

# Moxa Managed Switch Next-generation Layer 3 OS Manual

---

Version 1.1, October 2021

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

**Models covered by this manual:**  
MDS-G4000-L3 Managed Ethernet Switches

**MOXA**®

© 2021 Moxa Inc. All rights reserved.

# Moxa Managed Switch Next-generation Layer 3 OS Manual

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

© 2021 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.....                            | 1-2        |
| Static Routing and Dynamic Routing .....                      | 1-2        |
| Static Routing .....  | 1-2        |
| Dynamic Routing with RIP (Routing Information Protocol) ..... | 1-2        |
| Dynamic Routing with OSPF (Open Shortest Path First).....     | 1-2        |
| <b>2. Getting Started.....</b>                                | <b>2-1</b> |
| Log in by Web Interface.....                                  | 2-2        |
| Connecting to the Switch.....                                 | 2-3        |
| Log in by RS-232 Console .....                                | 2-4        |
| Log in by Telnet.....   | 2-6        |
| <b>3. Layer 3 Function Configurations.....</b>                | <b>3-1</b> |
| System.....   | 3-2        |
| Network .....   | 3-2        |
| Layer 3 Routing .....   | 3-7        |
| Unicast Route .....   | 3-7        |
| Network Redundancy .....                                      | 3-22       |
| Layer 3 Redundancy .....                                      | 3-22       |

## Introduction to Layer 3 Switches

---

Moxa's Layer-3 switches 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**

#### □ **Static Routing and Dynamic Routing**

- Static Routing
- Dynamic Routing with RIP (Routing Information Protocol)
- Dynamic Routing with OSPF (Open Shortest Path First)

# 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 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).

## Getting Started

---

In this chapter, we explain how to log in to a Moxa switch for the first time. There are three ways to access the Moxa switch's configuration settings: RS-232 console, web-based interface, and telnet.

The following topics are covered in this chapter:

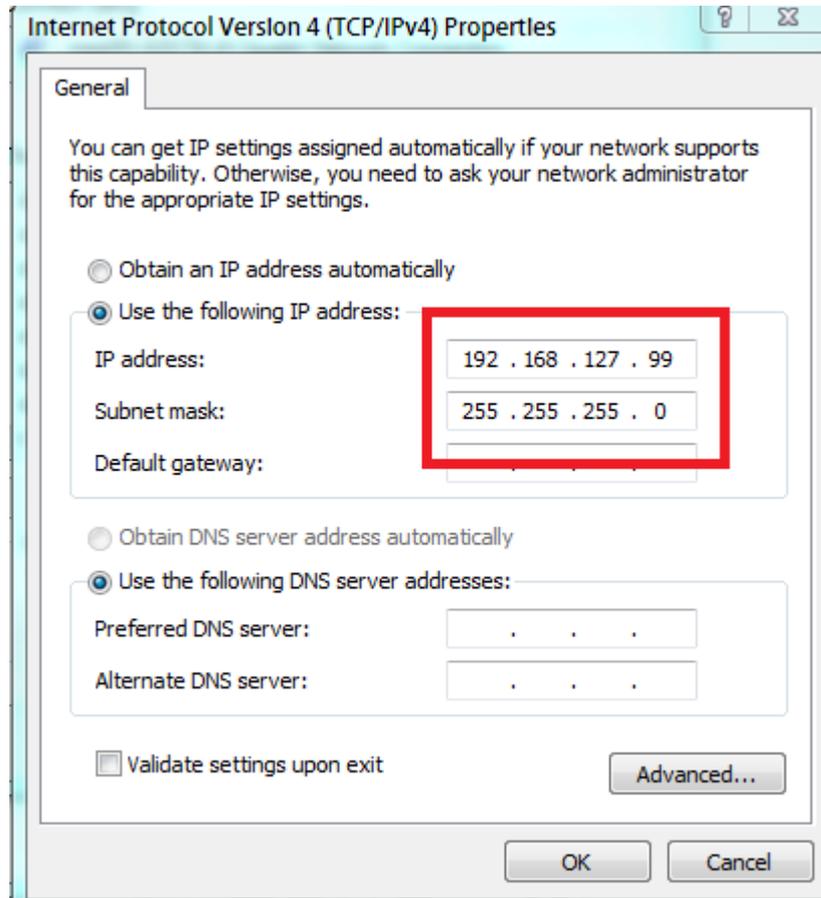
- ❑ **Log in by Web Interface**
  - Connecting to the Switch
- ❑ **Log in by RS-232 Console**
- ❑ **Log in by Telnet**

## Log in by Web Interface

You can directly connect a Moxa switch to your computer with a standard network cable or install your computer on the same intranet as your switch. You will then need to configure your computer's network settings. The default IP address for a Moxa switch is:

**192.168.127.253**

For example, you can configure the computer's IP setting as **192.168.127.99**, and the subnet mask as 255.255.255.0.



Click **OK** when finished.

## Connecting to the Switch

Open a browser, such as Google Chrome, Internet Explorer 11, or Firefox, and connect to the following IP address:

**http://192.168.127.253**

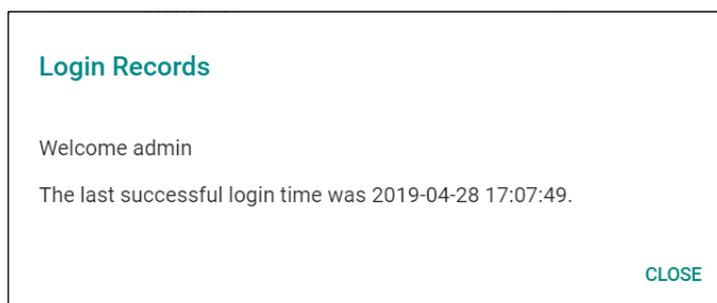


The default username and password are:

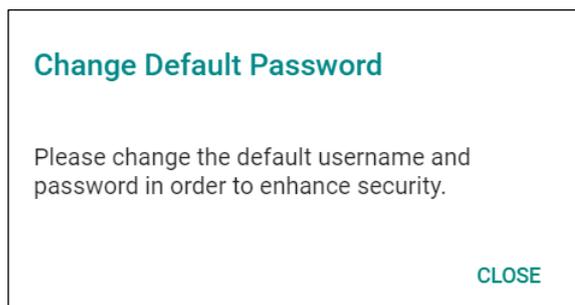
Username: **admin**

Password: **moxa**

**Click LOG IN to continue.** If you have logged in before, you will see a screen indicating the previous login information. Click **Close**.



Another system message will appear, reminding you to change the default password. We recommend that you change your password, or a message will appear whenever you log in telling you to change your password. You can change the password in the **Account Management** section. Click **Close** to continue.



