Technical white paper

HP Network Simulator for Comware devices: user guide (Windows)

A Comware OS learning tool

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Introduction

Comware version 7 (v7) is a high-end network HP Networking operating system (OS). It provides control and management to switches, routers, and security appliances.

HP Network Simulator (HNS) allows users to learn the Comware v7 interface and features. Using HNS, networking professionals can create, configure, and connect simulated fixed-port and modular HP switches and routers. For example, simulated switches can be aggregated to form an Intelligent Resilient Framework (IRF)-fabric.

HNS runs virtual machines on Oracle VM VirtualBox. The performance of the virtual machines is determined by the VirtualBox environment, the Windows OS, and the hardware platform.

Note

Switching features based on ASICs cannot be tested on the HP Network Simulator.

The following table provides a list of devices and device cards that can be created within HNS.

Table 1: HP Network Simulator cards and devices

Card model	Device type	Ports
SIM1101	32-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: Serial ports
SIM1201	64-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: Serial ports
SIM1102	32-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: POS ports
SIM1202	64-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: POS ports
SIM1103	32-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: E1 ports
SIM1203	64-bit centralized router	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: E1 ports
SIM1104	32-bit centralized router	• Port 1: Network management port • Ports 2 to 3: 25-Mbps ATM ports • Port 4: 155-Mbps ATM port • Port 5: 622-Mbps ATM port • Port 6: ADSL ATM port • Port 7: G.SHDSL ATM port • Port 8: E1 ATM port
SIM1204	64-bit centralized router	• Port 1: Network management port • Ports 2 to 3: 25-Mbps ATM ports • Port 4: 155-Mbps ATM port • Port 5: 622-Mbps ATM port • Port 6: ADSL ATM port • Port 7: G.SHDSL ATM port • Port 8: E1 ATM port

SIM1105	32-bit centralized router	• Port 1: Network management port • Port 2: E3 ATM port • Port 3: T1 ATM port • Port 4: T3 ATM port • Port 5: ADSL 2+ port • Port 6: SHDSL_4WIRE ATM port • Port 7: SHDSL_4WIRE_BIS ATM port • Port 8: SHDSL_8WIRE_BIS ATM port
SIM1205	64-bit centralized router	• Port 1: Network management port • Port 2: E3 ATM port • Port 3: T1-ATM port • Port 4: T3 ATM port • Port 5: ADSL 2+ port • Port 6: SHDSL_4WIRE ATM port • Port 7: SHDSL_4WIRE_BIS ATM port • Port 8: SHDSL_8WIRE_BIS ATM port
SIM2101	32-bit centralized switch	• Port 1: Network management port • Ports 2 to 8: GE ports
SIM2201	64-bit centralized switch	• Port 1: Network management port • Ports 2 to 8: GE ports
SIM2102	32-bit centralized switch	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: 10-GE ports that can operate as FC interfaces
SIM2202	64-bit centralized switch	• Port 1: Network management port • Ports 2 to 4: GE ports • Ports 5 to 8: 10-GE ports that can operate as FC interfaces
SIM3101 (MPU)	32-bit distributed switch or router	• Port 1: Network management port • In the Comware system, the number of this port is 0
SIM3201 (MPU)	64-bit distributed switch or router	• Port 1: Network management port • In the Comware system, the number of this port is 0
SIM3111 (interface card)	64-bit distributed switch or router	• Ports 1 to 7: GE ports
SIM3112 (interface card)	32-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: Serial ports
SIM3113 (interface card)	32-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: POS ports
SIM3114 (interface card)	32-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: E1 ports
SIM3115 (interface card)	32-bit distributed switch or router	• Ports 1 to 2: 25-Mbps ATM ports • Port 3: 155-Mbps ATM port • Port 4: 622-Mbps ATM port • Port 5: ADSL ATM port • Port 6: G.SHDSL ATM port • Port 7: E1 ATM port
SIM3116 (interface card)	32-bit distributed switch or router	• Port 1: E3 ATM port • Port 2: T1 ATM port

- Port 3: T3 ATM port
- Port 4: ADSL 2+ port
- Port 5: SHDSL_4WIRE ATM port
- Port 6: SHDSL_4WIRE_BIS ATM port
- Port 7: SHDSL_8WIRE_BIS ATM port

SIM3211 **(interface card)**	64-bit distributed switch or router	• Ports 1 to 7: GE ports
SIM3212 **(interface card)**	64-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: Serial ports
SIM3213 **(interface card)**	64-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: POS ports
SIM3214 **(interface card)**	64-bit distributed switch or router	• Ports 1 to 3: GE ports • Ports 4 to 7: E1 ports
SIM3215 **(interface card)**	64-bit distributed switch or router	• Ports 1 to 2: 25-Mbps ATM ports • Port 3: 155-Mbps ATM port • Port 4: 622-Mbps ATM port • Port 5: ADSL port • Port 6: G.SHDSL port • Port 7: E1 ATM port
SIM3216 **(interface card)**	64-bit distributed switch or router	• Port 1: E3 ATM port • Port 2: T1 ATM port • Port 3: T3 ATM port • Port 4: ADSL 2+ port • Port 5: SHDSL_4WIRE ATM port • Port 6: SHDSL_4WIRE_BIS ATM port • Port 7: SHDSL_8WIRE_BIS ATM port

Installing HP Network Simulator

Host PC requirements

For performance purposes, the PC running HNS must meet the requirements listed in the following table.

Table 2: Host PC requirements

| Item	Specifications
CPU	CPU frequency: ≥ 3.0 GHz
SDRAM	≥ 4 GB
Hardware	≥ 80 GB
Operating system	Windows 7 or later

Installation procedure

Note
The Windows administrator rights are required to install and uninstall HP Network Simulator.

Important
To install an upgraded version of HNS, the current HNS software must first be uninstalled.

1. Obtain and install Oracle VM VirtualBox Release 4.2.18 or later.
    A. VM VirtualBox can be downloaded from: VirtualBox.org.
2. For Oracle VM VirtualBox Release **4.2.24 and higher**, users need to create a new Environment Variable (User Variable): VBOX_INSTALL_PATH
    i. **Start** > **Control Panel** > **System and Security** > **System** > **Advanced system settings** > **Environment Variables** > VBOX_INSTALL_PATH
    ii. The value for the variable is the local VirtualBox install folder, typically "C:\Program Files\Oracle\VirtualBox\"

Figure 1: Environment variable creation
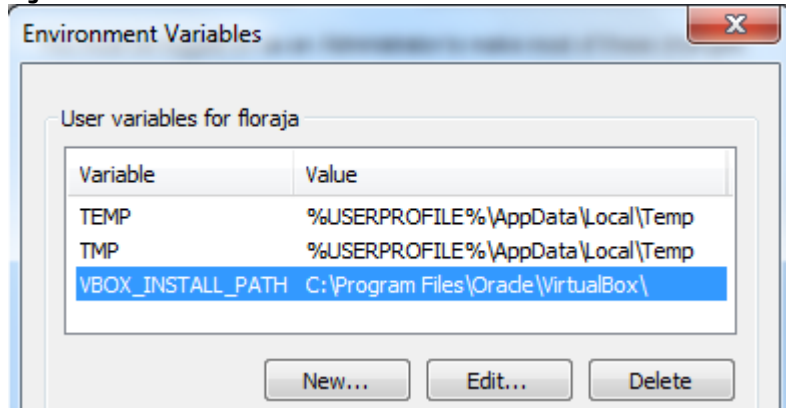
3. Reboot the PC.

Note
This guide provides VirtualBox installation steps required for an HNS installation. The actual installation of VirtualBox is outside the scope of this document.

4. Obtain the HNS installation package for the Windows OS running.
    A. HP Network Simulator can be downloaded from: hp.com/networking/hns
5. Once downloaded, unzip, and double-click the installation package to start the installation.

