

# Layer 3 Routing User's Manual (UI 2.0)

---

First Edition, September 2014

[www.moxa.com/product](http://www.moxa.com/product)

**Models covered by this manual:**

IKS-G6824A, ICS-G7826A, ICS-G7828A, ICS-G7848A, ICS-G7850A,  
ICS-G7852A Series

The logo for Moxa Inc. features the word "MOXA" in a bold, teal, sans-serif font. The letter "A" is stylized with a triangular shape at its top. A registered trademark symbol (®) is located to the upper right of the "A".

© 2014 Moxa Inc. All rights reserved.

# Layer 3 Routing User's Manual (UI 2.0)

The software described in this manual is furnished under a license agreement and may be used only in accordance with the terms of that agreement.

## Copyright Notice

© 2014 Moxa Inc. All rights reserved.

## Trademarks

The MOXA logo is a registered trademark of Moxa Inc.  
All other trademarks or registered marks in this manual belong to their respective manufacturers.

## Disclaimer

Information in this document is subject to change without notice and does not represent a commitment on the part of Moxa.

Moxa provides this document as is, without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. Moxa reserves the right to make improvements and/or changes to this manual, or to the products and/or the programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, Moxa assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

## Technical Support Contact Information

[www.moxa.com/support](http://www.moxa.com/support)

### **Moxa Americas**

Toll-free: 1-888-669-2872  
Tel: +1-714-528-6777  
Fax: +1-714-528-6778

### **Moxa Europe**

Tel: +49-89-3 70 03 99-0  
Fax: +49-89-3 70 03 99-99

### **Moxa India**

Tel: +91-80-4172-9088  
Fax: +91-80-4132-1045

### **Moxa China (Shanghai office)**

Toll-free: 800-820-5036  
Tel: +86-21-5258-9955  
Fax: +86-21-5258-5505

### **Moxa Asia-Pacific**

Tel: +886-2-8919-1230  
Fax: +886-2-8919-1231

# Table of Contents

<b>1. Introduction to Layer 3 Switches .....</b>	<b>1-1</b>
The Layer 3 Switching Concept.....	1-1
Static Routing and Dynamic Routing .....	1-1
Static Routing .....	1-1
Dynamic Routing with RIP (Routing Information Protocol) .....	1-2
Dynamic Routing with OSPF (Open Shortest Path First).....	1-2
<b>2. IP Interface .....</b>	<b>2-1</b>
IP Interface Setting.....	2-1
<b>3. Unicast Routing Protocols .....</b>	<b>3-1</b>
Static Routing .....	3-1
Static Routing Settings.....	3-1
Dynamic Routing with Routing Information Protocol (RIP).....	3-2
RIP Settings .....	3-2
Dynamic Routing with Open Shortest Path First (OSPF) .....	3-3
OSPF Global Settings .....	3-3
OSPF Area Settings .....	3-4
OSPF Interface Settings .....	3-5
OSPF Virtual Link Settings .....	3-6
OSPF Area Aggregation Settings.....	3-7
OSPF Neighbor Table .....	3-7
OSPF Database Table.....	3-8
Routing Table.....	3-8
<b>4. Multicast Routing Protocols.....</b>	<b>4-1</b>
Distance Vector Multicast Routing Protocol (DVMRP) .....	4-1
DVMRP Settings .....	4-1
DVMRP Routing Table .....	4-2
DVMRP Neighbor Table.....	4-2
Protocol Independent Multicast Dense Mode (PIM-DM) .....	4-2
PIM-DM Settings .....	4-2
PIM-DM Neighbor Table.....	4-3
Protocol Independent Multicast Sparse Mode (PIM-SM).....	4-3
PIM-SM Settings.....	4-4
PIM-SM RP Settings .....	4-4
PIM-SM SSM Settings .....	4-6
PIM-SM RP-Set Table .....	4-6
PIM-SM Neighbor Table .....	4-7
Multicast Routing Table .....	4-7
DVMRP Multicast Routing Table .....	4-7
PIM-DM Multicast Routing Table .....	4-7
PIM-SM Multicast Routing Table .....	4-7
<b>5. Gateway Redundancy.....</b>	<b>5-1</b>
Virtual Router Redundancy Protocol (VRRP) .....	5-1
VRRP Settings.....	5-1

# Introduction to Layer 3 Switches

---

Moxa offers Layer-3 switches that perform data switching on the Network Layer (Layer 3) of the ISO OSI layer model. Unlike Layer-2 switching, which uses the MAC address for exchanging data, a Layer-3 switch uses the IP address to represent the destination of a data packet.