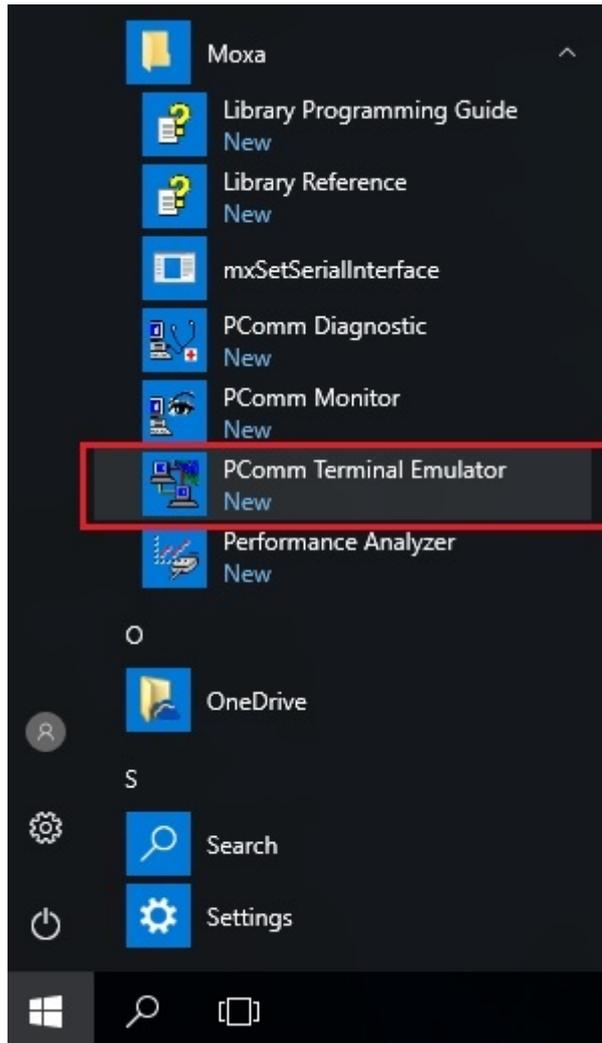
## Log in by RS-232 Console

Moxa's managed switch has a serial console port that can be used to connect to the switch and configure the settings. Take the following steps:

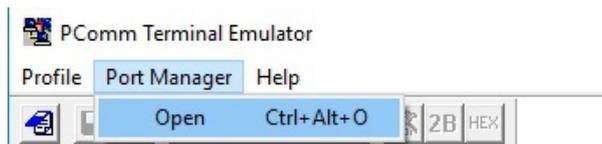
1. Prepare an RS-232 serial cable with an RJ45 interface.
2. Connect the RJ45 interface end to the console port on the switch, and the other end to the computer.
3. We recommend that you use **PComm Terminal Emulator** for serial communication. The software can be downloaded free of charge from Moxa's website.

After installing PComm Terminal Emulator, access the Moxa switch's console as follows:

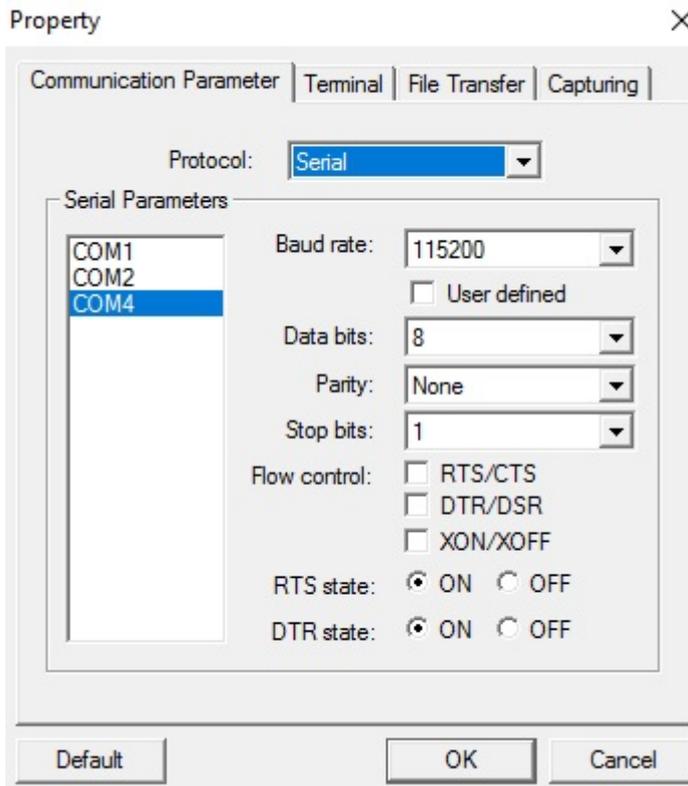
1. From the Windows desktop, click **Start → Moxa → PComm Terminal Emulator**.



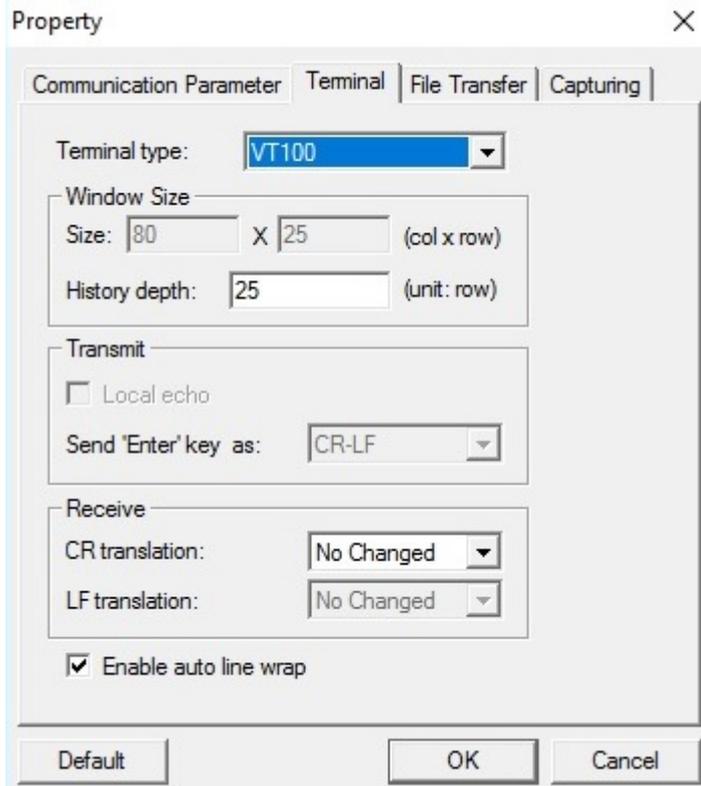
2. Select **Open** under the **Port Manager** menu to open a new connection.



