READ THIS FIRST

This procedure for updating the firmware on the R8000 and R8100 has more steps than the standard method. Please read through the following procedure carefully before attempting to upgrade firmware. **This upgrade requires the use of a 4 GB (minimum) or 8 GB (recommended) USB drive.** The drive will be completely overwritten; **all data on the USB drive will be lost so it is recommended that a new drive be used.**

*** Tech support (903) 985-8999 Option 2, 2 ***

Purpose

This procedure upgrades the communications system analyzer software utilizing the "OS, FPGA, and Application Combo" method. R8xxx updates may be applied only to systems that match the version number listed as part of the update name. The downloaded zip file has the following nomenclature:

R8000_Update_{current version}_to_{new version}.zip

Where:

{current version} is the software version number reported on System/About screen.

{new version} is the software version number that will be reported in System/About after the upgrade process is complete.

To read the version number, understand that the decimal points have been removed and each number in the dot-decimal notated version is always two digits wide in the file name.

Example: version "3.2.0.0" becomes "03020000" in the name of the upgrade zip file.

So, the update from 3.2.0.0 to 3.3.0.0 will read:

R8000_Update_03020000_to_03030000.zip

Once you verify that you have the correct upgrade for your unit, then verify you are using the correct procedure. For the rest of this procedure _{current version}_ and _{new version}_ will be utilized in the file names to represent the unit and upgrade version as identified and explained above.

Using a ZIP tool open the update file to view the top level. If at the top level you see a file with the name "rufus-2.17.exe", then this is the correct procure to use for this update. If you DO NOT see the file name with "rufus," please contact Freedom Communication Technical Support for help to get the correct upgrade procedure.

This procedure must be performed in its entirety for the update to apply correctly.

Freedom recommends the user read over the entire procedure once before starting the process.

This upgrade requires the use of a 4 GB (minimum) or 8 GB (recommended) USB drive. Larger size USB drives can be used. The drive will be completely overwritten; all data on the USB drive will be lost.

This procedure uses a third-party, open-source utility (SUPPLED IN THE UPDATE FILE), Rufus (v.2.17), to write the downloaded drive image (ISO file) onto the USB drive. This software is released under the *GNU General Public License (GPL) version 3*.   A copy of the executable is included in the downloaded ZIP file.

Upgrade Procedure Overview (Details to follow at STEP 1 on page 4)

- USB Drive Setup on PC
    - o Download ZIP file and extract contents to PC
    - o Open Rufus utility, configure and burn ISO image to USB drive
    - o Verify upgrade USB drive readiness and eject from PC
- Instrument Upgrade
    - o Start R8xxx upgrade process
    - o Follow onscreen instructions
    - o The USB will be plugged in and removed twice during upgrade
    - o Remove USB drive; finish upgrade and cleanup

Conventions Used

Soft Key – Vertical and horizontal buttons along the edge of the communications system analyzer LCD screen.

WARNING
PERFORM THESE STEPS WITH THE COMMUNICATION SYSTEM ANALYZER POWERED BY AN UNINTERRUPTABLE POWER SUPPLY (UPS). IF POWER IS LOST DURING AN UPDATE, IT IS POSSIBLE TO DAMAGE THE ANALYZER IN A MANNER THAT REQUIRES FACTORY REPAIR.

WARNING
THIS PROCEDURE REQUIRES A USB THUMB DRIVE WITH CERTAIN SECURITY FEATURES DISABLED (FOR EXAMPLE, PASSWORD PROTECTION). THE COMMUNICATION SYSTEM ANALYZER IS NOT CONFIGURED TO SUPPORT SUCH SECURITY FEATURES.

NOTE
THESE INSTRUCTIONS CONCERN UNPACKING A .ZIP FILE USING WINDOWS BUILT IN ZIP FILE EXTRACTION. IF OTHER TOOLS ARE USED TO UNPACK .ZIP FILES, CERTAIN PORTIONS OF THE PROCEDURE MAY NEED TO BE ALTERED.

