

IEF-G9010 Series User's Manual

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IEF-G9010 Series User's Manual

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Terms and Acronyms

The following table lists the terms and acronyms used in this document.

Term/Acronym	Definition
ALG	Application Layer Gateway
CEF	Comment Event Format
CIDR	Classless Inter-Domain Routing
DPI	Deep Packet Inspection
EWS	Engineering Workstation
HMI	Human-Machine Interface
ICS	Industrial Control System
IT	Information Technology
NAT	Network Address Translation
SDC	Security Dashboard Console
OT	Operational Technology
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition

About the IEF-G9010 Series

The following topics are covered in this chapter:

- **Introduction**
- **Main Functions**

Introduction

The IEF-G9010 Series next generation firewalls are a highly integrated industrial multiport firewall with NAT and IPS functions. They are designed for Ethernet-based security applications in factory networks and provide an electronic security perimeter to protect critical cyber assets such as pump-and-treat systems in water stations, DCS systems in oil and gas applications, and PLC/SCADA systems in factory automation. The firewall's web-based console provides an intuitive graphical user interface for device configuration and security policy settings. The IEF-G9010 Series protects your individual assets with OT visibility, cybersecurity, and OT protocol whitelisting.

Traditionally, IT and OT operate on separate networks, each with their own transportation team, goals, and needs. In addition, industrial environments are equipped with tools and devices that are traditionally unable to interface with a corporate network, thus making provisioning security updates or patches in a timely manner difficult. Therefore, the demand for security products that provide comprehensive asset protection and visibility are on the rise.

Moxa Industrial Network Defense Solutions provide a wide range of security products that cover both the IT and OT layers. These easy-to-build solutions provide active and immediate protection to the Industrial Control System (ICS) environments with the following features:

- Certified industrial-grade hardware that comply with size, power consumption, durability for OT environments and have the ability to tolerate a wide range of temperature variations
- Threat detection and interception against the spread of worms
- Intrusion Prevention System and Denial-of-Service (DoS) that target legacy vulnerable devices
- Virtual patch protection against OT device exploits

Main Functions

The IEF-G9010 Series is a transparent network security device. Below are the main functions of the product:

Extensive Support for Industrial Protocols

The IEF-G9010 Series supports the identification of a wide range of industrial control protocols, including Modbus and other protocols used by industry leaders such as Siemens, Mitsubishi, Schneider Electric, ABB, Rockwell, Omron, and Emerson. In addition to allowing OT and IT security system administrators to work together, this feature also allows the flexibility to deploy defense measures in appropriate network segments and seamlessly connects them to existing factory networks.

Policy Enforcement for Mission-critical Machines

The IEF-G9010 Series core technology allows administrators to maintain a policy enforcement database. By analyzing Layer 3 to Layer 7 network traffic between mission-critical production machines, policy enforcement executes filtering of control commands within the protocols and blocks traffic that is not defined in the policy rules. This feature can help prevent unexpected operations, block unknown network attacks, and block other traffic that matches the policy for sending data to these mission-critical machines.

Improve Shadow OT Visibility by Integrating IT and OT Networks

The IEF-G9010 Series integrates and coordinates your IT and OT networks with each other and grant visibility of your shadow OT environment.

Intrusion Prevention and Intrusion Detection

IPS/IDS provides a powerful, up-to-date, first line of defense against known threats. Vulnerability filtering rules provide effective protection against all potential exploits at the network level. Manufacturing personnel manage patching and updating, providing pre-emptive protection against critical production failures, and additional protection for old or terminated software.

Switch Between Two Flexible Modes, 'Monitor' & 'Prevention'

The IEF-G9010 Series flexibly switches between 'Monitor' and 'Prevention' modes. The 'Monitor' mode will log traffic without interfering, while 'Prevention' mode will filter traffic based on policies you create. These modes work together to preserve your productivity while maximizing security.

Top Threat Intelligence and Analytics

The IEF-G9010 Series provides advanced protection against unknown threats with its up-to-date threat information.

Centralized Management

Security Dashboard Console (SDC) provides a graphical user interface for policy management in compliance with a manufacturing SOP. It centrally monitors operations information, edits network protection policies, and sets patterns for attack behaviors.

