D-Link Certified Engineer – Switch Hands-On Laboratory Exercise Sheets

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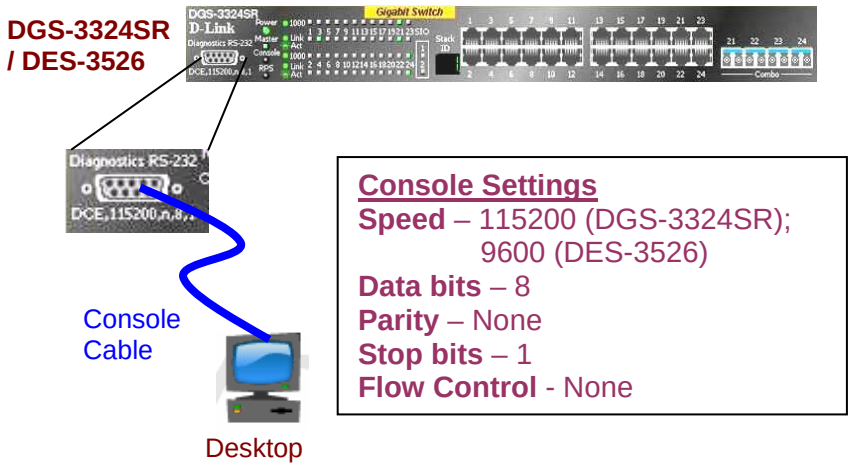
Ver. 1.1

Lab Module 1 – Basic Switch Commands

D-Link Switches can be managed through Serial Port, Telnet and Web-interface. The Command-Line-Interface (CLI) can be used to configure and managed the switches via serial port and telnet interfaces.

For the entire Lab Exercises, we will focus on the use of Command-Line-Interface to achieve the configuration of various features.

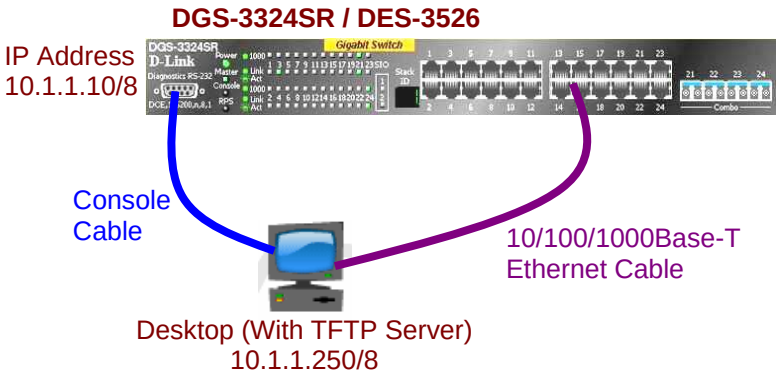
Objective	This lab session is designed to familiarize users with the basic commands for configuring, monitoring and troubleshooting of D-Link switches.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	1
	Desktop PC (loaded with TFTP Server)	1
	Console Cable	1
Setup		

DGS-3324SR / DES-3526 Configuration	
Default IP Address	10.90.90.90/8
Change IP Address	*config ipif System vlan default ipaddress 10.1.1.10/8*
Verify Configuration	*show switch*
Reset to Default Settings	*reset config* All the factory default settings are restored on the switch including IP address, user accounts and the switch history log. The switch will not save or reboot.

	OR
	reset system
	All the factory default settings are restored on the switch except IP address, user accounts and the switch history log. The switch will not save or reboot.
Reboot the Switch	*reboot*
Save changes in configuration to non-volatile RAM	*save*

Lab Module 2 – Upgrade Switch Firmware Commands

Upgrading of firmware and bootrom may be necessary at times when new features are available and bug-fixes are required.

Objective	This lab session is designed to allow user to have a better grasp of how the firmware and bootrom is to be upgraded.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	1
	Desktop PC (loaded with TFTP Server)	1
	Console Cable	1
	Ethernet Cable	1
Setup		

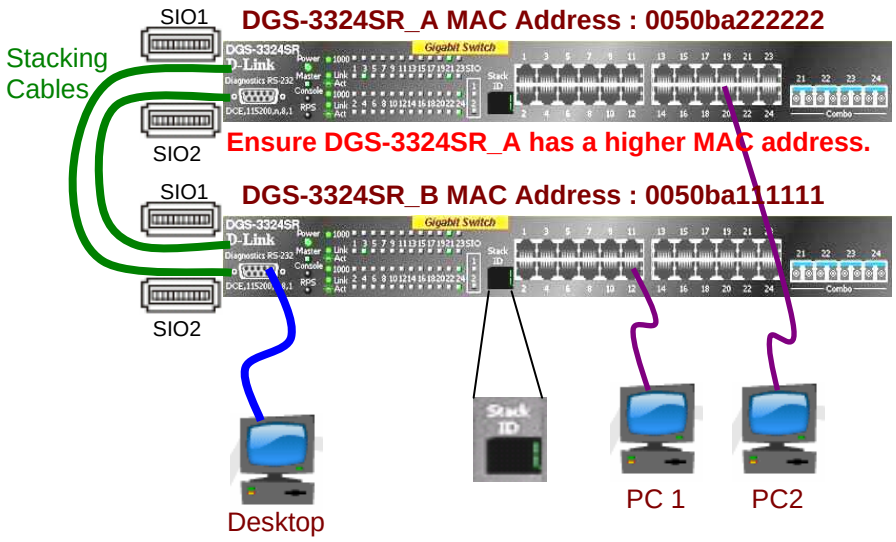
DGS-3324SR / DES-3526 Configuration	
Configure IP Address of Switch	*config ipif System vlan default ipaddress 10.1.1.10/8*
Setup TFTP Server	Select the firmware for upload (10.1.1.250/8).
Download Firmware to Switch	*download firmware_fromTFTP 10.1.1.250 xStack400B13.had* Note : DO NOT power reset the switch during uploading of firmware
Reboot the Switch	Upgraded firmware will not take effect until the switch is rebooted.
Official Firmware Release	All official firmware release includes the release notes which highlight new features incorporated and latest

	bug fixes

Exercises	
Task	**Observation**
Verify Firmware Information	*show firmware information*
What do you observed?	It shows the Box ID, version, update time, older firmware version and method of upgrade.

Lab Module 3 – Stacking Commands (for xStack only)

xStack provides 10G uplinks for transmission at 10 times the speed of Gigabit. xStack technology provides fault tolerance ad the ability to add and remove switch units without interrupting the service of the entire stack. These switches are stacked together through high-speed stack cables to allow the entire stack to function as a single high-performance entity.

Objective	This lab session allows users to familiarize with the stacking commands of the xStack switches.	
Equipment	DGS-3324SR	2
	Desktop PC / Notebook	1
	Stacking Cable	2
	Console Cable	1
Setup		

Note :

Do not connect the stacking cable while configuring the two switches.

Configuring Stacking with Auto-Mode	
DGS-3324SR_A Configuration	
Verify the MAC addresses of the switch	*show switch*

Configure the switch to adopt the auto stacking mode	*config all_boxes_id auto_mode*

DGS-3324SR_B Configuration	
Verify the MAC addresses of the switch	*show switch*
Configure the switch to adopt the auto stacking mode	*config all_boxes_id auto_mode*

Reboot both Switches	Reboot them with the Stacking Cable connected.

Exercises	
Task	**Observation**
What is the Stack ID on both switches?	Stack ID for DGS-3324SR_A is 2 and the Stack ID for DGS-3324SR_B is 1.
What do you conclude from this observation?	The switch with the smallest MAC address becomes the master switch and the Stack ID is 1.

Configuring Stack with Priority	
DGS-3324SR_A Configuration	
Verify the MAC addresses of the switch	*show switch*
Configure the switch to adopt the auto stacking mode	*config all_boxes_id auto_mode*
Configure Priority	*config box_priority current_box_id 1 priority 1*
Save Configuration	*save* Do not change the current box ID from AUTO to STATIC mode.

DGS-3324SR_B Configuration	
Verify the MAC addresses of the switch	*show switch*
Configure the switch to adopt the auto stacking mode	*config all_boxes_id auto_mode*
Reboot both Switches	Reboot them with the Stacking Cable connected.

Exercises	
Task	**Observation**
What is the Stack ID on both switches?	Stack ID for DGS-3324SR_A is 1 and the Stack ID for DGS-3324SR_B is 2.
Change the Priority of DGS-3324SR_A to 16	*config box_priority current_box_id 1 priority 16*
Save Configuration	*save* Do not change the current box ID from AUTO to STATIC mode.
What do you observed after the change?	Stack ID for DGS-3324SR_A becomes 2 and the Stack ID for DGS-3324SR_B becomes 1.
What do you conclude from this observation?	The switch with the highest priority (1) will become the master regardless the MAC address.
Perform a continuous ping from DGS-3324SR_A to the Desktop Computer. Remove one of the stacking cables without power off the switch. Does the connectivity break? (if it doesn't, connect this connect back and remove the other stacking cable)	The connectivity breaks when one of the stacking cable is removed.
Reboot the switches with only one stacking cable. Perform a continuous ping from DGS-3324SR_A to the Desktop Computer. Is there any connectivity?	There is connectivity between the two stackable switches.
What do you conclude from the above test?	The switches will only check the stacking status during power-on-self-test (P.O.S.T.)

Lab Module 4 – Spanning Tree Protocol Commands (STP, RSTP, MSTP)

Spanning Tree Protocol (STP) prevents loops from being formed when switches or bridges are interconnected via multiple paths. Spanning Tree Protocol implements the IEEE 802.1d algorithm by exchanging BPDU messages with other switches to detect loops and then removes the loop by shutting down selected bridge interfaces. This algorithm guarantees that there is one and only one active path between two network devices.

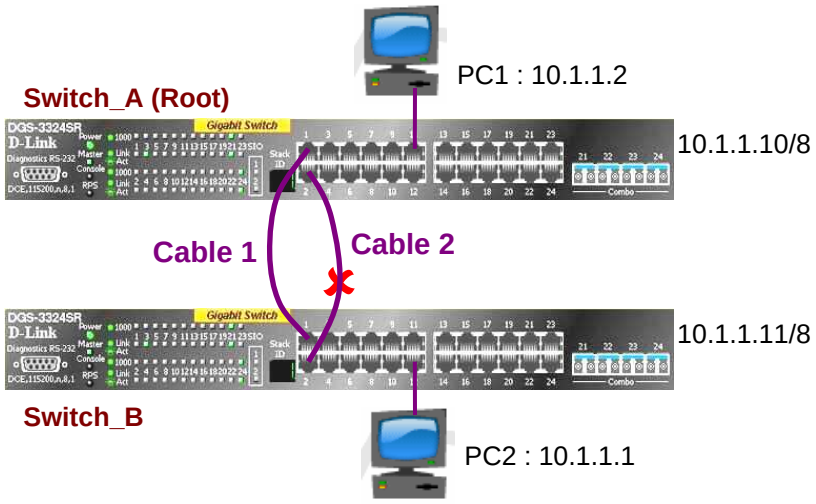
Rapid Spanning Tree Protocol (RSTP) is an evolution of the Spanning Tree Protocol (802.1d standard) and provides for faster spanning tree convergence after a topology change.

Multiple Spanning Tree Protocol (MSTP) is an IEEE standard which allows several VLANs to be mapped to a reduced number of spanning tree instances. This is possible since most networks do not need more than a few logical topologies. Each instance handles multiple VLANs that have the same Layer 2 topology.

Objective	This lab session is designed to allow user to have better grasp in the functionality and purpose of the Spanning Tree Protocol and how it is configured on the D-Link Switches.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	2
	Desktop PC / Notebook	6
	Ethernet Cable	4
	Console Cable	1

Configure Rapid Spanning Tree, RSTP (802.1w)

Setup



Note :

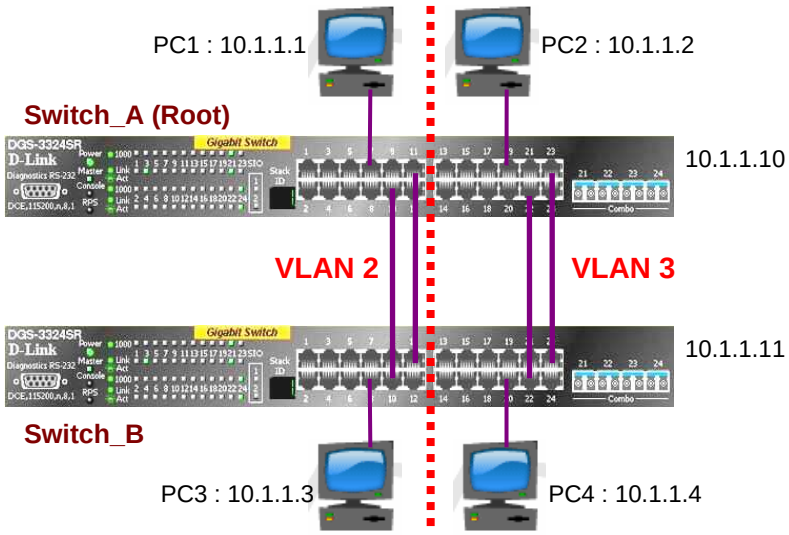
Do not connect the cascading cable (Cable 1 & 2) while configuring the two switches.

DGS-3324SR_A Configuration	
Configure IP Address of Default VLAN	*config ipif System ipaddress 10.1.1.10/8*
Enable Spanning Tree	*enable stp*
Verify status of Spanning tree Settings	*show stp*
Rapid Spanning Tree is selected by default when STP is enabled. If not, enable it	*config stp version rstp*
Set to lower priority so that it can be the Root (default priority = 32768)	*config stp priority 4096 instance_id 0*
Assign the other ports as edge ports	*config stp ports 1:5-1:24 edge true*

DGS-3324SR_B Configuration	
Configure IP Address of Default VLAN	*config ipif System ipaddress 10.1.1.11/8*
Enable Spanning Tree	*enable stp*
Verify status of Spanning tree Settings	*show stp*
Rapid Spanning Tree is selected by default when STP is enabled. If not, enable it	*config stp version rstp*
Assign the other ports as edge ports	*config stp ports 1:5-1:24 edge true*

Exercises	
Task	**Observation**
Verify the STP configuration, port status and roles of both switch	*show stp ports*
Question : - **Which is the root bridge?** - **Which is discarding port?**	 Switch_A is the root bridge. Port 2 is the discarding port.

