCLIC%` with your license key. To use a trial license, leave `%VNCLIC%` blank. When WinPE boots, you will be prompted for a license. Click "30 day trial" to continue.

```
@echo off
:: Turn off WinPE firewall
wpeutil disablefirewall
if %PROCESSOR_ARCHITECTURE%==AMD64 goto vnc64
:vnc32
:: Apply VNC settings
regedit /s "%~dp0settings.reg"
:: Start VNC Server for 32bit
start /MIN "" "%~dp0winvnc4.exe" -noconsole
goto sol

:vnc64
:: Apply VNC settings
"%~dp0vncconfig.exe" -noconsole -license %VNCLICENSE%
regedit /s "%~dp0settings.reg"
```

```

:: Start VNC Server for 64bit
"%~dp0winvnc4.exe" -register
"%~dp0winvnc4.exe" -start
goto sol

:sol
:: Start - Load SOL and notify remote user ::
:: Note - if you don't want SOL, just leave out the .inf and this section is
skipped ::
:: mesrl.inf for 32, mesrle.inf for 64
set SOLINF=mesrl.inf
if %PROCESSOR_ARCHITECTURE%==AMD64 set SOLINF=mesrle.inf
:: Check for the SOL driver
If not exist %SYSTEMDRIVE%\windows\inf\%SOLINF% goto end
:: Load SOL driver
drvload %SYSTEMDRIVE%\windows\inf\%SOLINF% 2>&1 >nul
:: Find SOL port
for /f "tokens=3" %%A in ('reg query HKLM\Hardware\Devicemap\Serialcomm /s ^|
find /i "REG_SZ"') do (
set COMPORT=%%A
)
:: If SOL port found, notify user that VNC server is up.
if "%COMPORT%"==" " goto end
echo . > %COMPORT%
echo . > %COMPORT%
echo . > %COMPORT%
echo You may connect to VNC server now. > %COMPORT%
:: End - Load SOL and notify remote user ::

:end

```

3. Save the file and exit the editor.

3.2.2 Obtain a Base Windows RE Image

The Windows 7 install media contains a base image for WinRE. This image is stored as a .wim (Windows Image) file. Basically this file is a compressed image taken from a hard drive. Included in the WAIK are tools for manipulating .wim files and building .iso images. In this step we obtain the base WinRE image and the iso build environment.

1. Click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. For 32 bit, type **copy x86 c:\winre**.

3. For 64 bit, type **copyype amd64 c:\winre**.
4. Insert Windows 7 Install Media. Be sure the architecture (bitness) matches your desired WinRE version; 32 or 64 bit. When you see <w7_cd> substitute the drive letter that holds your Windows 7 install media.
5. At the command prompt type **imagex.exe /export /boot <w7_cd>:\sources\boot.wim 2 c:\winre\winre.wim "Windows Recovery Environment"**
6. Type **copy c:\winre\winre.wim c:\winre\ISO\sources\boot.wim**.

Boot.wim is the image file you will be using. Winre.wim will remain unused. It is available in case you need to start over for any reason. Do not accidentally use **winpe.wim**

3.2.3 Add Tools and Drivers to the Image

Follow the steps below to add tools and drivers to the image.

3.2.3.1 Mount the Image

Files with a .wim extension can be mounted. This means that all files in the .wim file are temporarily copied to a location on the local hard drive. Once there, the files can be manipulated, added to or removed. When image is unmounted, all changes can be written back to the image.

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. Mount the image:

```
Dism /mount-WIM /wimfile:c:\winre\ISO\sources\boot.wim /index:1
/mountdir:c:\winre\mount
```

3.2.3.2 Add Drivers

Follow the steps below to add the drivers.

3.2.3.2.1 For 32 bit

Add LAN driver:

```
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\32\e1k6232.inf
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\32\e1c6232.inf
```

Note: adjust the path to point to the bolded file.

3.2.3.2.2 For 64 bit

Add LAN driver:

```
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\64\e1k62x64.inf
```

```
Dism /image:C:\winre\mount /Add-Driver /driver:C:\drivers\lan\64\e1c62x64.inf
```

Note: adjust the path to point to the bolded file.