WARNING
WHEN REMOVING A USB DRIVE FROM A COMPUTER, IT IS USUALLY CRITICAL TO USE A "SAFELY REMOVE HARDWARE" FEATURE TO PREVENT CORRUPTION OF FILES COPIED TO THE DEVICE.

USB Drive Setup on PC

STEP 1: Download and Extract the USB Files

Download:
From the FREEDOM website upgrades page
> **www.freedomcte.com/upgrades/**

click the link labeled
> **R8100/R8000 update {current version}_to_{new version}**

to begin the download of the following ZIP file:
> **R8000_Update__{current version}_to_{new version}.zip**

Extract:
See Appendix A for help extracting the contents of the ZIP archive file.

The ZIP file contains two files:
- **R8000_Update_{current version}_to_{new version}.iso** (drive image for the USB)
- **Rufus-2.17.exe** (Utility to burn the ISO file to the USB drive)

Copy or extract these two files to a location of your choice **on the PC** and navigate to that location.

<p style="color:red; text-align:center">*** DO NOT PLACE THESE FILES ON THE USB DRIVE ***</p>

STEP 2: Burn the ISO File to the USB Drive.

> **NOTE:** The Rufus utility will only run on Microsoft Windows. If you are using a different operating system, you will need to find and use an equivalent tool to burn the ISO file to the USB drive.

> **NOTE:** It is recommended that a NEW (unused) USB drive be used for the upgrade process. If the USB drive has been utilized for updates in past it is recommended that the used USB drive be re-formatted, with "full format" not just "quick format". One recommended USB drive is "SanDisk – Cruzer Glide 16GB"
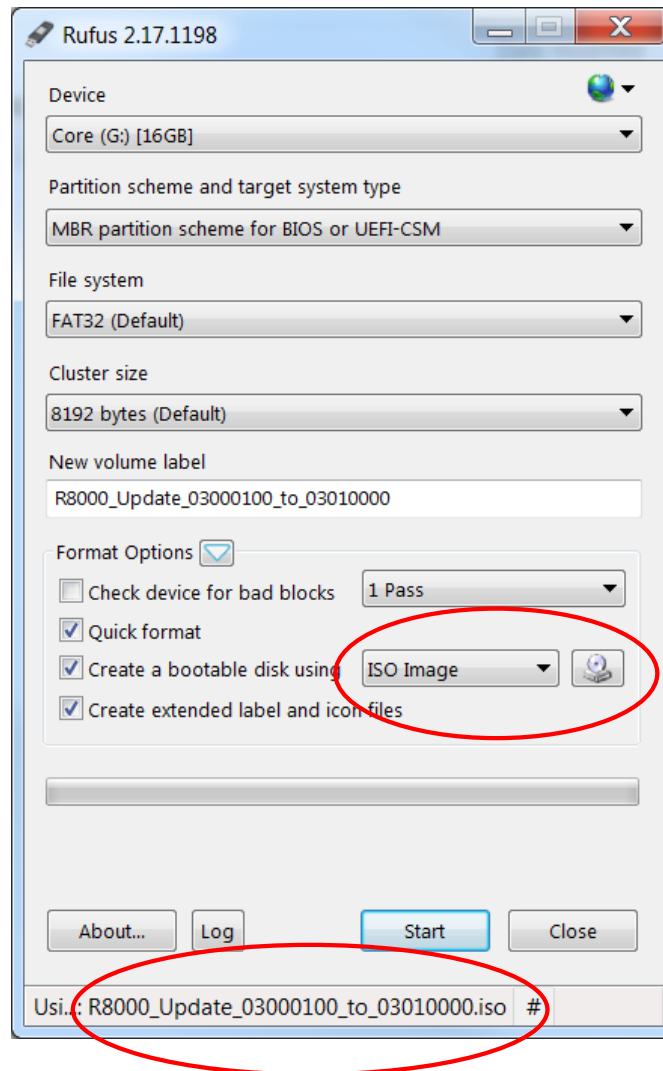
Open:
Plug the USB drive into the PC

Double-click on the "Rufus-2.17" file to start the Rufus utility. Depending on your operating system, you may be asked to allow the utility to run or to let it check for updates. Answer "YES" to run , but "NO" to check for updates.