Note
A message saying Virtual Box isn't installed yet will appear for VirtualBox releases after 4.2.24. If the Environment Variable described earlier has been added, ignore this message and continue with the installation. If the Environment variable hasn't been added, please add it and then continue with HNS installation.
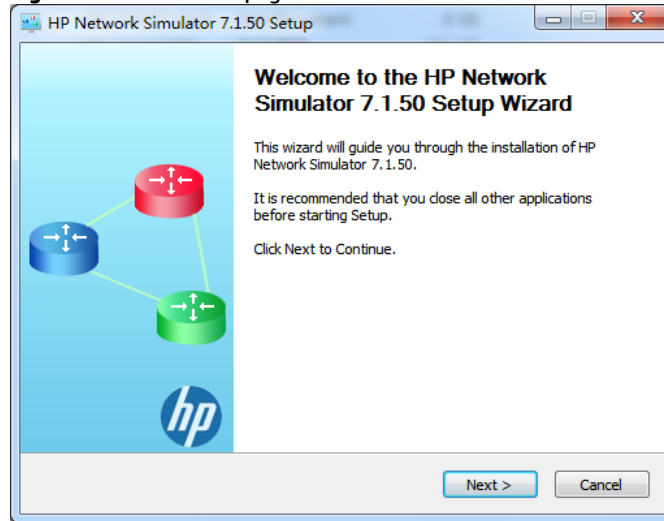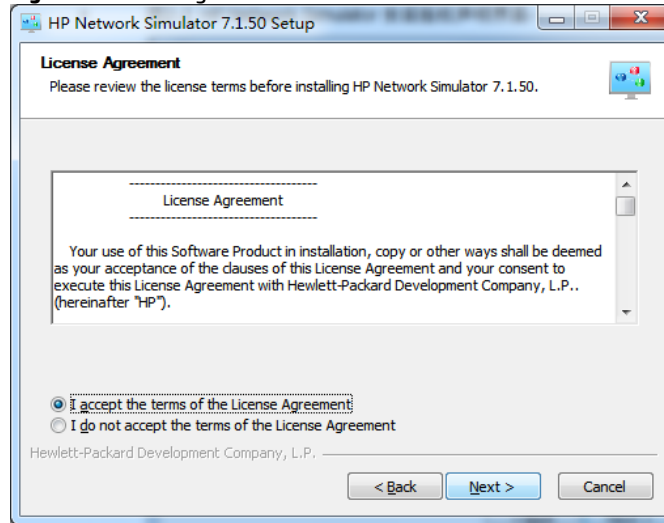
Figure 2: HNS message
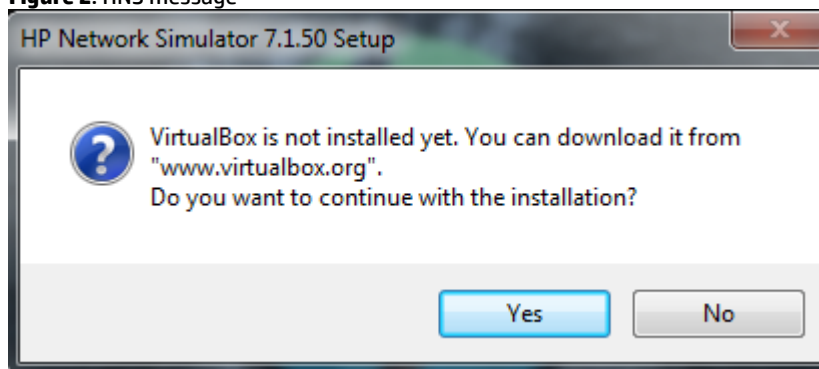
6. The HNS welcome page appears.

Figure 3: HSN welcome page

7. Click **Next**.

8. On the license agreement step, select **I accept the terms of the License Agreement** and click **Next**.

Figure 4: License agreement

9. Enter or navigate to the destination folder and click **Install**. To use the default folder **C:\Program Files**, click **Install** directly.

   A. The destination folder path and name can contain up to 128 characters. Percent signs (%) and pound signs (#) are not allowed.
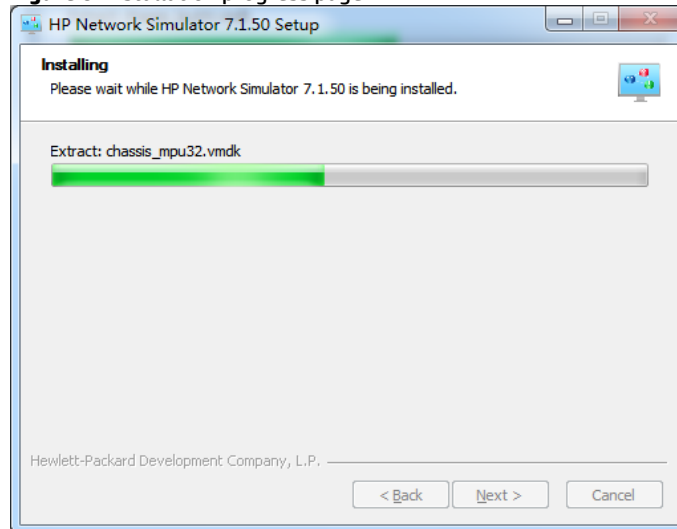
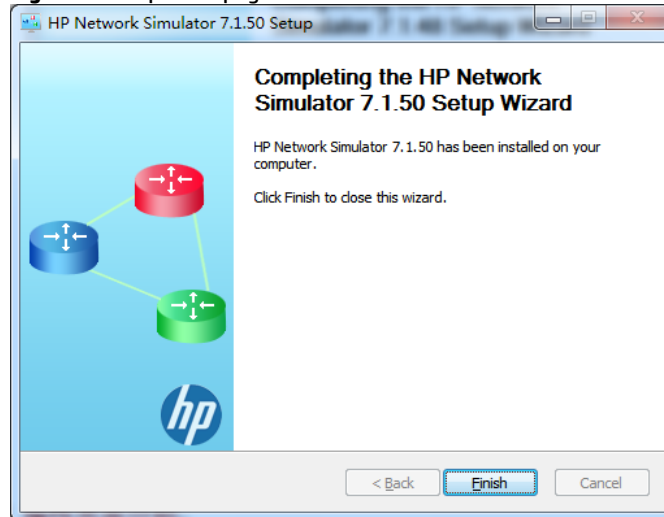**Figure 5**: Specifying the installation path
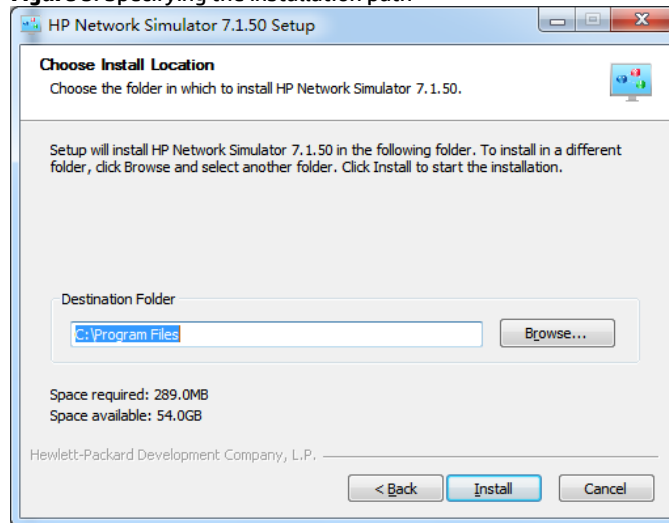
10. After clicking **Install**, the installation progress page appears.

Figure 6: Installation progress page

11. After the installation is completed, the completion page appears. Click **Finish.**

Figure 7: Completion page

12. A desktop shortcut and a start menu shortcut are created. Either of them can be clicked to start HNS.
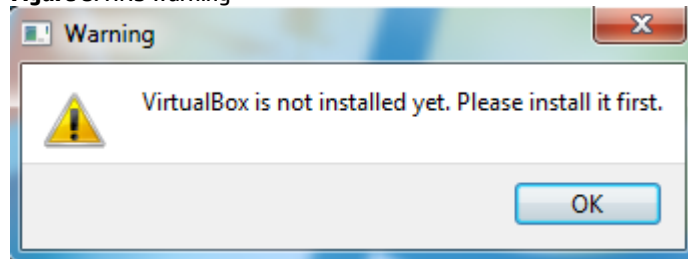
Note
If HNS is already installed and VirtualBox is being upgraded to any version higher than 4.2.24, an error message will appear when HNS is opened. Close HNS, add the Environment Variable mentioned in previous steps, and reopen HNS.

