CHAPTER 1

Overview

The *Cisco Nexus 1000V Layer 2 Switching Configuration Guide, Release 4.0(4)SV1(1)* provides an overview of the available Layer 2 features and how to configure them.

This chapter includes the following sections:

Information about the Cisco Nexus 1000V

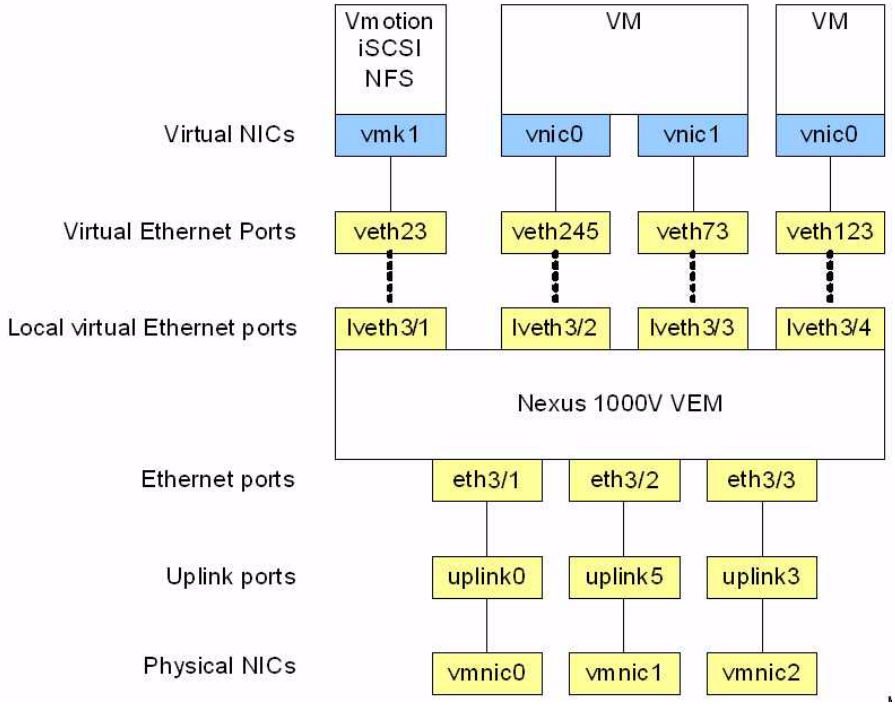
This section includes the following topics:

VEM Port Model

The Cisco Nexus 1000V differentiates the following Virtual Ethernet Module (VEM) ports:

Figure 1-1 shows how VEM ports are bound to physical and virtual VMware ports.

Figure 1-1 VEM Port View



VEM Virtual Ports

The virtual side of the VEM maps together the following three layers of ports:

- Virtual NICs, page 1-2
- Virtual Ethernet Ports, page 1-2
- Local Virtual Ethernet Ports, page 1-3

Virtual NICs

There are three types of Virtual NICs in VMware. The virtual NIC (vnic) is part of the VM, and represents the physical port of the host which is plugged into the switch. The virtual kernel NIC (vmknic) is used by the hypervisor for management, VMotion, iSCSI, NFS and other network access needed by the kernel. This interface would carry the IP address of the hypervisor itself, and is also bound to a virtual Ethernet port. The vswif (not shown) appears only in COS-based systems, and is used as the VMware management port. Each of these types maps to a veth port within Nexus1000V.

Virtual Ethernet Ports

A virtual Ethernet port (vEth) represents a port on the Cisco Nexus 1000V Distributed Virtual Switch. Cisco Nexus 1000V has a flat space of vEth ports, 0...*n*. These vEth ports are what the virtual “cable” plugs into, and are moved to the host that the VM is running on.

Virtual Ethernet ports are assigned to port groups.

Local Virtual Ethernet Ports

Each host has a number of local vEth (lvEth) ports. These ports are dynamically selected for vEth ports needed on the host.

Local vEths do not move, and are addressable by the convention, module/port number.

VEM Physical Ports

The physical side of the VEM includes the following from top to bottom:

- VMware NIC, page 1-3
- Uplink Ports, page 1-3
- Ethernet Ports, page 1-3

VMware NIC

Each physical NIC in VMware is represented by an interface called a VMNIC. The VMNIC number is allocated during VMware installation, or when a new physical NIC is installed, and remains the same for the life of the host.

Uplink Ports

Each uplink port on the host represents a physical interface. It acts a lot like an lvEth port, but since physical ports do not move between hosts, the mapping is 1:1 between an uplink port and a VMNIC.