The following window will appear:

Configure:

- Device: **Select the USB Drive you want to use for the upgrade**

- Partition scheme and target system type:

    Select **MBR partition scheme for BIOS or UEFI-CSM**

- File system: Select **FAT32**

- Cluster size: Select **Default (The size may vary based on drive size)**

- New volume label: **This can be anything, but will get name of ISO file when selected**

- Format Options:

    o **[Unchecked]** Check Device for Bad Blocks

- [Checked] Quick Format
- [Checked] Create a bootable disk using **ISO Image**
    - Click the disk icon and select the update file just extracted from the zip. "**R8000_Update_{current version}_to_{new version}.iso**"
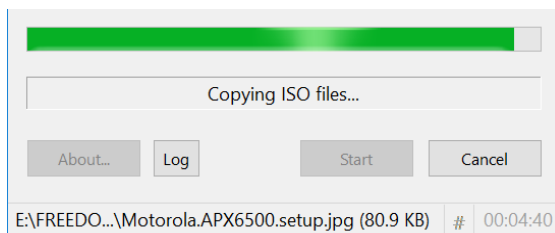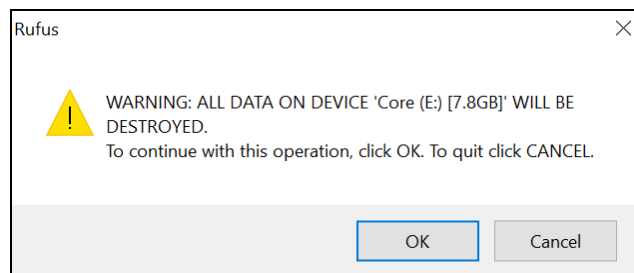- [Checked] Create extended label and icon files

Important:
Make sure the selection for "Create a bootable disk using" is ISO Image.
Then "Click" the disk icon (to right of ISO Image) and select file:
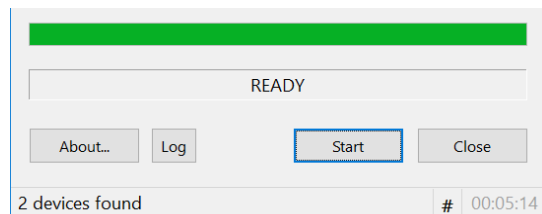*"R8000_Update_{current version}_to_{new version} .iso"*

Your Rufus application window should look like the image above with file name difference for version changes.

Burn:
After verifying all settings are correct, click **Start** to burn the ISO image onto the USB drive. You will be prompted to confirm you want to erase all files on the USB drive and replace them with the upgrade files.

In Progress…   …Complete.
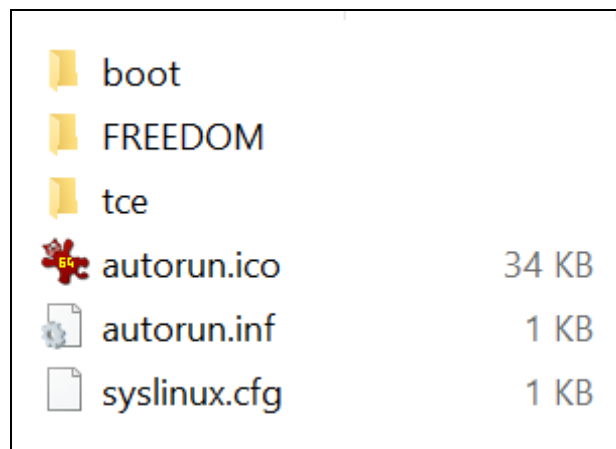
Click **Close** to exit Rufus utility.

STEP 3: Verify the Update USB Drive and Eject.

<u>**Verify:**</u>

Open the USB drive in File Explorer to view its contents.

The USB drive root directory should look like the following image:

It is possible that a few more directories will be seen at this level, like "FOUND.000" and "Sytem Volume Information". This will not effect the update.

NOTE: This USB is being built as a "bootable" USB. Some PCs or Laptops may have security software the prevents the creation of a bootable USB. If your system has this software or if you are using a "secure" USB you may need to build this USB on a non-secured computer/USB drive.