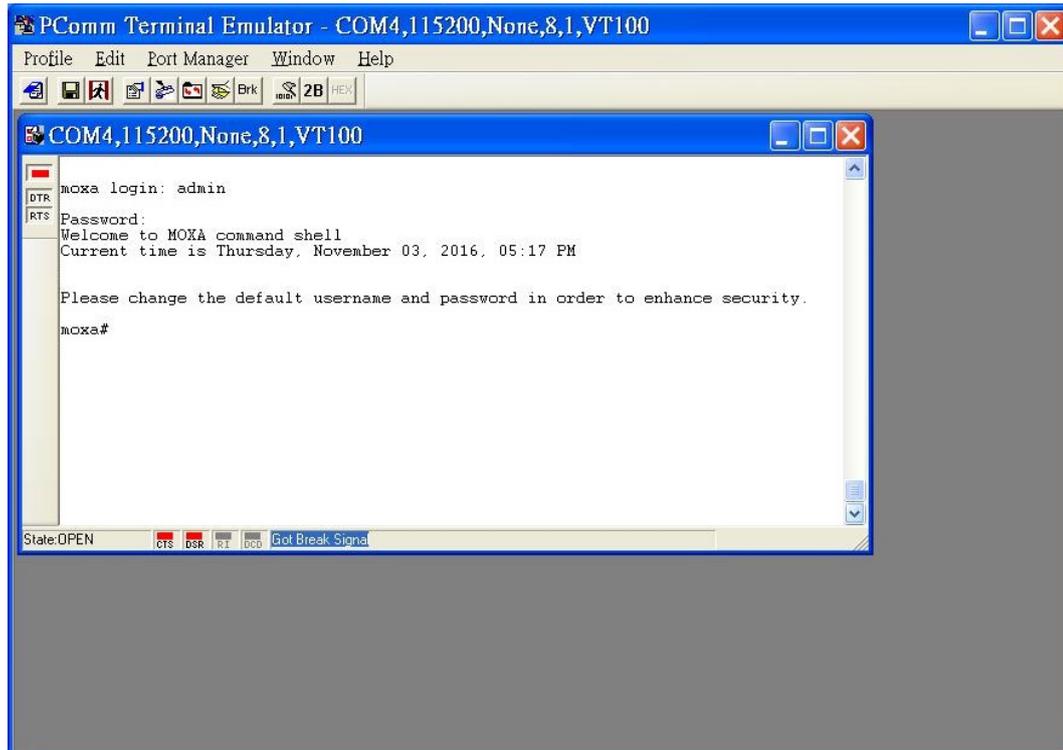
3. The **Property** window should open. On the **Communication Parameter** tab for **Ports**, select the COM port that is being used for the console connection. Set the other fields as follows: **115200** for **Baud Rate**, **8** for **Data Bits**, **None** for **Parity**, and **1** for **Stop Bits**.



4. On the **Terminal** tab, select **VT100** for **Terminal Type**, and then click **OK** to continue.



- The console will prompt you to log in. The default login name is **admin**, and the default password is **moxa**. This password will be required to access any of the consoles (web, serial, Telnet).



- After successfully connecting to the switch by serial console, you can start configuring the switch's parameters by using command line instructions. Refer to the **Moxa Command Line Interface Manual** for details.

**NOTE** By default, the password assigned to the Moxa switch is **moxa**. Be sure to change the default password after you first log in to help keep your system secure.

## Log in by Telnet

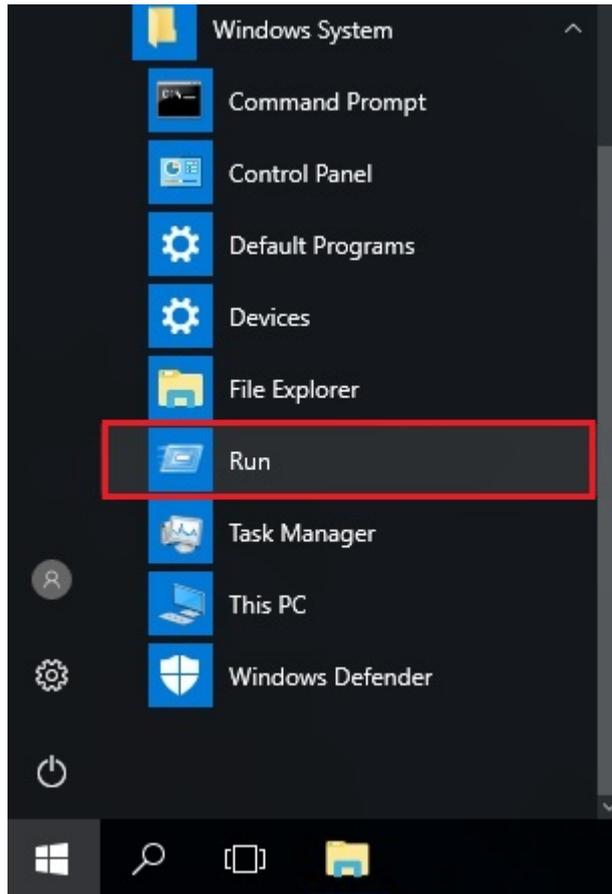
Opening the Moxa switch's Telnet or web console over a network requires that the PC host and Moxa switch are on the same logical subnet. You might need to adjust your PC host's IP address and subnet mask. By default, the Moxa switch's IP address is 192.168.127.253 and the Moxa switch's subnet mask is 255.255.255.0. Your PC's IP address must be set to 192.168.xxx.xxx if the subnet mask is 255.255.0.0, or to 192.168.127.xxx if the subnet mask is 255.255.255.0.

**NOTE** When connecting to the Moxa switch's Telnet or web console, first connect one of the Moxa switch's Ethernet ports to your Ethernet LAN, or directly to your PC's Ethernet port. You can use either a straight-through or cross-over Ethernet cable.

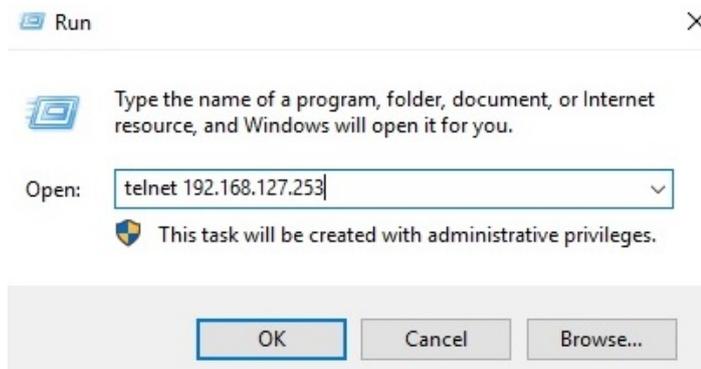
**NOTE** The Moxa switch's default IP address is 192.168.127.253.

After making sure that the Moxa switch is connected to the same LAN and logical subnet as your PC, open the Moxa switch's Telnet console as follows:

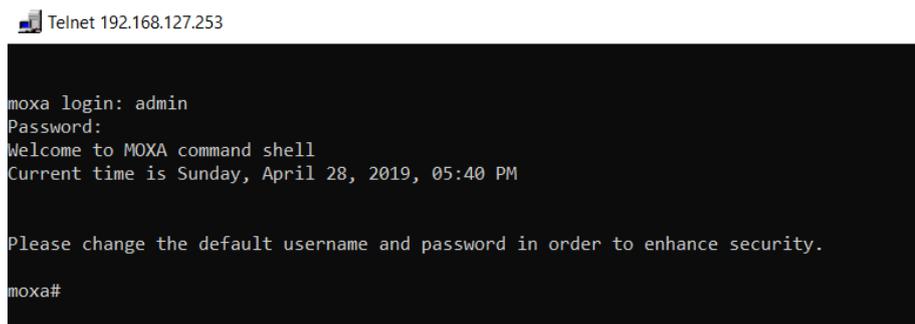
1. Click **Start** → **Run** from the Windows Start menu and then Telnet to the Moxa switch's IP address from the Windows **Run** window. You can also issue the Telnet command from a DOS prompt.



2. Next, use Telnet to connect the Moxa switch's IP address (192.168.127.253) from the Windows **Run** window. You can also issue the Telnet command from a DOS prompt.