## The Layer 3 Switching Concept

IP (Internet Protocol) is a protocol defined on layer 3 of the 7-layer OSI model. The IP address is used to address data packets on the Network Layer, and is not tied to the hardware of a device or PC. The IP address can be assigned by the system operator or network administrator.

Since Layer 2 switches use the MAC address to determine the destination of transmitted data packets, and Layer 3 switches use the IP address, some mechanism is needed to associate MAC addresses with IP addresses. This is done by ARP (Address Resolution Protocol), which creates a table that matches MAC addresses to IP addresses.

When a PC sends out an ARP request, which is just a broadcast packet requiring the IP address owner to send back his MAC address, two situations could occur:

- If your PC and the IP address owner are on the same subnet, the IP address owner will use a unicast packet, which contains his MAC address, to reply to your PC. Thereafter, your PC will use this MAC address to transmit to the IP address owner directly.
- If your PC and the IP address owner are not on the same subnet, your PC will not receive a reply, so it will ask for the MAC address of the Layer-3 switch (gateway/router). To transmit data packets to the IP address owner, your PC packs the data packet with the IP address, and sends the packet to the Layer-3 switch (gateway/router) using its MAC address. The Layer-3 switch (gateway/router) receives the data packet, re-packs it, and then forwards it to the next hop according to the routing rules.

## Static Routing and Dynamic Routing

The Moxa Layer 3 switch supports two routing methods: static routing and dynamic routing. Dynamic routing makes use of RIP V1/V1c/V2, and OSPF. You can either choose one routing method, or combine the two methods to establish your routing table.

A routing entry includes the following items: the destination address, the next hop address (which is the next router along the path to the destination address), and a metric that represents the cost we need to pay to access a different network.

### Static Routing

You can define the routes yourself by specifying what is the next hop (or router) that the Layer 3 switch forwards data to for a specific subnet. The settings of the Static Route will be added to the routing table and stored in the Layer 3 switch.

## Dynamic Routing with RIP (Routing Information Protocol)

RIP is a distance vector-based routing protocol that can be used to automatically build up a routing table in the Moxa Layer 3 switch.

The Moxa Layer 3 switch can efficiently update and maintain the routing table, and optimize the routing by identifying the smallest metric and most matched mask prefix.

## Dynamic Routing with OSPF (Open Shortest Path First)

The Moxa Layer 3 switch also supports OSPF (open shortest path first), which uses "Link State" instead of "hop count" to determine the network route. OSPF is more complicated than RIP. However, compared to RIP, OSPF has faster network convergence and results in less network traffic. Both RIP and OSPF are usually referred to as Interior Gateway Protocols (IGPs).

## IP Interface

Before configuring the routing protocols, we first need to set the correct IP interfaces for the network.

### IP Interface Setting

The IP Interface Setting page is used to assign the interface.

#### IP Interface Setting

##### IP Interface Entry

Interface Name

IP Address

Subnet Mask

VLAN ID

Proxy ARP  Enable

##### IP Interface Table

All	Interface Name	IP Address	Subnet Mask	VLAN ID	Proxy ARP
<input type="checkbox"/>	IF_1	100.10.1.1	255.255.255.0	2	Disabled
<input type="checkbox"/>	IF_2	100.10.2.1	255.255.255.0	3	Disabled

#### **Interface Name**

Choose a name that describes this interface (max. of 30 characters).

#### **IP Address**

The IP address of this interface.

#### **Subnet Mask**

The subnet mask for this IP address.

#### **VLAN ID**

Setting	Description	Factory Default
ID numbers	Display all available VLAN IDs that you have set in the Virtual LAN. To establish an interface, you must first assign an available ID to this interface. If a VLAN ID is assigned twice, a warning message will appear.	None (if no VLAN ID is available)

#### **Proxy ARP**

Setting	Description	Factory Default
Enable/Disable	This option is used to enable or disable the Proxy ARP.	Disabled

There are three action buttons for setting up the **IP Interface Table**:

**Add**

To add an entry into the IP Interface Table.

**Delete**

To remove the selected entries from the IP Interface Table.

**Modify**

To modify the content of a selected entry in the IP Interface Table.

---

**NOTE** The entries in the IP Interface Table will not be added to the Moxa Layer 3 switch's interface table until you click the Activate button.

