



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 16 2019

OFFICE OF
AIR AND RADIATION

Derek Favret
Director
Office of Public Radiation Protection (AU-22)
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Dear Mr. Favret,

The U.S. Environmental Protection Agency periodically releases updated versions of the CAP-88 PC compliance computer code, which include various updates necessary, for example, to address compatibility with updated computer operating systems. The most recent release, Version 4, does not retain a utility code used to convert a commonly-available meteorological data format (stability array, or STAR files) into the format required by CAP-88 PC (WND files). This change in functionality has caused confusion for some Department of Energy sites as they migrate to CAP-88 PC Version 4 to prepare annual air emission reports required under 40 CFR part 61, subpart H. The EPA has identified multiple options for the users of Version 4 on current operating systems to obtain meteorological data in the required format. This letter and the attached technical guidance are provided to help users to integrate meteorological data for compliance calculations.

Each of the methods described within the enclosed technical guidance, as well as the use of any earlier version of the code, is acceptable to the Agency for compliance reporting purposes. If you have questions on these methods, please contact Jonathan Walsh at 202-343-9238, walsh.jonathan@epa.gov. Users may always request technical assistance through our web site (<https://www.epa.gov/radiation/cap-88-pc>).

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Peake", is written over a horizontal line.

For Tom Peake

Director
Center for Waste Management and Regulation

Enclosure

cc: Jonathan Walsh, EPA ORIA
Alicia Williamson, DOE AU-22
Brian Littleton, EPA ORIA

(1) Use existing wind file data

CAP-88 PC Version 4 installs a set of default meteorological data files when the migration utility is run either as part of installation or manually. A list of the files may be viewed by selecting Tools>Wind File List under the main menu. This list includes the location at which the data was collected and time period during which it was collected. If an existing wind file includes data collected at the user's location or at a location near the user's (such as a nearby airport or town), the wind data contained in these files may be representative of the annual average wind data for the user's facility.

(2) Use a Previous Year's Annual Meteorological Data in CAP-88 PC Version 4

CAP-88 PC Version 4 is backward-compatible with wind files generated under CAP-88 PC Version 3. CAP-88 PC wind files generated by the user for previous years may be representative of the annual average wind field for the year being modeled. Examining the data in these existing wind files and evaluating the deviation about an average of the data within the files may show the average to be acceptably representative of the current annual average wind data for the year being analyzed. In other words, if the data in previous year wind files show consistent values, then the average of these years or simply a previous year's file should be sufficient for use in Version 4.

The data folders in CAP-88 PC Version 4 are located by default in the user's Documents folder, with location C:\Users\username\Documents\Cap88. The wind files are located in the folder named Wind Files within the above Cap88 folder. If the default installation folders are not chosen during installation, the location of the data files in Version 4 can be found by starting CAP-88 PC Version 4 and selecting Tools>Options from the menu bar on the main screen.

Use the migration utility in Version 4 for existing wind files:

CAP-88 PC Version 4 includes a migration utility to transition data, including wind files, from Version 3 into Version 4. The migration utility runs automatically when CAP-88 PC Version 4 is installed for the first time on a system. If Version 3 data exists, the migration utility should detect it. If the migration utility does not detect existing data or does not show the correct location of the existing data, the user can specify the location. The migration utility will then migrate the existing data into the Version 4 file system, retaining any custom wind files contained in the existing data folders. The migration utility also updates the data folders to include any Version 4 default data files that were not contained in the existing data folders. The migration utility can also be manually run after CAP-88 PC Version 4 has been installed, by selecting migration utility from the Tools>Options menu.

Manually copy existing wind files into the Version 4 data folders:

If the user wishes to use wind files that were generated using the post-2013 release of Version 3, but not to use the migration utility to move these files into the appropriate Version 4 data folder, the user can directly copy and paste the desired wind files into the appropriate Version 4 data folders.

NOTE: Wind files from versions of CAP88-PC prior to the 2013 release of version 3 may lack the extended data contained in the Version 4 wind files. When performing a manual copy, the extended data (primarily descriptive text) at the end of the older file may require updating with a text processor, e.g., Microsoft Windows® Notepad. The descriptive text typically entered can be seen by opening any current Version 4 wind file. In rare cases the first row ASCII characters from any current Version 4 wind file may need to be copied into the manually copied file, in order to make it operational.