3. The Telnet console will prompt you to log in. The default login name is **admin**, and the password is **moxa**. This password will be required to access any of the consoles (web, serial, Telnet).



4. After successfully connecting to the switch by Telnet, users can start configuring the switch parameters by using command line instructions. Refer to the **Moxa Command Line Interface Manual**.

**NOTE** By default, the password assigned to the Moxa switch is **moxa**. Be sure to change the default password after you first log in to help keep your system secure.

## Layer 3 Function Configurations

---

This chapter describes how to configure the layer 3 functions on Moxa's managed switches.

The following topics are covered in this chapter:

- **System**
  - Network
- **Layer 3 Routing**
  - Unicast Route
- **Network Redundancy**
  - Layer 3 Redundancy

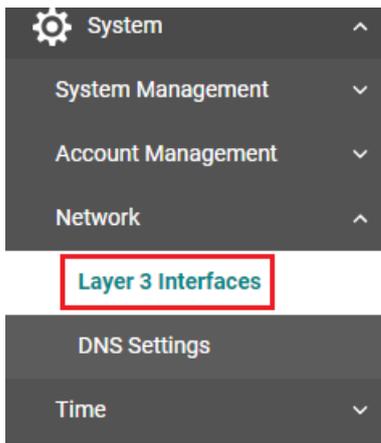
# System

## Network

This section describes the configurations for **Layer 3 Interfaces** and **DNS Settings**.

### Layer 3 Interfaces

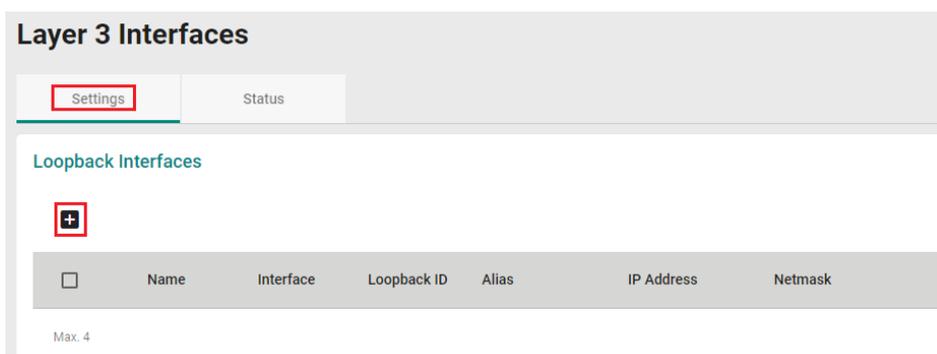
Click **Layer 3 Interfaces** from **System** → **Network** on the function menu.



### Layer 3 Interfaces Settings

The loopback interface is a special, virtual network interface that is used to identify and manage devices. It is used mainly for diagnostics and troubleshooting.

Click the **Settings** tab first, and then click the **+** icon under **Loopback Interfaces** to configure the settings.



Configure the following settings.

**Create Loopback Interface Settings**

Loopback Interface  
 Enabled

Loopback ID \*  
 1 - 10

Alias  
 0 / 64

IP Address \*  
 Netmask 255.255.255.255

CANCEL CREATE

**Loopback Interface**

| Setting        | Description                            | Factory Default |
|----------------|--|-----------------|
| Enable/Disable | Enable/disable the loopback interface. | Enabled         |

**Loopback ID**

| Setting | Description              | Factory Default |
|---------|--------------------------|-----------------|
| 1 to 10 | Specify the loopback ID. | None            |

**NOTE** A user may see interface 407 to 410 displayed via the network management tool based on SNMP. Interface 407 to 410 can be mapped to the 1<sup>st</sup> Loopback interface the user sets to the 4<sup>th</sup> Loopback interface the user sets based on the standard MIB design. A user can set a maximum of 4 loopback interfaces.

**Alias**

| Setting            | Description                                   | Factory Default |
|--------------------|---|-----------------|
| 0 to 64 characters | Specify the alias for the loopback interface. | None            |

**IP Address**

| Setting    | Description  | Factory Default |
|------------|--|-----------------|
| IP address | Specify the IP address for the loopback interface. | None            |

**Netmask**

| Setting | Description  | Factory Default |
|---------|--|-----------------|
| Netmask | Show the default netmask for the loopback interface. | 255.255.255.255 |

Click **CREATE** to finish.

## Creating VLAN Interfaces

Next, click  under **VLAN Interfaces** to create the interface.

### VLAN Interfaces



| <input type="checkbox"/> | Name  | Interface | VLAN ID | Alias | IP Address      | Netmask       | MTU (byte) | Proxy Arp |
|--------------------------|-------|-----------|---------|-------|-----------------|---------------|------------|-----------|
| <input type="checkbox"/> | vlan1 | Enabled   | 1       |       | 192.168.127.253 | 255.255.255.0 | 1500       | Disabled  |

Max. 256

Configure the following settings.

### Create VLAN Interface Settings

VLAN Interface  
Enabled

VLAN ID \*   
1 - 4094

Alias  
0 / 64

IP Address \*      Netmask \*

MTU \*  
1500  
1400 - 3000      byte

Proxy Arp  
Disabled

CANCEL      CREATE

### VLAN Interface

| Setting        | Description                        | Factory Default |
|----------------|------------------------------------|-----------------|
| Enable/Disable | Enable/disable the VLAN interface. | Enabled         |

### VLAN ID

| Setting   | Description   | Factory Default                   |
|-----------|---|-----------------------------------|
| 1 to 4094 | 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) |

**NOTE** A user may see interface 130 to 386 displayed via the network management tool based on SNMP. Interface 130 to 386 can be mapped to the 1<sup>st</sup> VLAN interface the user sets to the 256<sup>th</sup> VLAN interface the user sets based on the standard MIB design. A user can set a maximum of 256 VLANs.

**Alias**

| Setting            | Description                               | Factory Default |
|--------------------|---|-----------------|
| 0 to 64 characters | Specify the alias for the VLAN interface. | None            |

**IP Address**

| Setting    | Description                                    | Factory Default |
|------------|--|-----------------|
| IP address | Specify the IP address for the VLAN interface. | None            |

**Netmask**

| Setting | Description                                 | Factory Default |
|---------|---|-----------------|
| Netmask | Specify the netmask for the VLAN interface. | None            |

**MTU (byte)**

| Setting      | Description   | Factory Default |
|--------------|---|-----------------|
| 1400 to 3000 | Specify the MTU (Maximum Transmission Unit) for the VLAN interface. | 1500            |

**Proxy Arp**

| Setting        | Description  | Factory Default |
|----------------|--|-----------------|
| Enable/Disable | Enable/disable the Proxy ARP for the VLAN interface. | None            |

Click **CREATE** to finish.

### Viewing Layer 3 Interfaces Status

Click the **Status** tab to view the current configurations.