The following protections are deployed throughout the entire information technology (IT) and operational technology (OT) infrastructure. These include:

- A centralized policy deployment and reporting system
- Full visibility into assets, operations, and security threats
- IPS and policy enforcement configurations can be assigned per device group, allowing all devices in the same device group to share the same policy configuration
- Management permissions for device groups can be assigned per user account

Flexible Segmentation and Isolation

The IEF-G9010 Series is the ideal solution to segment a network into easily manageable security zones. The firewall can isolate connectivity between the different facilities and production zones to increase security against outside attacks and to create highly secure isolated network zones that can contain threats if they occur.

Getting Started

This chapter describes the IEF-G9010 Series and how to get started with configuring the initial settings.

The following topics are covered in this chapter:

- ❑ **Getting Started Task List**
- ❑ **Opening the Management Console**
- ❑ **Changing the Administrator's Password**

Getting Started Task List

This task list provides a high-level overview of all procedures required to get the IEF-G9010-2MGSFP Series up and running as quickly as possible. Each step links to more detailed instructions later in the document.

Steps Overview:

1. Open the management console.
For more information, see [Opening the Management Console](#).
2. Change the administrator password.
For more information, see [Changing the Administrator's Password](#).
3. Configure the link speed of the Ethernet ports to suit the network environment.
For more information, see [Configuring Port Settings](#).
4. Change the default web interface IP address.
The default IP address is **192.168.127.254** and is bound to the **LAN1** port.
For more information, see [Configuring LAN Network Interface](#).
5. Configure the network interface.
For more information, see [The Network Screens](#).
6. Configure the system time.
For more information, see [Configuring System Time](#).
7. (Optional) Configure the Syslog settings.
For more information, see [Configuring Syslog Settings](#).
8. Configure Object Profiles.
For more information, see [The Object Profiles Screens](#).
9. Configure security policies.
For more information, see [The Security Screens](#).
10. Configure the device name and device location information.
For more information, see [Configuring Device Name and Device Location Information](#).
11. (Optional) Configure access control list from management clients.
For more information, see [Configuring Control List Access from Management Clients](#).
12. (Optional) Configure management protocols and ports.
For more information, see [Configuring Management Protocols and Ports](#).
13. (Optional) Update the DPI (Deep Packet Inspection) pattern for the device.
For more information, see [Manually Updating the Pattern](#).
14. (Optional) Enabling Management by SDC.
For more information, see [Enabling Management by SDC](#).
15. (Optional) Configure the password policy.
For more information, see [Configuring Password Policy Settings](#).

Opening the Management Console

The IEF-G9010 Series provides a built-in management web console that you can use to configure and manage the product. View the management console using a web browser.

Note: View the management console using Google Chrome version 63 or later; Firefox version 53 or later; Safari version 10.1 or later; or Edge version 15 or later.

Steps:

1. In a web browser, type the address of the IEF-G9010 Series in the following format:
https://192.168.127.254, and the logon screen appears.

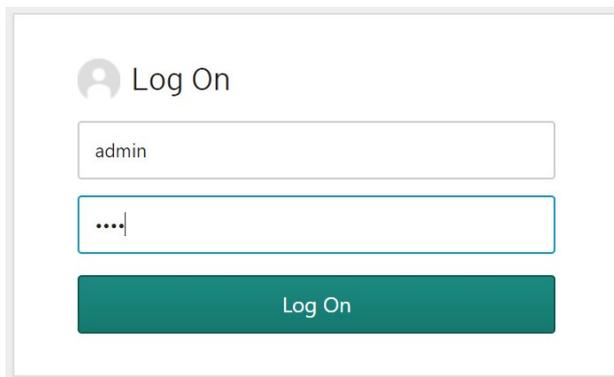
NOTE The default IP address of the IEF-G9010 Series is 192.168.127.254 with subnet 255.255.255.0. Before connecting a PC/Laptop to the IEF-G9010 Series, the PC's IP address should be set to an IP address that is able to access the default IP address. After that, connect the PC and the IEF-G9010 Series using an Ethernet cable.

