



FSM73xx GSM73xx GMS72xxR – Shared access to the Internet across Multiple routing VLANs using a Prosafe Firewall

This document describes how to:

- Create multiple routing VLANs
- Obtain Internet access on multiple VLANs using one Internet gateway

The procedure described can apply to most Layer 2 and Layer 3 Switches and VPN Firewall with new Web Interface (defined as the one with the Menu appearing horizontally on top).

Hardware differences among different models must be taken in consideration.

NOTE:

This document is not intended to illustrate how to perform full Layer3 separation, for which Access Control Lists (ACLs) should be used.

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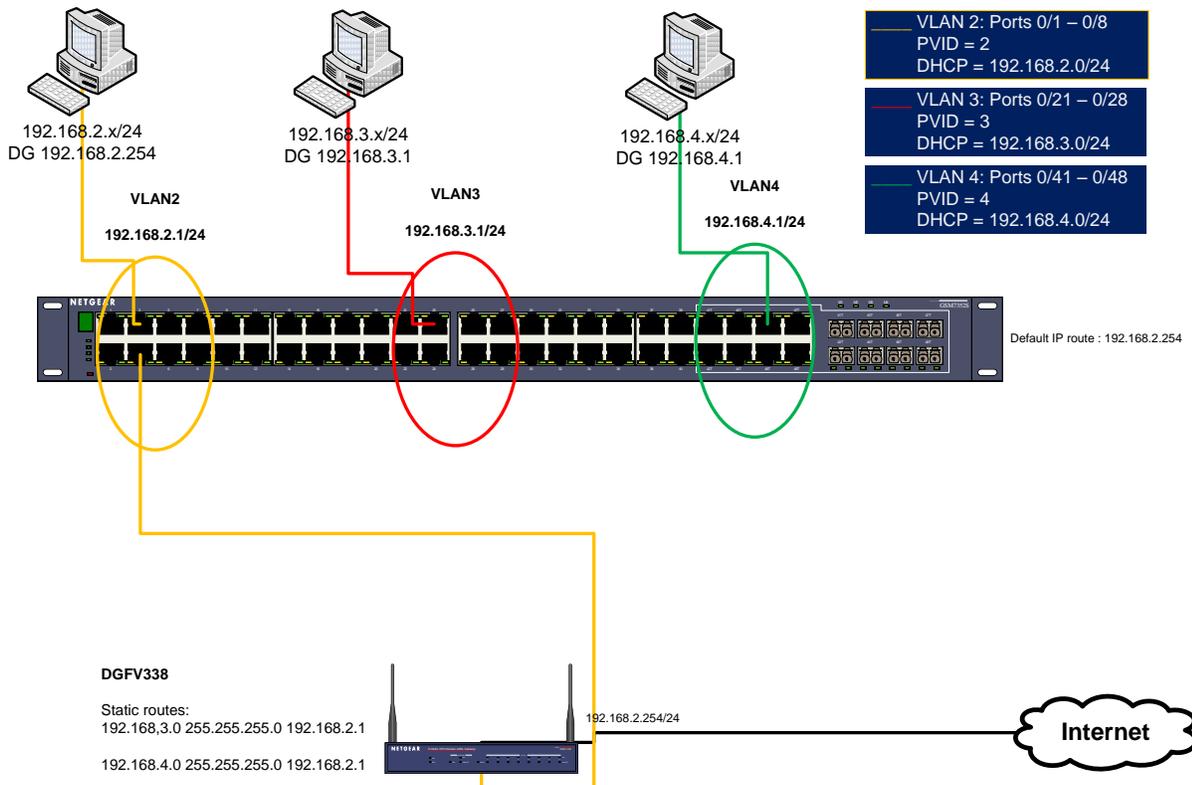
VLAN-Definition

VLANs are logical subgroups within a Local Area Network (LAN), which combine user stations, and network devices into a single unit, regardless of the physical LAN segment to which they are attached. VLANs allow network traffic to flow more efficiently within subgroups. VLANs use software to reduce the amount of time it takes for network changes, additions, and moves to be implemented.

