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Introduction

This configuration guide describes how to create, configure, and connect virtual HP Comware v7 devices using the HP Network Simulator (HNS) tool.

This guide will teach readers how to:

- Create static link aggregation groups
- Create dynamic link aggregation groups

Background information

Comware v7 is a network operating system that runs on HP high-end network devices. The HNS is an ideal Comware v7 learning tool. With the HNS, users can create:

- Fixed form-factor and modular routers
- Stackable and modular switches
- LAN and WAN links

This lab assumes that HNS has been downloaded and installed according to the user guide provided with the download. Installation of the HNS tool is outside the scope of this document. This lab also assumes that the reader has read the HNS Basics and configuration examples provided in the user guide.

Requirements

The following hardware is required:

- A PC with:
 - CPU frequency: 3.0 GHz or more
 - Memory: 4 GB or more
 - Hard disk: 80 GB or more
 - Operating system: Windows® 7/8 or Ubuntu (32-bit or 64-bit)

The following software is required:

- HP Network Simulator
- Oracle VM VirtualBox release 4.2.18 or later

Note:

1. If running HNS on Windows, use the name “VirtualBox Host-Only Ethernet Adapter” for the VirtualBox Ethernet adapter.
 2. If running HNS on Ubuntu, use the name “vboxnet0” for the VirtualBox Ethernet adapter.
-

Create

1. Copy paste the following within the HNS tool to create two simulated switches, as well as three connections between the switches.

```

#*****
# Switch A
device_id = 1
# Device type: 32-bit centralized device
device_model = SIM2100
# Card model: SIM2101
board = SIM2101 : memory_size 1024
#*****
# Switch B
device_id = 2
# Device type: 32-bit centralized device
device_model = SIM2100
# Card model: SIM2101
board = SIM2101 : memory_size 1024
#*****
# Connections between Switch A and Switch B
# Connection between interface 2 on Device A and interface 2 on Device B
device 1 : interface 2 <--> device 2 : interface 2
# Connection between interface 3 on Device A and interface 3 on Device B
device 1 : interface 3 <--> device 2 : interface 3
# Connection between interface 4 on Device A and interface 4 on Device B
device 1 : interface 4 <--> device 2 : interface 4
#*****

```

2. Save and run the file.
3. Two simulated switches will be created in VirtualBox Manager.
4. Start both switches.

Link aggregation

Ethernet link aggregation, also referred to as link aggregation, aggregates multiple physical Ethernet links into one logical link to increase link bandwidth beyond the limits of any one single link. Additionally, it allows for link aggregation group (LAG) members to dynamically back up one another, resulting in link redundancy.

HP Comware v7 devices support two link aggregation modes:

- Static—A static LAG has its member ports assigned manually.
- Dynamic—A dynamic LAG also has its member ports assigned manually; however, it uses the Link Aggregation Control Protocol (LACP) to verify the integrity of the LAG. It prevents issues like:
 - one port in the group is connected to a port in which LACP is not enabled (is not part of a dynamic LAG)
 - one port in the group is on a different LAG than the others
 - one port in the group is on a different switch than the others

In all of these cases, the port is put into the unselected state and is not used for traffic forwarding.

Network diagram

As shown in figure 1, Device A and Device B are connected with three Ethernet links. These Ethernet links are aggregated into LAG 1. The bandwidth of this aggregate link can be as high as the total bandwidth of these three Ethernet links.

Figure 1. Network diagram for Ethernet link aggregation



Configure static link aggregation

This section focuses on configuring a static aggregation link between the two simulated switches.

1. Create a static aggregation group with ports gig1/0/2-gig 1/0/4 on both the switches.

```
[switch] interface bridge-aggregation 1
[switch-Bridge-Aggregation] quit
[switch] interface gig 1/0/2
[switch-gig1/0/2] undo shutdown
[switch-gig1/0/2] port link-aggregation group 1
[switch-gig1/0/2] interface gig 1/0/3
[switch-gig1/0/3] undo shutdown
[switch-gig1/0/3] port link-aggregation group 1
[switch-gigs/0/3] interface gig 1/0/4
[switch-gig1/0/4] undo shutdown
[switch-gig1/0/4] port link-aggregation group 1
[switch-gig1/0/4] quit
```

Note:

By default, the ports on the simulated switches are administratively down, and must be enabled with the `undo shutdown` command.