Figure 8: HNS warning

Graphical user interface (GUI) introduction

The HNS GUI is divided in four sections:

- Title bar
  - If no project has been opened or the current project is not saved yet, the title bar displays **HP Network Simulator**
  - If a project has been opened or the current project has been saved, the title bar displays *Project name*–**HP Network Simulator**
- Menu bar
  - **File** – Project operations menu
  - **Edit –** Edit functions menu
  - **Simulate –** Simulation functions menu
  - **Setting –** Configuration menu
  - **Help –** Help document and version information menu
- Quick launch bar
  - **New** button ![icon] **–** Creates a project
  - **Open** button ![icon] **–** Opens a project
  - **Delete** button ![icon] **–** Deletes a project

- **Save** button 💾 – Saves a project

- **Save as** button 💾 – Saves the project as another project

- **Import** button – Imports a project

- **Export** button – Exports a project

- **Run** button – Runs a project

- **Stop** button – Stops a project

• Configuration item editing area

- Displays the configuration items in the white area and the configuration item numbers in the gray area. The configuration items can be edited

Figure 9: HP Network Simulator GUI
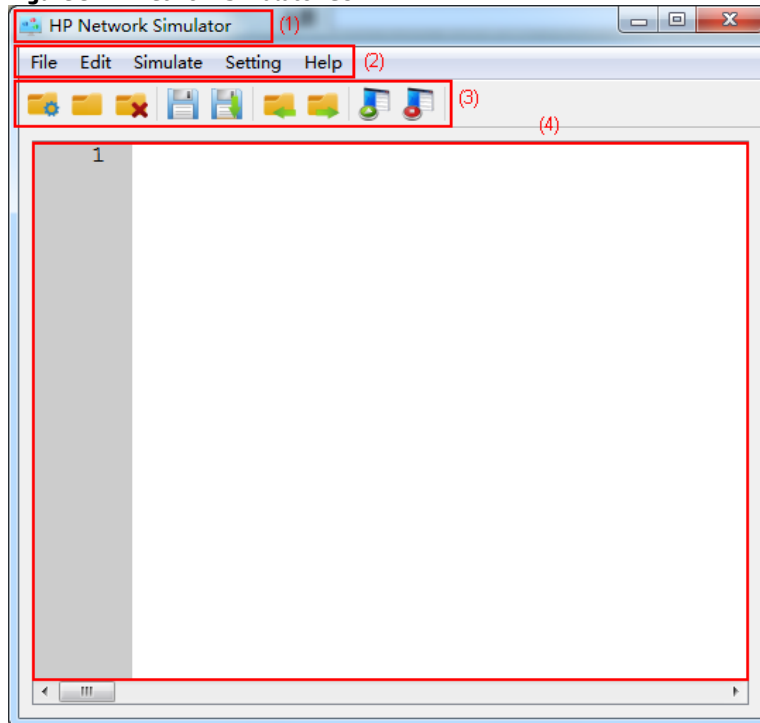
(1) Title bar	(2) Menu bar
(3) Quick launch bar	(4) Configuration item editing area

Creating a simulated network project

Creating a project from scratch

A simulated network project consists of two parts:

• Device parameter configuration items

• Connection parameter configuration items

The device parameter configuration items must be defined before the connection parameter configuration items.

Project syntax
A simulated network project must follow these syntax rules:

• Each configuration item defines one parameter and occupies one line.

• A device parameter configuration item must be in the format Parameter = value. A correct keyword is displayed in blue.

• A connection parameter configuration item must be in the format Parameter <-> Parameter. Multiple hyphens can be entered between the angle brackets.

- Some parameters consist of sub-parameters, which are separated by colons (:). Enter a tab or space after a sub-parameter to configure a value for it.
- A line beginning with a pound sign (#) is a comment line, which is displayed in green.
- Blank lines, tabs, and spaces can be inserted for information grouping purposes.

Device parameters

The following device parameters are used to create the simulated devices in a project.

Table 3: Device Parameters

Parameter	Description	Remarks
device_id	Configures a device ID in the range of 1 to 120.	Required • Configuration for a device must start with this parameter. • A device ID uniquely identifies a device in the network. • A simulated network project supports up to 30 devices. **Example:** device_id = 1
device_model	Configures the device model in the format **SIMxxxx**, where each *x* indicates a digit. The first two digits are configurable. The last two digits are fixed at zero.	Required • Configure this parameter before configuring the board parameter. • Configuration for a device can contain only one device_model configuration item. • For information about supported devices, see Table 1. **Example:** device_model = SIM1100
board	Configures a card in the device in the following format: • **board** = [**slot** *x* :] **SIMxxxx** [: **memory_size** *x*] • **slot** *x*: Configures the slot number of a card on a distributed device. Slots 0 to 1 are for MPUs. Slots 2 to 7 for interface cards. This part is required for a distributed device. • **SIMxxxx**: Configures the card model. The first two digits must be the same as the two configurable digits in the device model. • **memory_size**: Configures the size of the card's memory. This part is optional. The memory size varies with device types: • 32-bit centralized router—300 MB to 3072 MB, 512 MB by default. • 32-bit centralized switch—400 MB to 3072 MB, 512 MB by default. • 64-bit centralized device—500 MB to 3072 MB, 768 MB by default. • 32-bit MPU (for a distributed device)—400 MB to 3072 MB, 512 MB by default. • 64-bit MPU (for a distributed device)—500 MB to 3072 MB, 768 MB by default. • 32-bit interface card (for a distributed device)—200 MB to 3072 MB, 384 MB by default. • 64-bit interface card (for a distributed device)—300 MB to 3072 MB, 512 MB by default.	Required • Only one board configuration item can be configured for a card. • A simulated network project supports up to 120 cards. • For information about supported cards, see Table 1. **Example:** board = slot 0 : SIM1101 : memory_size 500
host_ip	Configures the IP address of the host PC in the format **host_ip** = *x.x.x.x*.	Optional This parameter is required only when the simulated devices reside on different host PCs. The host PCs must be able to reach each other. **Example:** host_ip = 192.168.0.1

Important

The default memory size may not be enough for the Telnet/SSH server to run. To connect to a device using Telnet or SSH declare a larger device memory_size in the project configuration file. **Example:**

board = slot 0 : SIM3101 : memory_size 1024

Connection parameters

Connection parameters configure connections of the following types:

- Device-to-device connection - Connection between two simulated devices
- Device-to-host connection - Connection between a simulated device and its host PC

Up to 200 connection parameters can be configured after all simulated devices' parameters have been entered.

Table 4: Connection parameters

Type	Syntax	Remarks
Device-to-device connection parameter	**device_id** x : [slot x :] **interface** x <---> **device_id** x : [slot x :] **interface** x • **device_id x**: Specifies the device ID. • **slot** x: Specifies the slot number of the interface card. • **interface** x: Specifies the number of the interface.	Optional • The two device IDs must be different. • The value range of the interface number depends on the card model.
Device-to-host connection parameter	**device_id** x : [slot x :] **interface** x <---> **host** : **NIC name** • **device_id** x: Specifies the device ID. • **slot** x: Specifies the slot number of the interface card. • **interface** x: Specifies the number of the interface. • **NIC name**: Specifies the name of the host PC's NIC. If the name contains spaces, double-quote the name.	Optional • **The device information must be on the left side of the angle brackets.** • **To obtain the NIC name, right-click the NIC and view its name under Connect using, as shown in Figure 10.**