<u>**Eject:**</u>

Use "Safely Remove Hardware" controls to when ready to remove the USB drive from the computer. Details on how to do this vary by operating system and desktop configuration. For non-Windows operating systems, this is sometimes referred to as "unmounting" or "ejecting" the media. Refer to **Appendix B** for some examples how to "Safely Remove Hardware" on a PC that has one of several Microsoft Windows operating systems installed.

Unplug the USB drive from the PC.

USB drive preparation is complete. Proceed with instrument upgrade.

CAUTION: In this state, the USB drive is a bootable drive that should only be used to upgrade an R8000 or R8100. DO NOT boot from this drive on a PC. This may result in data loss on the PC.

After use, this USB drive should be formatted to make it non— bootable and safe to use for other purposes.

Instrument Upgrade

1. Power up the analyzer using the green power button.
2. Wait approximately one minute for the analyzer boot sequence to complete.

   While the product is booting a "Loading Configuration File… Please Wait" message is shown in the product display status bar. Do not proceed to the next step until the message disappears from the status bar.

3. Insert a USB drive prepared using the "USB Drive Setup on PC" procedure into an available USB port located on the front or side of the analyzer.
4. Wait about 30 seconds to allow the analyzer to identify the USB drive.
5. Press the blue **<Settings>** button located on the analyzer front panel.
6. Press the "**About…**" soft key.
7. Verify that the current "System" version is {current version} as shown in the upgrade file name.
8. Press the "**Search for Updates**" soft key.

   a. An "IMMEDIATE ACTION REQUIRED" message panel is shown.

   If the message panel is not shown, either the analyzer does not recognize that the USB drive is installed, or the USB drive preparation described in the "USB Drive Setup on PC" section was not successful. In some cases, using a different brand or model of USB drive may be helpful.

   b. IF the screen indicates that an Update was found, then Press the "**Continue**" soft key to proceed with the update process.

   c. *NOTE: From this point forward the most important instructions are shown on the DISPLAY of the R8000. Do not remove USB until told by the R8000. Then plug USB back when told by the R8000. Follow the onscreen instructions exactly. Following text is supporting information.*

   d. Wait for a second "IMMEDIATE ACTION REQUIRED" message panel to be shown after the update files have transferred from the USB drive to the analyzer.

   During this time, the standard operating menu is visible. While it may appear that the system is not processing the update, there is no need to navigate away from the settings screen or to press additional controls.

   IMPORTANT: USB drive light activity ceases prior to completion of the transfer. Do not assume that the transfer has failed if the second panel does not appear immediately after the drive appears inactive.

   If the panel fails to appear, a file on the USB drive is corrupt, or could not be processed, a red status bar ": code = <x>" message appears.

The update procedure must be restarted if the transfer fails. It may be sufficient to re-run the "USB Drive Setup on PC" procedure using files previously obtained from the web site, but it may be necessary to download the files again if they are corrupted. In some cases, use of a different brand or model of USB drive may be helpful.

e. Unplug all USB devices from the analyzer when told on screen.
f. Press the "**Continue**" soft key to apply the update.

9. Wait for the system software upgrade to begin.

The analyzer automatically reboots twice and then displays an "Upgrade in progress…" message.

The following section is new in this upgrade.

Please proceed step-by-step to avoid confusion or errors.

10. A prompt appears requesting that the USB drive be reinserted. Plug the USB into the unit at this request. An "Ok" button is displayed. Press the **ENTER** key on the front of the unit to continue.
11. The unit will reboot into Linux and copy the update to the unit.
12. A prompt will appear indicating the USB drive should be removed. The unit will auto detect that the USB drive is gone and will reboot.
13. The screen will display an "Upgrade in progress…" message.
14. Wait for a firmware upgrade operation to complete.

During this phase, all indicators on the system light up and status messages appear on the display. The process takes approximately eight minutes to complete.

15. When instructed to do so, power down the analyzer using the green power button. Press and hold the button until the unit shuts off.
16. Press the green power button briefly to restart the analyzer.
17. Wait for the system software upgrade to complete.