---

## Unicast Routing Protocols

Moxa Layer 3 switches support two unicast routing methods: static routing and dynamic routing. Dynamic routing makes use of Routing Information Protocol (RIP) V1/V1c/V2, or Open Shortest Path First (OSPF). You can either choose static routing only, or combine static routing and one of the dynamic routing methods to establish your routing table.

A routing entry includes the following items: the destination address, the next hop address (which is the next router along the path to the destination address), and a metric that represents the cost we need to pay to access a different network.

### Static Routing

You can define the routes yourself by specifying what is the next hop (or router) that the Layer 3 switch forwards data for a specific subnet. The settings of the Static Route will be added to the routing table and stored in the Layer 3 switch.

### Static Routing Settings

The Static Routing page is used to set up the static routing table for the Moxa Layer 3 switch.

#### Static Routing

Destination Address

Subnet Mask

Next Hop

Metric (1~255)

<input type="checkbox"/> All	Destination Address	Netmask	Next Hop	Metric
<input type="checkbox"/>	100.10.3.1	255.255.255.0	100.10.1.254	10
<input type="checkbox"/>	100.10.4.1	255.255.255.0	100.10.2.254	20

#### **Destination Address**

The destination's IP address.

#### **Netmask**

The subnet mask for this IP address.

#### **Next Hop**

The next router along the path to the destination.

#### **Metric**

This option is a value assigned to an IP route for a particular network interface. The value identifies the cost associated with using that route to access the neighboring network.



There are three action buttons for setting up the Static Routing Table:

**Add**

To add a new entry into the Static Routing Table.

**Delete**

To remove the selected entries from the Static Routing Table.

**Modify**

To modify the contents of a selected entry in the Static Routing Table.

**NOTE** After inputting all of the information for a static routing configuration, click the Add button to add it to the static routing table. The entries in the Static Routing Table will not be added to the Moxa Layer 3 switch’s routing table until you click the Apply button.

## Dynamic Routing with Routing Information Protocol (RIP)

Routing Information Protocol (RIP) is a distance vector-based routing protocol that can be used to automatically build up a routing table in the Moxa Layer 3 switch. The Moxa Layer 3 switch can efficiently update and maintain the routing table, and optimize the routing by identifying the smallest metric and most matched mask prefix.

### RIP Settings

RIP employs the hop count as a routing metric. RIP prevents routing loops by implementing a limit on the number of hops allowed in a path from the source to a destination. The RIP page is used to set up the RIP parameters.

 **RIP Settings**

Enable RIP

RIP Version V1

RIP Distribution  Connected  Static  OSPF

Enable	Interface Name	IP Address	VID
<input type="checkbox"/>	V100	172.100.1.2	100
<input type="checkbox"/>	V200	172.200.1.2	200
<input type="checkbox"/>	V10	172.10.1.2	10
<input type="checkbox"/>	V20	172.20.1.2	20

**Apply**

**Enable RIP**

Setting	Description	Factory Default
Enable/Disable	This option is used to enable or disable the RIP function globally.	Disable

**RIP Version**

Setting	Description	Factory Default
V2/V1/V1Compatibility	Determines which version of RIP will be followed. Selecting "V1 Compatibility" ensures that Version 1 RIP packets can be received.	V1

**RIP Distribution**

Setting	Description	Factory Default
Connected	Entries learned from directly connected interfaces will be re-distributed if this option is enabled.	Checked (Enable)
Static	Entries set in a static route will be re-distributed if this option is enabled.	Unchecked (disable)
OSPF	Entries learned from the OSPF will be re-distributed if this option is enabled.	Unchecked (disable)

**RIP Table**

This is a table showing the entries learned from RIP.

**NOTE** The RIP settings will not function until you click the Apply button.

## Dynamic Routing with Open Shortest Path First (OSPF)

Open Shortest Path First (OSPF) is a dynamic routing protocol for use on Internet Protocol (IP) networks. Specifically, it is a link-state routing protocol, and falls into the group of interior gateway protocols, operating within a single autonomous system. As a link-state routing protocol, OSPF establishes and maintains neighbor relationships in order to exchange routing updates with other routers. The neighbor relationship table is called an adjacency database in OSPF. OSPF forms neighbor relationships only with the routers directly connected to it. In order to form a neighbor relationship between two routers, the interfaces used to form the relationship must be in the same area. An interface can only belong to a single area. With OSPF enabled, the Moxa Layer 3 switch is able to exchange routing information with other L3 switches or routers more efficiently in a large system.