Notes when setting-up VLANs

- A VLAN does not have a minimum number of port
- VLANs work at the OSI Layer 2
- A VLAN can be created per unit, device or via logical connection/combination
- Broadcast and Multicast traffic is transmitted only in the VLAN in which traffic is generated.
- To allow traffic between VLAN a device working at protocol level (Layer 3) is required

GSM7xxx - Shared access to the Internet across Multiple Routing VLANs using a Prosafe Firewall



1 - Physical Setup

1x GSM7352S Prosafe Layer3 - Firmware 7.2.1.6

3x Windows XP Computers (1 on each VLAN)

1 x Prosafe Firewall Router DGFV338

2 - Logical Setup

DGFV338:

LAN IP 192.168.2.254/24

DHCP enabled (192.168.2.0/24, DG 192.168.2.1, DNS 192.168.2.254)

Static routes:

192.168.3.0 255.255.255.0 192.168.2.1

192.168.4.0 255.255.255.0 192.168.2.1

GSM7352S:

VLAN1: Management VLAN

IP 192.168.1.1

DG 192.168.1.254

DHCP disabled

VLAN2:

IP 192.168.2.1

DHCP enabled on DGFV338

(192.168.2.0/24 , DG 192.168.2.1, DNS 192.168.2.254)

VLAN3:

IP 192.168.3.1

DHCP enabled (192.168.3.0/24, DG 192.168.3.1, DNS 192.168.2.254)

VLAN4:

IP 192.168.4.1

DHCP enabled (192.168.4.0/24, DG 192.168.4.1, DNS 192.168.2.254)

3 - Configuring the Switch management IP address

The Management IP address (by default on VLAN1) can be setup using the CLI (Command Line Interface).

The CLI should be access via HyperTerminal (or similar applications) using the Console cable included in the box.

User: admin

Password:

(FSM7352S) >enable

Password:

(GSM7352S) #

(GSM7352S) #network protocol none

Changing protocol mode will reset ip configuration.

Are you sure you want to continue? (y/n)y

(GSM7352S) #network parms 192.168.1.1 255.255.255.0 192.168.1.254

(GSM7352S) #show network

IP Address..... 192.168.1.1

Subnet Mask..... 255.255.255.0

Default Gateway..... 192.168.1.254

Burned In MAC Address..... 00:1F:33:E6:81:A5

Locally Administered MAC Address..... 00:00:00:00:00:00

MAC Address Type..... Burned In

Network Configuration Protocol Current..... None

Management VLAN ID..... 1

Web Mode..... Enable

Java Mode..... Enable

(GSM7352S) #

When a Management IP address is configured, the Web Interface of the switch can be accessed.

It will possible to modify the Management IP configuration via System – Management – IP configuration including the IP address, Subnet Mask, Default Gateway and Management VLAN ID.

The screenshot displays the Netgear web interface for a GSM7352S switch. The top navigation bar includes tabs for System, Switching, Routing, QoS, Security, Monitoring, Maintenance, Help, and Index. The main content area is titled "IP configuration" and contains a form with the following fields and values:

Field	Value
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.254
Burned In MAC Address	00:1F:33:E6:81:A5
Locally Administered MAC Address	00:00:00:00:00:00
MAC Address Type	<input checked="" type="radio"/> Burned In <input type="radio"/> Locally Administered
Current Network Configuration Protocol	<input checked="" type="radio"/> None <input type="radio"/> Bootp <input type="radio"/> DHCP
Management VLAN ID	1

4 - Creating a routing VLAN

To create routing VLANs access the VLAN Routing Wizard via Routing VLAN.

- 1) Type the VLAN ID (in the example the VLAN ID is 2)
- 2) Specify the IP address (192.168.2.1) and the subnet mask (255.255.255.0)
- 3) Expand the Port list by clicking on Unit 1
- 4) Select the correct option for each port that will be member of the VLAN

Three options are available:

- No membership (no symbol appearing in the gray box underneath the port number)
- Untagged membership (U)
- Tagged membership (T)

In order to browse through the options just continuously click on the gray box until the correct one is set. For this scenario we will be using the U (Untagged) option on all the ports.