NOTE The IEF-G9010 Series uses an automatically generated self-signed SSL certificate to encrypt communications to and from the client accessing the device. Given that the certificate is self-signed, most browsers will not trust the certificate and will give a warning that the certificate being used is not signed by a known authority.

NOTE For security reasons, the web management console can be only be accessed through port 1.

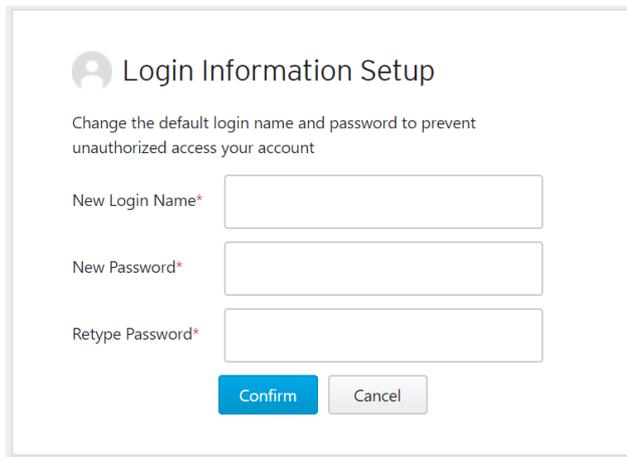
2. Input the logon credentials (user ID and password). Use the default administrator logon credentials when logging on for the first time:

- User ID: admin
- Password: moxa



The screenshot shows a web-based login interface. At the top left, there is a user icon followed by the text 'Log On'. Below this, there are two input fields. The first field contains the text 'admin'. The second field contains three dots, indicating a password field. At the bottom of the form is a green button with the text 'Log On'.

3. Click Log On
4. When you log on for the first time, the IEF-G9010 Series will request you to create a new admin account and change the default password for security reasons.



Login Information Setup

Change the default login name and password to prevent unauthorized access your account

New Login Name*

New Password*

Retype Password*

Confirm **Cancel**

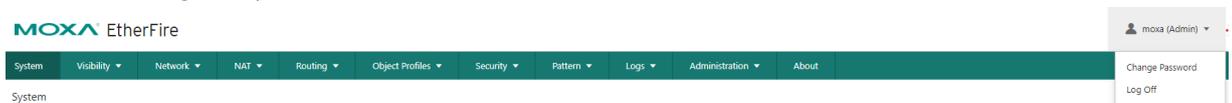
5. The logon screen will pop out again. Please use the new admin account and password to log on.

Changing the Administrator's Password

To change the password of the IEF-G9010 Series, you have to log in to a web browser with proper credentials first.

Steps:

1. In a web browser, type the address of the IEF-G9010 Series in the following format: `https://192.168.127.254`, and the logon screen will appear.
2. Log in as the administrator.
3. Click the admin account icon at the top-right corner and select [Change Password].
4. Proceed to change the password.



NOTE If you accidentally forget the administrator account and password, the only way to retrieve your administration access is to reset IEF-G9010 to factory default. To reset the IEF-G9010 to factory default, press and hold the reset button for more than 10 seconds. The MANAGED LED will begin to blink every half-second, which means the system is resetting itself to factory default. DO NOT power off the device when loading default settings.

The System Screens

Monitor your system information, system status, and system resource usage on the system screen.

MOXA EtherFire moxa (Admin)

System | Visibility | Network | NAT | Routing | Object Profiles | Security | Pattern | Logs | Administration | About

System Refresh Time 10 Sec

Device Information

System Boot Time: 1970-01-01T00:00:00Z
 Device Name: EtherFire
 Model: IEF-C8010-2MGSFP-Pro
 Firmware Version: IEF_M02_1.0.1
 FW Build Date / Time: 2020-04-22T10:00:10Z

Secured Service Status

Cyber Security: Disabled
 Policy Enforcement: Disabled
 Signature Version: MX_20022_1_16
 SDC Sync: Disconnected

