1 Understanding Access and Trunk Links in VLANs

1.1 Theory

An access link is a link that is part of only one VLAN, and normally access links are for end devices. An access-link connection can understand only standard Ethernet frames. Switches remove any VLAN information from the frame before it is sent to an access-link device.

A Trunk link can carry multiple VLAN traffic and normally a trunk link is used to connect switches to other switches or to routers. A trunk link is not assigned to a specific VLAN. Multiple VLAN traffic can be transported between switches using a single physical trunk link.



Figure 1-1: Understanding Access and Trunk Links in VLANs

Access link

Access link connection is the connection where switch port is connected with a device that has a standardized Ethernet NIC. Standard NIC only understand IEEE 802.3 or Ethernet II frames. Access link connection can only be assigned with single VLAN. That means all devices connected to this port will be in the same broadcast domain.

For example, twenty users are connected to a hub, and we connect that hub with an access link port on switch, then all these users belong to same VLAN. If we want to keep ten users in another

VLAN, then we need to plug in those ten users to another hub and then connect it with another access link port on switch.

Trunk link

Trunk link connection is the connection where switch port is connected with a device that is capable to understand multiple VLANs. Usually trunk link connection is used to connect two switches. A VLAN can span anywhere in network, and that can happen due to trunk link connection. Trunking allows us to send or receive VLAN information across the network. To support trunking, original Ethernet frame is modified to carry VLAN information.

1.2 Network Setup

Open NetSim and click on Experiments> Advanced and Routing> Understanding Access and Trunk Links in VLANs then click on the tile in the middle panel to load the example as shown in below Figure 1-2.

NetSim Home NetSim Stand Network Simulation/E Version 13.1.19 (64 Bit	dard mulation Pla	tform		Consti	
New Simulation Your Work Examples Experiments	Ctrl+N Ctrl+O	Experiments	Understanding Access and Trunk links VLANs An access link is a link that is part of only one VLAN, and normally access links are for end devices. An access-link connection can understand only standard Ethernet frames. Switches renove any VLAN information from the frame before it is sent to an access-link device. A Trunk link can carry multiple VLAN traffic and normally a trunk link is used to connect switches to other switches or to routers. A trunk link is not assigned to a specific VLAN. Multiple VLAN traffic can be transported between switches using a single physical trunk link. U Switch Access and Trunk Links in VLAN Powicse 4. Were nodes, 21.3 Switches Two different VLANs VLAN Dort Jp: Access and Trunk port Devices 4. Were TRUE VLAN D: 1, 2, 3	Results	Wred Node 6
License Settings				Throughput	(Mbps)
Exit	Alt+F4			Application 1	0.58
				Application 2	0.58
		Learn networking concepts through simulation experiments. Documentation comes middle panel to load the simulation. Click on the book icon on the left (Experiments)	with objective, theory, set-up, results, and discussion. Expand and click on the file name to display panel to view documentation (pdf).	experiments and associated content.	Then click on a tile in the
Support Answer/FAQ Contact Technical Sup Email - support@tetco	port	Learn Videos Experiment Manual	Documentation CC User Manual En Technology Ubranies PP Source Code Help W	ontact Us nail - sales@tetcos.com ione - +91 767 605 4321 ebsite : www.tetcos.com	

Figure 1-2: List of scenarios for the example of Understanding Access and Trunk Links in VLANs NetSim UI displays the configuration file corresponding to this experiment as shown below Figure 1-3.



Figure 1-3: Network set up for studying the L3 Switch Access and Trunk Links in VLANs

1.3 Procedure

The following set of procedures were done to generate this sample:

Step 1: A network scenario is designed in NetSim GUI comprising of 4 Wired Nodes and 2 L3 Switches in the "Internetworks" Network Library.

Step 2: In the INTERFACE (ETHERNET) > NETWORK LAYER Properties, set the following Table 1-1.

Node	Wired Node 3	Wired Node 4	Wired Node 5	Wired Node 6
Nouc	I/f1_Ethernet	I/f1_Ethernet	I/f1_Ethernet	I/f1_Ethernet
IP Address	192.168.1.3	192.168.1.4	192.168.2.3	192.168.2.4
Default Gateway	192.168.1.1	192.168.1.2	192.168.2.1	192.168.2.2
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0

Table 1-1: Network Layer Properties

NOTE: The subnet mask of all L3 Switch interfaces is set to 255.255.255.0

Step 3: L3 Switch 1 and L3 Switch 2 properties are set as follows:

Switch	l/f1_Ethernet	l/f2_Ethernet	I/f3_Ethernet
Switch	IP Address	IP Address	IP Address
L3 Switch 1	192.168.1.1	192.168.3.1	192.168.2.1
L3 Switch 2	192.168.1.2	192.168.3.2	192.168.2.2