Figure 10: Obtaining the NIC name
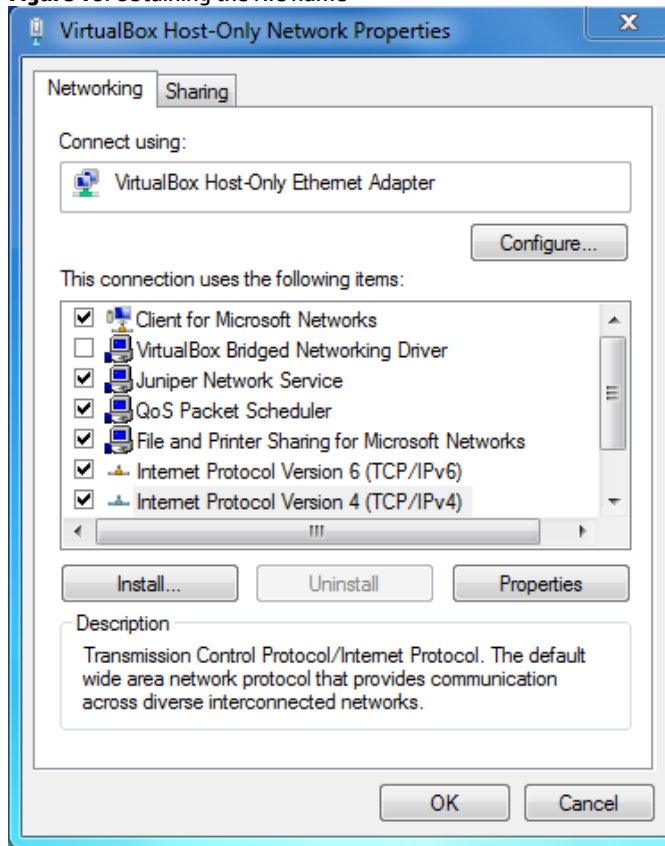
Notes
HP recommends choosing the **VirtualBox Host-Only** virtual NIC for connecting the simulated device and its host PC. The VirtualBox Host-Only NIC might have different names on different types of operating systems and different numbers on different versions of operating systems.

Choose the physical NIC for connecting a simulated device to a physical router or switch. HP recommends using the physical NIC for only one simulated device.

HP Network Simulator Basics

Default project

HNS provides a default simulated network project. This project contains one distributed device and one centralized device connected to each other. The default simulated network project can be modified to create a new project.

To create a simulated network project based on the default project:

1. Select **File** > **New**, or click the **New** button ⬛ on the quick launch bar.
2. The default simulated network project is imported and displayed in the configuration item editing area, as shown in **Figure 11**.
3. Modify the default simulated network project to create the desired devices.

Figure 11: Default simulated network project
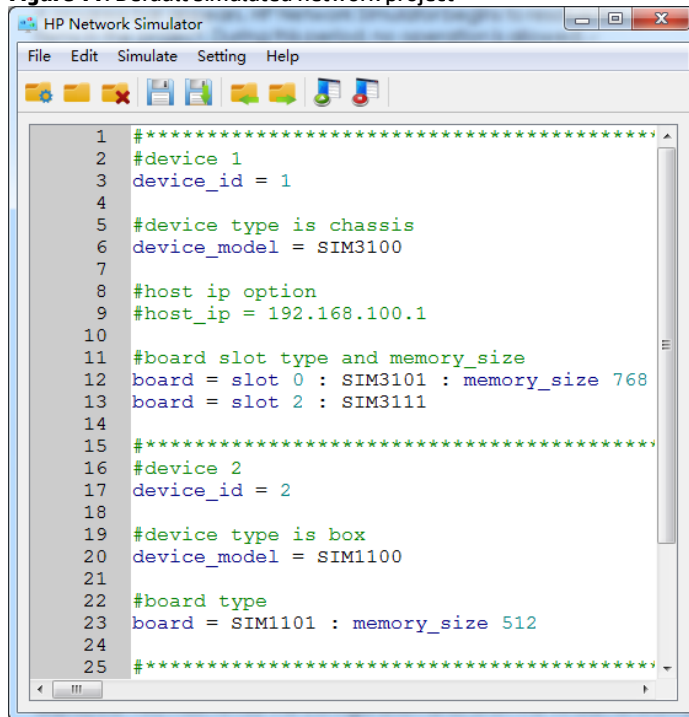
4. Save the project.

    A. Choose the configuration saving mode:

        i. To save the configuration to the current project, select **File** > **Save** or click the **Save** button 🖫 on the quick launch bar

        ii. To save the configuration to a new project, select **File** > **Save As** or click the **Save as** button 🖫 on the quick launch bar

    B. Enter the project name in the popup dialog box, as shown in **Figure 12**

        i. The project name can be a case-insensitive string of up to 20 characters. Valid characters include letters, numbers, and underscores (_)

        ii. If the name of an existing project is entered, the existing project will be overwritten

    C. Click **OK.**

Figure 12: Entering the project name
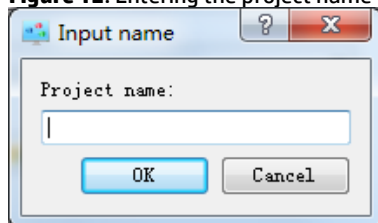
Viewing and changing the project storage path

Projects are saved to the path C:\Users\<your_user_name>\HNS VNs by default. However, the storage path can be changed.

After changing the storage path:

- All projects created after the change will be saved in the new path.
- If an existing project is edited, the project is still saved in the old path.
- If a new project is created with the name of an existing project, the new project is saved in the new path. The existing project is deleted.

To view and change the storage path:

1. Select **Setting** > **Project Directory**.

        A.   The current path is displayed, as shown in **Figure 13.**

2.   To change the path, enter the new path.

        A.   The path must be an existing absolute path. The entire path information can have up to 128 characters and cannot contain the percent sign (%)

Figure 13: Setting the storage path
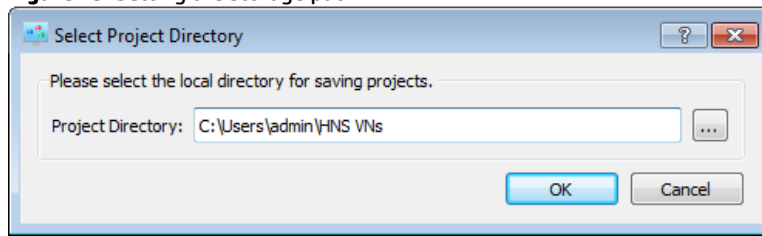
3.   Click **OK**

Starting a simulated network

1.   Select **File** > **Open,** or click the **Open** button   on the quick launch bar, to open a project for the simulated network.

2.   Select **Simulate** > **Run**, or click the **Run** button   on the quick launch bar.

Note

A progress bar appears and HP Network Simulator begins to resolve the configuration items in the project. During this period, **no** operation is allowed.

Figure 14: Progress bar during the Run operation
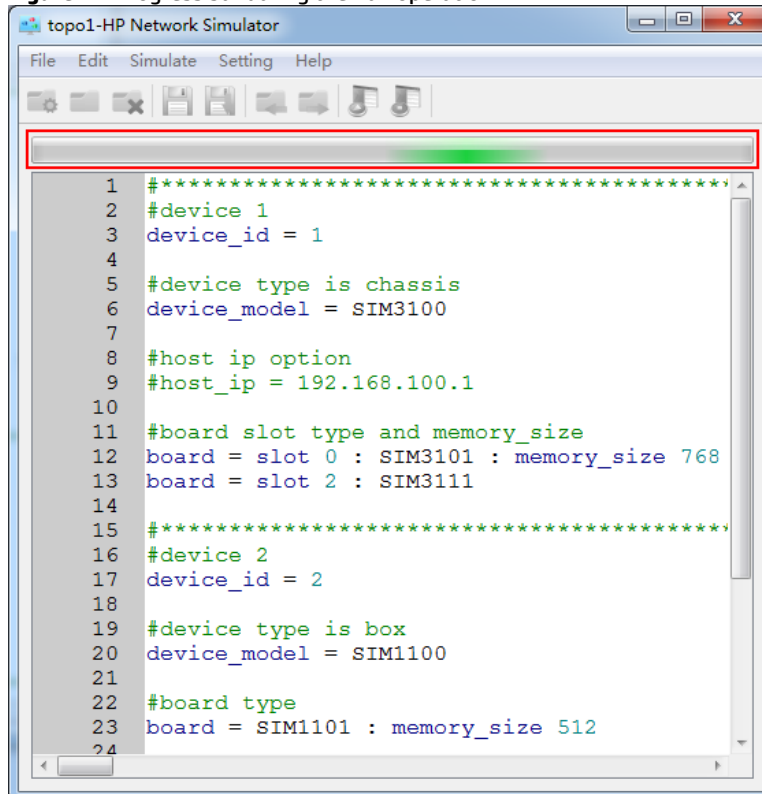
If the configuration of the simulated network project has syntax errors, an error message is displayed. The configuration must be revised and the simulated network project rerun. For more information about the error messages, see **Error messages** in **Appendix A**.