**Layer 3 Interfaces**

Settings
Status

**Loopback Interfaces**

↻
+

| Name      | Admin Status | Operation Status | Loopback ID | Alias | IP Address      | Netmask         |
|-----------|--------------|------------------|-------------|-------|-----------------|-----------------|
| loopback1 | Enabled      | Up               | 1           | Test  | 192.168.227.120 | 255.255.255.255 |

---

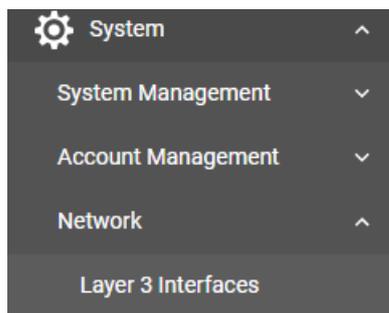
**VLAN Interfaces**

↻
+

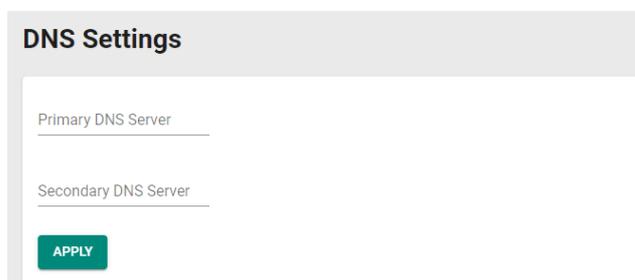
| Name  | Admin Status | Operation Status | VLAN ID | Alias | IP Address      | Netmask       | MTU (byte) | Proxy Arp |
|-------|--------------|------------------|---------|-------|-----------------|---------------|------------|-----------|
| vlan1 | Enabled      | Up               | 1       |       | 192.168.127.253 | 255.255.255.0 | 1500       | Disabled  |

## DNS Settings

Click **DNS Settings** from **System** → **Network**.



**DNS Settings**



### Primary DNS Server

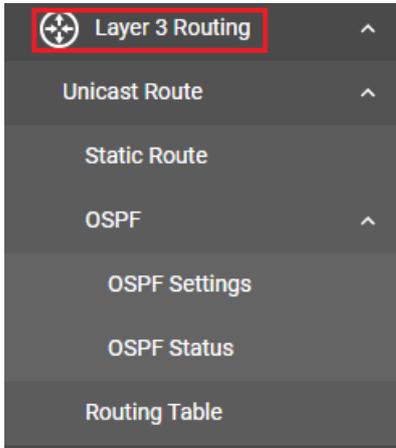
| Setting                   | Description   | Factory Default |
|---------------------------|---|-----------------|
| 1st DNS server IP address | Specify the IP address of the 1st DNS server used by your network. The server will transfer your domain name to the IP address. | None            |

### Secondary DNS Server

| Setting                   | Description  | Factory Default |
|---------------------------|--|-----------------|
| 2nd DNS server IP address | Specify the IP address of the 2nd DNS server used by your network. The switch will use the second DNS server if the first DNS server fails to connect. | None            |

# Layer 3 Routing

This section describes how to configure the layer 3 routing settings for the switch. Click **Layer 3 Routing** on the function menu on the left of the page.



## Unicast Route

Click **Unicast Route** to configure **Static Route** and **OSPF**.

## Static Route



Click **Static Route** on the function menu and then click the  icon on the page.



Configure the following settings.

Create Static Route Settings

Destination \*  
 \_\_\_\_\_

Netmask \*  
 \_\_\_\_\_

Next Hop Type \* 

Next Hop IP \_\_\_\_\_ Next Hop Interface \_\_\_\_\_

Distance \*  
 1 - 255

CANCEL CREATE

**Destination**

| Setting          | Description                                | Factory Default |
|------------------|--|-----------------|
| Input IP address | Specify the IP address of the destination. | None            |

**Netmask**

| Setting       | Description  | Factory Default |
|---------------|--|-----------------|
| Input Netmask | Specify the subnet mask of the destination subnet. | None            |

**Next Hop:** The next router along the path to the destination. You can choose a VLAN interface which has already been created or choose **Unselect** to ignore this setting.

**Next Hop IP**

| Setting          | Description  | Factory Default |
|------------------|--|-----------------|
| Input IP address | Specify the IP address of the next hop IP address. | None            |

**Next Hop Interface**

| Setting  | Description   | Factory Default |
|----------|---|-----------------|
| Unselect | Unselect to ignore this setting; if selected, you will need to specify the next hop IP address. | Unselect        |
| VLAN1    | Specify VLAN1 as the next hop interface   |                 |

**Distance**

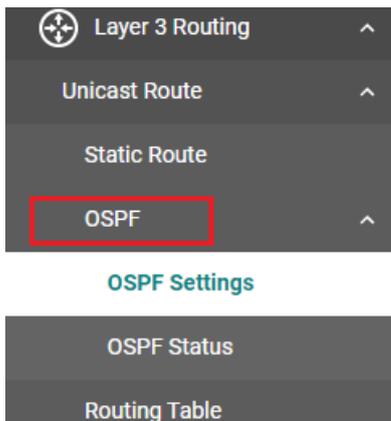
| Setting  | Description  | Factory Default |
|----------|--|-----------------|
| 1 to 255 | Shorter distances have a higher priority; if set to 255, the router will not trust the source of that route and will not install the route in the routing table. | None            |

When finished, click **Create** to save your changes.

## OSPF

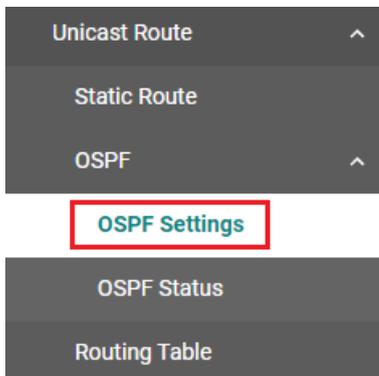
Open Shortest Path First (OSPF) is a dynamic routing protocol for use on Internet Protocol (IP) networks. Specifically, it is a link-state routing protocol in the group of interior gateway protocols, operating within a single autonomous system. As a link-state routing protocol, OSPF establishes and maintains 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.

Click **OSPF** to configure the settings, including **OSPF Settings** and **OSPF Status**.



### OSPF Settings

Click **OSPF Settings** on the function menu.



## General Settings

Click the **General** tab. 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.

### OSPF Settings

General

Area

Interface

Neighbor

Aggregation

Virtual Link

OSPF  
Disabled ▼

Router ID Current Router ID

0.0.0.0 192.168.227.120 i

Compatible RFC 1583  
Disabled ▼

SPF Hold Time  
5000

0 - 65535 ms

APPLY

### OSPF

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

### Router ID

| Setting             | Description                           | Factory Default |
|---------------------|---------------------------------------|-----------------|
| Input the router IP | Specify the IP address of the router. | 0.0.0.0         |

### Current Router ID

| Setting | Description   | Factory Default |
|---------|---|-----------------|
| None    | A router ID identifies a router in the OSPF domain. You can manually assign an IP address, or use "0.0.0.0" to force the switch to auto assign a router ID. When selecting 0.0.0.0, the switch will set the Router ID to the lowest interface IP address. | None            |

**Note:** The Router ID is just used to recognize the device in the OSPF protocol; it does not need to be ICMP reachable.