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System Switching **Routing** QoS Security Monitoring Maintenance Help Index

Routing Table IP **VLAN** ARP RIP OSPF Router Discovery VRRP

▼ VLAN Routing Wizard
▶ VLAN Routing

VLAN Routing Wizard

Wlan ID: 2

IP Address: 192.168.2.1 Network Mask: 255.255.255.0

LAG Enabled:

Unit 1

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	U	U	U	U	U	U	U	U																
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	49	50	51	52																				

- 5) Apply the changes

Once all the relevant VLANs have been added – a summary can be found in the VLAN routing section of the menu.

In this case VLAN 2, 3, and 4 have been added to the configuration.

A new Virtual port is assigned to each VLAN.

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System | Switching | **Routing** | QoS | Security | Monitoring | Maintenance | Help | Index

Routing Table | IP | **VLAN** | ARP | RIP | OSPF | Router Discovery | VRRP

> VLAN Routing Wizard
> **VLAN Routing**

VLAN Routing Configuration

:: VLAN Routing

	VLAN ID (1 to 4093)	Port	MAC Address	IP Address	Subnet Mask
<input type="checkbox"/>	1				
<input type="checkbox"/>	2	0/2/3	00:1f:33:e6:81:a7	192.168.2.1	255.255.255.0
<input type="checkbox"/>	3	0/2/2	00:1f:33:e6:81:a7	192.168.3.1	255.255.255.0
<input type="checkbox"/>	4	0/2/1	00:1f:33:e6:81:a7	192.168.4.1	255.255.255.0

5 - Remove ports' VLAN membership

To remove port memberships from a VLAN, the VLAN configuration must be accessed via Switching – VLAN – VLAN Membership.

In order to remove a port from the VLAN memberships just continuously click on the gray box underneath the port number, until no symbol appears as in the picture below.

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System | **Switching** | Routing | QoS | Security | Monitoring | Maintenance | Help | Index

VLAN | STP | Multicast | Address Table | Ports | LAG

VLAN Membership

:: VLAN Membership ?
 VLAN ID: 1 | Group Operation: Untag All v
 VLAN Name: Default | UNTAGGED PORT MEMBERS
 VLAN Type: Default | TAGGED PORT MEMBERS

Unit 1

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
										U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
					U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
	49	50	51	52																				
	U	U	U	U																				

The VLAN Status page will show the update membership for all the VLAN

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System | **Switching** | Routing | QoS | Security | Monitoring | Maintenance | Help | Index

VLAN | STP | Multicast | Address Table | Ports | LAG

VLAN Status

:: VLAN Status ?

VLAN ID	VLAN Name	VLAN Type	Port	Member Ports
1	Default	Default		1/0/9 1/0/10 1/0/11 1/0/12 1/0/13 1/0/14 1/0/15 1/0/16 1/0/17 1/0/18 1/0/19 1/0/20 1/0/29 1/0/30 1/0/31 1/0/32 1/0/33 1/0/34 1/0/35 1/0/36 1/0/37 1/0/38 1/0/39 1/0/40 1/0/49 1/0/50 1/0/51 1/0/52
2		Static	0/2/1	1/0/1 1/0/2 1/0/3 1/0/4 1/0/5 1/0/6 1/0/7 1/0/8
3		Static	0/2/2	1/0/21 1/0/22 1/0/23 1/0/24 1/0/25 1/0/26 1/0/27 1/0/28
4		Static	0/2/3	1/0/41 1/0/42 1/0/43 1/0/44 1/0/45 1/0/46 1/0/47 1/0/48