The unit reboots during this process. When the upgrade is complete, the analyzer displays the standard user interface and resumes normal operation.

This concludes the new instructions. The unit should be fully upgraded. Proceed to verification.

18. Verify that the product has finished rebooting.

While the product is booting a "Loading Configuration File… Please Wait" message is shown in the product display status bar. Do not proceed to the next step until the message disappears from the status bar.

19. Press the blue **<Settings>** button.
20. Press the "**About…**" soft key.
21. Verify that the "System" version has changed to {new version}.
22. Press the "**Versions**" soft-key and review the list of versions. The list below is just an example, but the application version should match {new version}
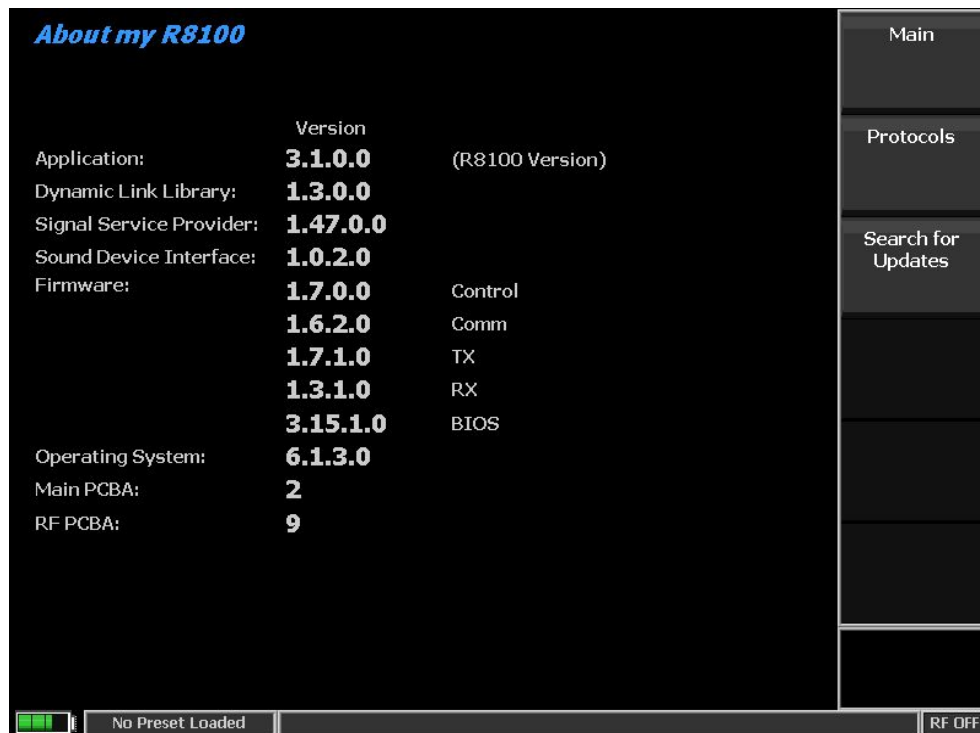
Note: Your BIOS and PCBA numbers may vary based on instrument hardware

NOTE: If any version number is "0.0.0.0", an additional reboot may be required to return the unit to normal operation.

23. The upgrade is complete.

24. You may use the USB to upgrade multiple instruments.

25. **Once you are done with the USB drive, place it in the PC, right click the drive, and format it. This step will allow you to use the drive for other purposes.**

If you should need technical assistance before, during, or after this upgrade, please call out Technical Support hotline at (903) 985-8999 and select Option 2 "Product Support" followed by Option 2 "Technical Support." (Option 1 will connect you with our Service Department if you need calibration or repair services.)

For urgent support:
- West: Doyle Wofford (602) 721-5889
- East: Chuck Cox (903) 261-6984
- Asia: Keith Yeo +65 (9155) 1168
- Latin America: Jose Julio +55 11 949 703 643

Appendix A: Extracting Files from a ZIP Archive

The procedure for extracting files from the .zip file varies from system to system, particularly when a third-party archive/unarchive tool is installed, but, for reference, a number of .zip extraction scenarios for using a built-in Windows file extraction tool are documented below:

Windows 10 / Windows 8.1

Select "R8000_Update_{current version}_to_{new version}.zip" by clicking it once. A Compressed Folder Tools "Extract" menu ribbon should appear, but if it is not shown ("Extract all" is not visible), click the "Extract" menu tab to reveal it.