### Compatible RFC 1583 (Available in Advanced Mode only)

| Setting        | Description                                   | Factory Default |
|----------------|---|-----------------|
| Enable/Disable | Enable/disable to be compatible with RFC 1583 | Disabled        |

### SPF Hold Time (ms) (Available in Advanced Mode only)

| Setting    | Description                | Factory Default |
|------------|----------------------------|-----------------|
| 0 to 65535 | Specify the SPF hold time. | 5000            |

When finished, click **APPLY** to save your changes.

## Redistribute Static Settings

The "Redistribute Static" function allows you to share your internal routing settings (e.g., Static and Connected) with other devices.

Click the  icon to edit the **Redistribute Static** settings.



| Protocol  | Redistribute |
|---|--------------|
|  Static    | Disabled     |
|  Connected | Disabled     |

### Edit Redistribute Static

Redistribute  
Disabled 

CANCEL

APPLY

#### Redistribute Static

| Setting        | Description                                      | Factory Default |
|----------------|--|-----------------|
| Enable/disable | Enable/disable the redistribute static function. | Enabled         |

#### Type (Available in the Advanced Mode only)

| Setting | Description  | Factory Default |
|---------|--|-----------------|
| E1/E2   | Configure the metric type applied to the routes to be redistributed. | E2              |

#### Metric (Available in the Advanced Mode only)

| Setting       | Description   | Factory Default |
|---------------|---|-----------------|
| 1 to 16777214 | Configure the metric values for the routes to be redistributed into OSPF. | 20              |

When finished, click **APPLY** to save your changes.

### Redistribute Connected Settings

Click the  icon to edit the **Redistribute Connected** settings.



|  | Protocol  | Redistribute |
|--|-----------|--------------|
|                                 | Static    | Disabled     |
|  | Connected | Disabled     |

#### Edit Redistribute Connected

Redistribute  
 Disabled ▼

CANCEL

APPLY

#### *Redistribute Connected*

| Setting        | Description   | Factory Default |
|----------------|---|-----------------|
| Enable/disable | Enable/disable the redistribute connected function. | Enabled         |

#### *Type (Available in Advanced Mode only)*

| Setting | Description  | Factory Default |
|---------|--|-----------------|
| E1/E2   | Configure the metric type applied to the routes to be redistributed. | E2              |

#### *Metric (Available in Advanced Mode only)*

| Setting       | Description   | Factory Default |
|---------------|---|-----------------|
| 1 to 16777214 | Configure the metric values for the routes to be redistributed into OSPF. | 20              |

When finished, click **APPLY** to save your changes.

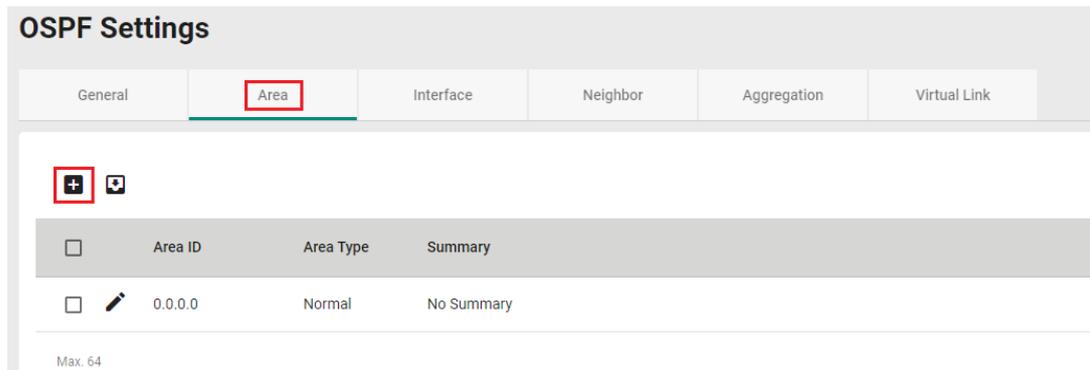
### Area Settings

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.

Follow the contents below to configure the settings.

**Creating a New Area ID**

Click the **Area** tab.



Click the **+** icon to create the new area settings.

**Create Area**

Area ID

Area Type

Summary 

CANCEL **CREATE**

**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  | Defines the area type as Normal. | None            |
| Stub    | Defines the area type as Stub.   |                 |
| NSSA    | Defines the area type as NSSA.   |                 |

**Summary**

| Setting                | Description                           | Factory Default |
|------------------------|---------------------------------------|-----------------|
| Summary/<br>No Summary | Displays the summary of the Area type | None            |

When finished, click **CREATE** to finish.

**Editing the Existing Area ID**

Click the  icon and configure the following settings.

| <input type="checkbox"/> | Area ID   | Area Type | Summary    |
|--------------------------|---|-----------|------------|
| <input type="checkbox"/> |  0.0.0.0 | Normal    | No Summary |

Max. 64

**Area Type**

| Setting | Description                      | Factory Default |
|---------|----------------------------------|-----------------|
| Normal  | Defines the area type as Normal. | None            |
| Stub    | Defines the area type as Stub.   |                 |
| NSSA    | Defines the area type as NSSA.   |                 |

**Summary**

| Setting                | Description                           | Factory Default |
|------------------------|---------------------------------------|-----------------|
| Summary/<br>No Summary | Displays the summary of the Area type | None            |

When finished, click **APPLY**.

**Interface Settings**

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

Click the **Interface** tab and then click the  icon on the interface you want to configure.

**OSPF Settings**

General Area **Interface** Neighbor Aggregation Virtual Link

 Q Search

| Interface Name  | IP Address      | OSPF     | Area ID | Hello Interval (sec.) | Dead Interval (sec.) | Priority | Cost | Network Type | Auth Type | Key ID | Passive interface |
|---|-----------------|----------|---------|-----------------------|----------------------|----------|------|--------------|-----------|--------|-------------------|
|  vlan1 | 192.168.127.253 | Disabled | 0.0.0.0 | 10                    | 40                   | 1        | 1    | Broadcast    | --        | --     | Disabled          |

Items per page: 50 1 - 1 of 1 |< >

Configure the following settings.

**Edit Interface vlan1**

OSPF  
 Disabled

Area ID  
 0.0.0.0

Hello Interval: 10  
 Dead Interval: 40

Priority: 1

Cost: 1

Network Type: Broadcast

Auth Type: None

Passive interface: Disabled

CANCEL APPLY

**OSPF**

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

**Area ID**

| Setting | Description          | Factory Default |
|---------|----------------------|-----------------|
| Area ID | Defines the Area ID. | 0.0.0.0         |

**Hello Interval (sec)**

| Setting    | Description   | Factory Default |
|------------|---|-----------------|
| 1 to 65535 | 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 |
|------------|---|-----------------|
| 1 to 65535 | The dead interval is also a configurable interval (in seconds), and defaults to four times the value of the hello interval. | 40              |

**Priority**

| Setting  | Description                              | Factory Default |
|----------|--|-----------------|
| 0 to 255 | Defines the L3 switch/router's priority. | 1               |

**Cost (sec)**

| Setting    | Description  | Factory Default |
|------------|--|-----------------|
| 1 to 65535 | The cost for each interface; a lower cost means the interface has higher priority. | 1               |

**Network Type (Available in Advanced Mode only)**

| Setting   | Description   | Factory Default |
|---|---|-----------------|
| Broadcast<br>Non-Broadcast<br>Point-to-Multipoint<br>Point-to-Point | Select the network type from the drop-down list to determine how the Hello message will be sent. For Non-Broadcast or Point-to-Multipoint settings, you will need to add a neighbor manually. | Broadcast       |