Ethernet Ports

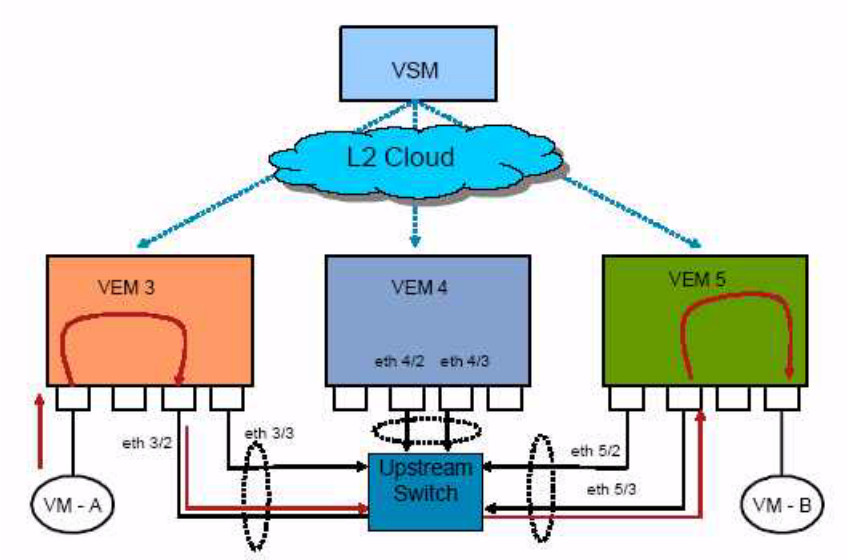
Each physical port added to Cisco Nexus 1000V appears as a physical Ethernet port, just as it would on a hardware-based switch.

Note The uplink ports are handled entirely by VMware, and are used to associate port configuration with VMNICs. There is no fixed relationship between the uplink number and VMNIC number, and these can be different on different hosts, and can change throughout the life of the host. On the VSM, the ethernet interface number, for example, ethernet 2/4, is derived from the VMNIC number, not the uplink number.

VSM Port Model

Figure 1-2 shows the VSM view of the network.

Figure 1-2 VSM View



The Virtual Supervisor Module (VEM) has the following ports or interfaces:

- Virtual Ethernet Interfaces, page 1-4
- Physical Ethernet Interfaces, page 1-4
- Port Channel Interfaces, page 1-4

Virtual Ethernet Interfaces

Virtual Ethernet interfaces (vEths) can be associated with any of the following:

- A virtual machine VNIC on the ESX host
- A virtual machine kernel NIC on the ESX host
- A virtual switch interface on an ESX COS host

Physical Ethernet Interfaces

Physical Ethernet interfaces (Eths) correspond to the physical NICs on the ESX host.

Port Channel Interfaces

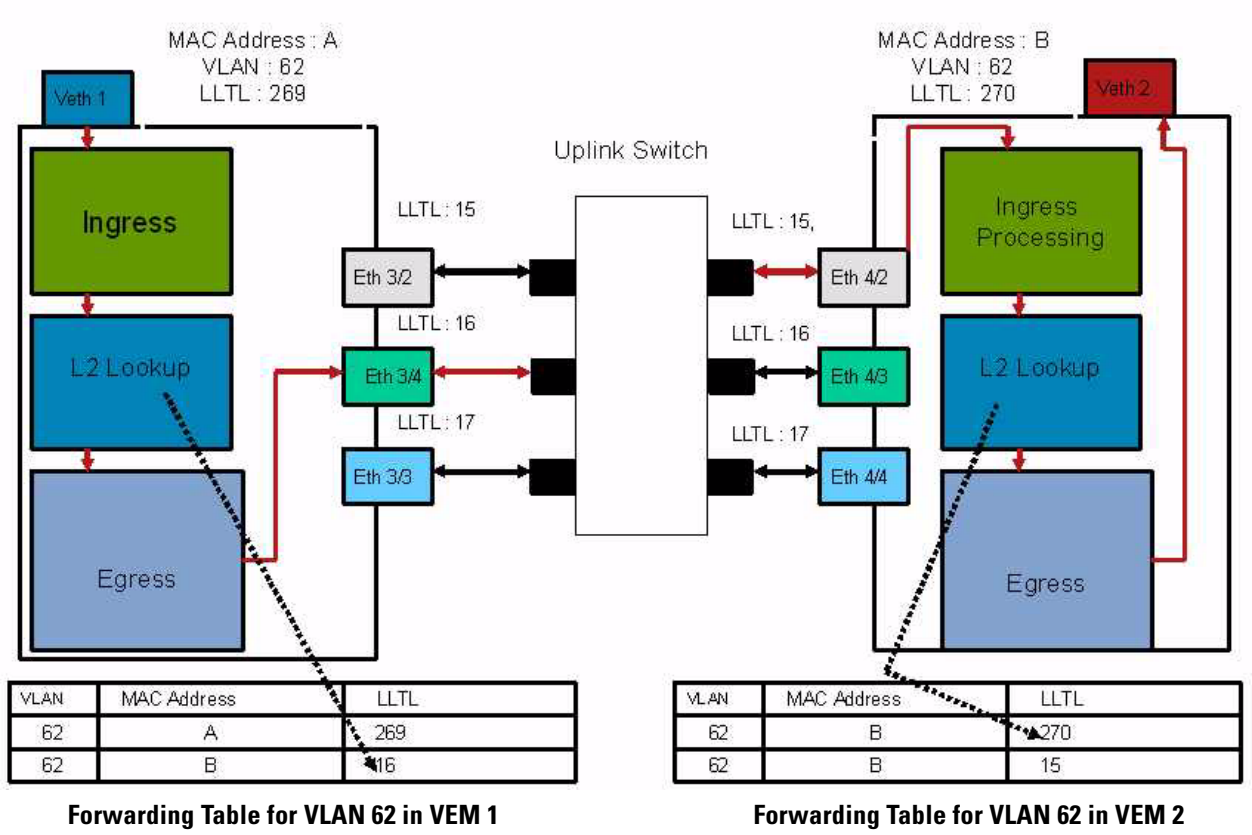
The physical NICs of an ESX host can be bundled into a logical interface called a port channel interface.