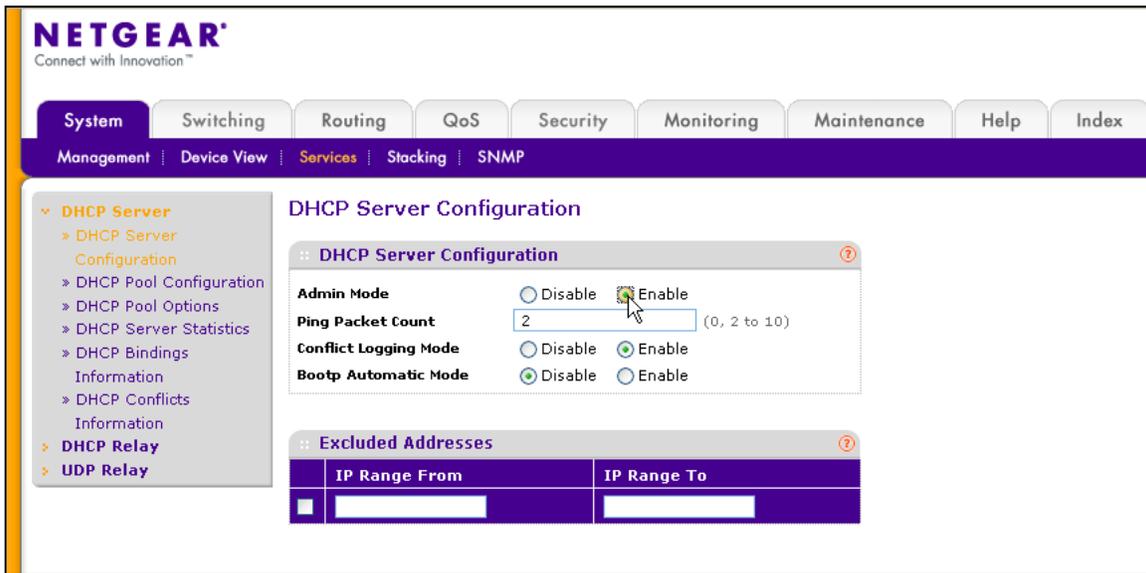
In this scenario we require to remove from VLAN1, membership to those ports that appear in any of the other VLANs to ensure total VLAN separation.

When setting a routing VLAN the PVID (Port VLAN ID) is automatically set to the VLAN ID. This can be confirmed using the Port PVID Configuration page.

The screenshot shows the Netgear web interface for Port PVID Configuration. The navigation menu includes System, Switching, Routing, QoS, Security, Monitoring, Maintenance, Help, and Index. Under Switching, there are links for VLAN, STP, Multicast, Address Table, Ports, and LAG. The left sidebar shows a tree view with 'Basic' and 'Advanced' sections. The 'Advanced' section is expanded, showing 'Port PVID Configuration' as the selected item. The main content area is titled 'PVID Configuration' and shows a table of ports. The table has columns for Interface, PVID (1 to 4093), Acceptable Frame Types, Ingress Filtering, and Port Priority (0 to 7). The PVID is automatically set to the VLAN ID for each port.

	Interface	PVID (1 to 4093)	Acceptable Frame Types	Ingress Filtering	Port Priority (0 to 7)
<input type="checkbox"/>	1/0/1	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/2	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/3	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/4	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/5	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/6	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/7	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/8	2	Admit All	Disable	0
<input type="checkbox"/>	1/0/9	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/10	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/11	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/12	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/13	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/14	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/15	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/16	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/17	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/18	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/19	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/20	1	Admit All	Disable	0
<input type="checkbox"/>	1/0/21	3	Admit All	Disable	0
<input type="checkbox"/>	1/0/22	3	Admit All	Disable	0
<input type="checkbox"/>	1/0/23	3	Admit All	Disable	0

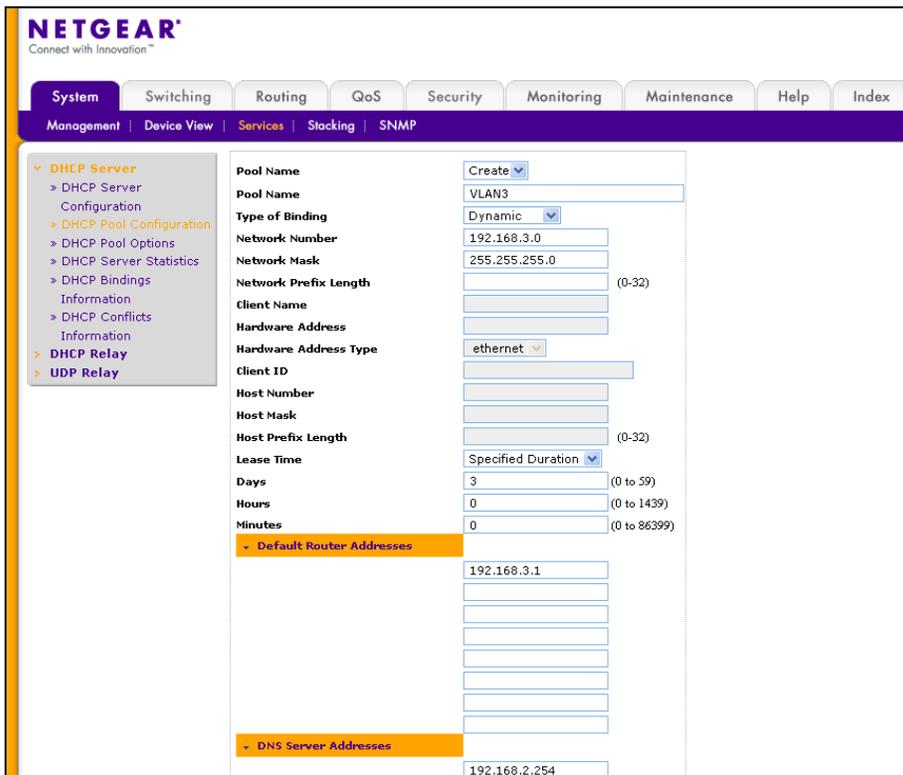
6 - Enable DHCP and create a DHCP pool per VLAN