If the amount of the memory space required by the virtual machines is greater than 3 GB, HNS displays a notification and continues to resolve the project.

After HNS finishes resolving the configuration items, Oracle VM VirtualBox Manager is displayed together with the virtual machines. See **Figure 15**.

In VirtualBox Manager, the name of a virtual machine is in one of the following formats:

– Centralized device - project name-device ID
– Distributed device - project name-device ID-card slot number

Figure 15: VirtualBox Manager
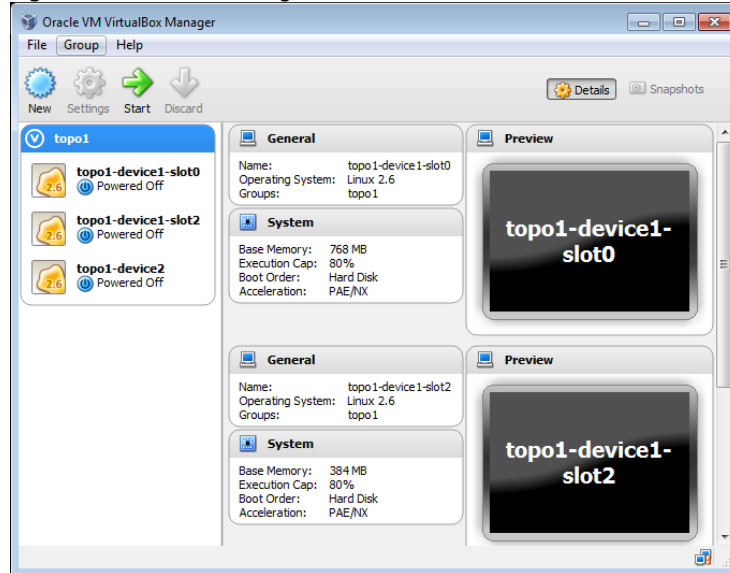
3. Select the virtual machines to be started and click the **Start** button .

   A. To start a centralized device, select the virtual machine

   B. To start an IRF fabric or a distributed device in standalone mode, select all virtual machines for the fabric or device

   C. To start multiple virtual machines, make sure the memory space of the host PC can satisfy the memory requirements of the virtual machines.

Rerunning the current simulated network project does not restart the running virtual machines.

Important
If a simulated network project is modified after running the project, the project must be rerun to force HNS to resolve the new configuration. Otherwise, the configuration changes do not take effect when the virtual machines are started.

For successful communication between two devices on different PCs, the two devices must use the same software version and the same simulated network project.

Logging in to a simulated device

Logging in through the console port
For a centralized device, the console CLI is displayed automatically after the virtual machine is started. The virtual machine can be managed at the CLI as with the CLI of a physical centralized device.

For a distributed device, the console CLI of the active MPU is displayed automatically after the virtual machines are started. The entire distributed device can be managed at the CLI of the active MPU.

Logging in through Telnet/SSH
The simulated network project must has a connection configured between the simulated device and the virtual NIC of the host PC. HP recommends that the simulated device's network management port is used for the connection.

The simulated network project must be compiled before starting the virtual machines.

1. At the console CLI of the simulated device, perform the following:

   A. Assign an IP address to the interface connected to the host PC's NIC. Make sure this IP address is in the same subnet as the NIC's IP address

B.   Configure Telnet login.

```
[switch]telnet server enable
[switch]user-interface vty 0 4
[switch-ui-vty0-4]authentication-mode none
```

2.   Run a Telnet or SSH client on a PC. Use the IP address of the simulated device's virtual interface as the destination address.

Note

For SSH commands, please see a Comware v7 fundamentals guide.

Device memory requirements for Telnet and SSH

The default memory size may not be enough for the telnet server to run. Declare a larger device memory_size in the board configuration statement. Example:

```
# Device B
device_id = 2
# Device type: 32-bit distributed device
device_model = SIM3100
# Card models and slot numbers
board = slot 0 : SIM3101 : memory_size 1024
```

Telnet/SSH Interface mapping requirements

To manage a simulated device through Telnet or SSH, one of its ports needs to be mapped to one of the host's network interfaces. The interface to map will vary if the Telnet/SSH utility is running on the same or a different host than the simulated device.

Table 5: Telnet/SSH Interface mapping requirements

Telnet/SSH Connection	Link Configuration	IP Interface on Device
From the same PC	Device x : interface 1 <> host: "VirtualBox NIC name"	Management Ethernet port
From another PC	Device x : interface y <> host: "Physical NIC name" (y: 2-8)	VLAN 1

Physical Network Connection

To connect the simulated network to a physical network device, one of the physical device's ports must be linked to the PC's physical NIC.

Table 6: Physical Network Connection Requirements

Link Configuration	IP Interface on Device
Device x : interface y <> host: "Physical NIC name" (y: 2-8)	VLAN 1

Exporting and importing a simulated network project

A simulated network project can be deployed on multiple PCs. To do so, export the simulated network project from HNS on the primary PC and import the project into HNS on the destination PCs.

The exported or imported project has the same configuration as the source project, which includes the following:

- Simulated network project configuration
- Configuration made on the virtual machines while the virtual machines were running

Exporting a simulated network project

1.   Select **File** > **Export**, or click the **Export** button [icon] on the quick launch bar.
2.   A dialog box appears.
3.   Enter the directory for saving the exported project, or navigate to the directory.
    A.   The directory information can have up to 128 characters.
4.   Click **OK**.

The exported project is saved to a file named in the format *project name***.hns**.

Figure 16: Exporting a simulated network project
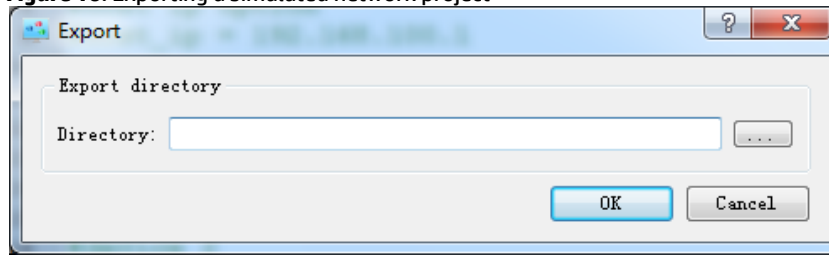
Importing a simulated network project

1. Select **File** > **Import**, or click the **Import** button on the quick launch bar.
2. A dialog box appears.
3. Select the .hns project file to be imported in the **Select File** box.
4. Specify a name for the imported project in the **Import As** box. To use the original project name, skip this step.
5. Click **OK**.

If the project name is identical to the name of an existing project, the imported project overwrites the existing project.

Figure 17: Importing a simulated network project
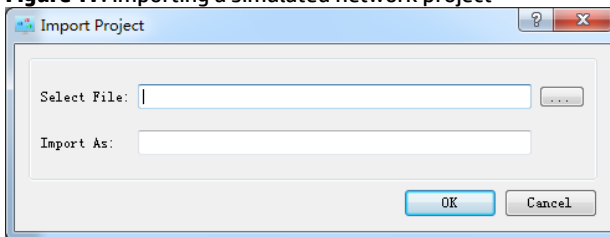
Closing a simulated network project

To close a virtual machine:

1. Click the **Close** button at the upper right corner of the virtual machine window.
2. The **Close Virtual Machine** window appears.
3. To save the operation information of the virtual machine for the next startup, select **Save the machine state**. To quit without saving operation information, select **Power off the machine**.
4. Click **OK**.

Figure 18: Closing a virtual machine
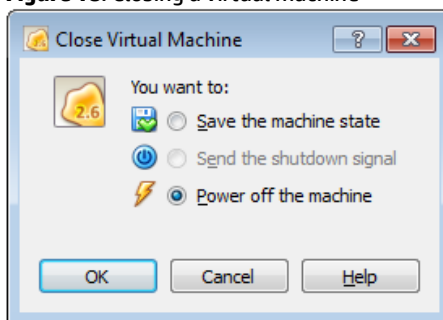
To close the entire simulated network project without saving the operation information:

1. In HNS, select **Simulator** > **Stop** or click the **Stop** button on the quick launch bar.
2. Create or open another simulated network project.