### OSPF Global Settings

**OSPF Global Settings**

Enable OSPF

Current Router ID 192.168.99.12

Router ID

OSPF Distribution  Connected  Static route  RIP

**Apply**

Each L3 switch/router has an OSPF router ID, customarily written in the dotted decimal format (e.g., 1.2.3.4) of an IP address. This ID must be established in every OSPF instance. If not explicitly configured, the default ID (0.0.0.0) will be regarded as the router ID. Since the router ID is an IP address, it does not need to be a part of any routable subnet on the network.

**Enable OSPF**

Setting	Description	Factory Default
Enable/Disable	This option is used to enable or disable the OSPF function globally.	Disable

**Current Router ID**

Setting	Description	Factory Default
Current Router ID	Shows the current L3 switch's Router ID.	0.0.0.0

**Router ID**

Setting	Description	Factory Default
Router ID	Sets the L3 switch's Router ID.	0.0.0.0

**OSPF Distribution**

Setting	Description	Factory Default
Connected	Entries learned from the directly connected interfaces will be re-distributed if this option is enabled.	Checked (Enable)
Static	Entries set in a static route will be re-distributed if this option is enabled.	Unchecked (disable)
RIP	Entries learned from the RIP will be re-distributed if this option is enabled.	Unchecked (disable)

## OSPF Area Settings

### OSPF Area Settings

Area ID

Area Type

Metric

<input type="checkbox"/> All	Area ID	Area Type	Metric
<input type="checkbox"/>	0.0.0.0	Normal	0
<input type="checkbox"/>	1.1.1.1	NSSA	1

An OSPF domain is divided into areas that are labeled with 32-bit area identifiers, commonly written in the dot-decimal notation of an IPv4 address. Areas are used to divide a large network into smaller network areas. They are logical groupings of hosts and networks, including the routers connected to a particular area. Each area maintains a separate link state database whose information may be summarized towards the rest of the network by the connecting router. Thus, the topology of an area is unknown outside of the area. This reduces the amount of routing traffic between parts of an autonomous system.

**Area ID**

Setting	Description	Factory Default
Area ID	Defines the areas that this L3 switch/router connects to.	0.0.0.0

**Area Type**

Setting	Description	Factory Default
Normal/Stub/NSSA	Defines the area type.	Normal

**Metric**

Setting	Description	Factory Default
Metric	Defines the metric value.	0

**OSPF Area Table**

This is a table showing the current OSPF area table.

# OSPF Interface Settings

## OSPF Interface Settings

Interface Name:       Auth Type:

Area ID:       Auth Key:

Router Priority:       MD5 Key ID:

Hello Interval (sec):       Metric:

Dead Interval (sec):

          

<input type="checkbox"/>	Interface Name	IP Address	Area ID	Role	Priority	Hello Interval	Dead Interval	Auth Type	Auth Key	MD5 Key ID	Metric
<input type="checkbox"/>	V200	172.200.1.2	0.0.0.0	Backup	1	10	40	None		1	1
<input type="checkbox"/>	V10	172.10.1.2	0.0.0.0	DR	1	10	40	None		1	1
<input type="checkbox"/>	V100	172.100.1.2	0.0.0.0	Backup	1	10	40	None		1	1
<input type="checkbox"/>	V20	172.20.1.2	0.0.0.0	DR	1	10	40	None		1	1

Before using OSPF, you need to assign an interface for each area. Detailed information related to the interface can be defined in this section.

### Interface Name

Setting	Description	Factory Default
Interface Name	Defines the interface name.	N/A

### Area ID

Setting	Description	Factory Default
Area ID	Defines the Area ID.	N/A

### Router Priority

Setting	Description	Factory Default
Router Priority	Defines the L3 switch/router's priority.	1

### Hello Interval (sec)

Setting	Description	Factory Default
Hello Interval	Hello packets are packets that an OSPF process sends to its OSPF neighbors to maintain connectivity with those neighbors. The hello packets are sent at a configurable interval (in seconds). The value of all hello intervals must be the same within a network.	10

### Dead Interval (sec)

Setting	Description	Factory Default
Dead Interval	The dead interval is also a configurable interval (in seconds), and defaults to four times the value of the hello interval.	40

### Auth Type

Setting	Description	Factory Default
None/Simple/MD5	OSPF authentication provides the flexibility of authenticating OSPF neighbors. Users can enable authentication to exchange routing update information in a secure manner. OSPF authentication can either be none, simple, or MD5. However, authentication does not need to be configured. If it is configured, all L3 switches/routers on the same segment must have the same password and authentication method.	None