(3) Convert met data to wind file format using CAP-88 PC Version 3

Many facilities have access to meteorological data in the STAR format, or can access STAR data from web-based data sources such as <https://mrcc.illinois.edu/CLIMATE/> (registration and login required). CAP-88 PC Version 3 contains a utility (GETWND) that could be used to convert STAR format meteorological data (and some other less common data formats) into the CAP-88 PC wind file format, however, that Version 3 utility does not run under Windows 7 or later operating systems. If the user has access to a Windows XP system, then STAR data can be converted to the wind file format using CAP-88 PC Version 3, and those wind files used as inputs to Version 4. Specific instructions for using the utility are found in Section 11 of the CAP-88 PC Version 3 User Guide.

If a physical computer system that operates on Windows XP is unavailable, Windows XP can be installed on a virtual machine, and CAP-88 Version 3 installed on that virtual machine. There are many ways to set up a Windows XP virtual machine, such as using XP Mode Virtual PC in Windows 7, or the Hyper-V feature in Windows 10. Step-by-step instructions for creating a Windows XP virtual machine using the Hyper-V feature of Windows 10 Pro or Enterprise are attached to this guidance as a convenience, however, the security requirements of the user's local network will ultimately dictate whether, and how, a virtual machine may be created and used. Please consult with any facility or corporate IT managers for your specific limitations on creating virtual machines.

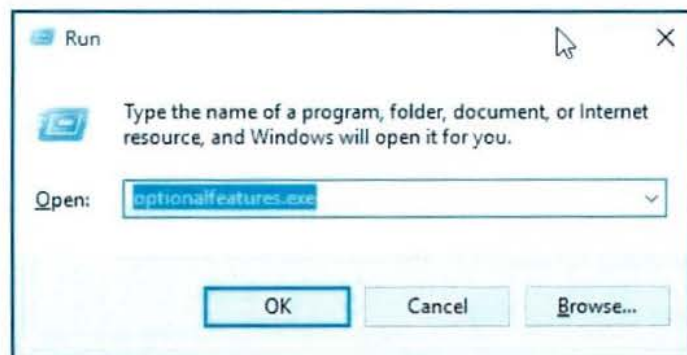
If the user chooses to create a virtual machine, a setup image for a properly licensed copy of Windows XP will be required. CAP-88 PC Version 3 can then be installed and the conversion utility run on the virtual machine.

Creating a Virtual Machine (VM) with Hyper-V on Windows 10

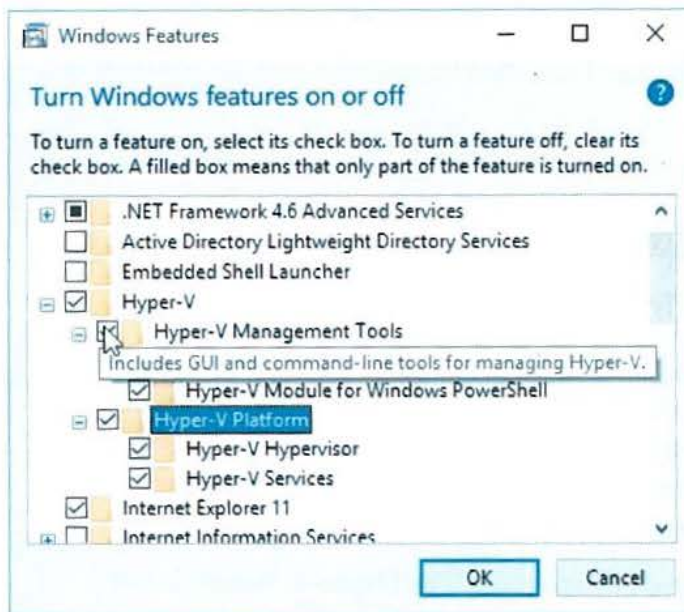
Verify System is Ready to Support Virtual Machines:

Ensure system BIOS support virtualization and have that functionality activated. Typically, this involves enabling Virtualization Technology (VTx) and possibly Virtualization Technology Directed I/O (VTd) within the system BIOS. System BIOS are usually accessed by pressing F2 or DEL key during system boot. Check system documentation to determine the specific process for accessing the BIOS and enabling virtualization.