System Resources

CPU Utilization (5%): 0% 100%
 Memory Utilization (14%): 0% 100%

Throughput / Connection

Real Time Throughput: 0 bps
 Connection Usage: 1 / 75000

WAN Interface Summary

Interface	Mode	IP Address	MAC Address	VLAN ID
WAN1	DHCP	0.0.0.0	00:51:82:11:22:00	-

LAN Interface Summary

Interface	Status	DHCP/Relay	IP Address	VLAN ID
LAN1	Enabled	Disabled	192.168.127.254	-
LAN2	Disabled	Disabled	0.0.0.0	-

The following topics are covered in this chapter:

- ❑ **Device Information**
- ❑ **Secured Service Status**
- ❑ **System Resources**
- ❑ **WAN Interface Summary**
- ❑ **LAN Interface Summary**
- ❑ **Throughput/Connection**

Device Information

This widget shows the system boot time, device name, model, firmware version, and firmware build date and time.

Device Information

System Boot Time: 1970-01-01T00:00:00Z

Device Name: EtherFire

Model: IEF-G9010-2MGSP-PRO

Firmware Version: IEF_M02_1.0.1

FW Build Date / Time: 2020-04-22T10:00:10Z

Secured Service Status

This widget shows the status of the device's security services, the current pattern version, and the sync status with SDC.

Secured Service Status

Cyber Security: Disabled

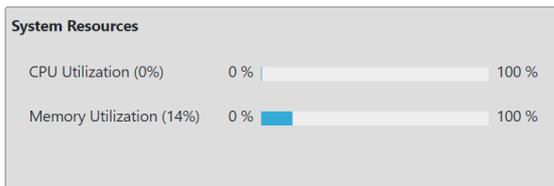
Policy Enforcement: Disabled

Signature Version: MX_200221_16

SDC Sync: Disconnected

System Resources

This widget shows resource usage on the device.



Item	Description
CPU Utilization	Real-time CPU utilization % (according to the refresh time settings)
Memory Utilization	Real-time memory utilization % (according to the refresh time settings)

WAN Interface Summary

This widget shows a summary of information for the WAN interface.

WAN Interface Summary				
Interface	Mode	IP Address	MAC Address	VLAN ID
WAN1	DHCP	10.144.39.5	00:51:82:11:22:00	-

LAN Interface Summary

This widget shows a summary of information for the LAN and LAN2 interfaces.

LAN Interface Summary				
Interface	Status	DHCP/Relay	IP Address	VLAN ID
LAN1	Enabled	Disabled	192.168.127.254	-
LAN2	Disabled	Disabled	0.0.0.0	-

Throughput/Connection

This widget shows the real-time throughput and connection usage of the device.

Throughput / Connection	
Real Time Throughput	Connection Usage
0 bps	46 / 60000

The Visibility Screens

The Visibility screen gives you an overview of asset visibility of your managed assets. The screens provide you with timely and accurate information on the assets that are managed by the IEF-G9010 Series.

Visibility > Assets View

Manually asset info refresh 

Name: PLC Example Nr 0
IP Addr: 10.103.86.6
MAC: ffae:79:9f:51:8b

Name: PLC Example Nr 1
IP Addr: 10.78.167.109
MAC: 65:14:a0:34:c9:58

Name: PLC Example Nr 2
IP Addr: 10.102.74.125
MAC: 4b:27:95:c3:1c:71

Name: PLC Example Nr 3
IP Addr: 10.158.102.115
MAC: 7c:c4:d9:f2:8b:a8

Assets Information

Model Name: LOGIX35663

Asset Type: -

Host Name: PLC Example Nr 0

Serial Number: SN 1234.441056

OS: Windows Server 2008

MAC Address: ffae:79:9f:51:8b

Real Time Network Application Traffic Refresh Time: 10 Sec

No	Application Name	TX	RX
1	Modbus	42.88 TB	42.81 TB
2	SLMP	42.73 TB	42.82 TB
3	IntraMessenger	42.79 TB	42.82 TB
4	Uploading	42.92 TB	42.70 TB

Number of active assets: 4 / 50 Real time network application traffic: 4 / Device

The assets, listed on the screen, are automatically detected by the IEF-G9010 Series devices.

NOTE The term **asset** in this chapter refers to the devices or hosts that are protected by the IEF-G9010 Series.