Click "Extract all" in the "Extract" menu ribbon.

When an "Extract Compressed (Zipped) Folders" pop-up appears, modify the path that appears in an edit box below "Files will be extracted to this folder." Select a folder location on the PC where the files will be used in the next step.

Check "Show extracted files when complete", then click the "Extract" button at the bottom of the pop-up window.

Windows 7

Either right-click "R8000_Update_{current version}_to_{new version}.zip" and select "Extract all...", or, double-click the .zip file and click "Extract all files" on the task ribbon beneath the title bar. Alternatively, use "File" | "Extract all..." from the command menu next to the title bar. The <Alt> key toggles visibility of the command menu.

When an "Extract Compressed (Zipped) Folders" pop-up appears, modify the path that appears in an edit box below "Files will be extracted to this folder." Select a folder location on the PC where the files will be used in the next step.

Check "Show extracted files when complete", then click the "Extract" button at the bottom of the pop-up window.

Windows XP

Double-click "R8000_Update_{current version}_to_{new version}.zip" to reveal "Folder Tasks" in the explorer window.

If "Folder Tasks" appears, click "Extract all files". Alternatively, use "File" | "Extract All..." from the command menu.

When the "Compressed Folders Extraction Wizard" appears, click the "Next" button.

In the window called "Extraction Wizard", click the "Browse" button and select a folder location on the PC where the files will be used in the next step.

Press the "OK" button.

Press "Next" (to extract the files to the USB drive).

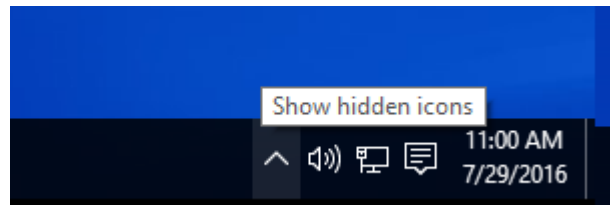Ensure that the "Show extracted files" checkbox is checked.

Press the "Finish" button.

Appendix B: Safely Remove Hardware Examples

Examples of safe removal of USB storage are provided below, but the procedure can vary significantly per installed operating system and desktop configuration.

Windows 10

As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware and Eject Media" icon.

Move the mouse pointer over the "Eject USB Mass Storage Device" widget for the drive letter of the USB media, then click it.

Wait for a "Safe To Remove Hardware" notification near the "Safely Remove Hardware and Eject Media" icon.
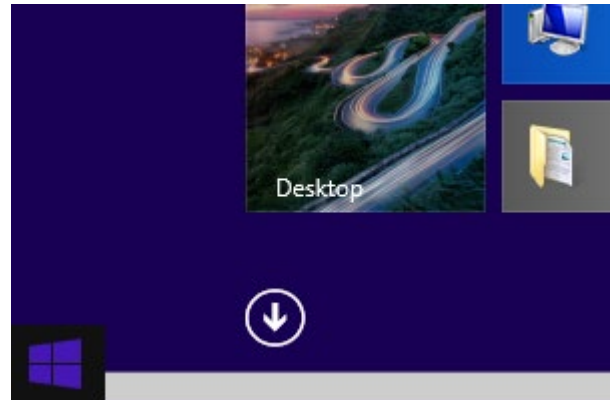
Windows 8.1