Ensure the machine is running Windows 10 Pro or Enterprise. The Hyper-V feature is not available on Windows 10 Home. To verify or enable the Hyper-V feature simultaneously press the Windows key and the R key (**Windows key+R**) to activate the Run dialog. Type 'optionalfeatures.exe' to start the Windows Features on/off selection dialog. Also, we recommend at least a minimum of 8 GB of RAM on the host machine (16 GB is preferable) and 512 GB of free hard disk space on the host machine.



Scroll to the Hyper-V entry and verify it is checked or check it if it is not.



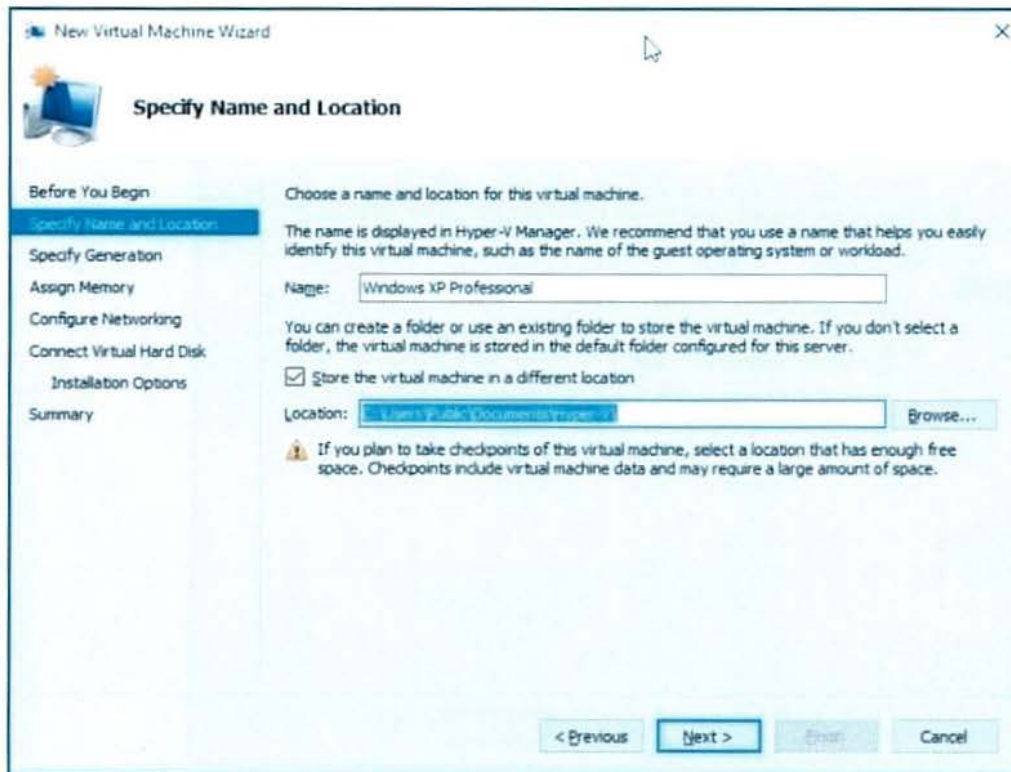
Select OK and follow the prompts

Create a Virtual Machine with Hyper-V Manager

1. Open Hyper-V Manager by either pressing **Windows key+S** and typing "Hyper-V Manager" or by left-clicking the Windows icon in the lower left and finding **Hyper-V Manager** in your applications. It is usually under the Windows Administrative Tools heading in the apps list.
2. In Hyper-V Manager, click **Action>New>Virtual Machine** from the menu bar or select **New** on the right-side Actions pane to bring up the New Virtual Machine Wizard.
3. Review the 'Before You Begin' content and click **Next**.
4. Give the virtual machine a name.

Note: This is the name the Hyper-V app on the host system uses for the virtual machine, not the computer name given to the guest operating system that will be deployed inside the virtual machine.