- **What is the role of this discarding port?**	
Perform a continuous ping from PC1 to PC2 and vice versa.	On PC1, ***ping 10.1.1.2 –t*** On PC2, ***ping 10.1.1.1 -t***
Remove the cable from the root port that is forwarding from DGS-3324SR_B. What happen to the Ping Test?	The Ping Test stops a short while and continues.
Are there any reply time-out?	There is one time-out
How long do you have to wait before it responds again?	It responds again in 1 second.
Check the status of the "discarding" port now.	The discarding port becomes the forwarding port.
Change RSTP to STP	*config stp version stp*
Perform a continuous ping from PC1 to PC2 and vice versa again.	On PC1, ***ping 10.1.1.2 –t*** On PC2, ***ping 10.1.1.1 –t***
Remove the cable from the root port that is forwarding from DGS-3324SR_B. What happen to the Ping Test?	The Ping Test stops for a longer period of time and continues.
Are there any reply time-out?	There are approximately 6 time-outs.
How long do you have to wait before it responds again?	It responds again in approximately 30 seconds.
Check the status of the "discarding" port now.	After the original forwarding is disabled, the discarding port takes a few seconds to take on the learning state and takes some time to become the forwarding port.

Configure Per-VLAN Spanning Tree	
Setup	

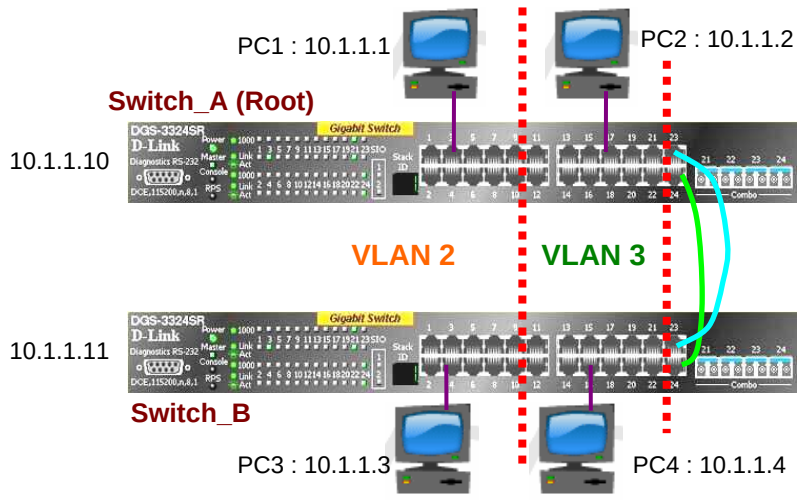
DGS-3324SR_A Configuration	
Delete ports from default VLAN for other VLANs use	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign untagged ports to each VLAN	*create vlan v2 tag 2* *config vlan v2 add untagged 1-12* *create vlan v3 tag 3* *config vlan v3 add untagged 13-24*
Enable Spanning Tree Protocol (default is RSTP)	*enable stp*
Check the STP status	*show stp ports*
Enable Multiple Spanning Tree Protocol	*config stp version mstp* *config stp mst_config_id name abc* *config stp mst_config_id revision_level 1* *create stp instance_id 2* *config stp instance_id 2 add_vlan 2* *create stp instance_id 3* *config stp instance_id 3 add_vlan 3 S*

Configure STP priority so that it can be the Root. Priority must be 4096*n, default=32768	*config stp priority 4096 instance_id 0* *config stp priority 4096 instance_id 2* *config stp priority 4096 instance_id 3*
Configure the rest of the ports as edge ports	*config stp ports 1-10 edge true* *config stp ports 13-22 edge true*

DGS-3324SR_B Configuration	
Delete ports from Default VLAN for other VLANs	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign untagged ports to each VLAN	*create vlan v2 tag 2* *config vlan v2 add untagged 1-12* *create vlan v3 tag 3* *config vlan v3 add untagged 13-24*
Enable Spanning Tree Protocol (default is RSTP)	*enable stp*
Connect UTP cables as shown in the above diagram. Use port 11 and 12 for VLAN 2 and port 23 and 24 for VLAN 3	Verify with Ping Test. - Can PC1 access PC3 from the same VLAN? - Can PC2 access PC4 from the same VLAN?
Check the STP status	*show stp ports*
Enable Multiple Spanning Tree	*config stp version mstp* *config stp mst_config_id name abc* *config stp mst_config_id revision_level 1* *create stp instance_id 2* *config stp instance_id 2 add_vlan 2* *create stp instance_id 3* *config stp instance_id 3 add_vlan 3*
Configure the rest of the ports as edge ports	*config stp ports 1-10 edge true* *config stp ports 13-22 edge true*

Exercises

Task	Observation
Ping Test - **From PC1 to PC3** - **From PC2 to PC4** - **From PC1 to PC2** - **From PC3 to PC4** - **From PC1 to PC4** - **From PC3 to PC2**	 Yes Yes No No No No
Check the STP status of ports on both switches	*show stp ports*
Where are the root and alternate ports for v2?	Root port – Switch_B Port 11 Alternate port – Switch_B Port 12
Where are the root and alternate ports for v3?	Root port – Switch_B Port 23 Alternate port – Switch_B Port 24
Where are the designated ports for v2?	Switch_A Port 11 & 12
Where are the designated ports for v3?	Switch_A Port 23 & 24
What do you conclude on the relationship between the Root Bridge and Root Ports?	There are no Root Ports on the Root Bridge. The ports that are connected to the Root Bridge are Root Ports.

Configure Multiple Spanning Tree, MSTP (802.1s) for Load Balancing	
Setup	

DGS-3324SR_A Configuration	
Delete ports from default VLAN for other VLANs use	*config vlan default delete 1-22*
Create VLANs , add ports to the VLANs and create IPv2 and v3 and assign untagged and tagged ports to each VLAN	*create vlan v2 tag 2* *config vlan v2 add untagged 1-10* *config vlan v2 add tagged 23-24* *create vlan v3 tag 3* *config vlan v3 add untagged 11-22* *create vlan v3 add tagged 23-24*
Enable Multiple Spanning Tree Protocol	*enable stp* *config stp version mstp* *config stp mst_config_id name abc* *config stp mst_config_id revision_level 1* *create stp instance_id 2* *config stp instance_id 2 add_vlan 2* *create stp instance_id 3* *config stp instance_id 3 add_vlan 3* **Switch**

Adjust STP priority so that it can be the Root	*config stp priority 4096 instance_id 0* *config stp priority4096 instance_id 2* *config stp priority4096 instance_id 3*
Adjust port priory so that Port 23 is the active port for v2 and Port 24 is the active port for v3	*config stp mst_ports 23 instance_id 2 priority 96* *config stp mst_ports 24 instance_id 3 priority 96*
Configure the rest of the ports as edge ports	*config stp ports 1-22 edge true*

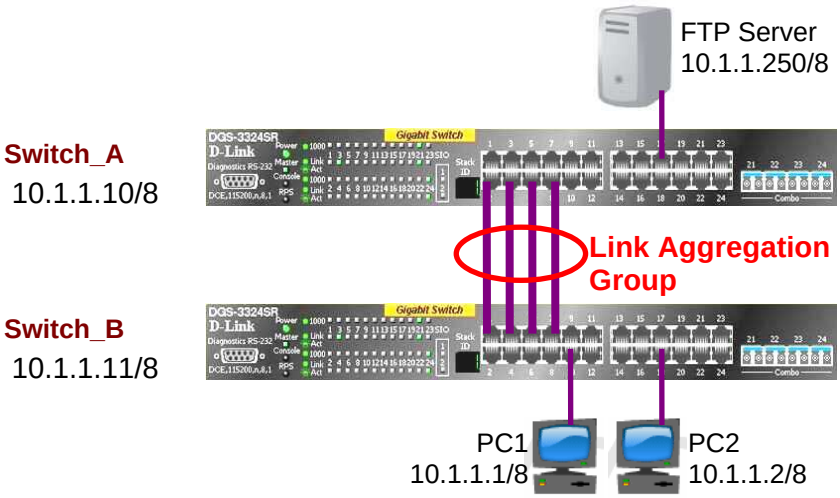
DGS-3324SR_B Configuration	
Delete ports from default VLAN for other VLANs	*config vlan default delete 1-22*
Create VLANs, add ports to the VLANs and create IP Interface for the VLANs	*create vlan v2 tag 2* *config vlan v2 add untagged 1-10* *config vlan v2 add tagged 23-24* *create vlan v3 tag 3* *config vlan v3 add untagged 11-22* *config vlan v3 add tagged 23-24*
Enable Multiple Spanning Tree	*enable stp* *config stp version mstp* *config stp mst_config_id name abc* *config stp mst_config_id revision_level 1* *create stp instance_id 2* *config stp instance_id 2 add_vlan 2* *create stp instance_id 3* *config stp instance_id 3 add_vlan 3*
Configure the rest of the ports as edge ports	*config stp ports 1-22 edge true*

Exercises

Task	Observation
Ping Test - **From PC1 to PC3** - **From PC2 to PC4** - **From PC1 to PC2** - **From PC3 to PC4** - **From PC1 to PC4** - **From PC3 to PC2**	 Yes Yes No No No No
Check the STP status of ports on both switches	*show stp ports*
Where are the root and alternate ports for v2?	Root port – Switch_B Port 23 Alternate port – Switch_B Port 24
Where are the root and alternate ports for v3?	Root port – Switch_B Port 24 Alternate port – Switch_B Port 23
Where are the designated ports for v2?	Switch_A Port 23 & 24
Where are the designated ports for v3?	Switch_A Port 23 & 24
Disconnect the root port for v2. Perform the Ping Test - **From PC1 to PC3** - **From PC2 to PC4**	 Yes Yes
What do you conclude from the above Ping Tests?	With MSTP, traffic between VLANs is load-shared between the two trunks. With one link is disconnected, the other trunk link will provide redundancy to the other VLAN.

Lab Module 5 – Link Aggregation 802.3ad Commands

Link Aggregation Control Protocol (LACP) is part of the IEEE 802.3ad specification that allows you to bundle several physical ports together to form a single logical channel. LACP allows a switch to negotiate an automatic bundle by sending LACP packets to the peer.

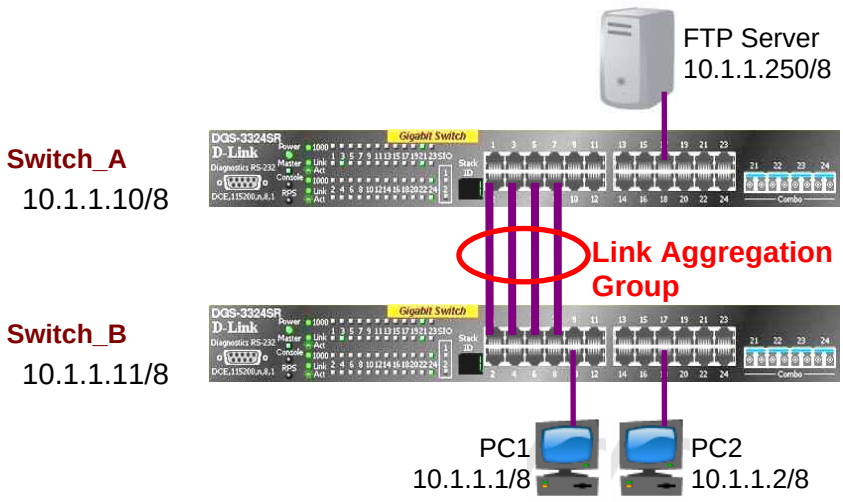
Objective	This lab session is designed to familiarize users with the configuration of Link Aggregation on D-Link switches.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	2
	Desktop PC / Notebook	3
	Ethernet Cable	7
Setup		

DGS-3324SR_A (Member Ports 2, 4, 6 & 8) Configuration	
Create Link Aggregation Group	*create link_aggregation group_id 1 type static*
Configure the Link Aggregation Algorithm. This setting is applied to the switch globally	*config link_aggregation algorithm mac_source_dest*
Select Link Aggregation Group Member	*config link_aggregation group_id 1 master_port 2 ports 2,4,6,8 state enable*

DGS-3324SR_B (Member Ports 1, 3, 5 & 7) Configuration

Create Link Aggregation Group	*create link_aggregation group_id 1 type static*
Configure the Link Aggregation Algorithm. This setting is applied to the switch globally	*config link_aggregation algorithm mac_source_dest*
Select Link Aggregation Group Member	*config link_aggregation group_id 1 master_port 1 ports 1,3,5,7 state enable*

Exercises	
Task	**Observation**
Download files from FTP Server (IP Address 10.1.1.250/8) using PC1 and PC2 using FTP client or using these commands	ftp 10.1.1.250 hash mget *
While downloading the files to the two PCs, check the ports utilization on both switches	*show utilization ports*
What do you observe? Is the traffic load-shared between the links?	The traffic from PC1 uses one link and the traffic from PC2 uses another.