The DHCP server can be enabled via the System – Services – DHCP Server Configuration page.

To create a new DHCP pool, access the DHCP Pool Configuration page:

- 1) Select the Pool name - for ease of configuration this might be same as the VLAN name if the pool will be associate to a VLAN



2) Specify the Network number (subnet address), Subnet mask , Default router and DNS Server

The association between a DHCP pool and a VLAN will be on the basis of the IP address assigned to the VLAN itself and the subnet mask.

Therefore if it is required to associate a DHCP Pool to a VLAN ensure that the IP address assigned to the VLAN falls within the network number (or subnet) specified in the pool.

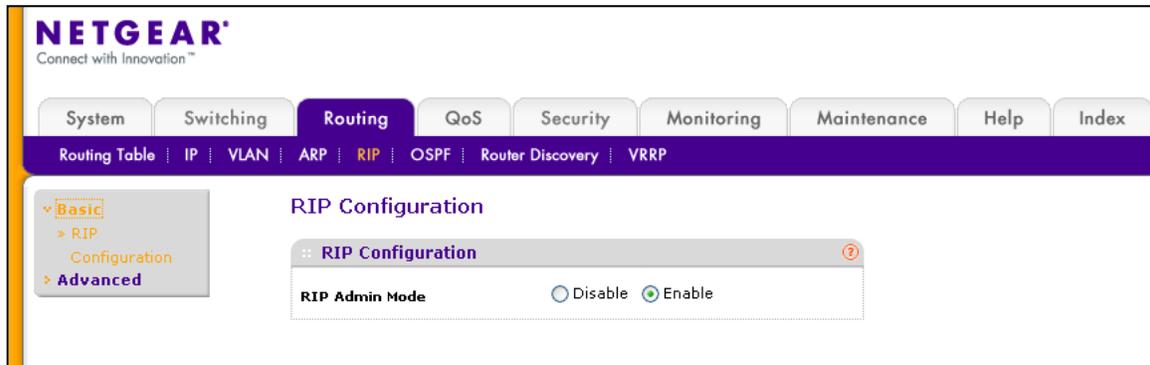
For example VLAN 2 which in this scenario is assigned with IP address 192.168.2.1 and subnet mask 255.255.255.0 falls within the subnet 192.168.2.0/24.

When creating the DHCP for VLAN2 we have made sure that the network address specified would be 192.168.2.0 with subnet mask 255.255.255.0. Automatically the switch will associate such DHCP pool with VLAN2.

7 – VLAN routing

By default RIP is enabled on the Layer 3 switches.