**Auth Key**

Setting	Description	Factory Default
Auth Key	<ul style="list-style-type: none"> <li>pure-text password if Auth Type = Simple</li> <li>encrypted password if Auth Type = MD5</li> </ul>	N/A

**MD5 Key ID**

Setting	Description	Factory Default
MD5 Key ID	MD5 authentication provides higher security than plain text authentication. This method uses the MD5 to calculate a hash value from the contents of the OSPF packet and the authentication key. This hash value is transmitted in the packet, along with a key ID.	1

**Metric**

Setting	Description	Factory Default
Metric	Manually set Metric/Cost of OSPF.	1

**OSPF Interface Table**

This is a table showing the current OSPF interface table.

## OSPF Virtual Link Settings

**OSPF Virtual Link Settings**

Transit Area ID

Neighbor Router ID

All	Transit Area ID	Neighbor Router ID
-----	-----------------	--------------------

All areas in an OSPF autonomous system must be physically connected to the backbone area (Area 0.0.0.0). However, this is impossible in some cases. For those cases, users can create a virtual link to connect to the backbone through a non-backbone area and also use virtual links to connect two parts of a partitioned backbone through a non-backbone area.

**Transit Area ID**

Setting	Description	Factory Default
Transit Area ID	Defines the areas that this L3 switch/router connect to.	N/A

**Neighbor Router ID**

Setting	Description	Factory Default
Neighbor Router ID	Defines the neighbor L3 switch/route's ID.	0.0.0.0

**OSPF Virtual Link Table**

This is a table showing the current OSPF Virtual Link table.

## OSPF Area Aggregation Settings

### OSPF Area Aggregation Settings

Area ID

Destination Network

Subnet Mask

All	Area ID	Network Address	Network Mask
-----	---------	-----------------	--------------

Each OSPF area, which consists of a set of interconnected subnets and traffic, is handled by routers attached to two or more areas, known as Area Border Routers (ABRs). With the OSPF aggregation function, users can combine groups of routes with common addresses into a single routing table entry. The function is used to reduce the size of routing tables.

#### Area ID

Setting	Description	Factory Default
Area ID	Select the Area ID that you want to configure.	0.0.0.0

#### Destination Network

Setting	Description	Factory Default
Destination Network	Fill in the network address in the area.	

#### Subnet Mask

Setting	Description	Factory Default
4(240.0.0.0) to 30(255.255.255.252)	Select the network mask.	24(255.255.255.0)

#### OSPF Area Aggregation Table

This is a table showing the current OSPF Area Aggregation table.

## OSPF Neighbor Table

### OSPF Neighbor Table

Page 1/1

Index	Neighbor Router ID	Priority	State	Neighbor IP Address	Interface Name
1	192.168.99.14	1	Full/DR	172.100.1.4	V100
2	192.168.99.13	1	Full/DR	172.200.1.3	V200

#### OSPF Neighbor Table

This is a table showing the current OSPF Neighbor table.

# OSPF Database Table

## OSPF Database Table

Page 1/1

Index	Area ID	LSA Type	Link State ID	Advertising Router	Route
1	0.0.0.0	Router LSA	192.168.99.11	192.168.99.11	-
2	0.0.0.0	Router LSA	192.168.99.12	192.168.99.12	-
3	0.0.0.0	Router LSA	192.168.99.13	192.168.99.13	-
4	0.0.0.0	Router LSA	192.168.99.14	192.168.99.14	-
5	0.0.0.0	Network LSA	172.100.1.4	192.168.99.14	-
6	0.0.0.0	Network LSA	172.101.1.4	192.168.99.14	-
7	0.0.0.0	Network LSA	172.200.1.3	192.168.99.13	-
8	1.1.1.1	Router LSA	192.168.99.12	192.168.99.12	-

### OSPF Database Table

This is a table showing the current OSPF Database table.

# Routing Table

The Routing Table page shows all routing entries used by the Moxa Layer 3 switch.