Configuring Dynamic Link Aggregation (LACP)	
Setup	

DGS-3324SR_A Configuration (member ports auto-negotiated 2,4,6,8)	
Before creating a link aggregation group based on LACP, delete the existing group	*delete link_aggregation group_id 1*
Create Link Aggregation Group	*create link_aggregation group_id 1 type lacp*
Select Link Aggregation Group Member	*config link_aggregation group_id 1 master_port 2 port 2,4,6,8 state enabled* *config lacp_port 2,4,6,8 mode passive*

DGS-3324SR_B Configuration (member ports auto-negotiated 1,3,5,7)	
Before creating a link aggregation group based on LACP, delete the existing group	*delete link_aggregation group_id 1*
Create Link Aggregation Group	*create link_aggregation group_id 1 type lacp*
Select Link Aggregation Group Member	*config link_aggregation group_id 1 master_port 1 port 1,3,5,7 state enable*

Switch

Exercises	
Task	**Observation**
Download files from FTP Server (IP Address 10.1.1.250/8) using PC1 and PC2 using FTP client or using these commands	ftp 10.1.1.250 hash mget *
While downloading the files to the two PCs, check the ports utilization on both switches	*show utilization ports*
What do you observe? Is the traffic load-shared between the links?	All the traffic go to one link.
Change the mode of the LACP ports on DGS-3324SR_A to "active" and perform the above tasks again	*config lacp_ports 2,4,6,8 mode active*
What do you observe? Is there load sharing across the links?	???

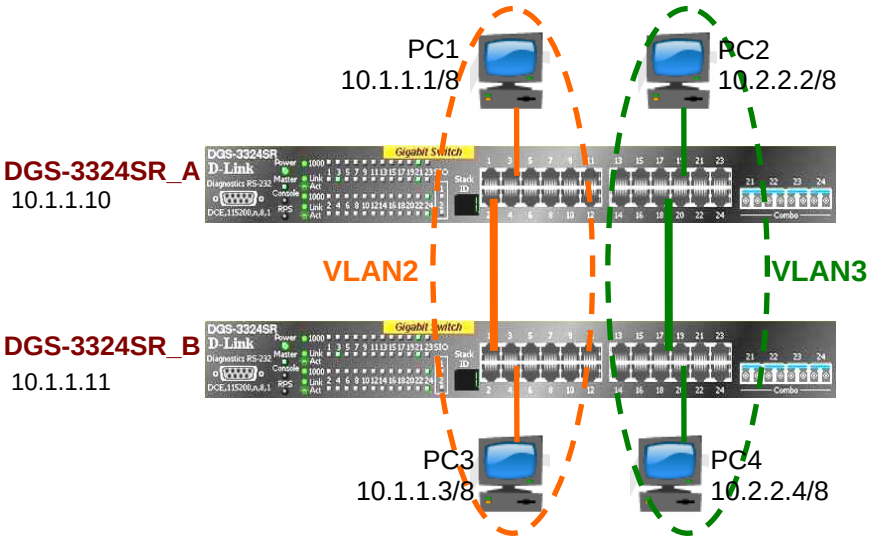
Lab Module 6 – Port-Based and 802.1q VLAN Commands

A Virtual LAN (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 as physical LANs, but you can group end stations even if they are not physically located on the same LAN segment. Any switch port can belong to a VLAN, and unicast, broadcast and multicast packets are forwarded and flooded only to end stations in the 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 router or bridge.

Objective	This lab session is designed for better understand for VLAN features and how it is configured.	
Equipment	DGS-3324SR or DES-3526 or DS-3024	2
	Desktop PC / Notebook	4
	Ethernet Cable	6

Configure Port-Based VLAN

Setup



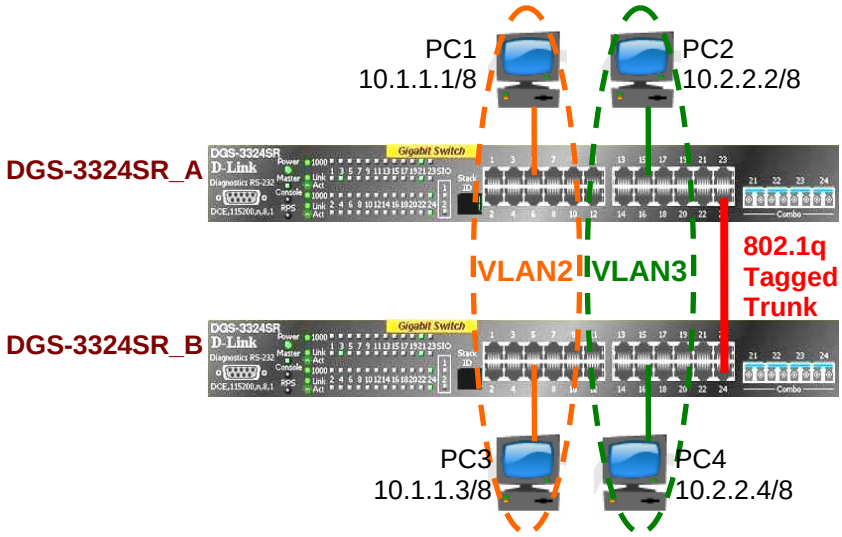
DGS-3324SR_A Configuration

Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign	*create vlan v2 tag 2*

untagged ports to respective VLANs	*config vlan v2 add untagged 1-12* *create vlan v3 tag 3* *config vlan v3 add untagged 13-24*

DGS-3324SR_B Configuration	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign untagged ports to respective VLANs	*create vlan v2 tag 2* *config vlan v2 add untagged 1-12* *create vlan v3 tag 3* *config vlan v3 add untagged 13-24*

Exercises	
Task	**Observation**
Verify the VLAN configuration on both switches	*show vlan*
Ping Test - **from PC1 to PC3** - **from PC2 to PC4** - **from PC1 to PC2 & PC4** - **from PC2 to PC1 & PC3**	 Yes. With replies Yes. With replies No. Request timeout No. Request timeout

Configuring 802.1q VLAN Trunking	
Setup	

DGS-3324SR_A Configuration	
Delete ports from Default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign untagged ports to respective VLANs. Assign tagged port 24	*create vlan v2 tag 2* *config vlan v2 add untagged 1-10* *config vlan v2 add tagged 24* *create vlan v3 tag 3* *config vlan v3 add untagged 11-20* *config vlan v3 add tagged 24*

DGS-3324SR_B Configuration	
Delete ports from Default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLANs v2 and v3 and assign untagged ports to respective VLANs. Assign tagged port 24	*create vlan v2 tag 2* *config vlan v2 add untagged 1-10* *config vlan v2 add tagged 24* *create vlan v3 tag 3* *config vlan v3 add untagged 11-20*

	config vlan v3 add tagged 24

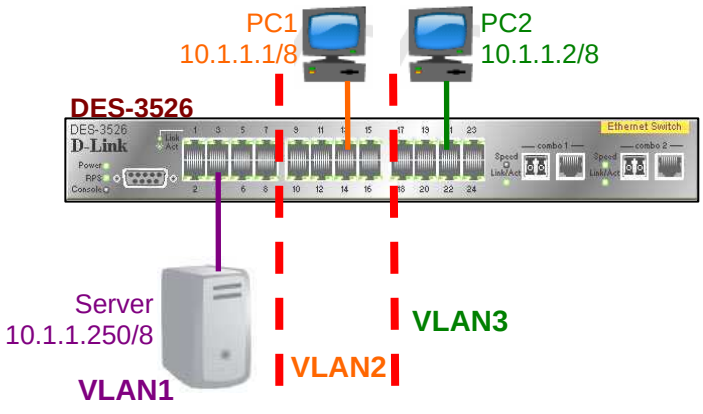
Exercises	
Task	**Observation**
Verify the VLAN configuration on both switches	*show vlan*
Ping Test - **from PC1 to PC3** - **from PC2 to PC4** - **from PC1 to PC2 & PC4** - **from PC2 to PC1 & PC3**	 Yes. With replies. Yes. With replies. No. Request timeout. No. Request timeout.

Lab Module 7 – Asymmetric VLAN and Traffic Segmentation Commands

Asymmetric VLAN, also known as Overlapping VLAN, allows devices across different VLANs to share common resources. Asymmetric VLAN is unique to D-Link and is not supported on Layer 3 switches.

Traffic Segmentation, on the other hand, is used to limit traffic flow from a single port to a group of ports on either a single switch or a group of ports on another switch in a switch stack. This method of segmenting the flow of traffic is similar to using VLANs to limit traffic and also provides a method of directing traffic without increasing the overhead of the switch CPU. Traffic segmentation allows you to further sub-divide VLANs into smaller groups of ports that will help to reduce traffic on the VLAN. The VLAN rules take precedence, and then the traffic segmentation rules are applied.

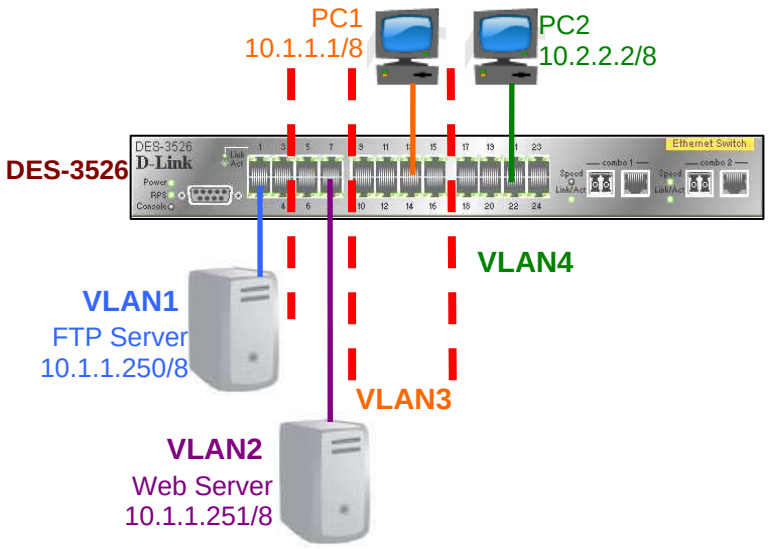
Objective	This lab session is designed to familiarize users with the configuration of Asymmetric VLAN and Traffic Segmentation.	
Equipment	DGS-3324SR or DES-3026 or DES-3526 (for Asymmetric VLAN)	1
	Desktop PC / Notebook	3
	Ethernet Cable	3

Configure Asymmetric VLAN (Example 1)	
Setup	

DGS-3324SR Configuration	
Enable Asymmetric VLAN function for the Switch	*enable asymmetric_vlan*

Ensure all ports are assigned to the default VLAN	*show vlan*
Create VLANs with tags	*create vlan v2 tag 2* *create vlan v3 tag 3*
Assign untagged ports to VLANs	*config vlan v2 add untagged 1-16* *config vlan v3 add untagged 1-8, 17-24*

Exercises	
Task	**Observation**
Ping Test - **from PC1 to Server** - **from PC2 to Server** - **from PC1 to PC2** - **from PC2 to PC1**	 Yes. With replies. Yes. With replies. Yes. With replies. Yes. With replies.
Show GVRP command	*show gvrp*
Assign PVIDs on all the VLANs	*config gvrp 1-8 pvid 1* *config gvrp 9-16 pvid 2* *config gvrp 17-24 pvid 3*
Ping Test - **from PC1 to Server** - **from PC2 to Server** - **from PC1 to PC2** - **from PC2 to PC1**	 Yes. With replies. Yes. With replies. No. Request timeout. No. Request timeout.
Show GVRP command again	*show gvrp*

Configure Asymmetric VLAN (Example 2)	
Setup	

DGS-3324SR Configuration	
Reset the switch to default settings. Enable Asymmetric VLAN function for the Switch	*enable asymmetric_vlan*
Ensure all ports are assign to default VLAN	*show vlan*
Create VLANs with tags	*create vlan v2 tag 2* *create vlan v3 tag 3* *create vlan v4 tag 4*
Assign untagged ports to VLANs	*config vlan v2 add untagged 5-8, 17-24* *config vlan v3 add untagged 1-4, 9-16* *config vlan v4 add untagged 1-8, 17-24*
Assign PVIDs on different VLANs	*config gvrp 1-4 pvid 1* *config gvrp 5-8 pvid 2* *config gvrp 9-16 pvid 3* *config gvrp 17-24 pvid 4*

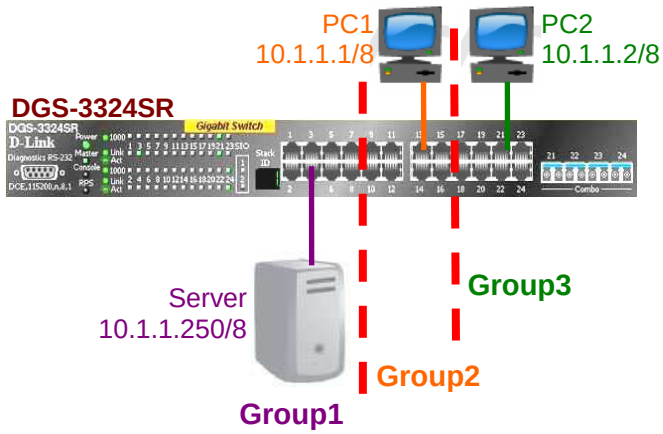
Exercises	
Task	**Observation**

Ping Test	
- **from PC1 (VLAN3) to FTP (VLAN1)**	Yes. With replies.
- **from PC2 (VLAN4) to FTP (VLAN1)**	Yes. With replies.
- **from PC1 (VLAN3) to Web (VLAN2)**	No. Request timeout.
- **from PC2 (VLAN4) to Web (VLAN2)**	Yes. With replies.
- **from FTP (VLAN1) to Web (VLAN2)**	No. Request timeout.
- **from PC1 (VLAN3) to PC2 (VLAN4)**	No. Request timeout.

Configure Traffic Segmentation (Example 1)

Configure Traffic Segmentation to allow users/PCs from Group 2 and 3 to access to Server in Group 1 but not each other.