3.2.3.3 Add VNC* and WinRE Startup Script

1. Delete **c:\winre\iso\boot\bootfix.bin**.
2. Copy the contents of **c:\vnc** to **c:\winre\mount\windows\system32**.
3. Copy the contents of **c:\drivers\sol** to **c:\winre\mount\windows\inf**.
4. Create **c:\winre\mount\windows\system32\winpeshl.ini** with a text editor like Notepad and make it look like this:

```
[LaunchApps]
"%windir%\system32\cmd.exe /C %windir%\system32\startnet.cmd"
%SYSTEMDRIVE%\sources\recovery\recenv.exe
```

5. Open **c:\winre\mount\windows\system32\startnet.cmd** with a text editor like Notepad and make it look like this:

```
wpeinit
start "" cmd /c "%~dp0vnscsvr.cmd"
```

3.2.3.4 Unmount the Image

The commands below will unmount the image. You can either commit the changes made to the image or discard the changes and start over. Both options are provided below.

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. To save changes and unmount, enter:

```
Dism /unmount-WIM /mountdir:c:\winre\mount /commit
```

OR

To discard changes and unmount (so you can start over), enter:

```
Dism /unmount-WIM /mountdir:c:\winre\mount /discard
```

3.2.4 Create the .iso Image

Follow the steps below to create the ISO image:

1. If you have not already done so, click **Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt** then right-click **Deployment Tools Command Prompt** and select **Run As Administrator**.
2. Type **oscdimg -n -bc:\winre\etfsboot.com c:\winre\iso c:\winre\winre.iso**.

The resulting .iso file is your WinRE boot disc. If you wish, you may burn it to a CD and boot your Intel vPro technology based system from a CD drive to test it.

4 Perform IDER Boot and Basic Remote Tasks

This section outlines two methods of booting and using WinRE. The first method uses KVM Remote Control and IDER. This is useful for Intel AMT 6 and greater with Intel® Integrated Graphics. The second method uses SOL/IDER plus the VNC server built into WinPE (as described above). This is useful for any Intel vPro technology based system.

Note that the time an IDER boot takes can vary based on a number of factors such as LAN speed, load on the Help Desk Console, and the size and complexity of the image being booted to. Unfortunately, WinRE's size is not conducive for fast remote booting. However, once you have a known working image, it may be used with the 2 stage boot process. Upon completion of this UCRD, please see the following UCRDs to significantly reduce the time it takes to remotely boot WinRE:

- <http://communities.intel.com/docs/DOC-5552>
- <http://communities.intel.com/docs/DOC-5616>

4.1 KVM Remote Control and IDER

This example uses RealVNC's VNC* Viewer Plus. Please substitute your favorite KVM Remote Control and IDER capable tools. Also, this example uses a Dell* E6410 that has been provisioned locally. We are using the admin digest credential and no TLS. See the following for more information.

http://communities.intel.com/docs/DOC-4795	Quick KVM Remote Control for Brand New Intel Core vPro Processor Based PCs
http://communities.intel.com/docs/DOC-4354	Local Setup and Configuration Using a USB Flash Drive
http://communities.intel.com/docs/DOC-4910	Help Desk Console for Non-TLS Environments; more information about VNC Viewer Plus

If your system is using Kerberos and/or TLS, adjust the steps below as needed.

1. If desired, download and install RealVNC's VNC Viewer Plus:
<http://www.realvnc.com/products/viewerplus/index.html>
2. Open VNC Viewer Plus.
3. Click **Options**.
4. Click **Advanced**.
5. Choose the **AMT Server** tab.
6. Deselect **Always connect using FQDN**.
7. Click **OK**.
8. Enter the IP address of the remotely managed Intel vPro technology based system.

9. Set **Connection mode** to **Intel AMT**.
10. Set **Encryption** to **None** (or adjust based on your setup).
11. Click **Connect**.
12. Enter your Intel AMT Admin credentials and click **OK**.
13. Enter a **User Consent Code** if prompted.
14. Click the **Mount Disk Images** menu icon, shown in Figure 3 below.