## Routing Table

All Page 1/1

		Destination	Next hop	Interface Name	Metric	VID
1	connected	172.10.0.0/16	172.10.1.2	V10	1	10
2	connected	172.20.0.0/16	172.20.1.2	V20	1	20
3	ospf	172.30.0.0/16	172.200.1.3	V200	2	200
4	connected	172.100.0.0/16	172.100.1.2	V100	1	100
5	ospf	172.101.0.0/16	172.100.1.4	V100	2	100
6	ospf	172.101.0.0/16	172.200.1.3	V200	2	200
7	connected	172.200.0.0/16	172.200.1.2	V200	1	200
8	ospf	172.220.0.0/16	172.100.1.4	V100	2	100
9	ospf	172.230.0.0/16	172.100.1.4	V100	2	100

### Routing Table

Setting	Description	Factory Default
All	Show all routing rules	N/A
Connected	Show connected routing rules	N/A
Static	Show static routing rules	N/A
RIP	Show RIP exchanged routing rules	N/A
OSPF	Show OSPF exchanged routing rules	N/A

# Multicast Routing Protocols

Moxa Layer 3 switches support three multicast routing protocols: Distance Vector Multicast Routing Protocol (DVMRP), Protocol Independent Multicast Dense Mode (PIM-DM), and Protocol Independent Multicast Sparse Mode (PIM-SM).

## Distance Vector Multicast Routing Protocol (DVMRP)

Distance Vector Multicast Routing Protocol (DVMRP) is used to build multicast delivery trees on a network. When a Layer 3 switch receives a multicast packet, DVMRP provides a routing table for the relevant multicast group, and include distance information on the number of devices between the router and the packet destination. The multicast packet will then be forwarded through the Layer 3 switch interface specified in the multicast routing table.

### DVMRP Settings

This page is used to set up the DVMRP table for Moxa Layer 3 switches.

#### DVMRP Settings

Enable DVMRP

Enable	Interface Name	IP	VID
<input type="checkbox"/>	V100	172.100.1.2	100
<input type="checkbox"/>	V200	172.200.1.2	200
<input type="checkbox"/>	V10	172.10.1.2	10
<input type="checkbox"/>	V20	172.20.1.2	20

Apply

#### **Enable DVMRP**

Setting	Description	Factory Default
Enable/Disable	Enable or disable DVMRP globally	Disable

#### **Enable (individual)**

Setting	Description	Factory Default
Enable/Disable	Enable or disable DVMRP by the selected interface	Disable



**NOTE** Only one multicast routing protocol can be enabled on one Moxa Layer 3 switch. DVMRP, PIM-DM, and PIM-SM can NOT be enabled simultaneously.

## DVMRP Routing Table

### DVMRP Routing Table

Page 1/1 ▼

Index	Type	Destination Network	Next hop	Interface Name	VID	Cost	Expire Time
-------	------	---------------------	----------	----------------	-----	------	-------------

#### *DVMRP Routing Table*

This is a table showing the current DVMRP Routing table.

## DVMRP Neighbor Table

### DVMRP Neighbor Table

Page 1/1 ▼

Index	Neighbor IP Address	Interface Name	VID	Expire Time	Hold Time
-------	---------------------	----------------	-----	-------------	-----------

#### *DVMRP Neighbor Table*

This is a table showing the current DVMRP Neighbor table.

# Protocol Independent Multicast Dense Mode (PIM-DM)

Protocol Independent Multicast (PIM) is a method of forwarding traffic to multicast groups over the network using any pre-existing unicast routing protocol, such as RIP or OSPF, set on routers within a multicast network. Protocol Independent Multicast Dense Mode (PIM-DM) protocol will flood multicast traffic on the network and revise the multicast routing table based on the responses.

## PIM-DM Settings

This page is used to set up the PIM-DM table for Moxa Layer 3 switches.

### ⚙️ PIM-DM Settings

Enable PIM-DM

Enable	Interface Name	IP	VID
<input type="checkbox"/>	V100	172.100.1.2	100
<input type="checkbox"/>	V200	172.200.1.2	200
<input type="checkbox"/>	V10	172.10.1.2	10
<input type="checkbox"/>	V20	172.20.1.2	20

Apply

#### Enable PIM-DM

Setting	Description	Factory Default
Enable/Disable	Enable or disable PIM-DM globally	Disable

#### Enable (individual)

Setting	Description	Factory Default
Enable/Disable	Enable or disable PIM-DM by selected interface	Disable

**NOTE** Only one multicast routing protocol can be enabled on one Moxa Layer 3 switch. DVMRP, PIM-DM, and PIM-SM can NOT be enabled simultaneously.

## PIM-DM Neighbor Table

### ⚙️ PIM-DM Neighbor Table

Page 1/1

Index	Neighbor IP	Interface Name	VID	Expire Time
-------	-------------	----------------	-----	-------------

#### PIM-DM Neighbor Table

This is a table showing the current PIM-DM Neighbor table.