Setup



DGS-3324SR Configuration	
Configure Traffic Segmentation	*config traffic_segmentation 1-24 forward_list 1-24* *config traffic_segmentation 9-16 forward_list 1-16* *config traffic_segmentation 17-24 forward_list 1-8, 17-24*

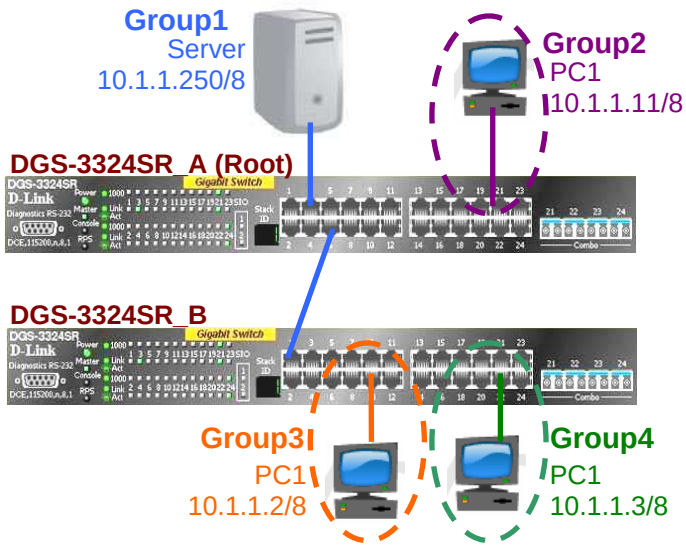
Exercises

Task	Observation
Verify configuration	*show traffic_segmentation*
Ping Test	
- **from PC1 (Group2) to Server (Group1)**	Yes. With replies.
- **from PC2 (Group3) to Server (Group1)**	Yes. With replies.
- **from PC1 (Group2) to PC2 (Group3)**	No. Request timeout.

Configure Traffic Segmentation (Example 2)

Configure Traffic Segmentation of two switches to allow different groups to access shared server but denying access between each other.

Setup



DGS-3324SR_A Configuration	
Configure Traffic Segmentation	*config traffic_segmentation 1-4 forwarding 1-24* *config traffic_segmentation 6 forwarding 1-6* *config traffic_segmentation 9-16 forwarding 1-4, 9-16* *config traffic_segmentation 17-24 forwarding 1-4, 17-24*

DGS-3324SR_B Configuration	
Configure Traffic Segmentation	*config traffic_segmentation 1 forwarding_list 1-24* *config traffic_segmentation 2-16 forwarding_list 1-16* *config traffic_segmentation 17-24 forwarding_list 1, 17-24*

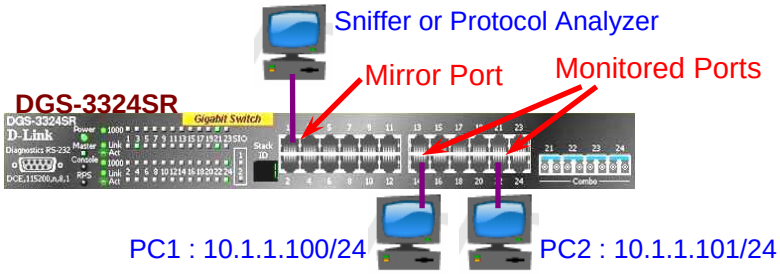
Exercises

Task	**Observation**
Verify configuration	*show traffic_segmentation*
Ping Test - **from PC1 (Group2) to Server (Group1)**	Yes. With replies.

- **from PC2 (Group3) to Server (Group1)**	Yes. With replies.
- **from PC3 (Group4) to Server (Group1)**	Yes. With replies.
- **from PC1 (Group2) to PC2 (Group3)**	No. Request timeout.
- **from PC2 (Group3) to PC3 (Group4)**	No. Request timeout.
- **from PC3 (Group4) to PC1 (Group2)**	No. Request timeout.

Lab Module 8 – Port Mirroring Commands

D-Link Switches allow data frames transmitted and received on a port to be copied and redirected to mirror port. Monitoring probes and devices (such as sniffer or protocol analyzer) can be connected to the mirror port to view details of the packets going through the monitored port.

Objective	This lab session is designed to allow users to better understand the purpose and usage of port mirroring and how it is configured.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	1
	Desktop PC / Notebook (loaded with Ethereal)	3
	Ethernet Cable	3
Setup		

DGS-3324SR Configuration	
Enable Port Mirroring on the switch	*config mirror port 1:1 add source ports 13-24 both* *enable mirror*

Exercises	
Task	**Observation**
Perform Ping Test from PC1 to PC2 and vice versa. Activate Ethereal and capture and analyze the traffic. Do you see the packets to and fro from both PCs?	Yes
Disable Port Mirroring	*disable mirror*
Perform Ping Test from PC1 to PC2 and vice versa. Activate Ethereal again. What do you observe?	No

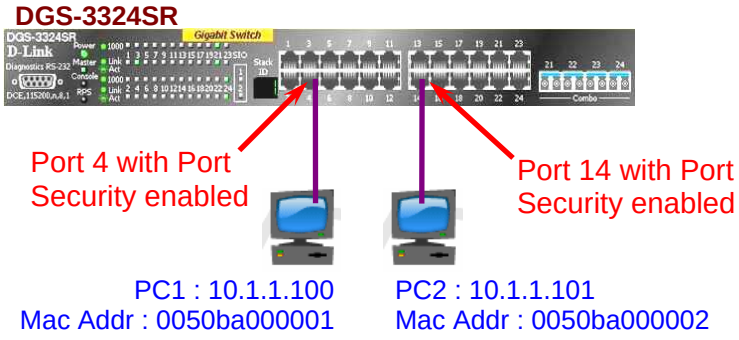
Lab Module 9 – Port Security Commands

Configuring port security is to block input to an Ethernet, Fast Ethernet or Gigabit Ethernet port when the MAC address of the station attempting to access the port is different from any of the MAC addresses specified for that port. This security feature prevents unauthorized desktop or notebooks from gaining access to the network.

Objective	This lab session is designed to familiarize users with the configuration of Basic Port Security feature on the D-Link Switches.	
Equipment	DGS-3324SR or DES-3526 or DES-3026	1
	Desktop PC / Notebook	2
	Ethernet Cable	2

Configuring Port Securing based on Maximum Learning Address

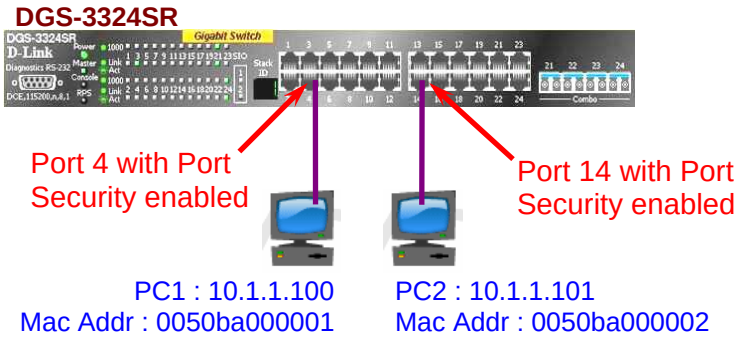
Setup



DGS-3324SR Configuration

Configure Port Security based on maximum learning address of 1	*config port_security ports 1-24 admin_state enable max_learning_addr 1*
Connect PC1 and PC2 to any ports on the switch	In this example, we connect Port 4 and Port 14
Check the MAC address learned by the port. Verify whether the MAC address registered belongs to the PC	*show fdb port 4* *show fdb port 14*

Exercises	
Task	**Observation**
Perform Ping Test from PC1 to PC2 and vice versa.	PC1 is able to ping PC2 and vice versa.
Swap the ports of the two PCs. Perform the Ping Test again.	PC1 is not able to ping PC2 and vice versa.
What do you conclude from the above?	After enabling port security feature, the switch will record the MAC address of the first computer connecting to each port. Any other computers with difference MAC addresses after that will be denied.

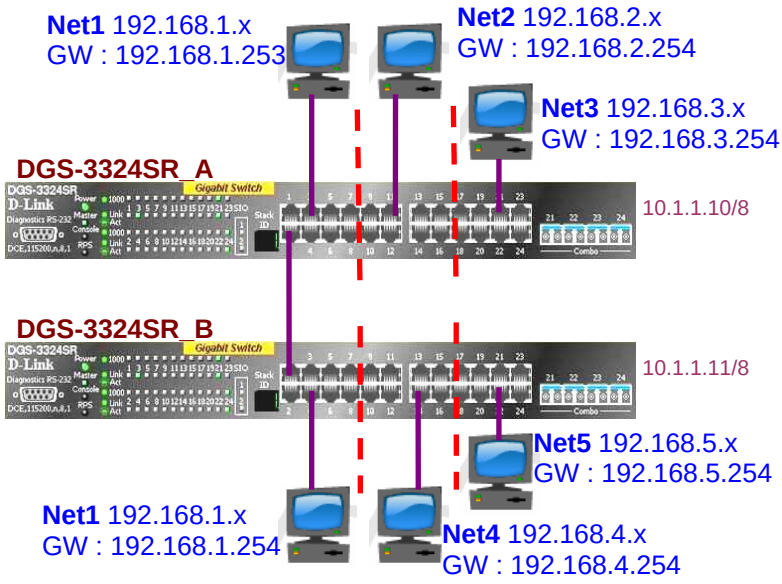
Configuring Port Securing based on Static MAC Forwarding Table	
Setup	

DGS-3324SR Configuration	
Configure Port Security based on maximum learning address of 0	*config port_security ports 1-24 admin_state enabled max_learning_addr 0*
Perform Ping Test from PC1 to PC2 and vice versa	
Manually create the MAC address entries on the ports which the PCs are connected	*create fdb default 00-50-ba-00-00-01 port 14* *create fdb default 00-50-ba-00-00-02 port 4*

Exercises	
Task	**Observation**
Perform Ping Test from PC1 to PC2 and vice versa	PC1 is not able to ping PC2 and vice versa.
Swap the ports of the two PCs. Perform the Ping Test again	PC1 is able to ping PC2 and vice versa.
What do you conclude from the above?	After enabling port security feature and add the authorized MAC address for each port, the switch will only allow the computer with the authorized MAC address to connect to each port. Any other computers with difference MAC addresses will be denied.

Lab Module 10 – Static Route Commands

Static Routing entries are entered manually. Static IP forwarding is accomplished by entry of an IP address into the Switch's Static IP Routing Table.

Objective	This lab session is designed to help users to have a better understanding of the static routing and how it can be configured.	
Equipment	DGS-3324SR or DES-3526	3
	Desktop PC / Notebook (with TFTP/Web Server)	1
	Other Desktop PC / Notebook	5
	Ethernet Cable	6
Setup		

In order for two DGS-3324SR to communicate with each other, you have to configure Static Route in both devices so that :

- **Networks at DGS-3324SR_A (Net2, Net3) can ping Networks at DGS-3324SR_B (Net4, Net5)**
- **Networks at DGS-3324SR_B (Net4, Net5) can ping Networks at DGS-3324SR_A (Net2, Net3)**

DGS-3324SR_A Configuration	
Configure VLAN and IP Interfaces	*config vlan default delete 1-24* *create vlan v101 tag 101* *config vlan v101 add untagged 1-8* *create ipif net1 192.168.1.253/24 v101 state enable* *create vlan v102 tag 102* *config vlan v102 add untagged 9-16* *create ipif net2 192.168.2.254/24 v102 state enable* *create vlan v103 tag 103* *config vlan v103 add untagged 17-24* *create ipif net3 192.168.3.254/24 v103 state enable*
Create Static Route	*create iproute 192.168.4.0/24 192.168.1.254* *create iproute 192.168.5.0/24 192.168.1.254*

DGS-3324SR_B Configuration	
Configure VLAN and IP Interfaces	*config vlan default delete 1-24* *create vlan v101 tag 101* *config vlan v101 add untagged 1-8* *create ipif net1 192.168.1.254/24 v101 state enable* *create vlan v104 tag 104* *config vlan v104 add untagged 9-16* *create ipif net4 192.168.4.254/24 v104 state enable* *create vlan v105 tag 105* *config vlan v105 add untagged 17-24* *create ipif net5 192.168.5.254/24 v105 state enable*
Create Static Route	*create iproute 192.168.2.0/24 192.168.1.253* *create iproute 192.168.3.0/24 192.168.1.253*

Exercises

Tasks	Observation
Check Routing Table	*show iproute*
a. for DGS-3324SR_A	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0 0.0.0.0 net1 1 Local 192.168.2.0 0.0.0.0 net1 1 Local 192.168.3.0 0.0.0.0 net1 1 Local 192.168.4.0 192.168.1.254 net1 1 Static 192.168.5.0 192.168.1.254 net1 1 Static
b. for DGS-3324SR_B	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0 0.0.0.0 net1 1 Local 192.168.2.0 192.168.1.253 net1 1 Static 192.168.3.0 192.168.1.253 net1 1 Static 192.168.4.0 0.0.0.0 net1 1 Local 192.168.5.0 0.0.0.0 net1 1 Local

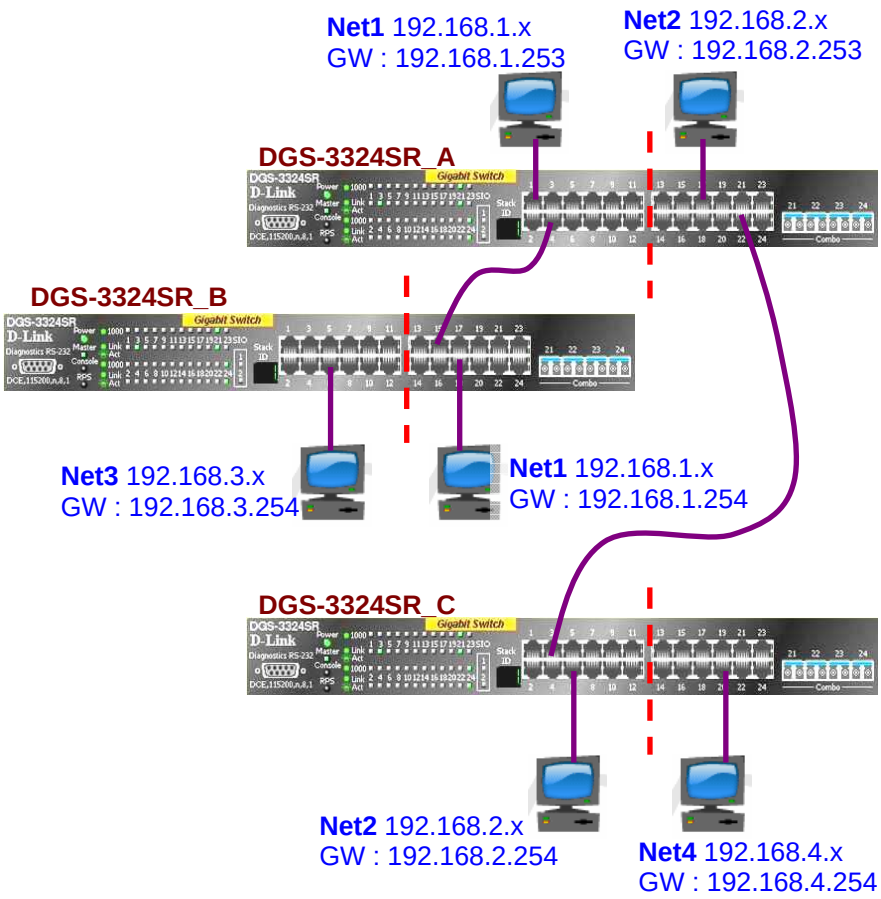
Ping Test	
a. Networks at DGS-3324SR_A (Net2 & Net3) ping Networks at DGS-3324SR_B (Net4 & Net5)	Net 2 & Net 3 are able to ping Net 4 & Net 5.
b. Networks at DGS-3324SR_B (Net4 & Net5) ping Networks at DGS-3324SR_A (Net2 & Net3)	Net 4 & Net 5 are able to ping Net 2 & Net 3.