Verify

1. Verify that the static aggregation link has been created.

```
[switch] display link-aggregation summary
```

Aggregation Interface Type:

BAGG - Bridge-Aggregation, BLAGG - Blade-Aggregation, RAGG - Route-Aggregation

Aggregation Mode: S -- Static, D -- Dynamic

Loadsharing Type: Shar -- Loadsharing, NonS -- Non-Loadsharing

Actor System ID: 0x8000, 00e0-0100-0000

AGG Interface	AGG Mode	Partner	ID	Selected Ports	Unselected Ports	Individual Ports	Share Type
BAGG1	S	None		0	3	0	Shar

- Further verify the interfaces used for link aggregation.

```
[switch] display link-aggregation verbose

Loadsharing Type: Shar -- Loadsharing, NonS -- Non-Loadsharing
Port Status: S -- Selected, U -- Unselected, I -- Individual
Flags: A -- LACP_Activity, B -- LACP_Timeout, C -- Aggregation,
       D -- Synchronization, E -- Collecting, F -- Distributing,
       G -- Defaulted, H -- Expired
Aggregate Interface: Bridge-Aggregation1
Aggregation Mode: Static
Loadsharing Type: Shar
  Port          Status      Priority    Oper-Key
-----
GE1/0/2        U           32768      1
GE1/0/3        U           32768      1
GE1/0/4        U           32768      1
```

Reset

- Disconnect all links between the switches and undo the static aggregation group.

```
[switch] undo interface bridge-aggregation 1
```

Configure dynamic link aggregation

This section focuses on configuring a dynamic aggregation link between the two simulated switches.

- Create a dynamic aggregation group with ports gig 1/0/2-gig 1/0/4 on both switches.

```
[switch] interface bridge-aggregation 1
[switch-Bridge-Aggregation] link-aggregation mode dynamic
[switch-Bridge-Aggregation] quit
[switch] interface gig 1/0/2
[switch-gig1/0/2] port link-aggregation group 1
[switch-gig1/0/2] interface gig 1/0/3
[switch-gig1/0/3] port link-aggregation group 1
[switch-gigs/0/3] interface gig 1/0/4
[switch-gig1/0/4] port link-aggregation group 1
[switch-gig1/0/4] quit
```

Verify

- Verify that the dynamic aggregation link has been created.

```
[switch] display link-aggregation summary

Aggregation Interface Type:
BAGG - Bridge-Aggregation, BLAGG - Blade-Aggregation, RAGG - Route-Aggregation
Aggregation Mode: S -- Static, D -- Dynamic
Loadsharing Type: Shar -- Loadsharing, NonS -- Non-Loadsharing
Actor System ID: 0x8000, 00e0-0100-0000

AGG      AGG Partner  ID          Selected  Unselected  Individual  Share
Interface Mode                                     Ports     Ports       Ports       Type
-----
BAGG1    D  0x8000, 0000-0000-0000  0         3           0           Shar
-----
```

- Further verify the interfaces used for link aggregation.

```
[switch] display link-aggregation verbose
```

```
Loadsharing Type: Shar -- Loadsharing, NonS -- Non-Loadsharing
Port Status: S -- Selected, U -- Unselected, I -- Individual
Flags: A -- LACP_Activity, B -- LACP_Timeout, C -- Aggregation,
       D -- Synchronization, E -- Collecting, F -- Distributing,
       G -- Defaulted, H - Expired
```

```
Aggregate Interface: Bridge-Aggregation1
```

```
Aggregation Mode: Dynamic
```

```
Loadsharing Type: Shar
```

```
System ID: 0x8000, 00e0-0100-0000
```

```
Local:
```

Port	Status	Priority	Oper-Key	Flag
GE1/0/2	U	32768	1	{ACG}
GE1/0/3	U	32768	1	{ACG}
GE1/0/4	U	32768	1	{ACG}

```
Remote:
```

Actor	Partner	Priority	Oper-Key	SystemID	Flag
GE1/0/2	0	32768	0	0x8000, 0000-0000-0000	{EF}
GE1/0/3	0	32768	0	0x8000, 0000-0000-0000	{EF}
GE1/0/4	0	32768	0	0x8000, 0000-0000-0000	{EF}

Reset

- Disconnect all links between the switches and undo the dynamic aggregation group.

```
[switch] undo interface bridge-aggregation 1
```

Additional links


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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
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