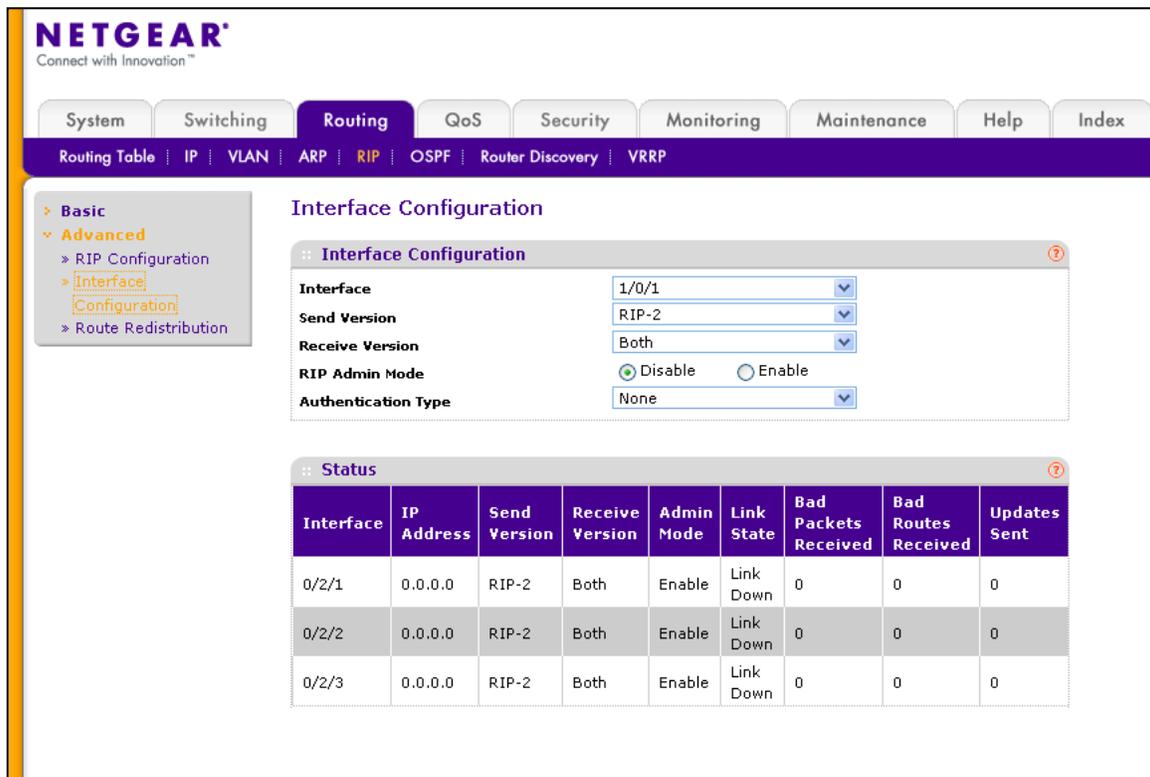
RIP can be disabled on all the ports via Routing – RIP – RIP configuration



or alternatively it can be disabled on a per port basis , including the VLAN virtual ports.

The picture below shows RIP enable on all the Virtual ports associated to each of the VLAN created and the Link State for each port as “**Link Down**”.

The reason for this is due to no device being plugged in any of the VLAN ports – RIP requires at



least one interface to be active in order for the protocol to be able to send routing updates.

The next picture shows that at least one device has been connected to one of the ports in VLAN 2 (Interface 0/2/1) and VLAN 4 (Interface 0/2/3) changing the Link state to “**Link up**”.

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System | Switching | **Routing** | QoS | Security | Monitoring | Maintenance | Help | Index

Routing Table | IP | VLAN | ARP | **RIP** | OSPF | Router Discovery | VRRP

Basic
Advanced
RIP Configuration
Interface Configuration
Route Redistribution

Interface Configuration

Interface Configuration

Interface: 0/2/1
Send Version: RIP-2
Receive Version: Both
RIP Admin Mode: Disable Enable
Authentication Type: None