Hands-on Exercise

In order for PCs to communicate between VLANs of the two switches, you need to configure Static Route in both devices so that :

- **Networks at DGS-3324SR_A (Net1, Net2) can ping Networks at DGS-3324SR_B (Net3) and DGS-3324SR_C (Net4)**
- **Networks at DGS-3324SR_B (Net3) can ping Networks at DGS-3324SR_A (Net2) and DGS-3324SR_C (Net4)**

Setup



Switches	Configuration for Static Route
DGS-3324SR_A	create iproute 192.168.3.0/24 192.168.1.254 create iproute 192.168.4.0/24 192.168.2.254
DGS-3324SR_B	create iproute 192.168.2.0/24 192.168.1.253 create iproute 192.168.4.0/24 192.168.1.253
DGS-3324SR_C	create iproute 192.168.1.0/24 192.168.2.253 create iproute 192.168.3.0/24 192.168.2.253

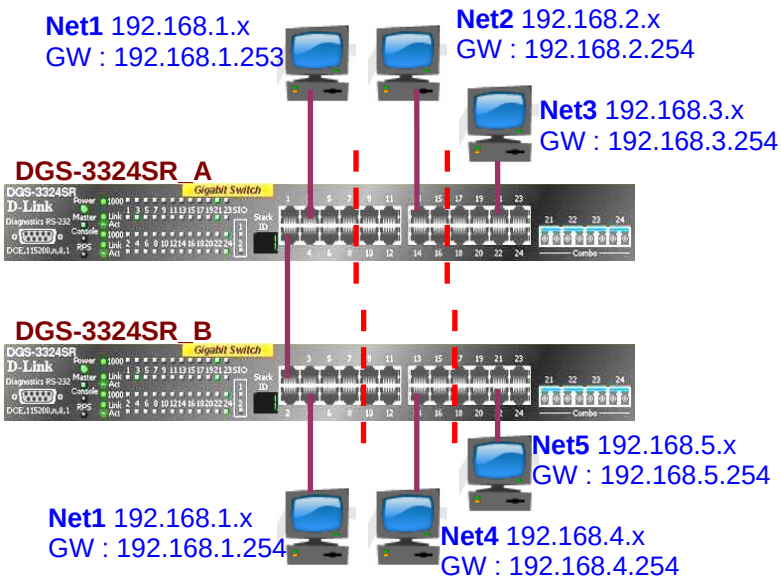
Exercises

Tasks	Observation
Check Routing Table	*show iproute*
a. for DGS-3324SR_A	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0 0.0.0.0 net1 1 Local 192.168.2.0 0.0.0.0 net2 1 Local 192.168.3.0 192.168.1.254 net1 1 Static 192.168.4.0 192.168.2.254 net2 1 Static
b. for DGS-3324SR_B	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0 0.0.0.0 net1 1 Local 192.168.2.0 192.168.1.253 net1 1 Static 192.168.3.0 0.0.0.0 net3 1 Local 192.168.4.0 192.168.1.253 net1 1 Static
c. for DGS-3324SR_C	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0 192.168.2.253 net2 1 Static 192.168.2.0 0.0.0.0 net2 1 Local 192.168.3.0 192.168.2.253 net2 1 Static 192.168.4.0 0.0.0.0 net4 1 Local

Ping Test	
a. Networks at DGS-3324SR_A (Net1 & Net2) ping Network at DGS-3324SR_B (Net3) and Network at DGS-3324SR_C (Net4)	Yes
b. Networks at DGS-3324SR_B (Net3) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324_C (Net4)	Yes
c. Networks at DGS-3324SR_C (Net4) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324SR_B (Net3)	Yes

Lab Module 11 – RIPv1 and RIPv2 Commands

The Routing Information Protocol (RIP) is a distance-vector protocol that uses hop count as its metric. RIP is widely used for routing traffic in the global Internet and is an interior gateway protocol (IGP), which means that it performs routing within a single autonomous system.

Objective	This lab session is designed to help users to have a better understanding of the RIPv1/v2 protocol and how it can be configured.	
Equipment	DGS-3324SR or DES-3526	3
	Desktop PC / Notebook (with TFTP/Web Server)	1
	Other Desktop PC / Notebook	5
	Ethernet Cable	6
Setup		

Note before you start :

Static route is suitable for simple network. If there are many subnets in the Network, configure static route will be tough. Uses RIP can let Layer 3 witches to learn each other's routing table AUTOMATICALLY.

Configure RIP in both switches so that :

- **DGS-3324SR_A can learn the networks (Net4, Net5) at DGS-3324SR_B**
- **DGS-3324SR_B can learn the networks (Net2, Net3) at DGS-3324SR_A**

DGS-3324SR_A Configuration	
Configure VLAN and IP Interfaces	*config vlan default delete 1-24* *create vlan v101 tag 101* *config vlan v101 add untagged 1-8* *create ipif net1 192.168.1.253/24 v101 state enabled* *create vlan v102 tag 102* *config vlan v102 add untagged 9-16* *create ipif net2 192.168.2.254/24 v102 state enabled* *create vlan v103 tag 103* *config vlan v103 add untagged 17-24* *create ipif net3 192.168.3.254/24 v103 state enable*
Enable RIP and the associated Interfaces (or all Interfaces)	*enable rip* *config rip all state enabled*
Enable interfaces that connect between two switches	*config rip ipif net1 tx_mode v2_only rx_mode v2_only state enabled*

DGS-3324SR_B Configuration	
Configure VLAN and IP Interfaces	*config vlan default delete 1-24* *create vlan v101 tag 101* *config vlan v101 add untagged 1-8* *create ipif net1 192.168.1.254/24 v101 state enabled* *create vlan v104 tag 104* *config vlan v104 add untagged 9-16* *create ipif net4 192.168.4.254/24 v104 state enabled* *create vlan v105 tag 105* *config vlan v105 add untagged 17-24* *create ipif net5 192.168.5.254/24 v105 state enable*

Enable RIP and the associated Interfaces (or all Interfaces)	*enable rip* *config rip all state enable*
Enable interfaces that connect between two switches	*config rip ipif net1 tx_mode v2_only rx_mode v2_only state enable*

Exercises

Tasks	Observation
Check Routing Table	*show iproute*
a. for DGS-3324SR_A	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net4 1 Local 192.168.3.0/24 0.0.0.0 net5 1 Local 192.168.4.0/24 192.168.1.254 net1 2 RIP 192.168.5.0/24 192.168.1.254 net1 2 RIP
b. for DGS-3324SR_B	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 192.168.1.253 net1 2 RIP 192.168.3.0/24 192.168.1.253 net1 2 RIP 192.168.4.0/24 0.0.0.0 net4 1 Local 192.168.5.0/24 0.0.0.0 net5 1 Local

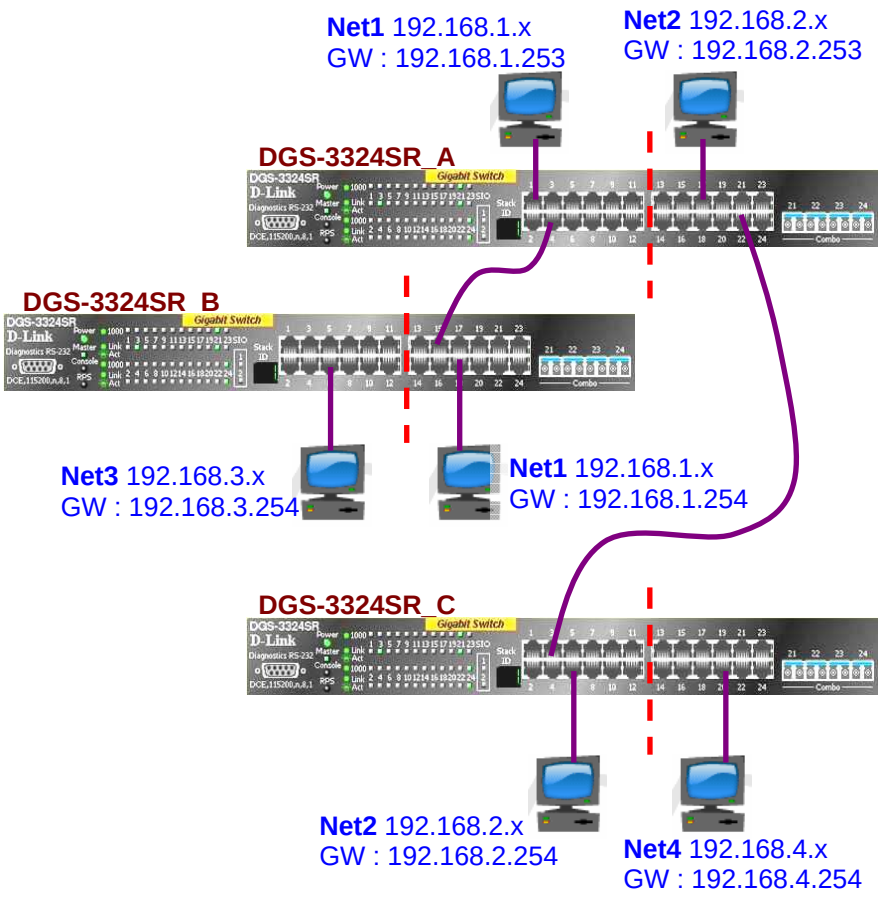
Ping Test	
a. Networks at DGS-3324SR_A (Net2 & Net3) ping Networks at DGS-3324SR_B (Net4 & Net5)	Net 2 & Net 3 are able to ping Net 4 & Net 5.
b. Networks at DGS-3324SR_B (Net4 & Net5) ping Networks at DGS-3324SR_A (Net2 & Net3)	Net 4 & Net 5 are able to ping Net 2 & Net 3.

Hands-on Exercise

In order for PCs to communicate between VLANs of the two switches, you need to configure Static Route in both devices so that :

- **Networks at DGS-3324SR_A (Net1, Net2) can ping Networks at DGS-3324SR_B (Net3) and DGS-3324SR_C (Net4)**
- **Networks at DGS-3324SR_B (Net3) can ping Networks at DGS-3324SR_A (Net2) and DGS-3324SR_C (Net4)**

Setup



Switches	Configuration for Interfaces between two Switches
DGS-3324SR_A	config rip ipif net1 tx_mode v2_only rx_mode v2_only state enable config rip ipif net2 tx_mode v2_only rx_mode v2_only state enable
DGS-3324SR_B	config rip ipif net1 tx_mode v2_only rx_mode v2_only state enable
DGS-3324SR_C	config rip ipif net2 tx_mode v2_only rx_mode v2_only state enable

Exercises

Tasks	Observation
Check Routing Table	*show iproute*
a. for DGS-3324SR_A	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 192.168.1.254 net1 2 RIP 192.168.4.0/24 192.168.2.254 net2 2 RIP
b. for DGS-3324SR_B	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 192.168.1.253 net1 2 RIP 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 192.168.1.253 net1 3 RIP
c. for DGS-3324SR_C	IP Address/Netmask Gateway Interface Cost Protocol --- --- --- --- --- 192.168.1.0/24 192.168.2.253 net2 2 RIP 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 192.168.2.253 net2 3 RIP 192.168.4.0/24 0.0.0.0 net4 1 Local

Ping Test	
a. Networks at DGS-3324SR_A (Net1 & Net2) ping Network at DGS-3324SR_B (Net3) and Network at DGS-3324SR_C (Net4)	Yes.
b. Networks at DGS-3324SR_B (Net3) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324_C (Net4)	Yes.
c. Networks at DGS-3324SR_C (Net4) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324_B (Net3)	Yes.