Figure 3: The VNC* Viewer Plus Mount Disk Images Menu Icon

15. A **Mount Disk Images** window is displayed. Click **Browse** next to CD/DVD
16. Enter **select the WinRE image created above**.
17. Click **Mount**.
18. Place the mouse near the top of the screen and click the Power icon.
19. Click **Reset**.
20. Choose **Boot to CD/DVD**.
21. Click **Reset**.

The Intel vPro technology based system will now reboot. It will automatically boot from the WinRE ISO file created above. As it boots, the KVM Remote Control session will display progress. Once the boot process is complete proceed to section 4.3

4.2 Serial over LAN and IDER

This example uses Remote ISO Launcher, although you can substitute your favorite SOL and IDER capable tools. Also, this example uses an Intel® Desktop Board DQ45CB that has been provisioned locally. We are using the admin digest credential and no TLS. See the following for more information:

http://communities.intel.com/docs/DOC-4354	Local Setup and Configuration Using a USB Flash Drive If your system is using Kerberos and/or TLS, please adjust the steps as needed
http://communities.intel.com/docs/DOC-5943	Remote ISO Launcher (RIL)

If your system is using Kerberos and/or TLS, adjust the steps below as needed.

1. If desired, download Remote ISO Launcher:
<http://communities.intel.com/docs/DOC-5943>. Section 4 outlines generic steps to use RIL. Or, follow the steps below.
2. Unzip the download files included with this UCRD.

3. Navigate to the folder where you unzipped the files and double-click **RemoteISOLauncher.exe**.
4. On the Launch tab, click **File > Edit ISO Images**. The Manage ISO Images dialog is displayed.
5. Enter WinRE as the Name and enter the Path for your WinRE image (UNC paths are NOT allowed) and click **Add**.
6. Click **Done** to close the dialog.
7. On the Settings tab, fill in admin for username and the admin password. Set Encryption to none. Leave all else default.
8. On the Launch tab, enter the hostname, FQDN, or IP address of the target remote client to be rebooted
9. To save these settings (hostname, authentication and encryption settings, ISO names and paths, etc.), click **File > Save Config** from the menu bar.
10. Click the button for WinRE. Your Managed vPro client will reboot to the WinRE image.

**NOTE**

The following steps rely on having the VNC Sever embedded in WinRE.

If you opted to include the SOL drivers, WinRE will notify you after the VNC server has started. To see this notification, select the Terminal tab. The key is to look for the message "you may connect to VNC server now." Example provided below. Note: some systems may not show the SAC messages. This is not a problem.