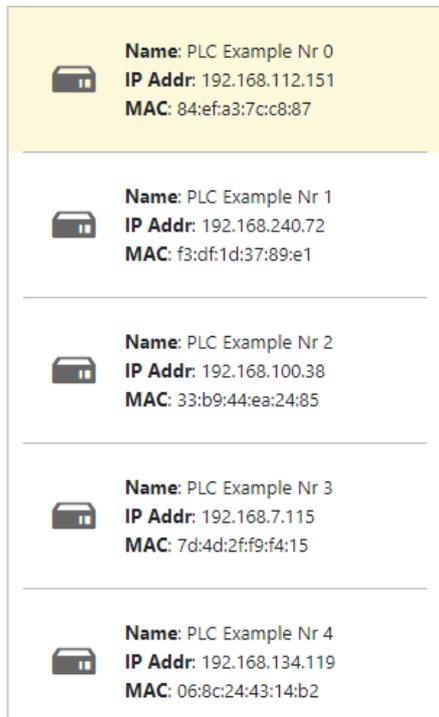
The following topics are covered in this chapter:

- ❑ **Viewing Asset Information**
- ❑ **Viewing Real-time Network Application Traffic**

Viewing Asset Information

Steps:

1. Go to [Visibility] → [Assets View].
2. Click an asset icon and view its detailed information.



3. The [Assets Information] pane shows the following information for the asset:

Field	Description
Vendor Name	The vendor name of the asset.
Model Name	The model name of the asset.
Asset Type	The asset type of the asset.
Host Name	The name of the asset.
Serial Number	The serial number of the asset.
OS	The operating system of the asset.
MAC Address	The MAC address of the asset.
IP Address	The IP address of the asset.
First Seen	The date and time the asset was first seen.
Last Seen	The date and time the asset was last seen.

Viewing Real-time Network Application Traffic

Steps:

1. Go to [Visibility] → [Assets View].
2. Click an asset icon and view its detailed information.
3. The [Real Time Network Application Traffic] pane shows a list of network traffic statics of the asset

Field	Description
No.	Ordinal number of the application traffic.
Application Name	The application type of the traffic.
TX	The amount of traffic transmitted for this traffic.
RX	The amount of traffic received for this traffic.

NOTE Click the [Manual Asset Info Refresh] to refresh the information displayed.

NOTE Specify the refresh time under the [Refresh Time] dropdown menu.

The Network Screens

This chapter describes how to configure the physical ports and network interfaces of the IEF-G9010 Series devices.

The following topics are covered in this chapter:

❑ **Port Settings**

- Configuring Port Settings

❑ **Port Mapping**

❑ **Network Interface**

- Configuring the LAN Network Interface
- Configuring the WAN Network Interface

Port Settings

The [Port Settings] tab allows you to enable or disable the ports and configure the port link speed.

NOTE The term **Port** in the document refers to physical ports to which network cables are connected.

Configuring Port Settings

Steps:

1. Go to [Network] → [Port Settings].

Network > Port Settings Manually Port Info Refresh 



Port Name	Enable Status	Link Speed Setting	Link Status	Description
PORT1	Enabled	Auto Negotiation	-	-
PORT2	Enabled	Auto Negotiation	-	-
PORT3	Enabled	Auto Negotiation	-	-
PORT4	Enabled	Auto Negotiation	-	-
PORT5	Enabled	Auto Negotiation	-	-
PORT6	Enabled	Auto Negotiation	1 Gbps Full Duplex	-
PORT7	Enabled	Auto Negotiation	-	-
PORT8	Enabled	Auto Negotiation	-	-
G1	Enabled	Auto Negotiation	-	-
G2	Enabled	Auto Negotiation	-	-

2. Click on a port in the [Port Name] column to configure the port.
3. Use the toggle to enable or disable the port.
4. Select the port speed and negotiation method from the [Link Speed] drop-down menu.
5. (Optional) Enter a description for the port.
6. Click **Ok**.

✕

Port Configuration

Enable Port:

Port Name: PORT6

Description:

Link Speed: Auto Negotiation

NOTE The panel image on the page shows a graphical representation of the ports on the device that are connected.