Lab Module 12 – OSPF Commands

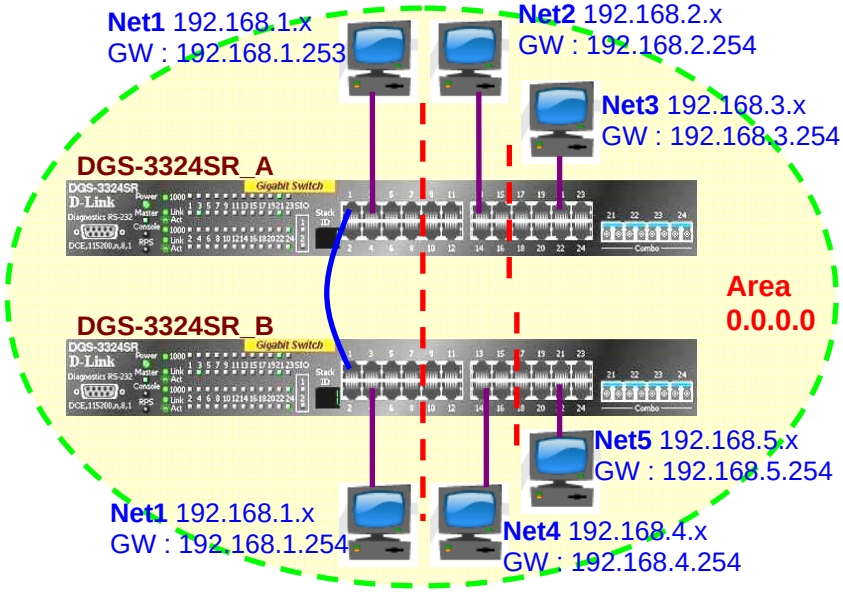
Open Shortest Path First (OSFP) is a routing protocol developed for Internet Protocol (IP) networks by the interior gateway protocol (IGP) working group of the Internet Engineering Task Force (IETF). OSPF works with an AREA concept, OSPF can divide a big network to several areas. Routes in the same area can learn each routing entries. An area topology is invisible outside of that area.

Objective	This lab session is designed to help users to have a better grasp of the OSPF Routing Protocol and how it can be configured.	
Equipment	DGS-3324SR or DES-3526	3
	Desktop PC / Notebook (with TFTP/Web Server)	1
	Other Desktop PC / Notebook	5
	Ethernet Cable	6

Configure OSPF in both devices inside one area so that :

- **DGS-3324SR_A can learn the networks (Net4, Net5) at DGS-3324SR_B**
- **DGS-3324SR_B can learn the networks (Net2, Net3) at DGS-3324SR_A**

Setup



DGS-3324SR_A Configuration	
Configure VLAN and IP Interfaces for Net1, Net2 and Net3	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:8* *create ipif net1 192.168.1.253/24 v101 state enabled* *create vlan v102 tag 102* *config vlan v102 add untagged 1:9-1:16* *create ipif net2 192.168.2.254/24 v102 state enabled* *create vlan v103 tag 103* *config vlan v103 add untagged 1:17-1:24* *create ipif net3 192.168.3.254/24 v103 state enable*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf router_id 192.168.1.253* *config ospf ipif net1 state enabled*
	OR
	enable ospf *config ospf all state enabled*
	(Other OSPF settings are by default)
Check settings	*show ospf*
	OSPF Router ID : 192.168.1.253 State : Enabled OSPF Interface Settings Interface IP Address Area ID State Link Metric ---------- ---------- ---------- ---------- ---------- --------- System 10.1.1.10/8 0.0.0.0 Disabled Link DOWN 1 net1 192.168.1.253/24 0.0.0.0 Enabled Link Up 1 net2 192.168.2.254/24 0.0.0.0 Enabled Link Up 1 net3 192.168.3.254/24 0.0.0.0 Enabled Link Up 1 Total Entries : 4

	OSPF Area Settings Area ID Type Stub Import Summary LSA Stub Default Cost ---------- ----- ---- ---------- ---------- 0.0.0.0 Normal None None Total Entries : 1

DGS-3324SR_B Configuration	
Configure VLAN and IP Interfaces for Net1, Net4 and Net5	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:8* *create ipif net1 192.168.1.254/24 v101 state enabled* *create vlan v104 tag 104* *config vlan v104 add untagged 1:9-1:16* *create ipif net4 192.168.4.254/24 v104 state enabled* *create vlan v105 tag 105* *config vlan v105 add untagged 1:17-1:24* *create ipif net5 192.168.5.254/24 v105 state enable*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf router_id 192.168.1.254* *config ospf ipif net1 state enabled* **OR** *enable ospf* *config ospf all state enabled* (Other OSPF settings are by default)
Check settings	*show ospf* OSPF Router ID : 192.168.1.254 State : Enabled OSPF Interface Settings

```
Interface   IP Address          Area ID   State      Link        Metric
----------- ------------------- --------- ---------- ----------- ------
System      10.1.1.11/8         0.0.0.0   Disabled   Link DOWN   1
net1        192.168.1.253/24    0.0.0.0   Enabled    Link Up     1
net4        192.168.4.254/24    0.0.0.0   Enabled    Link Up     1
net5        192.168.5.254/24    0.0.0.0   Enabled    Link Up     1
Total Entries : 4

OSPF Area Settings
Area ID     Type    Stub Import Summary   LSA Stub Default Cost
----------- ------- ---- ---------------- ---------------------
0.0.0.0     Normal  None                  None
Total Entries : 1
```

Exercises

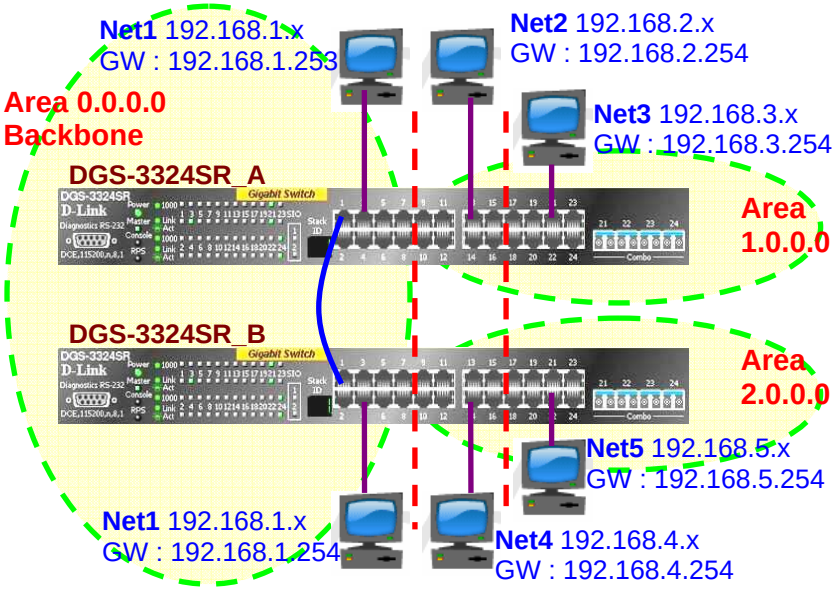
Tasks	Observation
Verify configuration by checking Routing Table	*show iproute*
a. for DGS-3324SR_A, check whether Net4 and Net5 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 192.168.1.254 net1 2 OSPF 192.168.5.0/24 192.168.1.254 net1 2 OSPF Total Entries : 5
b. for DGS-3324SR_B, check whether Net2 and Net3 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 192.168.1.253 net1 2 OSPF 192.168.3.0/24 192.168.1.253 net1 2 OSPF 192.168.4.0/24 0.0.0.0 net2 1 Local 192.168.5.0/24 0.0.0.0 net3 1 Local

	Total Entries : 5
Ping Test	
a. Networks at DGS-3324SR_A (Net2 & Net3) ping Networks at DGS-3324SR_B (Net4 & Net5)	Net 2 & Net 3 are able to ping Net 4 & Net 5.
b. Networks at DGS-3324SR_B (Net4 & Net5) ping Networks at DGS-3324SR_A (Net2 & Net3)	Net 4 & Net 5 are able to ping Net 2 & Net 3.

Configure OSPF in both devices across areas so that :

- **DGS-3324SR_A can learn the networks (Net4, Net5) at DGS-3324SR_B**
- **DGS-3324SR_B can learn the networks (Net2, Net3) at DGS-3324SR_A**

Setup



The switches in this scenario are acting as the "ABR". Routing table is exchanged inside each area first, and then through ABR to exchange the routing information at different areas

DGS-3324SR_A Configuration

Configure VLAN and IP Interfaces for Net1, Net2 and Net3	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:8* *create ipif net1 192.168.1.253/24 v101 state enabled* *create vlan v102 tag 102* *config vlan v102 add untagged 1:9-1:16* *create ipif net2 192.168.2.254/24 v102 state enabled* *create vlan v103 tag 103* *config vlan v103 add untagged 1:17-1:24* *create ipif net3 192.168.3.254/24 v103 state enable*

Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf router_id 192.168.1.253* *config ospf all state enabled*
Create new Area (1.0.0.0) and enable the associated Interface	*create ospf area 1.0.0.0 type normal* *config ospf ipif net2 area 1.0.0.0 state enabled* *config ospf ipif net3 area 1.0.0.0 state enabled*
Check settings	*show ospf* OSPF Router ID : 192.168.1.253 State : Enabled It is an area border router (ABR) OSPF Interface Settings Interface IP Address Area ID State Link Metric ---------- ---------- ---------- ---------- ---------- --------- System 10.1.1.10/8 0.0.0.0 Disabled Link DOWN 1 net1 192.168.1.253/24 0.0.0.0 Enabled Link Up 1 net2 192.168.2.254/24 0.0.0.0 Enabled Link Up 1 net3 192.168.3.254/24 1.0.0.0 Enabled Link Up 1 Total Entries : 4 OSPF Area Settings Area ID Type Stub Import Summary LSA Stub Default Cost ---------- ----- ---- ---------- ---------- 0.0.0.0 Normal None None 1.0.0.0 Normal None None Total Entries : 1

DGS-3324SR B Configuration	
Configure VLAN and IP Interfaces for Net1, Net4 and Net5	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:8* *create ipif net1 192.168.1.254/24 v101 state enabled*

	create vlan v104 tag 104 *config vlan v104 add untagged 1:9-1:16* *create ipif net4 192.168.4.254/24 v104 state enabled* *create vlan v105 tag 105* *config vlan v105 add untagged 1:17-1:24* *create ipif net5 192.168.5.254/24 v105 state enable*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf router_id 192.168.1.254* *config ospf all state enabled*
Create new Area (2.0.0.0) and enable the associated Interface	*create ospf area 2.0.0.0 type normal* *config ospf ipif net4 area 2.0.0.0 state enabled* *config ospf ipif net5 area 2.0.0.0 state enabled*
Check settings	*show ospf*
	OSPF Router ID : 192.168.1.254 State : Enabled It is an area border router (ABR) OSPF Interface Settings Interface IP Address Area ID State Link Metric ---------- ---------- ---------- ---------- ---------- --------- System 10.1.1.11/8 0.0.0.0 Disabled Link DOWN 1 net1 192.168.1.253/24 0.0.0.0 Enabled Link Up 1 net4 192.168.4.254/24 0.0.0.0 Enabled Link Up 1 net5 192.168.5.254/24 1.0.0.0 Enabled Link Up 1 Total Entries : 4 OSPF Area Settings Area ID Type Stub Import Summary LSA Stub Default Cost ---------- ----- ---- ---------- ---------- 0.0.0.0 Normal None None 2.0.0.0 Normal None None Total Entries : 2

Exercises

Tasks	Observation
Verify configuration by checking Routing Table	*show iproute*
a. for DGS-3324SR_A, check whether Net4 and Net5 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 192.168.1.254 net1 2 OSPF 192.168.5.0/24 192.168.1.254 net1 2 OSPF Total Entries : 5
b. for DGS-3324SR_B, check whether Net2 and Net3 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 192.168.1.253 net1 2 OSPF 192.168.3.0/24 192.168.1.253 net1 2 OSPF 192.168.4.0/24 0.0.0.0 net2 1 Local 192.168.5.0/24 0.0.0.0 net3 1 Local Total Entries : 5

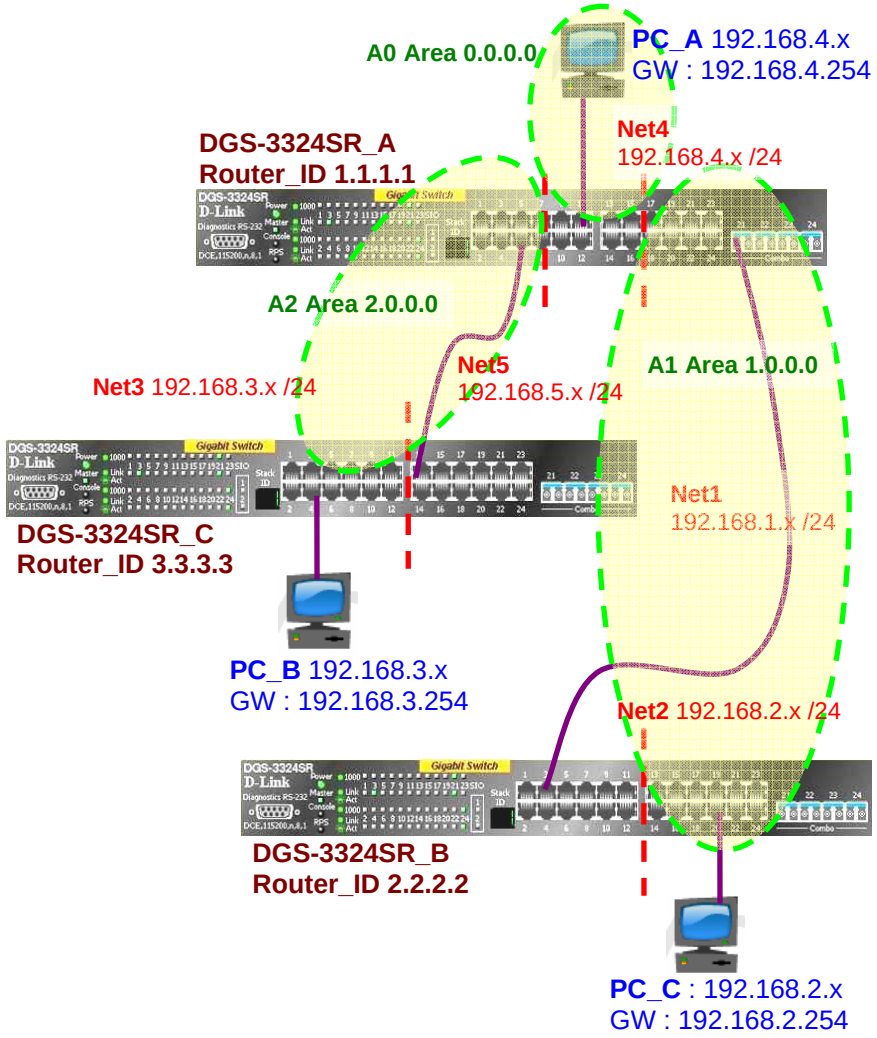
Ping Test	
a. Networks at DGS-3324SR_A (Net2 & Net3) ping Networks at DGS-3324SR_B (Net4 & Net5)	Net 2 & Net 3 are able to ping Net 4 & Net 5.
b. Networks at DGS-3324SR_B (Net4 & Net5) ping Networks at DGS-3324SR_A (Net2 & Net3)	Net 4 & Net 5 are able to ping Net 2 & Net 3.