Deleting a simulated network project

1. Select **File** > **Remove**, or click the **Delete** button on the quick launch bar.

Figure 19: Selecting the simulated network project to be deleted
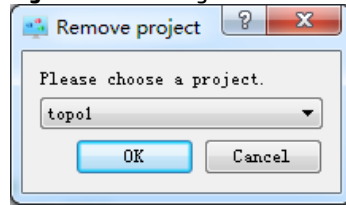
2. Select the simulated network project to be deleted and click **OK**.

3. The confirmation dialog box appears.

Figure 20: Confirming the operation
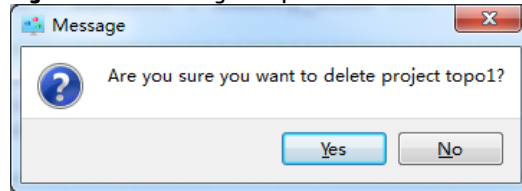
4. Click **Yes**.

Exiting HP Network Simulator

Exiting HP Network Simulator stops the active simulated network.

1. Select **File** > **Exit**, or click the **Close** button at the upper right corner of HNS.

Uninstalling HP Network Simulator

Important
Before uninstalling HNS, an option to delete all simulated network projects is presented. Deleted files will no longer be available should HNS be reinstalled. The simulated network projects kept when HNS was uninstall will be available.

To ensure complete removal of virtual machines, HNS must be uninstalled before uninstalling VirtualBox.

1. Close VirtualBox Manager and all virtual machines.
2. On the Windows operating system, select **Start** > **Control Panel** > **Programs and Features**, select HP **Network Simulator**, and click **Uninstall**.
3. The **Uninstall** window appears. Click **Uninstall.**

Figure 21: Uninstalling HP Network Simulator
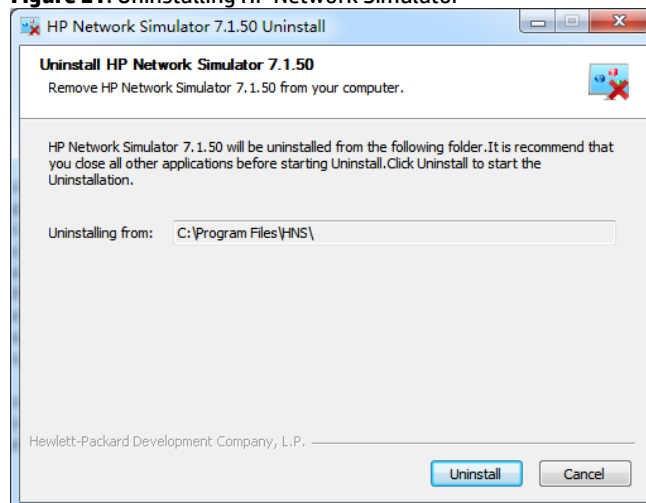
4. To remove all simulated network projects that have been created, select the **Remove the projects** check box. To keep the simulated network projects for future use, clear the check box.

5.   Click **Finish**

Figure 22: Completing the HP Network Simulator uninstall process
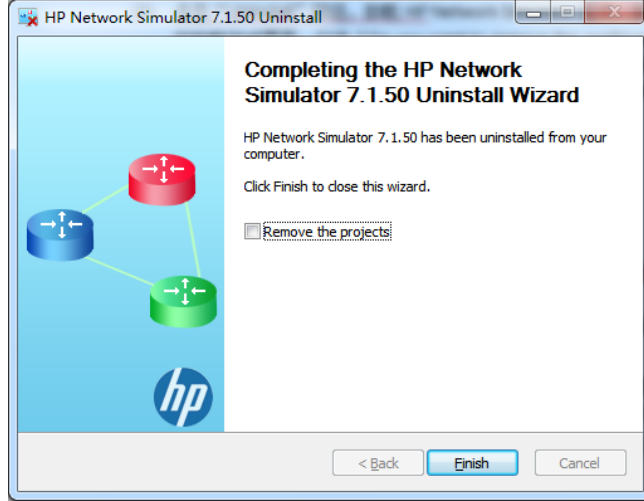
Configuration examples

Configuring a simulated network using a single PC

Network requirements

As shown in **Figure 23**, a single PC will be used to simulate the following devices:

• Centralized device: Device A
• Distributed device: Device B
   – Active MPU in slot 0
   – Standby MPU in slot 1
   – Interface cards in slots 2 and 3

Configure the following connections to form a network with the two simulated devices:

• Connection between M-Ethernet 1/0/1 on Device A and the virtual NIC of the PC
• Connection between GigabitEthernet 0/0/2 on Device A and GigabitEthernet 2/0/2 on Device B
• Connection between GigabitEthernet 0/0/3 on Device A and GigabitEthernet 3/0/2 on Device B

Figure 23: Network Diagram
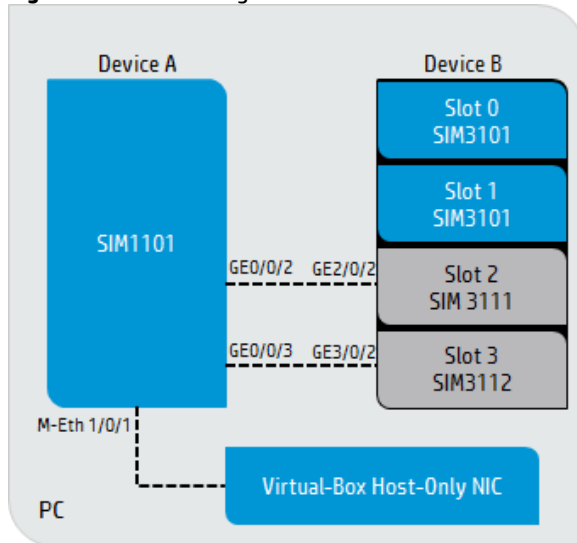
Configuration procedure

1.   Configure simulated network project **topo1**.

```
#*******************************************************************
```

```
# Device A
device_id = 1
# Device type: 32-bit centralized device
device_model = SIM1100
# Card model: SIM1101
board = SIM1101
#*********************************************************************
# Device B
device_id = 2
# Device type: 32-bit distributed device
device_model = SIM3100
# Card models and slot numbers
board = slot 0 : SIM3101 : memory_size 1024
board = slot 1 : SIM3101
board = slot 2 : SIM3111
board = slot 3 : SIM3112
#*********************************************************************
# Connections between Device A and Device B
# Connection between interface 1 on Device A and the virtual NIC of the PC.
device 1 : interface 1  <---> host : "VirtualBox Host-Only Ethernet Adapter"
# Connection between interface 2 on Device A and
# interface 2 on the card in slot 2 of Device B.
device 1 : interface 2  <--->  device 2 : slot 2 : interface 2
# Connection between interface 3 on Device A and
# interface 2 on the card in slot 3 of Device B.
device 1 : interface 3 <---> device 2 : slot 3 : interface 2
#*********************************************************************
```

2. Start the virtual machines:

    A. Select **Simulate > Run**, or click the **Run** button on the quick launch bar of HNS to start VirtualBox Manager

    B. Select **topo1-device1** and click the **Start** button on VirtualBox Manager to start Device A.

    C. Select **topo1-device2-slot0**, **topo1-device2-slot1**, **topo1-device2-slot2**, and **topo1-device2-slot3**, and click the **Start** button to start Device B

3. On the PC operating system, configure an IP address and mask for the virtual NIC, within the same subnet as the simulated devices. (Details not shown)

4. At the console CLI of the simulated device, assign IP addresses to interfaces:

    A. Assign interface M-Ethernet1/0/1 an IP address that is in the same subnet as the IP address of the PC NIC

    ```
    <Sysname> system-view
    [Sysname] interface m-ethernet 1/0/1
    [Sysname-M-Ethernet 1/0/1] ip address 20.0.0.1 24
    ```

    B. Assign IP addresses to interfaces **GigabitEthernet0/0/2**, **GigabitEthernet0/0/3**, **GigabitEthernet2/0/2**, and **GigabitEthernet3/0/2**. (Details not shown.)