**Auth Type**

| Setting  | Description   | Factory Default |
|--|---|-----------------|
| None/Simple/MD5/<br>SHA1/SHA-224/<br>SHA-256/<br>SHA-385/SHA-512 | 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            |

**Passive Interface (Available in Advanced Mode only)**

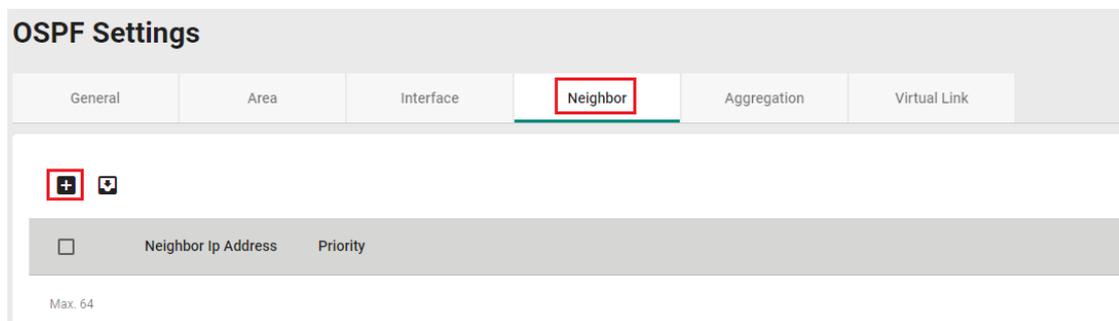
| Setting        | Description  | Factory Default |
|----------------|--|-----------------|
| Enable/Disable | Enable/Disable the settings to allow all interfaces to be configured as passive as the default value. For the Passive Interface, the OSPF related operation will not execute, but this passive interface’s route information can still be learned by other non-passive interfaces. | Disabled        |

When finished, click **APPLY** to save your changes.

**Neighbor Settings**

Click the **Neighbor** tab and then click the  icon for proceed with the configuration.

**NOTE** This function is available in **Advanced Mode** only.



Configure the following settings.

**Create Neighbor**

Neighbor Ip Address

Priority   
0 - 255

CANCEL

CREATE

**Neighbor IP Address**

| Setting             | Description                              | Factory Default |
|---------------------|--|-----------------|
| Neighbor IP address | Specify the IP address for the neighbor. | None            |

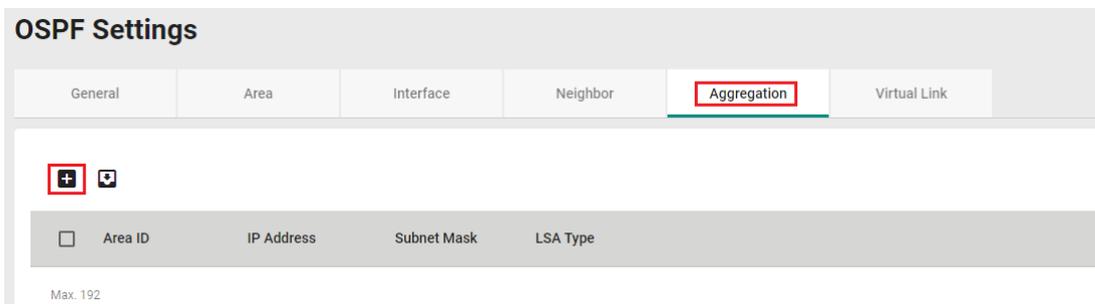
**Priority**

| Setting  | Description                            | Factory Default |
|----------|--|-----------------|
| 0 to 255 | Specify the priority for the neighbor. | None            |

**Aggregation Settings**

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). The OSPF aggregation function allows you to combine groups of routing table entries that represent the same route with a single entry in the routing table. The function will automatically update references to the old table entry IDs. The function is used to reduce the size of routing tables.

Click the **Aggregation** tab and then the  icon to proceed with the configuration.



Configure the following settings.

**Create Aggregation**

Area ID

IP Address  Subnet Mask

LSA Type

CANCEL

CREATE

**Area ID**

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

**IP Address**

| Setting                | Description                                 | Factory Default |
|------------------------|---|-----------------|
| Aggregation IP address | Specify the IP address for the aggregation. | None            |

**Subnet Mask**

| Setting                             | Description              | Factory Default |
|-------------------------------------|--------------------------|-----------------|
| 8(250.0.0.0) to 30(255.255.255.252) | Select the network mask. | None            |

**LSA Type**

| Setting        | Description          | Factory Default |
|----------------|----------------------|-----------------|
| Summary/Type 7 | Select the LSA type. | None            |

When finished, click **CREATE** to save your changes.

**Virtual Link Settings**

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.

Click **Virtual Link**, and then click the **+** icon to proceed with the configuration.



Configure the following settings.

**Create Virtual Link**

Area ID

Router ID

Hello Interval  sec. Dead Interval  sec.

Auth Type

CANCEL **CREATE**

**Area ID**

| Setting | Description   | Factory Default |
|---------|---|-----------------|
| Area ID | Define the areas that this L3 switch/router can connect to. | None            |

**Router ID**

| Setting   | Description                      | Factory Default |
|-----------|----------------------------------|-----------------|
| Router ID | Define the L3 switch/route's ID. | None            |

**Hello Interval (sec)**

| Setting    | Description   | Factory Default |
|------------|---|-----------------|
| 1 to 65535 | 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. | None            |

**Dead Interval (sec)**

| Setting    | Description   | Factory Default |
|------------|---|-----------------|
| 1 to 65535 | The dead interval is also a configurable interval (in seconds), and defaults to four times the value of the hello interval. | None            |

**Auth Type**

| Setting  | Description   | Factory Default |
|--|---|-----------------|
| None/Simple/MD5/SHA1/SHA-224/SHA-256/SHA-385/SHA-512 | 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            |

When finished, click **CREATE** to save your changes.

**OSPF Status**

Click **OSPF Status** to may view the current OSPF configuration status.



### Interface Status

Click the **Interface** tab to view the current OSPF interface status.

**OSPF Status**

Interface Neighbor Database Virtual Link

↻ ⚙

| Interface Name | IP Address      | Area    | State | DR Router ID    | BDR Router ID |
|----------------|-----------------|---------|-------|-----------------|---------------|
| vlan1          | 192.168.127.253 | 0.0.0.0 | DR    | 192.168.127.253 | N/A           |

### Neighbor Status

Click the **Neighbor** tab to view the current neighbor configuration status.

**OSPF Status**

Interface Neighbor Database Virtual Link

↻ ⚙ 🔍 Search

| Neighbor ID | Priority | State | IP Address | Interface Name | Dead Interval (sec.) |
|-------------|----------|-------|------------|----------------|----------------------|
| 10.30.1.2   | 1        | Full  | 10.30.1.2  | vlan10         | 35                   |
| 20.60.2.3   | 1        | Full  | 20.60.2.3  | vlan20         | 31                   |

Items per page: 50 1 - 2 of 2 |< < > >|

### Database Status

Click the **Database** tab to view the current database status.