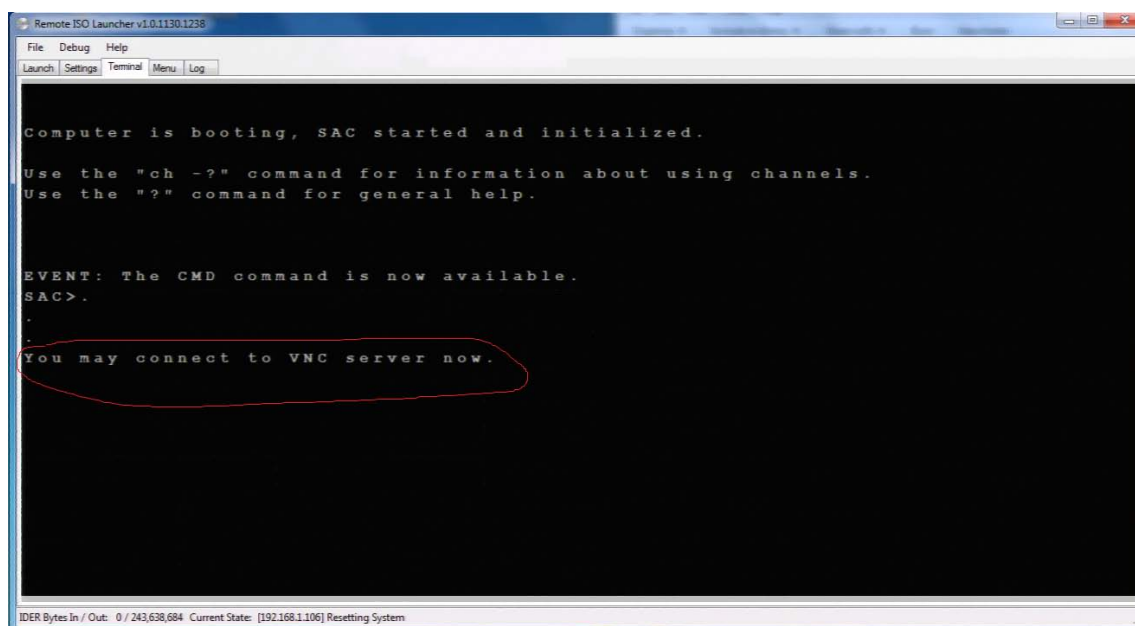


Figure 4: Messages Displayed in RIL Terminal Tab

11. Open RealVNC Viewer (you installed it in section 3.2.1.3).
12. Enter the IP address or FQDN of your remotely managed Intel vPro based system and click **OK**.
13. Enter the VNC Server password you set in section 3.2.1.3.

You now have full remote control of WinRE. Proceed to section 4.3 for some of the tools and possibilities available from here.

4.3 Once You are Connected

1. You will be prompted to "Initialize network connectivity..." Click **Yes**.
2. You may be prompted: "Would you like to Remap drive letters..." Click **Yes**.



NOTE

At this point WinRE scans the system and then begins a series of questions based on what it finds. See Microsoft documentation for more information. The below steps are the basic path through, but may differ based on the results of the scan.

3. System Recovery Options: Select the desired OS and click **Next**.
4. You are presented with a system Recovery Options Screen as follows:

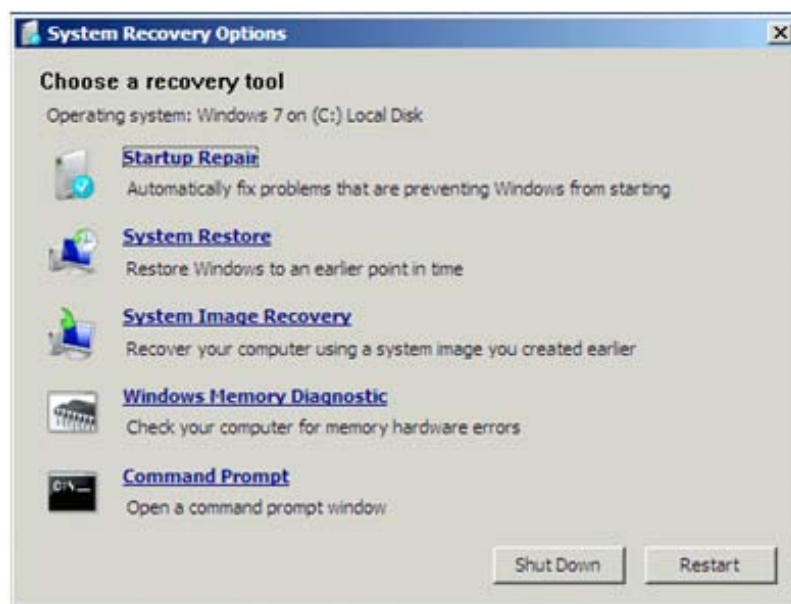


Figure 5: System Recovery Options Dialog

At this point, you may use any of these tools just as you would if you were sitting in front of the managed Intel vPro technology based client. As such, specific use of these

tools is beyond the scope of this document. Please refer to online guides for steps on specific tasks with these tools:

WinRE Guide

<http://www.winre.windowsreinstall.com/index.htm>

Also notice the Command Prompt option. The same tools are available in WinRE as WinPE. Check this UCRD for some example, useful commands:

<http://communities.intel.com/docs/DOC-5095>