## Protocol Independent Multicast Sparse Mode (PIM-SM)

Protocol Independent Multicast (PIM) is a method of forwarding traffic to multicast groups over the network using any pre-existing unicast routing protocol, such as RIP or OSPF, set on routers within a multicast network. Protocol Independent Multicast Sparse Mode (PIM-SM) protocol builds unidirectional shared trees rooted at a Rendezvous Point (RP) per group, and optionally creates shortest-path trees per source. Protocol Independent Multicast Source-Specific Multicast (PIM-SSM) builds trees that are rooted in just one source, offering a more secure and scalable model for a limited number of applications.

## PIM-SM Settings

This page is used to set up the PIM-SM table for Moxa Layer 3 switches.

### PIM-SM Settings

Enable PIM-SM

Shortest Path Tree Switchover Method Never ▼

Enable	Interface Name	IP Address	VID	Hello Interval (sec)	DR Priority	Join-Prune Interval (sec)
<input checked="" type="checkbox"/>	V100	172.100.1.2	100	30	0	30
<input checked="" type="checkbox"/>	V200	172.200.1.2	200	30	0	30
<input checked="" type="checkbox"/>	V10	172.10.1.2	10	30	0	30
<input checked="" type="checkbox"/>	V20	172.20.1.2	20	30	0	30

**Apply**

#### **Enable PIM-SM**

Setting	Description	Factory Default
Enable/Disable	Enable or disable PIM-SM globally	Disable

#### **Shortest Path Tree Switchover Method**

Setting	Description	Factory Default
Never/Immediate	Define how Shortest Path Tree switch over	Never

#### **Enable (individual)**

Setting	Description	Factory Default
Enable/Disable	Enable or disable PIM-SM by the selected interface	Disable

**NOTE** Only one multicast routing protocol can be enabled on one Moxa Layer 3 switch. DVMRP, PIM-DM, and PIM-SM can NOT be enabled simultaneously.

## PIM-SM RP Settings

This page is used to set up the PIM-SM RP settings for Moxa Layer 3 switches.

There are two RP Election Methods: Bootstrap and Static.

## Bootstrap

### PIM-SM RP Settings

PIM-SM RP Election Method

Candidate BSR Priority

Candidate BSR Hash Mask Length

Candidate RP Priority

---

Group Address

Group Address Mask

All
  Group Address
  Group Address Mask

#### Candidate BSR Priority

Setting	Description	Factory Default
0 to 255	Define the priority of BSR election	0

#### Candidate BSR Hash Mask Length

Setting	Description	Factory Default
4 to 32	Define the Hash mask length of BSR election	4

#### Candidate RP Priority

Setting	Description	Factory Default
0 to 255	Define the priority of RP election	0

#### Group Address

Setting	Description	Factory Default
Group Address	Define the group address	N/A

#### Group Address Mask

Setting	Description	Factory Default
4(240.0.0.0) to 32(255.255.255.255)	Select the group address mask.	24(255.255.255.0)

## Static

### PIM-SM RP Settings

PIM-SM RP Election Method

RP Address

Group Address

Group Address Mask

All
  RP Address
  Group Address
  Group Address Mask

#### RP Address

Setting	Description	Factory Default
RP Address	Define the RP address	N/A

**Group Address**

Setting	Description	Factory Default
Group Address	Define the group address	N/A

**Group Address Mask**

Setting	Description	Factory Default
4(240.0.0.0) to 32(255.255.255.255)	Select the group address mask.	24(255.255.255.0)

## PIM-SM SSM Settings

This page is used to set up the PIM-SM SSM settings for Moxa Layer 3 switches.

### PIM-SM SSM Settings

Enable PIM-SSM

Group address

Group address mask

<input type="checkbox"/> All	Group address	Group address mask
	232.0.0.0	8

**Enable PIM-SSM**

Setting	Description	Factory Default
Enable/Disable	Enable or disable PIM-SSM	Disable

**Group Address**

Setting	Description	Factory Default
Group Address	Define the group address	N/A

**Group Address Mask**

Setting	Description	Factory Default
4(240.0.0.0) to 32(255.255.255.255)	Select the group address mask.	24(255.255.255.0)

## PIM-SM RP-Set Table

### PIM-SM RP-Set Table

BSR IP Address 172.230.1.4  
 BSR Priority 0  
 BSR Hash Mask Length 4

Page 1/1

RP IP Address	Group Prefix	Priority	Hold time
172.230.1.4	224.0.0.0/4	0	98
172.200.1.3(*)	224.0.0.0/4	0	84
172.200.1.2	224.0.0.0/4	0	120

**PIM-SM RP-Set Table**

This is a table showing the current PIM-SM RP-Set table.