Hands-on Exercise

Configure OSPF in three devices inside three areas so that

- **DGS-3324SR_A can learn Networks Net2 and Net3**
- **DGS-3324SR_B can learn Network Net3**
- **DGS-3324SR_C can learn Network Net2**

Setup



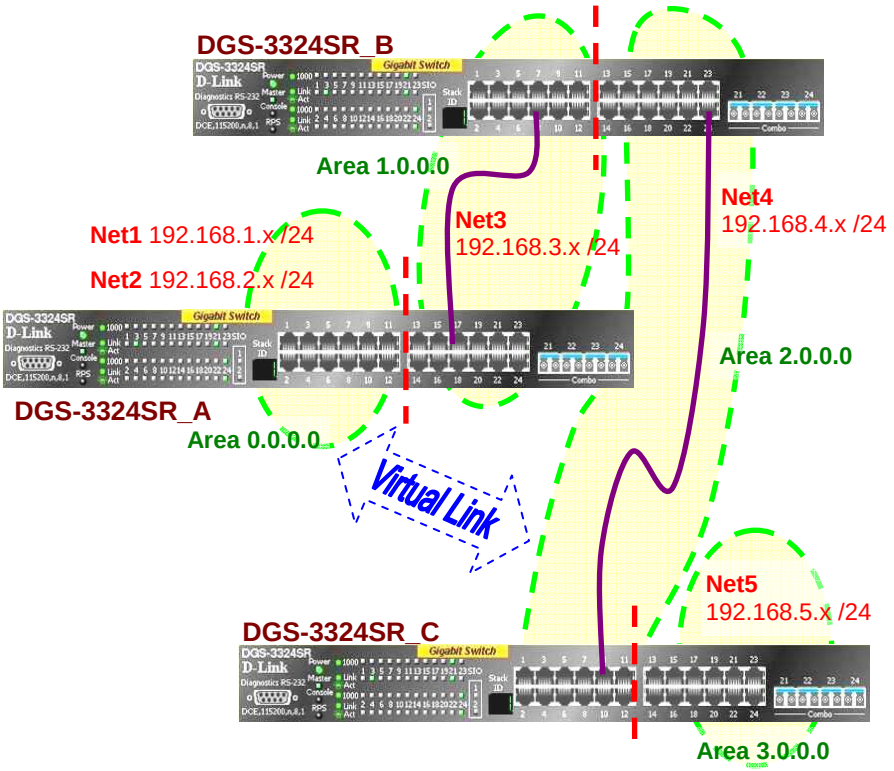
Exercises

Tasks	Observation
Ping Test	
a. Networks at DGS-3324SR_A (Net1 & Net2) ping Network at DGS-3324SR_B (Net3) and Network at DGS-3324SR_C (Net4)	Ping Successful

b. Networks at DGS-3324SR_B (Net3) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324_C (Net4)	Ping Successful
c. Networks at DGS-3324SR_C (Net4) ping Networks at DGS-3324SR_A (Net1 & Net2) and Network at DGS-3324_B (Net3)	Ping Successful

Configure OSPF in three devices inside three areas so that DGS-3324SR_C can learn the networks (Net1 and Net2) at DGS-3324SR_A

Setup



DGS-3324SR_C is not directly connected to Backbone area (area 0.0.0.0). Therefore, the virtual link configuration is needed in this scenario.

DGS-3324SR_A Configuration

Configure VLAN and IP Interfaces for Net1, Net2 and Net3	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:6* *create ipif net1 192.168.1.254/24 v101 state enabled* *create vlan v102 tag 102* *config vlan v102 add untagged 1:7-1:12* *create ipif net2 192.168.2.254/24 v102 state enabled* *create vlan v103 tag 103*

	config vlan v103 add untagged 1:13-1:24 *create ipif net3 192.168.3.254/24 v103 state enable*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled* *config ospf router_id 1.1.1.1*
Create new Area (1.0.0.0) and enable the associated Interface	*create ospf area 1.0.0.0 type normal* *config ospf ipif net3 area 1.0.0.0 state enabled*
Check settings	*show ospf*

DGS-3324SR_B Configuration	
Configure VLAN and IP Interfaces for Net3 and Net4	*config vlan default delete 1:1-1:24* *create vlan v103 tag 103* *config vlan v103 add untagged 1:1-1:12* *create ipif net3 192.168.3.254/24 v103 state enabled* *create vlan v104 tag 104* *config vlan v104 add untagged 1:13-1:24* *create ipif net4 192.168.4.253/24 v104 state enabled*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled* *config ospf router_id 2.2.2.2*
Create new Area (1.0.0.0), (2.0.0.0) and enable the associated Interface	*create ospf area 1.0.0.0 type normal* *create ospf area 2.0.0.0 type normal* *config ospf ipif net3 area 1.0.0.0 state enabled* *config ospf ipif net4 area 2.0.0.0 state enabled*
Check settings	*show ospf*

DGS-3324SR_C Configuration	
Configure VLAN and IP Interfaces for Net4 and Net5	*config vlan default delete 1:1-1:24* *create vlan v104 tag 104* *config vlan v104 add untagged 1:1-1:12* *create ipif net4 192.168.4.254/24 v104 state enabled* *create vlan v105 tag 105* *config vlan v105 add untagged 1:13-1:24* *create ipif net5 192.168.5.254/24 v105 state enabled*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled*
Create new Area (2.0.0.0), (3.0.0.0) and enable the associated Interface	*create ospf area 2.0.0.0 type norma* *create ospf area 3.0.0.0 type stub* *config ospf ipif net4 area 2.0.0.0 state enabled* *config ospf ipif net5 area 3.0.0.0 state enabled* *config ospf router_id 3.3.3.3*
Check settings	*show ospf*

Exercises	
Tasks	**Observation**
Verify Routing Table before creating Virtual Link	*show iproute*
a. For DGS-3324SR_A, check whether Net4 and Net5 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- -------- ---------- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 0.0.0.0 net3 1 Local Total Entries : 3
b. For DGS-3324SR_B, check whether Net1, Net2 and Net5 are	Routing Table IP Addr/mask Gateway Interface Cost Protocol

learned by OSPF	---------- ---------- ---------- -------- ---------- 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 0.0.0.0 net4 1 Local Total Entries : 2
c. For DGS-3324SR_C, check whether Net1, Net2 and Net3 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- -------- ---------- 192.168.4.0/24 0.0.0.0 net4 1 Local 192.168.5.0/24 0.0.0.0 net5 1 Local Total Entries : 2
Create Virtual Link Settings	
a. On DGS-3324SR_A	*create ospf virtual_link 1.0.0.0 2.2.2.2*
b. On DGS-3324SR_B	*create ospf virtual_link 1.0.0.0 1.1.1.1* *create ospf virtual_link 2.0.0.0 3.3.3.3*
c. On DGS-3324SR_C	*create ospf virtual_link 2.0.0.0 2.2.2.2*
Verify Virtual Link Settings **Make Sure Link Status is UP**	*show ospf virtual_link*
a. On DGS-3324SR_A	Virtual Interface Configuration Transit Area ID Virtual Neighbor Router Hello Interval Dead Interval Auth Link Status --------- ---------- ---------- ---------- ---------- ------- 1.0.0.0 2.2.2.2 10 60 None UP
b. On DGS-3324SR_B	Virtual Interface Configuration Transit Area ID Virtual Neighbor Router Hello Interval Dead Interval Auth Link Status --------- ---------- ---------- ---------- ---------- ------- 1.0.0.0 1.1.1.1 10 60 None UP 2.0.0.0 3.3.3.3 10 60 None UP
c. On DGS-3324SR_C	Virtual Interface Configuration Transit Area ID Virtual Neighbor Router Hello Interval Dead Interval Auth Link Status --------- ---------- ---------- ---------- ---------- ------- 2.0.0.0 2.2.2.2 10 60 None UP

Verify Routing Table	*show iproute*
a. For DGS-3324SR_A, check whether Net4 and Net5 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 192.168.3.253 net3 2 OSPF 192.168.5.0/24 192.168.3.253 net3 3 OSPF Total Entries : 5
b. For DGS-3324SR_B, check whether Net1, Net2 and Net5 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 192.168.3.254 net3 2 OSPF 192.168.2.0/24 192.168.3.254 net3 2 OSPF 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 0.0.0.0 net4 1 Local 192.168.5.0/24 192.168.4.254 net4 2 Local Total Entries : 5
c. For DGS-3324SR_C, check whether Net1, Net2 and Net3 are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 192.168.4.253 net4 3 OSPF 192.168.2.0/24 192.168.4.253 net4 3 OSPF 192.168.3.0/24 192.168.4.253 net4 2 OSPF 192.168.4.0/24 0.0.0.0 net4 1 Local 192.168.5.0/24 0.0.0.0 net5 1 Local Total Entries : 5
Ping Test	
a. From DGS-3324SR_A (Net1, Net2), perform Ping Test to DGS-3324SR_C (Net5)	Net 1 & Net 2 are able to ping Net 5.
b. From DGS-3324SR_B (Net3, Net4), perform	Net 3 & Net 4 are able to ping Net1, Net 2 and Net 5

Ping Test to DGS-3324SR_A (Net1, Net2) and DGS-3324SR_C (Net5)	
c. From DGS-3324SR_C (Net5), perform Ping Test to DGS-3324SR_A (Net1, Net2)	Net 5 are able to ping Net1 and Net2t

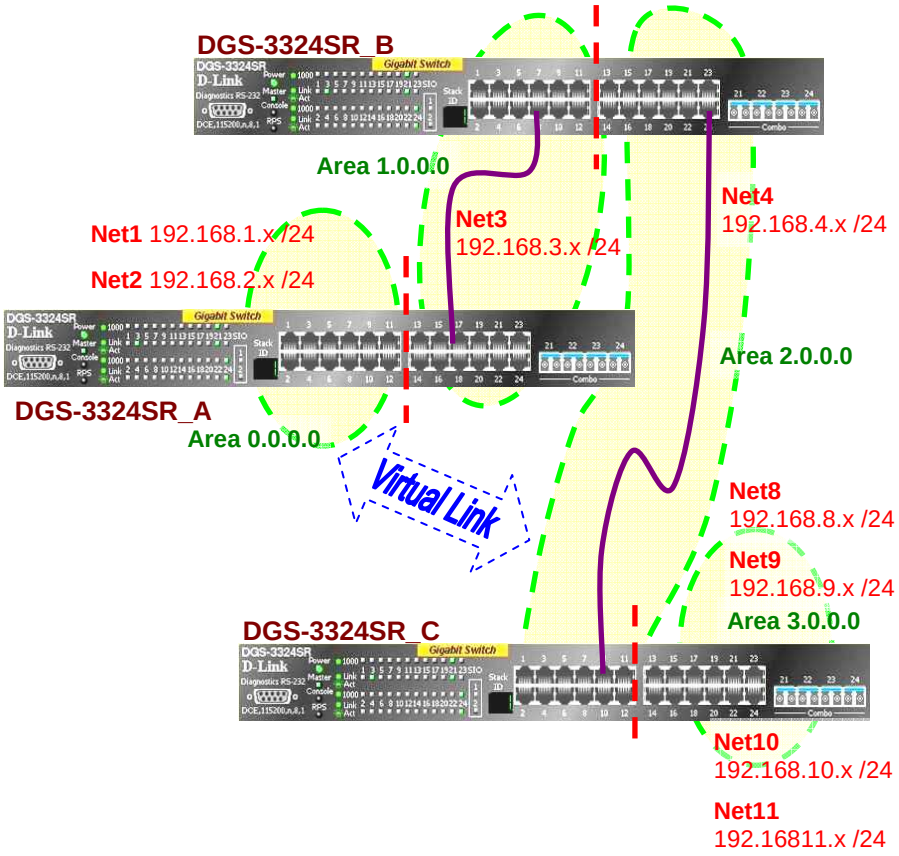
Notes of OSPF Virtual Link:
One of the most confusing aspects of configuring virtual links is the mysterious area number included in the command. This transit area is not the area you are trying to reach, but rather the area through which the virtual link passes.

Virtual links are typically a sign of poor network design; rather than using them, you should evaluate your network design and attempt to eliminate them where you can.