Status

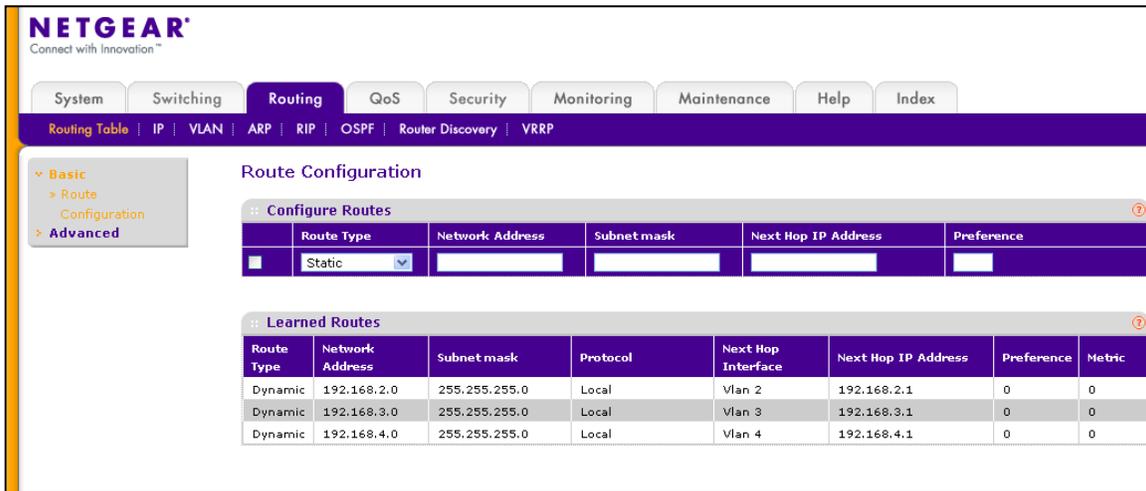
Interface	IP Address	Send Version	Receive Version	Admin Mode	Link State	Bad Packets Received	Bad Routes Received	Updates Sent
0/2/1	192.168.0.254	RIP-2	Both	Enable	Link Up	0	0	5
0/2/2	0.0.0.0	RIP-2	Both	Enable	Link Down	0	0	0
0/2/3	192.168.4.1	RIP-2	Both	Enable	Link Up	0	0	1

8 – Configuring the switch default route

Although RIP is enabled by default, this is not necessary for routing to take place and can be disabled.

When creating a routing VLAN a static route is added to the Layer 3 switch routing table

A summary of the routes can be found in Routing – Routing table – Route configuration.



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System Switching **Routing** QoS Security Monitoring Maintenance Help Index

Routing Table | IP | VLAN | ARP | RIP | OSPF | Router Discovery | VRRP

Basic
Route Configuration
Advanced

Route Configuration

Configure Routes

	Route Type	Network Address	Subnet mask	Next Hop IP Address	Preference
<input type="checkbox"/>	Static				

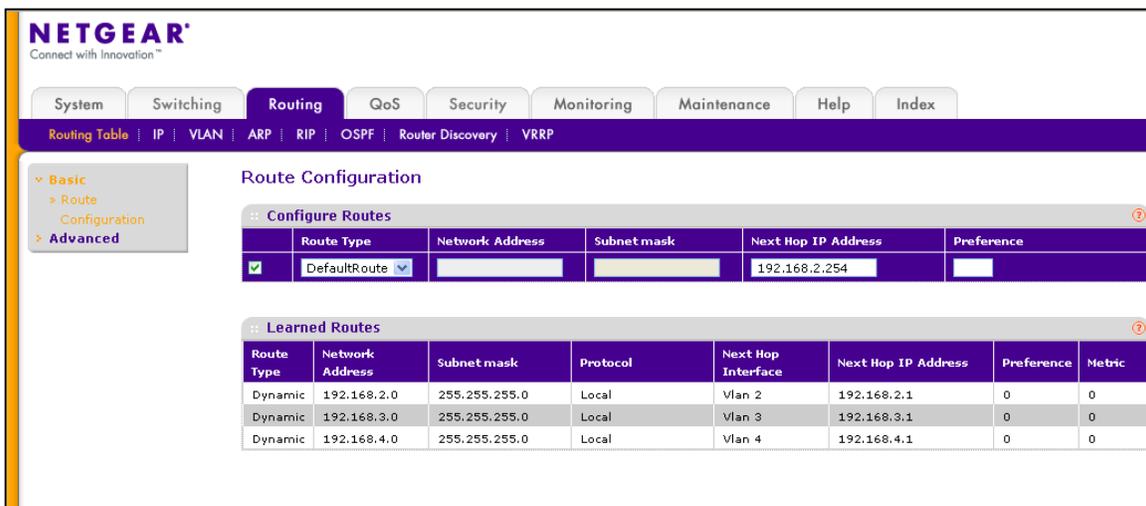
Learned Routes

Route Type	Network Address	Subnet mask	Protocol	Next Hop Interface	Next Hop IP Address	Preference	Metric
Dynamic	192.168.2.0	255.255.255.0	Local	Vlan 2	192.168.2.1	0	0
Dynamic	192.168.3.0	255.255.255.0	Local	Vlan 3	192.168.3.1	0	0
Dynamic	192.168.4.0	255.255.255.0	Local	Vlan 4	192.168.4.1	0	0

In the same page it is possible to set the DefaultRoute.