Verifying the configuration

1. At the console CLI of the simulated device, configure Telnet login.

    ```
    [Sysname] line vty 0 4
    [Sysname-line-vty0-4] authentication-mode none
    [Sysname-line-vty0-4] user-role network-admin
    [Sysname-line-vty0-4] quit
    [Sysname] telnet server enable
    ```

2. Verify that Device A can be accessed through Telnet:

    A. On the PC operating system, run the Telnet or SSH client. Use the IP address 20.0.0.1 and the port number 23. Device A should be accessible.

3. Verify that the interfaces for the configured three connections can ping each other. (Details not shown)

Important

Simulated devices have all interfaces shutdown by default (administratively down) except for the Ethernet management port. During the configuration process bridged and routed ports, VLAN interfaces, bridge aggregation interfaces, etc. must be enabled using the **undo shutdown** command.

Configuring a simulated network using multiple PCs

Network requirements

As shown in **Figure 24**, two PCs will be used to simulate the following devices:

- Centralized device, Device A, on PC 1
- Distributed device, Device B, on PC 2:
  - Active MPU in slot 0
  - Interface cards in slots 2, 3, and 4

Configure the following connections to form a network using the two simulated devices:

- Connection between GigabitEthernet 0/0/2 on Device A and GigabitEthernet 2/0/2 on Device B
- Connection between Serial 0/0/5 on Device A and Serial 2/0/4 on Device B

Figure 24: Network Diagram
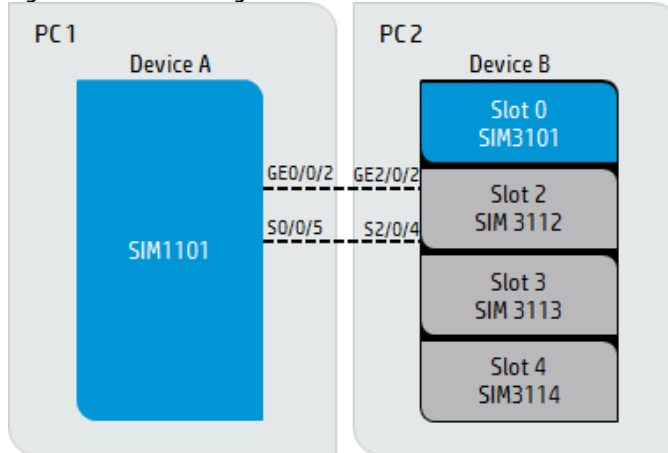
Configuration procedure

1. Configure simulated network project **topo2**.

```
#*********************************************************************
# Device A
device_id = 1
# Device type: 32-bit centralized device
device_model = SIM1100
# Host IP: IP address of PC 1
host_ip = 192.168.20.63
# Card model SIM1101
board = SIM1101
#*********************************************************************
# Device B
device_id = 2
# Device type: 32-bit distributed device
device_model = SIM3100
# Host IP: IP address of PC 2
#(This address and the IP address of PC1 must be able to reach each other)
host_ip = 192.168.20.53
# Card models and slot numbers
board = slot 0 : SIM3101
board = slot 2 : SIM3112
board = slot 3 : SIM3113
board = slot 4 : SIM3114
#*********************************************************************
# Connections between Device A and Device B
device 1 : interface 2 <---> device 2 : slot 2 : interface 2
device 1 : interface 5 <---> device 2 : slot 2 : interface 4
#*********************************************************************
```

Note

To ensure successful communication between devices on different PCs, make sure the two devices use the same software version and simulated network project.

2. Start the simulated network:

   A. On each host PC, select **Simulate** > **Run**, or click the Run button 🔲 on the quick launch bar of HNS to start VirtualBox Manager

   B. On PC 1, select **topo2-device1** and click the **Start** button 🔄 on VirtualBox Manager to start Device A

   C. On PC 2, select **topo2-device2-slot0**, **topo2-device2-slot2**, **topo2-device2-slot3** and **topo2-device2-slot4**, and click the **Start** button 🔄 on VirtualBox Manager to start Device B

3. At the console CLI of the simulated device, assign IP addresses to interfaces **GigabitEthernet0/0/2**, **GigabitEthernet2/0/2**, **Serial0/0/5**, and **Serial2/0/4**. (Details not shown)

Verifying the configuration

1. Verify that the console CLI of each simulated device appears after the virtual machines are started.

2. Verify that the interfaces for the network connections can ping each other. (Details not shown)

Important

Simulated devices have all interfaces shutdown by default (administratively down) except for the Ethernet management port. During the configuration process bridged and routed ports, VLAN interfaces, bridge aggregation interfaces, etc. must be enabled using the `undo shutdown` command.

Configuring a simulated network using a PC and a physical device

Network requirements

As shown in **Figure 25**, use the PC to simulate a centralized device.

Configure the following connections to form a network using the simulated device and the physical device:

• Connection between GigabitEthernet 1/0/2 on Device A and the physical NIC of the PC

• Connection between the physical NIC of the PC and GigabitEthernet 4/7/0/1 on the physical device, Device B

Note

On the virtual machine, only the Ethernet port is available for communicating with the physical device.

Figure 25: Network Diagram
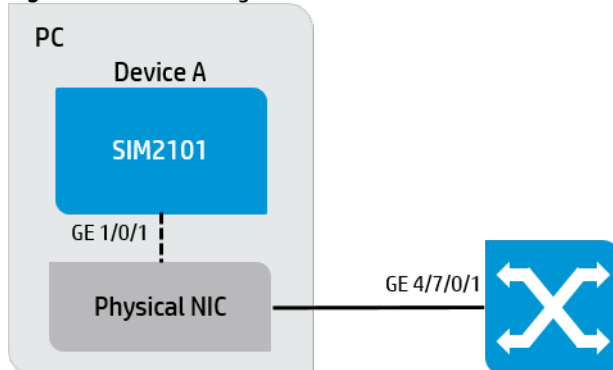
Configuration procedure

1. On HNS, configure simulated network project **topo3**.

```
#****************************************************************
# Device A
device_id = 1
# Device type: 32-bit centralized device
device_model = SIM2100
```

```
# Card model SIM2101
board = SIM2101
#*******************************************************************
# Connection between interface 2 on Device A and the physical NIC of the PC.
device 1 : interface 2 <-----> host : "Intel(R) 82579LM Gigabit Network
Connection"
#*******************************************************************
```

2. Connect **GigabitEthernet 4/7/0/1** on Device B to the physical NIC of the PC.

3. Power on Device B.

4. On HNS, select **Simulate** > **Run**, or click the **Run** button on the quick launch bar to start VirtualBox Manager.

5. Select **topo2-device1** and click the **Start** button on VirtualBox Manager to start Device A.

6. At the console CLI of the simulated device, assign IP addresses to interfaces **GigabitEthernet1/0/2** and **GigabitEthernet4/7/0/1**. (Details not shown)

Verifying the configuration

1. Verify that the console CLI of the simulated device appears after the virtual machine is started.

2. Verify that the interfaces for the network connection can ping each other. (Details not shown)

Important

Simulated devices have all interfaces shutdown by default (administratively down) except for the Ethernet management port. During the configuration process bridged and routed ports, VLAN interfaces, bridge aggregation interfaces, etc. must be enabled using the **undo shutdown** command.

Appendix A: Error Messages

The table below describes the error messages that may be encountered with HNS.

Table 7: Error Message Description

Error message	Description
Line number: Invalid parameter.	The parameter is invalid.
Line number: Configuration for a device must start with "device_id".	Other parameter have been configured before the device_id parameter for the device has been entered.
Line number: The parameter can't be configured more than once on the same device.	The parameter for the device has already been configured.
Line number: Configuration of the previous device is incomplete.	Some parameters required for the previous device are missing.
Line number: System configuration must precede link configuration.	Device parameter configuration must be configured before entering connection parameters.
Line number: Invalid value.	The value is invalid, not in the value range, or in incorrect format.
Line number: One interface can have only one connection.	There is already a connection that uses the interface.
Line number: The device model is not configured yet or doesn't support the card.	The device model has not been configured, or the device model does not support the card model.
Line number: Number of connections exceeded the limit.	The number of connections has reached the limit.
Line number: Number of devices exceeded the limit.	The number of devices has reached the limit.
Line number: Number of boards exceeded the limit.	The number of boards has reached the limit.
Line number: The card is installed in an incorrect slot.	The slot number for an MPU or interface card is incorrect. This message might be displayed only for a distributed device.
Line number: Version file required for the previous device doesn't exist.	The system does not find the version file of the previous device.
Line number: Invalid interface number.	The specified interface does not exist.
Line number: The network adapter doesn't exist.	The specified NIC does not exist.
Line number: Unknown error.	The system cannot identify the error.
The project is being used.	The simulated network project is being used.
Failed to run the project.	The simulated network project has been resolved successfully, but it failed to operate.
Run the project successfully.	The simulated network project is now operating correctly.
No valid configuration found.	No configuration has been made for the project.
Starting all virtual machines of the project requires a lot of memory space and will slow the system down. Please start only the virtual machines that need to use.	The memory space required for the virtual machines exceeds 3 GB. To ensure smooth system operation, start only necessary virtual machines.