Divide net5 on DGS-3324SR_C to 4 subnets, summarize 4 subnets into one route at the ABR so that

- **DGS-3324SR_A can learn the summarized route from DGS-3324SR_C**

Setup



DGS-3324SR_A Configuration (same as previous example)

Configure VLAN and IP Interfaces for Net1, Net2 and Net3	*config vlan default delete 1:1-1:24* *create vlan v101 tag 101* *config vlan v101 add untagged 1:1-1:6* *create ipif net1 192.168.1.254/24 v101 state enabled* *create vlan v102 tag 102* *config vlan v102 add untagged 1:7-1:12* *create ipif net2 192.168.2.254/24 v102 state enabled* *create vlan v103 tag 103*

	config vlan v103 add untagged 1:13-1:24 *create ipif net3 192.168.3.254/24 v103 state enable*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled* *config ospf router_id 1.1.1.1*
Create new Area (1.0.0.0) and enable the associated Interface	*create ospf area 1.0.0.0 type normal* *config ospf ipif net3 area 1.0.0.0 state enabled*
Check settings	*show ospf*

DGS-3324SR_B Configuration (same as previous example)	
Configure VLAN and IP Interfaces for Net3 and Net4	*config vlan default delete 1:1-1:24* *create vlan v103 tag 103* *config vlan v103 add untagged 1:1-1:12* *create ipif net3 192.168.3.253/24 v103 state enabled* *create vlan v104 tag 104* *config vlan v104 add untagged 1:13-1:24* *create ipif net4 192.168.4.253/24 v104 state enabled*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled* *config ospf router_id 2.2.2.2*
Create new Area (1.0.0.0), (2.0.0.0) and enable the associated Interface	*create ospf area 1.0.0.0 type normal* *create ospf area 2.0.0.0 type normal* *config ospf ipif net3 area 1.0.0.0 state enabled* *config ospf ipif net4 area 2.0.0.0 state enabled*
Check settings	*show ospf*

DGS-3324SR_C Configuration	
Configure VLAN and IP Interfaces for Net4, Net8, Net9, Net10 and Net11	*config vlan default delete 1:1-1:24* *create vlan v104 tag 104* *config vlan v104 add untagged 1:1-1:12* *create ipif net4 192.168.4.254/24 v104 state enabled* *create vlan v108 tag 108* *config vlan v108 add untagged 1:13-1:15* *create ipif net8 192.168.8.254/24 v108 state enabled* *create vlan v109 tag 109* *config vlan v109 add untagged 1:16-1:18* *create ipif net9 192.168.9.254/24 v109 state enabled* *create vlan v110 tag 110* *config vlan v110 add untagged 1:19-1:21* *create ipif net10 192.168.10.254/24 v110 state enabled* *create vlan v111 tag 111* *config vlan v111 add untagged 1:22-1:24* *create ipif net11 192.168.11.254/24 v111 state enabled*
Enable OSPF and the associated Interfaces (or all Interfaces)	*enable ospf* *config ospf all state enabled*
Create new Area (2.0.0.0), (3,0,0,0) and enable the associated Interface	*create ospf area 2.0.0.0 type normal* *create ospf area 3.0.0.0 type normal* *config ospf ipif net4 area 2.0.0.0 state enabled* *config ospf ipif net8 area 3.0.0.0 state enabled* *config ospf ipif net9 area 3.0.0.0 state enabled* *config ospf ipif net10 area 3.0.0.0 state enabled* *config ospf ipif net11 area 3.0.0.0 state enabled* *config ospf router_id 3.3.3.3*
Check settings	*show ospf*

Exercises

Tasks	Observation
Create Aggregation Settings on DGS-3324SR_C	*create ospf aggregation 3.0.0.0 192.168.8.0/22 lsdb_type summary*
Verify Configuration	*show iproute*
a. For DGS-3324SR_B, check whether summarized route from DGS-3324SR_C are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 192.168.3.254 net3 2 OSPF 192.168.2.0/24 192.168.3.253 net3 3 OSPF 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 0.0.0.0 net4 1 Local 192.168.8.0/22 192.168.4.254 net4 2 OSPF Total Entries : 5
b. For DGS-3324SR_A, check whether summarized route from DGS-3324SR_C are learned by OSPF	Routing Table IP Addr/mask Gateway Interface Cost Protocol ---------- ---------- ---------- ---------- ---------- 192.168.1.0/24 0.0.0.0 net1 1 Local 192.168.2.0/24 0.0.0.0 net2 1 Local 192.168.3.0/24 0.0.0.0 net3 1 Local 192.168.4.0/24 192.168.3.253 net3 2 OSPF 192.168.8.0/24 192.168.3.253 net3 3 OSPF Total Entries : 5
Ping Test	
a. From DGS-3324SR_A (Net1), perform Ping Test to DGS-3324SR_C (Net8~Net11)	Net1 is able to ping Net8, Net9, Net10 and Net11.

Lab Module 13 – VRRP Commands

The Virtual Router Redundancy Protocol (VRRP) is a standard router redundancy protocol supported in IP version 4. It is based on RFC 2338 and provides redundancy by eliminating the single point of failure inherent in a default route environment.

Objective	This lab session is designed to help users to have a better understanding of the VRRP feature and how it can be configured.	
Equipment	DGS-3324SR	3
	Managed / Unmanaged Layer 2 Switch	1
	Desktop PC / Notebook (with TFTP/Web Server)	1
	Other Desktop PC / Notebook	2
	Ethernet Cable	3

Configure VRRP with Critical IP

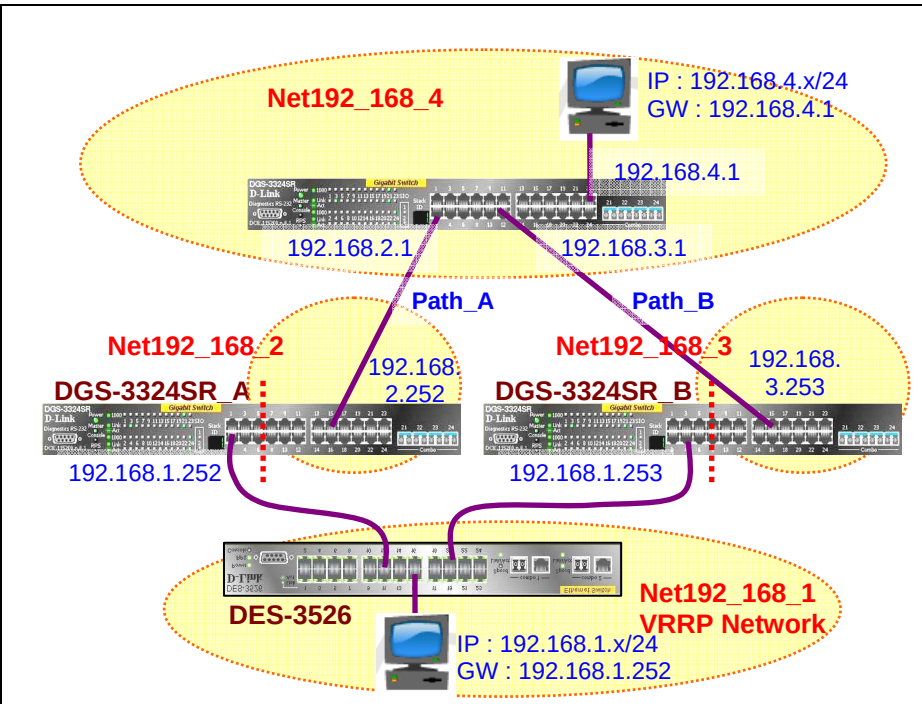
Critical IP function will detect NAT devices' status by using ARP request every 30 seconds. If one of the NAT devices fails, VRRP mechanism will be activated.

L3_DGS-3324SR_A and L3_DGS-3324SR_B provide the VRRP.

L3_DGS-3324SR_A is the Master. L3_DGS-3324SR_B is the Backup.

When Path_A is working, 192.168.1.x packets are routed by L3_DGS-3324SR_A and L3_DGS-3324SR_B is standby.

When Path_A fails, L3_DGS-3324SR_B will become the Master and route the packets for 192.168.1.x network, providing the redundancy for static default routed environment.

Setup	

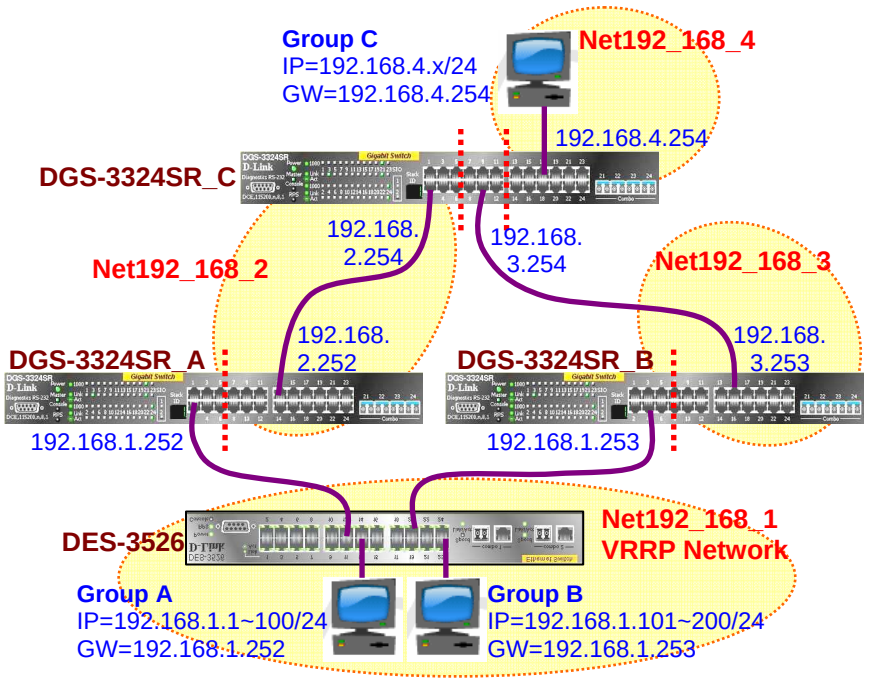
DGS-3324SR_A Configuration Two networks – Net192_168_1 & Net192_168_2 VRRP is enabled on Net192_168_1 Master of VRID = 252 Critical IP = 192.168.2.1 RIP is enabled	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create IP interface for the VLAN	*create vlan vlan2 tag 2* *config vlan vlan2 add untagged 1-6* *create ipif 192_168_1 192.168.1.252/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 7-24* *create ipif 192_168_2 192.168.2.252/24 vlan3 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*
Configure VRRP with VRID of 192.168.1.252 and	*create vrrp vrid 252 ipif 192_168_1 ipaddress 192.168.1.252 state enabled critical_ip 192.168.2.1 critical_ip_state enabled*

Critical IP of 192.168.2.1	
Enable VRRP	*enable vrrp*

DGS-3324SR_B Configuration Two networks – Net192_168_1 & Net192_168_3 VRRP is enabled on Net192_168_1 Backup of VRID = 252 Critical IP = 192.168.3.1 RIP is enabled	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create IP interface fro the VLAN	*create vlan vlan2 tag 2* *config vlan vlan2 add untagged 1-6* *create ipif 192_168_1 192.168.1.253/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 7-24* *create ipif 192_168_3 192.168.3.253/24 vlan3 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*
Configure VRRP with VRID of 192.168.1.252 and Critical IP of 192.168.2.1	*create vrrp vrid 252 ipif 192_168_1 ipaddress 192.168.1.252 state enable critical_ip 192.168.3.1 critical_ip_state enabled*
Enable VRRP	*enable vrrp*

DGS-3324SR_C Configuration Three networks – Net192_168_2, Net192_168_3 & Net192_168_4	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create IP interface fro the	*create vlan vlan2 tag 2* *config vlan vlan2 add untagged 1-8*

VLAN	*create ipif 192_168_2 192.168.2.1/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 9-16* *create ipif 192_168_3 192.168.3.1/24 vlan3 state enabled* *create vlan vlan4 tag 4* *config vlan vlan4 add untagged 17-24* *create ipif 192_168_4 192.168.4.1/24 vlan4 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*

Configure Fully Redundant VRRP	
Setup	

DGS-3324SR_C Configuration	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create IP interface fro the VLAN	*create vlan vlan2 tag 2* *config vlan vlan2 add untagged 1-6* *create ipif 192_168_2 192.168.2.254/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 7-12* *create ipif 192_168_3 192.168.3.254/24 vlan3 state enabled* *create vlan vlan4 tag 4* *config vlan vlan4 add untagged 13-24* *create ipif 192_168_4 192.168.4.254/24 vlan4 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*

DGS-3324SR_A Configuration Two networks – Net192_168_1 & Net192_168_2 VRRP is enabled on Net192_168_1 Master of VRID = 252 Backup of VRID = 253 RIP is enabled	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create IP interface fro the VLAN	*create vlan vlan2 tag 2* *config vlan vlan2 add untagged 1-6* *create ipif 192_168_1 192.168.1.252/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 7-24* *create ipif 192_168_2 192.168.2.252/24 vlan3 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*
Configure VRRP with Master VRID and Backup VRID	*create vrrp vrid 252 ipif 192_168_1 ipaddress 192.168.1.252 state enabled* *create vrrp vrid 253 ipif 192_168_1 ipaddress 192.168.1.253 state enabled*
Enable VRRP	*enable vrrp*

DGS-3324SR_B Configuration Two networks – Net192_168_1 & Net192_168_3 VRRP is enabled on Net192_168_1 Master of VRID = 253 Backup of VRID = 252 RIP is enabled	
Delete ports from default VLAN for other VLAN use	*config vlan default delete 1-24*
Create VLAN, add ports into it, create	*create vlan vlan2 tag 2*

IP interface fro the VLAN	*config vlan vlan2 add untagged 1-6* *create ipif 192_168_1 192.168.1.253/24 vlan2 state enabled* *create vlan vlan3 tag 3* *config vlan vlan3 add untagged 7-24* *create ipif 192_168_3 192.168.2.253/24 vlan3 state enabled*
Enable RIP Routing Protocol	*enable rip* *config rip all tx_mode v2_only rx_mode v2_only state enabled*
Configure VRRP with Master VRID and Backup VRID	*create vrrp vrid 252 ipif 192_168_1 ipaddress 192.168.1.252 state enabled* *create vrrp vrid 253 ipif 192_168_1 ipaddress 192.168.1.253 state enabled*
Enable VRRP	*enable vrrp*