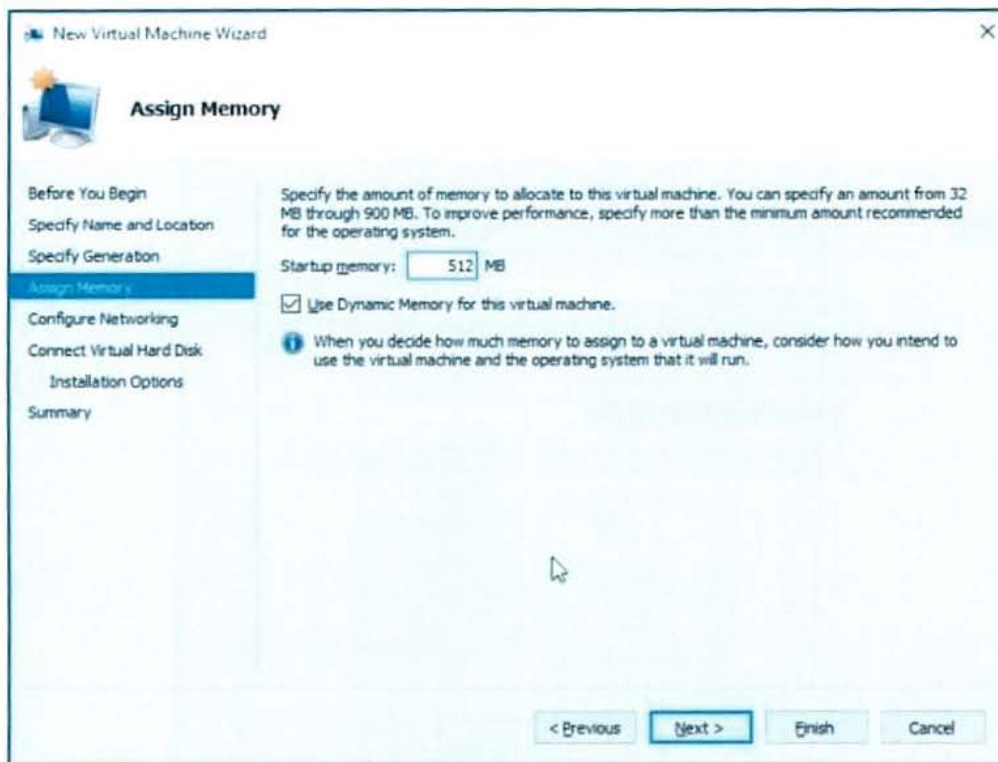
Choose a location where the virtual machine files will be stored such as **c:\virtualmachine**. You can also accept the default location. Click **Next** when done.



Select a generation for the machine and click **Next**.

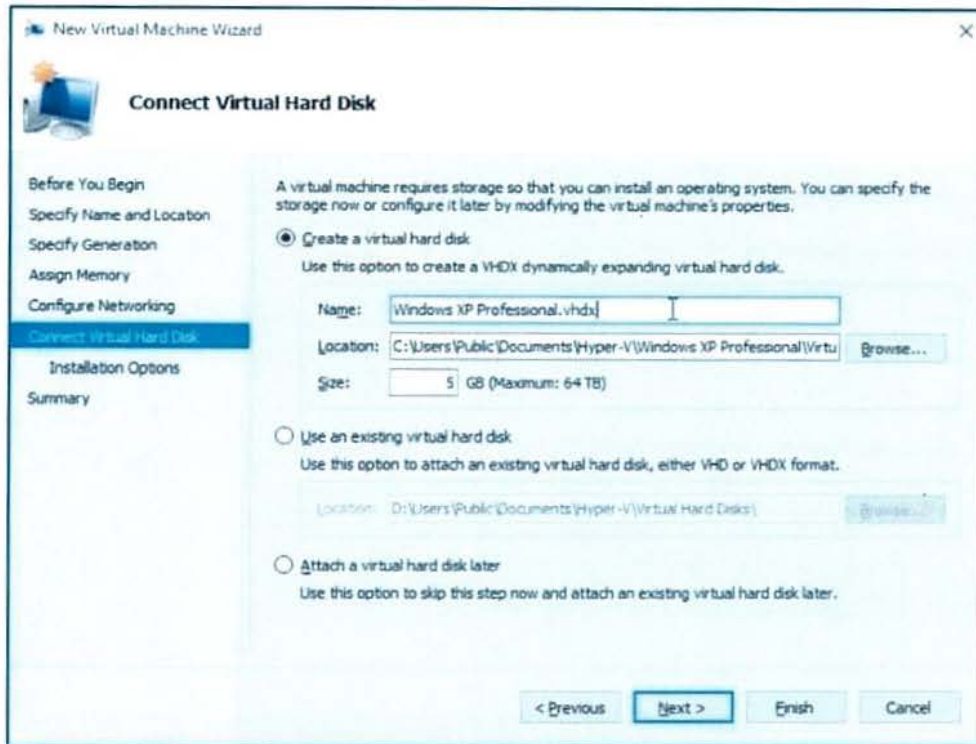
If you are planning to install older applications or legacy systems, we recommend using a Generation 1 VM. Generation 2 virtual machines were introduced with Windows Server 2012 R2 and provide a simplified virtual hardware model and some additional functionality but may not be as compatible with older applications. Also, you can only install a 64-bit operating system on a Generation 2 virtual machine.