NOTE Click the [Manual Port Info Refresh] button in the top-right to refresh the displayed information manually.

Port Mapping

Use the [Port Mapping] tab to view the port and interface mapping.

Steps

1. Go to [Network] → [Port Mapping].

The Port Mapping tab will appear. This tab shows the mapping between the physical ports and the WAN and LAN interfaces.

Interface	PORT1	PORT2	PORT3	PORT4	PORT5	PORT6	PORT7	PORT8	G1	G2
WAN1 (Specify one interface only)	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
LAN1	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>					
LAN2	<input type="radio"/>									

Network Interface

Use the [Network Interface] tab to configure the following settings:

- The settings of the device's network interfaces
- DHCP settings on the LAN interface
- The WAN connection type

NOTE The term **Network Interface** or **Interface** in this document refers to the logical interface that maps to one or more physical ports.

NOTE The default web management console IP address is **198.168.127.254** and is bound to the LAN1 network interface.

Configuring the LAN Network Interface

Steps:

1. Go to [Network] → [Network Interface].

The Network Interface tab will appear.

Interface	On / Off	Connection Type	IP Address	Mask	VLAN ID	Description
WAN1	On	DHCP Client	0.0.0.0	0.0.0.0	-	-
LAN1	On	DHCP Service Disabled	192.168.127.254	255.255.255.0	-	-
LAN2	Off	DHCP Service Disabled	0.0.0.0	0.0.0.0	-	-

- Click on **LAN1** or **LAN2** in the [Interface] column to configure the port. The Edit Network Interface window will appear.

- Use the toggle to enable or disable the interface.
- (Optional) Enter a descriptive name for the interface.
- In the [Network Settings] section, configure the following settings:
 - IP Address:** Enter a valid IP address.
 - Subnet Mask:** Enter the subnet mask.
 - (Optional) **Enable VLAN ID:** Use the toggle to enable/disable VLAN ID tagging.
 - (Optional) **VLAN ID:** If VLAN ID is enabled, specify a VLAN ID.
- In the [DHCP Service] section, choose the DHCP Service mode:
 - Disabled:** Disable DHCP services on the interface.
 - DHCP Service:** Enable DHCP services on the interface. Configure the following additional settings:

DHCP Service

DHCP Service	<input type="text" value="DHCP Server"/>
Start IP Address*	<input type="text" value="192.168.127.1"/>
End IP Address*	<input type="text" value="192.168.127.100"/>
Gateway Address*	<input type="text" value="192.168.127.254"/>
Lease Time*	<input type="text" value="86400"/>
DNS Server 1	<input type="text" value="8.8.8.8"/>
DNS Server 2	<input type="text" value="8.8.8.9"/>

- Start IP Address:** Enter the starting IP address of the DHCP address pool.
- End IP Address:** Enter the ending IP address of the DHCP address pool.
- Gateway Address:** Enter the gateway IP address that will be assigned to DHCP clients.
- Lease Time:** Specify the time (in seconds) that a client device can use the assigned IP address provided by the DHCP server.

- v. (Optional) **DNS Server 1,2:** Enter the primary and secondary DNS server that will be assigned to DHCP clients.
- c. **DHCP Relay:** Configure the interface to act as a relay to a remote DHCP server. Configure the following additional settings:

DHCP Service

DHCP Service	<input type="text" value="DHCP Relay"/>
Interface	<input type="text" value="WAN1"/>
Relay Server Address*	<input type="text" value="192.168.50.1"/>

- i. **Relay Server Address:** Enter the IP address of the remote DHCP server.

7. Click **Ok**.

Configuring the WAN Network Interface

Steps:

1. Go to [Network] → [Network Interface].

The Network Interface tab will appear.

Interface	On / Off	Connection Type	IP Address	Mask	VLAN ID	Description
WAN1	On	DHCP Client	0.0.0.0	0.0.0.0	-	-
LAN1	On	DHCP Service Disabled	192.168.127.254	255.255.255.0	-	-
LAN2	Off	DHCP Service Disabled	0.0.0.0	0.0.0.0	-	-

2. Click on **WAN1** in the [Interface] column to configure the port.

The Edit Network Interface window will appear.