**OSPF Status**

Interface Neighbor Database Virtual Link

↻ ⚙

| LSA Type | Area    | Link ID         | ADV Router      | Age (sec.) |
|----------|---------|-----------------|-----------------|------------|
| Router   | 0.0.0.0 | 192.168.127.253 | 192.168.127.253 | 70         |

### Virtual Link Status

Click the **Virtual Link** tab to view the current virtual link status.

**OSPF Status**

Interface Neighbor Database **Virtual Link**

🔄 📄 🔍 Search

| Area    | Router ID | Neighbor State | Events | LSA Retransmission Queue Length | Hello Suppressed |
|---------|-----------|----------------|--------|---------------------------------|------------------|
| 0.0.0.1 | 20.60.2.3 | Full           | 5      | 0                               | No               |

Items per page: 50 1 - 1 of 1 |< < > >|

### Routing Table

This function allows users to view the current routing table.

- Unicast Route ^
- Static Route
- OSPF v
- Routing Table**

Click **Routing Table** on the function menu to view the routing table.

**Routing Table**

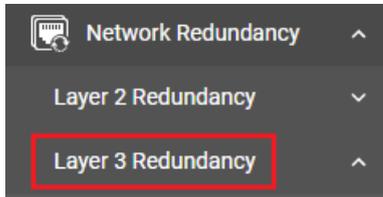
🔄 📄

| Type      | Destination   | Netmask       | Next Hop | Distance |
|-----------|---------------|---------------|----------|----------|
| Connected | 192.168.127.0 | 255.255.255.0 | vlan1    | 0        |

# Network Redundancy

## Layer 3 Redundancy

The MDS-4000 Layer 3 switch provides a layer 3 redundancy function. Click Layer 3 Redundancy under Network Redundancy on the function menu.



## VRRP

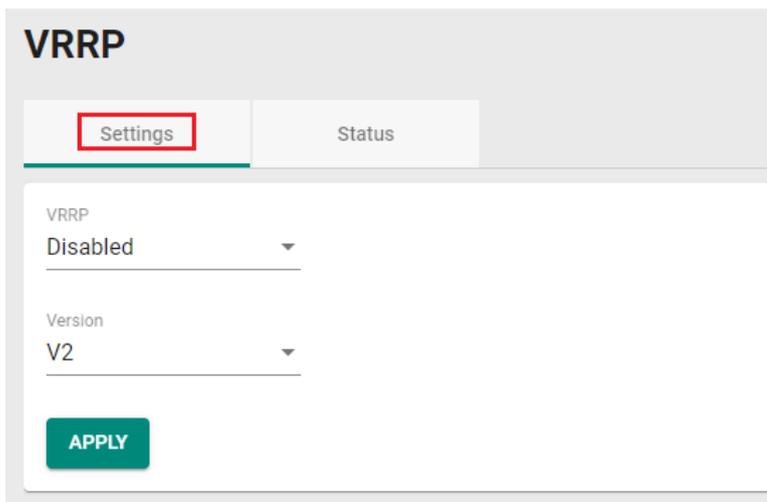
The **Virtual Router Redundancy Protocol (VRRP)** enables a group of routers to form a single virtual router with a virtual IP address. The LAN clients can then be configured with the virtual router's virtual IP address as their default gateway. The virtual router is the combination of a group of routers,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

Click **VRRP** under Layer 3 Redundancy on the function menu.



## VRRP Settings

Click the **Settings** tab on the page.



Configure the following settings.

**VRRP**

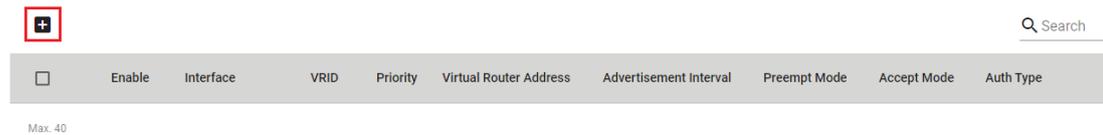
| Setting        | Description            | Factory Default |
|----------------|------------------------|-----------------|
| Enable/Disable | Enable or disable VRRP | Disabled        |

**Version**

| Setting | Description                                 | Factory Default |
|---------|---|-----------------|
| V2/V3   | Select version 2 or version 3 for the VRRP. | V2              |

When finished click **APPLY** to save your changes.

Click the  icon to create a virtual router.



Configure the following settings.

**Create Virtual Router**

Virtual Router

Interface  VRID \*   
1 - 255

Priority \*   
1 - 254

Virtual Router Address \*

Advertisement Interval \*  ms  
30 - 40000

Preempt Mode  Accept Mode

Auth Type  Auth Key \*    
0 / 8

**Virtual Router**

| Setting        | Description                       | Factory Default |
|----------------|-----------------------------------|-----------------|
| Enable/Disable | Enable or disable virtual router. | None            |

**Interface**

| Setting | Description                            | Factory Default |
|---------|--|-----------------|
| VLAN    | Select which VLAN to be the interface. | None            |

**VRID**

| Setting  | Description   | Factory Default |
|----------|---|-----------------|
| 1 to 255 | Specify the 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. | None            |

**Priority**

| Setting  | Description   | Factory Default |
|----------|---|-----------------|
| 1 to 254 | Determines priority in a VRRP group. The priority value range is 1 to 254, with 254 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 254". | None            |

**Virtual Router Address**

| Setting                          | Description   | Factory Default |
|----------------------------------|---|-----------------|
| IP Address of the virtual router | L3 switches/routers 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. | None            |

**Advertisement Interval (ms)**

| Setting     | Description                             | Factory Default |
|-------------|---|-----------------|
| 30 to 40000 | Define the VRRP advertisement interval. | None            |

**Preempt Mode**

| Setting        | Description  | Factory Default |
|----------------|--|-----------------|
| Enable/Disable | Determine whether or not a backup L3 switch/router will take over the authority of the master. | None            |

**Accept Mode**

| Setting        | Description   | Factory Default |
|----------------|---|-----------------|
| Enable/Disable | Enable or disable the accept mode. When enabled, VRRP IP can be accessed. | None            |

**Auth Type (available in V2 only)**

| Setting     | Description  | Factory Default |
|-------------|--|-----------------|
| None/Simple | Determines whether to activate the authentication (Simple Type), or not to activate the authentication (None). | None            |

**Auth Key (available in V2 only)**

| Setting            | Description  | Factory Default |
|--------------------|--|-----------------|
| Authentication key | Provides an authentication key when simple type for authentication is set. | None            |

When finished, click **CREATE** to complete the configuration.

## VRRP Status

Click the **Status** tab to view the current VRRP setting status.

**VRRP**

Settings **Status**

VRRP  
Enabled

Version  
V2

APPLY

+ Search

| <input type="checkbox"/> | Enable  | Interface | VRID | Priority | Virtual Router Address | Advertisement Interval | Preempt Mode | Accept Mode | Auth Type |
|--------------------------|---|-----------|------|----------|------------------------|------------------------|--------------|-------------|-----------|
| <input type="checkbox"/> |  Enabled | vlan1     | 1    | 1        | 192.168.127.254        | 30                     | Enabled      | Enabled     | None      |

Max. 40

To edit the existing VRRP setting, click the  icon.