Choose how much memory you want the VM to use. This depends upon the intended use of the VM and the amount of memory available on the host machine, because memory is shared between a Hyper-V host and the virtual machine running on the host. We recommend selecting 2048 MB for the Startup Memory value and leave Use Dynamic Memory selected unless the host has limited free memory. Click the Next button.



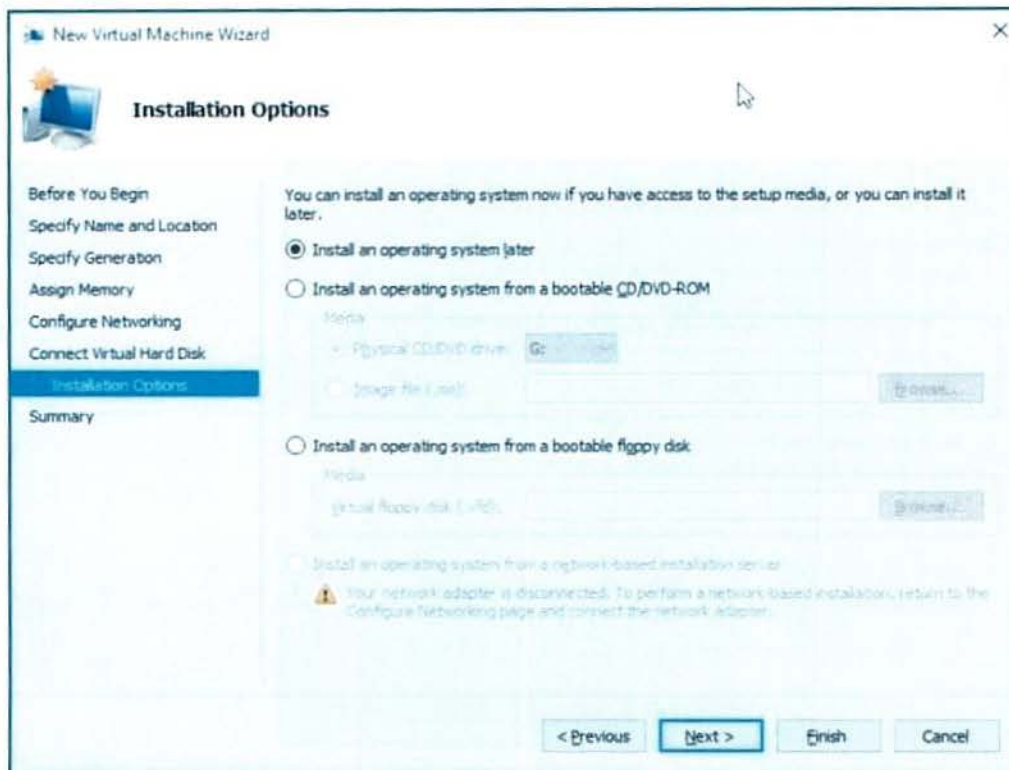
On the Configure Networking wizard, select a virtual switch for the virtual machine and click Next. If a virtual switch does not exist you can create one later using Hyper-V manager and then select that virtual switch for use by this VM. For more information, see the addendum at the end of this document.

Create and Configure your Virtual Hard Disk where you will install the operating system. You can make quick changes here such as the location where it will be stored along with the amount of space you would like to give the VM. Click Next when ready. A virtual hard drive provides storage for a virtual machine similar to a physical hard drive. A virtual hard drive is required so that you can install an operating system on the virtual machine. Make sure the virtual disk is large enough to hold the operating system and any additional applications and data you plan to have on the VM.



On the Installation Options wizard, we recommend that you select “Install an operating system from a bootable image file” and then select an operating system bootable image file. These are usually CD image files with a .iso extension. If a bootable image file is not available you can perform this using a physical CD/DVD or do it later once a source is available.

Note: Unless you're running a volume-licensed Version of Windows, you need a separate license for Windows running inside a virtual machine. The virtual machine's operating system is independent of the host operating system.