Table 1-2: L3 Switch 1 and L3 Switch 2 properties

L3_Switch			×
L3_Switch	► NETWORK_LAYER		
GENERAL	DATALINK_LAYER		
APPLICATION_LAYER	Protocol	ETHERNET	
NETWORK LAYER	MAC_Address	AF1D00000101	
	STP Status	TRUE	
INTERFACE_1 (ETHERNET)	Switch Priority	1	
INTERFACE_2 (ETHERNET)	Switch ID	1AF1D00000101	
INTERFACE_3 (ETHERNET)	Spanning Tree	IEEE 802.1D	
	STP Cost	90	
	Switching Mode	Store_Forward	•
	VLAN_Status	TRUE	•
	VLAN Name	VLAN 1	
	VLAN_GUI	Configure VLAN	
	VLAN ID	2	
	VLAN Port Type	ACCESS_PORT	-
	ОК	Reset	

Figure 1-4: Datalink layer properties window

L3 Switch 1						
Interface ID	VLAN Status	VLAN ID	VLAN Port Type			
Interface_1	TRUE	2	Access _Port			
Interface_2	TRUE	1	Trunk _Port			
Interface_3	TRUE	3	Access _Port			

L3 Switch 2						
Interface ID	VLAN Status	VLAN ID	VLAN Port Type			
Interface_1	TRUE	2	Access _Port			
Interface_2	TRUE	1	Trunk _Port			
Interface_3	TRUE	3	Access _Port			

 Table 1-3: VLAN Properties for L3 Switch 1
 Table 1-4: VLAN Properties for L3 Switch 2

Step 4: In the INTERFACE (ETHERNET) > DATALINK LAYER Properties of L3 Switch 1, Click on "Configure VLAN" to view the properties for VLAN 2 set as per the screenshot shown below Figure 1-5.

N Conf	igure VLAN						×
VLAN	+ –	VLAN ID			2		Î
	VLAN 2	VLAN Name			VLAN_2	VLAN_2	
	VLAN 3	Device Name				•	
		Interface ID				-	
		IP Address					
		Connec	Connected Device Name			~	
		Device Name	Interface ID	IP Address	Connected Device Name	Connected Interface ID	Connected IP Address
		L3_Switch_1	1	192.168.1.1	Wired_Node	1	192.168.1.3
		L3_Switch_2	1	192.168.1.2	Wired_Node	1	192.168.1.4
			OK	Cano	:el		

Figure 1-5: Configuring VLAN Properties in VLAN 2

Properties for VLAN 3 is set as per the below screenshot Figure 1-6.

N Configure VLAN						×
VLAN + -	VLAN I	D		3		
VLAN 2	VLAN N	Name		VLAN_3		
VLAN 3	Device	Name			•	
	Interface ID				•	
	IP Address					
	Connected Device Name					~
	Device Name	Interface ID	IP Address	Connected Device Name	Connected Interface ID	Connected IP Address
	L3_Switch_1	3	192.168.2.1	Wired_Node	1	192.168.2.3
	L3_Switch_2	3	192.168.2.2	Wired_Node	1	192.168.2.4
		ОК	Cano	el		

Figure 1-6: Configuring VLAN Properties in VLAN 3

After setting the properties of VLAN2 and VLAN3 click on OK.

Step 5: In the NETWORK LAYER Properties of L3 Switch 1, Enable - Static IP Route -> Click on **"Configure Static Route IP"** to set static route as per the screenshot shown below.

L3_Switch			×		
L3_Switch	VINTWORK_LAYER				
GENERAL	Protocol	VIPV4			
APPLICATION_LAYER	ACL_Status	Disable	•		
	Static_IP_Route	Enable	.		
NETWORK_LATER	Static_IP_Route_GUI	Configure Static Route IP			
INTERFACE_1 (ETHERNET)	Static_IP_Route_File	StaticIPConfigure1.txt			
INTERFACE_2 (ETHERNET)	Processing_Delay (Microsec)	0.0			
INTERFACE_3 (ETHERNET)					

Figure 1-7: Select Configure Static Route IP

Set the properties in Static Route IP window as per the screenshot below and click on Add.

$\mathsf{Click} \text{ on } \mathbf{OK}$

👔 Static IP Routing Configuration — 🗆 🗙				
Network Destination			Gateway	
Subnet Mask			Metrics	
Interface ID		•		
	Default	Add	Remove	
Network Destination	Subnet Mask	Gateway	Metrics	Interface ID
192.168.1.0	255.255.255.0	192.168.3.2	1	2
192.168.2.0	255.255.255.0	192.168.3.2	1	2
		ОК	Cancel	

Figure 1-8: Configure Static route in Static Route IP window

NOTE: Transport Protocol is set to **UDP** in Application properties.

Step 6: Enable the plots and run simulation for 10 seconds and observe the throughput.

1.4 Output

Throughput (Mbps)				
Application 1	0.58			
Application 2	0.58			

Table 1-5: Results Comparison

The above results conclude that trunking allows us to send or receive any VLAN information across the network.