On Windows 8.1, extra steps are sometimes needed to show the start bar where the system tray is found. Either use the keyboard Windows key to select a desktop with a start bar, or, swipe the mouse pointer to the lower left corner of the desktop to reveal a Windows button that, when clicked, acts like the Windows keyboard key.
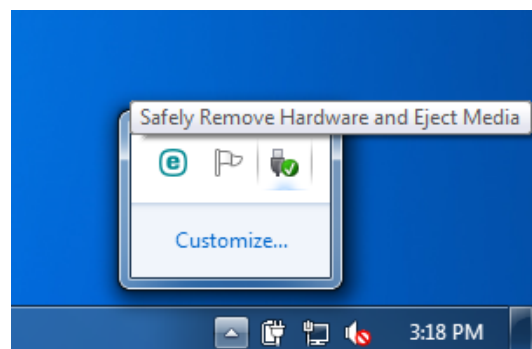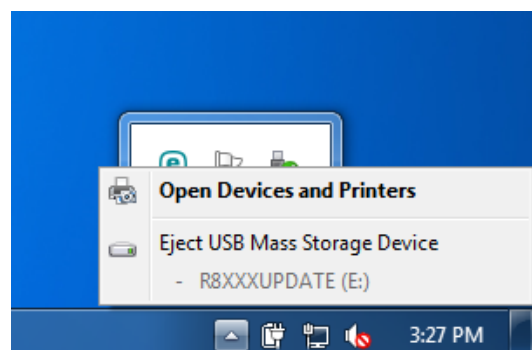
Windows 7 / 8.1

As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware and Eject Media" icon.
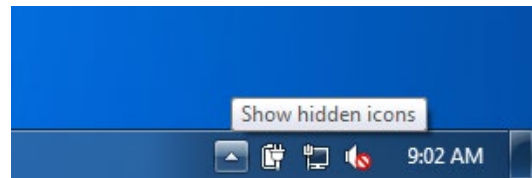
Move the mouse pointer over the "Safely Remove Hardware and Eject Media" icon, click it to expose an "Eject USB Mass Storage Device" widget.
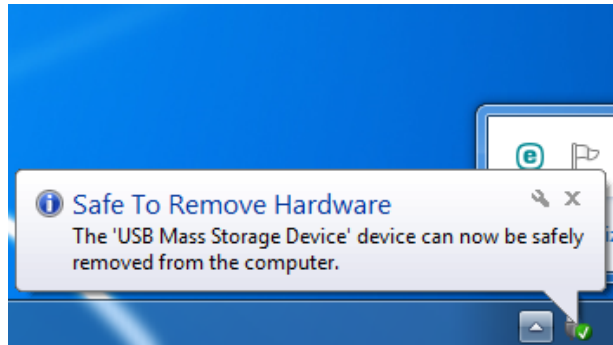
Move the mouse pointer over the "Eject USB Mass Storage Device" widget for the drive letter of the USB media, then click it.

Wait for a "Safe To Remove Hardware" notification near the "Safely Remove Hardware and Eject Media" icon.

Windows XP

As needed, move the mouse pointer over a "Show hidden icons" widget, then click the icon to expose the "Safely Remove Hardware" icon.

Move the mouse pointer over the "Safely remove Hardware" icon, click it to expose a "Safely remove USB Mass Storage Device" widget.

Move the mouse pointer over the "Safely remove USB Mass Storage Device" widget that mentions the drive letter of the USB media, then click it.

Wait for a "Safe to Remove Hardware" notification near the "Safely remove Hardware" icon.

Appendix C: Troubleshooting and Recommendations

While many USB drives that meet the required specifications may work, the following drives have been found to work well:

- SanDisk Cruzer Glide 16GB
- SanDisk Ultra 32 GB USB 3.0
- ONA 16AA016
- DataStick Pro 8GB by Centon

The following drives have been noted to cause issue when used in this procedure:

- Memorex 32GB
- PNY 16GB USB 3.0

If an update failure is encountered when using a particular USB drive, possible resolutions are:

1. Try recreating the update on the USB drive using a **full drive format** (not quick formatting).
2. Try applying the update using a different make of USB drive (see list above for recommendations).

A notable error message that may be encountered during an update, "No Caching Mode Page Found", may often be remedied by attempting the above resolutions.

Rev. B	M. Humphries	11/9/20	M. Humphries	11/9/20	0323
Initial Release – Rev A	M.Mullins	10/30/20	M. Humphries	10/30/20	0322
Change/Rev. No.	Revised By	Date	Approved By	Date	ECO#