This is necessary to instruct the Layer 3 switch that any traffic not destined to the local VLANs should be sent to a Default Gateway.

In our scenario the Internet Default Gateway is the DGFV338 on IP address 192.168.2.254. The DefaultRoute is configured accordingly in the next picture.



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System Switching **Routing** QoS Security Monitoring Maintenance Help Index

Routing Table | IP | VLAN | ARP | RIP | OSPF | Router Discovery | VRRP

Basic
Route Configuration
Advanced

Route Configuration

Configure Routes

	Route Type	Network Address	Subnet mask	Next Hop IP Address	Preference
<input checked="" type="checkbox"/>	DefaultRoute			192.168.2.254	

Learned Routes

Route Type	Network Address	Subnet mask	Protocol	Next Hop Interface	Next Hop IP Address	Preference	Metric
Dynamic	192.168.2.0	255.255.255.0	Local	Vlan 2	192.168.2.1	0	0
Dynamic	192.168.3.0	255.255.255.0	Local	Vlan 3	192.168.3.1	0	0
Dynamic	192.168.4.0	255.255.255.0	Local	Vlan 4	192.168.4.1	0	0

- Basic
- > Route Configuration
- Advanced

Route Configuration

Configure Routes

	Route Type	Network Address	Subnet mask	Next Hop IP Address	Preference
<input checked="" type="checkbox"/>	Static				
<input type="checkbox"/>	DefaultRoute	0.0.0.0	0.0.0.0	192.168.2.254	1

Learned Routes

Route Type	Network Address	Subnet mask	Protocol	Next Hop Interface	Next Hop IP Address	Preference	Metric
Dynamic	192.168.2.0	255.255.255.0	Local	Vlan 2	192.168.2.1	0	0
Dynamic	192.168.3.0	255.255.255.0	Local	Vlan 3	192.168.3.1	0	0
Dynamic	192.168.4.0	255.255.255.0	Local	Vlan 4	192.168.4.1	0	0

9 – Configuring static routes on the Internet Default Gateway

In order to ensure the Internet Gateway is aware on how to return traffic to devices in VLAN not directly attached to it, static routes must be configured for each VLAN.

The following two pictures provide a summary of how this is achieved on the DGFV338 via the Network Configuration – Routing page.

In this scenario two routes are required as two are the VLANs not directly connected to the DGFV338 LAN interface.

NETGEAR PROSAFE
NETGEAR ProSafe VPN Wireless ADSL Gateway DGFV338

Network Configuration | Security | VPN | Users | Administration | Monitoring | Web Support | Logout

WAN Settings :: Wireless Settings :: Dynamic DNS :: LAN Setup :: Routing ::

Add Static Route

Operation succeeded.

Static Route

Route Name:

Active Private

Destination IP Address: ...

IP Subnet Mask: ...

Interface:

Gateway IP Address: ...

Metric:

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NETGEAR PROSAFE
NETGEAR ProSafe VPN Wireless ADSL Gateway DGFV338

Network Configuration | Security | VPN | Users | Administration | Monitoring | Web Support | Logout

WAN Settings :: Wireless Settings :: Dynamic DNS :: LAN Setup :: Routing ::

Routing

Static Routes

Name	Destination	Gateway	Interface	Metric	Active	Private	Action
<input type="checkbox"/> VLAN3	192.168.3.0	192.168.2.1	LAN	2	Yes	No	<input type="button" value="edit"/>
<input type="checkbox"/> VLAN4	192.168.4.0	192.168.2.1	LAN	2	Yes	No	<input type="button" value="edit"/>

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10 – Saving the configuration

The switch does not save the configuration automatically every time a change is performed, either via the CLI or the WEB GUI.

It is necessary to force the saving, which can be achieved via Maintenance – Save Config