Review the virtual machine details and click **Finish** to complete the virtual machine creation.

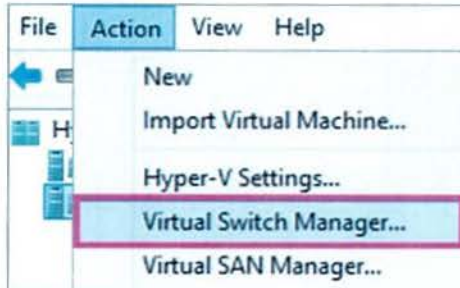
Complete the Operating System Deployment

In order to finish building your virtual machine, you need to start the virtual machine and walk through the operating system installation.

1. In Hyper-V Manager, double-click on the virtual machine. This launches the VMConnect tool.
2. In VMConnect, click on the green Start button. This is like pressing the power button on a physical computer. You may be prompted to 'Press any key to boot from CD or DVD'. Go ahead and do so.
3. The virtual machine boots into setup and you can walk through the installation like you would on a physical computer.

Creating a Virtual Switch Using Hyper-V Manager

1. Open Hyper-V Manager, select the Hyper-V host computer name.
2. Select Action>Virtual Switch Manager.



3. Choose the type of virtual switch you want.

Connection type	Description
External	Gives virtual machines access to a physical network to communicate with servers and clients on an external network. Allows virtual machines on the same Hyper-V server to communicate with each other. This is the most common selection for full network access.
Internal	Allows communication between virtual machines on the same Hyper-V server, and between the virtual machines and the management host operating system. Does not allow external access to an outside physical network.
Private	Only allows communication between virtual machines on the same Hyper-V server. A private network is isolated from all external network traffic on the Hyper-V server. This type of network is useful when you must create an isolated networking environment, like an isolated test domain.

4. Select Create Virtual Switch.
5. Add a name for the virtual switch.
6. If you select External from the above selection list, choose the network adapter (NIC) that you want to use and any other options described in the following table.

Connection type

What do you want to connect this virtual switch to?

☒ External network:

Intel(R) 82579LM Gigabit Network Connection

☒ Allow management operating system to share this network adapter

☐ Enable single-root I/O virtualization (SR-IOV)

☐ Internal network

☐ Private network

Setting name	Description
Allow management operating system to share this network adapter	Select this option if you want to allow the Hyper-V host to share the use of the virtual switch and NIC or NIC team with the virtual machine. With this enabled, the host can use any of the settings that you configure for the virtual switch like Quality of Service (QoS) settings, security settings, or other features of the Hyper-V virtual switch.
Enable single-root I/O virtualization (SR-IOV)	Select this option only if you want to allow virtual machine traffic to bypass the virtual machine switch and go directly to the physical NIC..

- If you want to isolate network traffic from the management Hyper-V host operating system or other virtual machines that share the same virtual switch, select “Enable virtual LAN identification for management operating system”. You can change the VLAN ID to any number or leave the default. This is the virtual LAN identification number that the management operating system will use for all network communication through this virtual switch.

VLAN ID

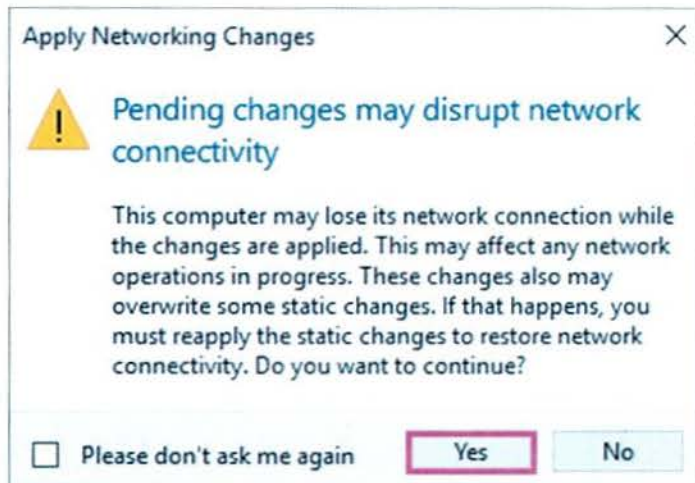
☐ Enable virtual LAN identification for management operating system

The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.

2

- Click OK.

9. Click Yes to the following prompt.



The virtual switch should now be available for use when configuring networking in the Hyper-V manager for a virtual machine.