✕

Edit Network Interface

Network Interface

Enable Network

Network Interface Name WAN1

Description

Network Settings

Connection Type

Get IP Address Automatically

Enable VLAN ID

VLAN ID*

3. Use the toggle to enable or disable the interface.
4. (Optional) Enter a descriptive name for the interface.
5. In the [Network Settings] section, choose a Connection Type:

- a. **Static IP:** Configure a static IP address for this interface. Configure the following additional settings:

The screenshot shows a 'Network Settings' form with the following fields and values:

Field	Value
Connection Type	Static IP
IP Address*	10.100.100.1
Subnet Mask*	255.255.255.0
Gateway Address*	10.100.100.254
DNS Server 1	8.8.8.8
DNS Server 2	8.8.8.9
Enable VLAN ID	<input type="checkbox"/>
VLAN ID*	0

- i. **IP Address:** Enter a valid IP address.
 - ii. **Subnet Mask:** Enter the subnet mask.
 - iii. **Gateway Address:** Enter the gateway IP address.
 - iv. (Optional) **DNS Server 1,2:** Enter the primary and secondary DNS server.
 - v. (Optional) **Enable VLAN ID:** Use the toggle to enable/disable VLAN ID tagging.
 - vi. (Optional) **VLAN ID:** If VLAN ID is enabled, specify a VLAN ID.
- b. **DHCP Client:** Configure the interface as a DHCP client that will receive its IP address information from a DHCP server. Configure the following additional settings:

The screenshot shows a 'Network Settings' form with the following fields and values:

Field	Value
Connection Type	DHCP Client
Get IP Address Automatically	<input type="checkbox"/>
Enable VLAN ID	<input type="checkbox"/>
VLAN ID*	0

- i. (Optional) **Enable VLAN ID:** Use the toggle to enable/disable VLAN ID tagging.
 - ii. (Optional) **VLAN ID:** If VLAN ID is enabled, specify a VLAN ID.
6. Click **Ok**.

The NAT Screens

This chapter describes how to configure Network Address Translation (NAT) rules and how to enable or disable application-layer gateways (ALG).

The following topics are covered in this chapter:

❑ **NAT Rules**

- Configuring 1-to-1 NAT Rules
- Configuring Multi 1-to-1 NAT Rules
- Configuring Port Forwarding

❑ **Application-layer Gateways (ALG)**

- Configuring ALG Settings

NAT Rules

Use the [NAT] tab to configure the following settings:

- 1-to-1: The simplest form of NAT for point-to-point translation of IP addresses.
- 1-to-N: This form of NAT maps multiple private hosts to a single public IP address. When packets travel from the private network to a public network, the source IP address will be changed. Similarly, when packets travel from a public network into the private network, their destination IP address will be changed.
- Port forwarding address translation for incoming traffic on the WAN interface.



The following table describes the basic tasks you can perform from the [NAT Rule] tab.

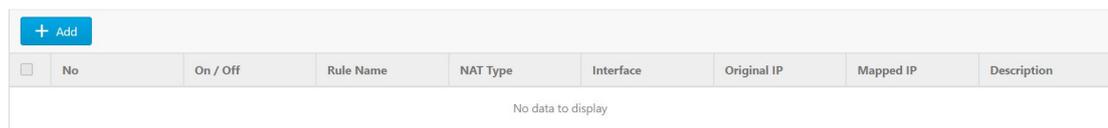
Task	Description
Add a NAT rule	Click Add to create a new NAT rule.
Edit a NAT rule	Click on the name of an existing NAT rule to edit it.
Delete a NAT rule	Select one or more NAT rules and click Delete .
Copy a NAT rule	Select one or more NAT rules and click Copy .

Configuring 1-to-1 NAT Rules

1-on-1 NAT rules allow you to map a destination IP address for incoming traffic to an IP address within the local network and vice versa. That is, these rules can also allow you to map a source IP address from your local network to outgoing traffic.

Steps:

1. Go to [NAT] > [NAT Rule].
The NAT Rule tab will appear.



2. Do one of the following:
 - a. Click **Add** to create a new rule.
 - b. Click on the name of an existing NAT rule to edit it.