Switching Architecture in Cisco Nexus 1000V

Each VEM attached to the VSM forwards traffic to and from the ESX server as an independent and intelligent line card. Each VLAN uses its forwarding table to learn and store MAC addresses for ports connected to the VEM.

Figure 1-3 shows the traffic flow between two VMs on different VEMs.

Figure 1-3 Traffic Flow Between VEMs



Forwarding Table for VLAN 62 in VEM 1

Forwarding Table for VLAN 62 in VEM 2

Veth1 is the interface connected to the Virtual NIC of Virtual Machine 1 on ESX Host 1.
Veth2 is the interface connected to the Virtual NIC of Virtual Machine 2 on ESX Host 2.
LLTL is the port index of each port, serving as the unique identifier for each port connected to the VEM.

Layer 2 Ethernet Switching

The congestion related to high bandwidth and large numbers of users can be solved by assigning each device (for example, a server) to its own 10-, 100-, 1000-Mbps, or 10-Gigabit collision domain. Because each LAN port connects to a separate Ethernet collision domain, servers in a switched environment realize full bandwidth access.

Full duplex allows two stations to transmit and receive at the same time. This is unlike 10/100-Mbps Ethernet, which usually operates in half-duplex mode, so that stations can either receive or transmit but not both. When packets can flow in both directions simultaneously, the effective Ethernet bandwidth doubles. 1/10-Gigabit Ethernet operates in full-duplex only.

Each LAN port can connect to a single workstation or server or to another device through which workstations or servers connect to the network.

To reduce signal degradation, each LAN port is considered to be an individual segment. When stations connected to different LAN ports need to communicate, frames are forwarded from one LAN port to the other at wire speed to ensure full bandwidth for each session.

MAC Address Tables

To switch frames between LAN ports efficiently, a MAC addres table is maintained. The MAC address of the sending network is associated with the LAN port on which it was received. For more information about MAC address tables, see Chapter 2, "MAC Address Table."

VLANs

A VLAN is a switched network that is logically segmented by function, project team, or application, without regard to the physical locations of the users. VLANs have the same attributes of physical LANs, but you can group end stations even if they are not physically located on the same LAN segment.

Any switchport can belong to a VLAN, and unicast, broadcast, and multicast packets are forwarded and flooded only to end stations in that VLAN. Each VLAN is considered a logical network, and packets destined for stations that do not belong to the VLAN must be forwarded through a bridge or a router.

All ports, including the management port, are assigned to the default VLAN (VLAN1) when the device first comes up.

The devices support 4094 VLANs in accordance with the IEEE 802.1Q standard. These VLANs are organized into several ranges for different uses. Some of these VLANs are reserved for internal use by the device and are not available for configuration

Note Inter-Switch Link (ISL) trunking is not supported by the Cisco Nexus 1000V.

See Chapter 3, "VLAN Configuration" for complete information on configuring VLANs.

Private VLANs

Private VLANs (PVLANs) are used to segregate Layer 2 ISP traffic and convey it to a single router interface. PVLANs achieve device isolation by applying Layer 2 forwarding constraints that allow end devices to share the same IP subnet while being Layer 2 isolated. In turn, the use of larger subnets reduces address management overhead.

IGMP Snooping

The Internet Group Management Protocol (IGMP) snooping software examines Layer 2 IP multicast traffic within a VLAN to discover the ports where interested receivers reside. Using the port information, IGMP snooping can reduce bandwidth consumption in a multi-access LAN environment to avoid flooding the entire VLAN. The IGMP snooping feature tracks which ports are attached to multicast-capable routers to help the routers forward IGMP membership reports. The IGMP snooping software responds to topology change notifications. By default, IGMP snooping is enabled on the device. For more information, see Chapter 5, "IGMP Snooping Configuration."

Related Topics

The following documents contain related information:

- *Cisco Nexus 1000V Interface Configuration Guide, Release 4.0(4)SV1(1)*
- *Cisco Nexus 1000V Port Profile Configuration Guide, Release 4.0(4)SV1(1)*
- *Cisco Nexus 1000V Security Configuration Guide, Release 4.0(4)SV1(1)*
- *Cisco Nexus 1000V System Management Configuration Guide, Release 4.0(4)SV1(1)*