Appendix B: Troubleshooting HP Network Simulator

The host PC operates slowly

Analysis
The virtual machines consumed more than 3 GB memory space.

Solution
Start only necessary virtual machines to reduce the memory space usage.

HP Network Simulator cannot start up

Analysis
Some files in the installation folder have been deleted, moved, or modified.

Solution
Uninstall HP Network Simulator and reinstall it. HP recommends not deleting, changing, or moving files in the installation folder.

64 Bit devices do not run on 64 Bit Windows

Analysis
VT-x/AMD-V hardware acceleration / virtualization support must be enabled in the PC's BIOS.

Figure 26: VT-x/AMD-V error
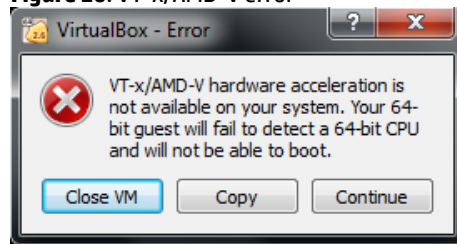
Solution
If VT-x or AMD-V cannot be enabled, implement the 32 bit version of the simulated devices.

Insufficient memory for MDCs

Analysis
The memory space configured for the virtual machine is not sufficient for creating MDCs.

Solution
Configure a memory space greater than 1024 MB for each MPU. Configure a memory space greater than 768 MB for each interface card.

Communication between a virtual machine and its host PC or between virtual machines on different PCs failed

Analysis
Packets might have been blocked by the firewall or the anti-virus software.

Solution
Disable the packet blocking function of the firewall or anti-virus software.

Connection between a virtual machine and its host PC failed

Analysis
The connection configuration was changed while the virtual machine was running.

Solution
Rerun the project to make HP Network Simulator resolve the new configuration. Configuration changes do not take effect when the virtual machines are running. HP recommends not changing the configuration for a virtual machine while the virtual machine is running.

Telnet and SSH Utility cannot connect to the device

Analysis: Option 1
The default memory size may not be enough for the telnet server to run.

Solution
Declare a larger device memory_size in the network configuration file. Example:

```
#*********************************************************************
# Device B
device_id = 2
# Device type: 32-bit distributed device
device_model = SIM3100
# Card models and slot numbers
board = slot 0 : SIM3101 : memory_size 1024
#*********************************************************************
```

Analysis: Option 2
To manage a simulated device through Telnet or SSH one of its ports needs to be mapped to one of the hosts network interfaces.

Solution
The interface to map will vary if the Telnet/SSH utility is running on the same or a different host than the simulated device.

Table 8: Telnet/SSH Interface mapping requirements

Telnet/SSH Connection	Link Configuration	IP Interface on Device
From the same PC	Device x : interface 1 <> host: "VirtualBox NIC name"	Management Ethernet port
From another PC	Device x : interface y <> host: "Physical NIC name" (y: 2-8)	VLAN 1

Connection to the Physical Network Does not Work

To connect the simulated network to a physical network device, one port of the simulated device needs to be mapped to the physical NIC of the PC.

Table 9: Physical Network Connection Requirements

Link Configuration	IP Interface on Device
Device x : interface y <> host: "Physical NIC name" (y: 2-8)	VLAN 1

The virtual machine cannot start up

Analysis
The Windows system is configured with a high notification level that prohibits the virtual machine from running.

Solution
Go to User Account Control Settings in Control Panel, and drag the slider down to Never notify.

The system time of the virtual machine is not synchronized with that of the host PC

Analysis
It is normal that the system time of the virtual machine is later than that of its host PC.

The progress bar keeps progressing

Analysis
Operations have been performed on HP Network Simulator before the progress bar disappears.

Solution

Refrain from performing operations on HP Network Simulator. The progress bar will show the progress correctly.

The virtual disk for the previous HP Network Simulator process remains

Analysis

HP Network Simulator was closed while it was resolving a project.

Solution

Manually delete the remaining virtual disk. To avoid this problem, do not stop HP Network Simulator before the startup progress bar disappears.

A simulated network project cannot be run

Analysis

The simulated network project might have been damaged.

Solution

Run the simulated network project again. If the run operation still fails, delete the simulated network project and configure a new one.
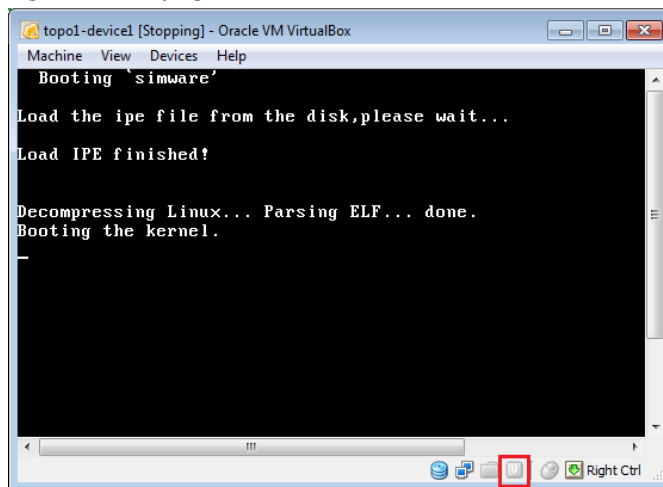
The virtual machines run slowly

Analysis

The VT-X or AMD-V function was disabled, or was not supported on the host PC. If the VT-X or AMD-V function is disabled, the icon in the red square is gray, as shown in **Figure 27**.

Solution

Enable the VT-X or AMD-V function on the PC if the PC supports the function.

Figure 27: Verifying the status of the VT-X or AMD-V function

The console terminal stops responding to key pressing

Analysis

If too many keys are pressed while a virtual machine is starting up, the console CLI might stop responding.

Solution

Do not press keys while the virtual machine is starting up.
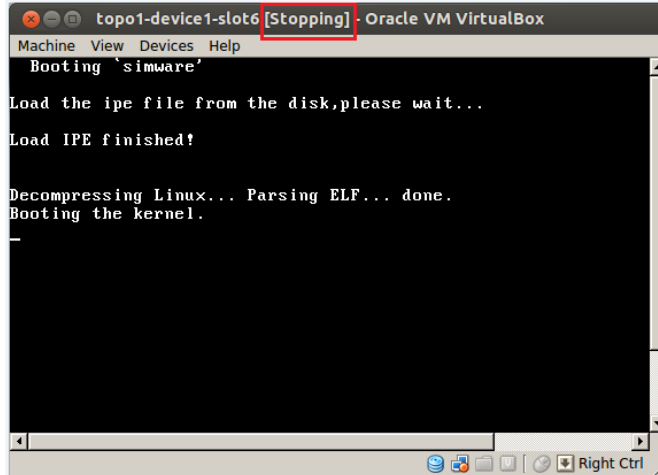
Some virtual machines cannot be stopped

Analysis

VirtualBox bug. When a stop operation is performed, some virtual machines might not be stopped if the virtual machines are using large amounts of memory.

Solution

Use the operating system's task manager to terminate VirtualBox Manager.

Figure 28: Remaining in the [Stopping] state

Resources, contacts, or additional links
End User License Agreement

HNS configurations are similar to those of the HP 5900 Switch Series. See the HP 5900 Switch Series manuals for configuration guidance.

Learn more at
hp.com/networking/hns

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