## PIM-SM Neighbor Table

### PIM-SM Neighbor Table

Page 1/1 ▾

Index	Neighbor IP	Interface Name	VID	Left Time
1	172.100.1.4	V100	100	103
2	172.200.1.3	V200	200	97

#### **PIM-SM Neighbor Table**

This is a table showing the current PIM-SM Neighbor table.

## Multicast Routing Table

### DVMRP Multicast Routing Table

#### DVMRP Multicast Routing Table

Page 1/1 ▾

Index	Multicast Group	Source	Upstream Neighbor	Interface Name	VID	Expire Time	Downstream interface VID
-------	-----------------	--------	-------------------	----------------	-----	-------------	--------------------------

#### **DVMRP Multicast Routing Table**

This is a table showing the current DVMRP multicast routing table.

### PIM-DM Multicast Routing Table

#### PIM-DM Multicast Routing Table

Page 1/1 ▾

Index	Multicast Group	Source	Upstream Neighbor	Incoming Interface Name	VID	Expire Time	Downstream interface VID
-------	-----------------	--------	-------------------	-------------------------	-----	-------------	--------------------------

#### **PIM-DM Multicast Routing Table**

This is a table showing the current PIM-DM multicast routing table.

### PIM-SM Multicast Routing Table

#### PIM-SM Multicast Routing Table

Page 1/1 ▾

Index	Multicast Group	Source	Upstream Neighbor	Incoming Interface Name	VID	Left Time	Downstream interface VID
-------	-----------------	--------	-------------------	-------------------------	-----	-----------	--------------------------

#### **PIM-SM Multicast Routing Table**

This is a table showing the current PIM-SM multicast routing table.

## Gateway Redundancy

### Virtual Router Redundancy Protocol (VRRP)

#### VRRP Settings

The Virtual Router Redundancy Protocol (VRRP) enables a group of routers to form a single virtual router with a virtual IP address. The LAN clients can then be configured with the virtual router's virtual IP address as their default gateway. The virtual router is the combination of a group of routers, also known as a VRRP group.

#### • VRRP Settings

Enable VRRP      Advertisement Interval (ms)

VRRP Enable	Interface Name	IP Address	VLAN ID	Virtual IP	Virtual Router ID	Priority	Preemption Mode	VRRP Status
<input type="checkbox"/>	V100	172.100.1.2	100	<input type="text" value="0.0.0.0"/>	<input type="text" value="1"/>	<input type="text" value="100"/>	<input checked="" type="checkbox"/>	Init
<input type="checkbox"/>	V200	172.200.1.2	200	<input type="text" value="0.0.0.0"/>	<input type="text" value="1"/>	<input type="text" value="100"/>	<input checked="" type="checkbox"/>	Init
<input type="checkbox"/>	V10	172.10.1.2	10	<input type="text" value="0.0.0.0"/>	<input type="text" value="1"/>	<input type="text" value="100"/>	<input checked="" type="checkbox"/>	Init
<input type="checkbox"/>	V20	172.20.1.2	20	<input type="text" value="0.0.0.0"/>	<input type="text" value="1"/>	<input type="text" value="100"/>	<input checked="" type="checkbox"/>	Init

Apply

#### Enable VRRP

Setting	Description	Factory Default
Enable/Disable	Enable or disable VRRP	Disable

#### Advertisement Interval (ms)

Setting	Description	Factory Default
25 to 1000	Defines the VRRP advertisement interval	1000

#### VRRP Interface Table

Setting	Description	Factory Default
VRRP Enable	Enable or disable the VRRP entry	Disabled
Virtual IP	L3 switch/router in the same VRRP group must have the identical virtual IP address. This virtual IP address must belong to the same address range as the real IP address of the interface.	0.0.0.0
Virtual Router ID	Virtual Router ID is used to assign a VRRP group. The L3 switch/router, which operate as master/backup, should have the same ID. The Moxa L3 switch/router supports one virtual router ID for each interface. IDs can range from 1 to 255.	0

Priority	Determines priority in a VRRP group. The priority value range is 1 to 255, with 255 the highest priority. If several L3 switches/routers have the same priority, the router with higher IP address will have the higher priority. The usable range is "1 to 255".	100
Preemption Mode	Determines whether or not a backup L3 switch/router will take over the authority of the master.	Enable