3. Configure the following settings:

- a. **Enable NAT Rule:** Use the toggle to enable or disable the NAT rule.
 - b. **NAT Type:** Select **1 to 1 NAT** from the drop-down list.
 - c. **Rule Name:** Enter a name for the rule.
 - d. (Optional) **Description:** Enter a description for the rule.
 - e. **Incoming Interface:** Select the interface that will process incoming traffic for this rule from the drop-down list.
 - f. **Original IP:** Enter the destination IP to be translated. When the device receives packets on the interface in the [Incoming Interface] setting, if the destination IP of the packet matches the [Original IP], it will be changed to the [Mapped IP].
 - g. **Mapped IP:** Enter the IP address the [Original IP] will be mapped to. This is usually a private IP address within your local network.
 - h. (Optional) **Enable NAT Loopback:** Use the toggle to enable or disable NAT loopback.
4. Click **Ok** to close the Create Rule window.
 5. On the Rules overview page, click **Save** to save your settings.

Configuring Multi 1-to-1 NAT Rules

1-to-N NAT rules allow you to map a public destination IP for incoming traffic to multiple private IP addresses within the local network and vice versa. That is, these rules can also allow you to map a source IP address from your local network to outgoing traffic.

The following table shows an example:

Original Destination IP	Mapped Destination IP
172.1.1.5	192.168.100.5
172.1.1.20	192.168.100.20
172.1.1.50	192.168.100.50
172.1.1.69	192.168.100.69

Steps:

1. Go to [NAT] > [NAT Rule].
The NAT Rule tab will appear.

2. Do one of the following:

- a. Click **Add** to create a new rule.
 - b. Click on the name of an existing NAT rule to edit it.
3. Configure the following settings:

- a. **Enable NAT Rule:** Use the toggle to enable or disable the NAT rule.
 - b. **NAT Type:** Select **Multi 1 to 1 NAT** from the drop-down list.
 - c. **Rule Name:** Enter a name for the rule.
 - d. (Optional) **Description:** Enter a description for the rule.
 - e. **Incoming Interface:** Select the interface that will process incoming traffic for this rule from the drop-down list.
 - f. **Original IP:** Enter the destination IP addresses to be translated using CIDR (Classless Inter-domain Routing) format, for example 172.1.1.0/24. When the device receives packets on the interface in the [Incoming Interface] setting, if the destination IP of the packet matches the [Original IP], it will be changed to the [Mapped IP]. These IP addresses are usually assigned by the ISP (Internet Service Provider).
 - g. **Mapped IP:** Enter the IP addresses the [Original IP] will be mapped to using the CIDR (Classless Inter-domain Routing) format, for example 192.168.100.0/24. This is usually a private IP address within your local network.
 - h. (Optional) **Enable NAT Loopback:** Use the toggle to enable or disable NAT loopback.
4. Click **Ok** to close the Create Rule window.
5. On the Rules overview page, click **Save** to save your settings.

Configuring Port Forwarding

Port forwarding rules allow you to map a host IP address to forward incoming traffic to another IP address within the local network.

Steps:

1. Go to [NAT] > [NAT Rule].
The NAT Rule tab will appear.

+ Add									
<input type="checkbox"/>	No	On / Off	Rule Name	NAT Type	Interface	Original IP	Mapped IP	Description	
No data to display									

2. Do one of the following:
 - a. Click **Add** to create a new rule.
 - b. Click on the name of an existing NAT rule to edit it.

3. Configure the following settings:

- a. **Enable NAT Rule:** Use the toggle to enable or disable the NAT rule.
 - b. **NAT Type:** Select **Port Forward** from the drop-down list.
 - c. **Rule Name:** Enter a name for the rule.
 - d. (Optional) **Description:** Enter a description for the rule.
 - e. **Incoming Interface:** Select the interface that will process incoming traffic for this rule from the drop-down list.
 - f. **Protocol:** Select the protocol that will be processed by the rule.
 - g. **Original IP:** Enter the port range to be translated. When the device receives packets on the interface in the [Incoming Interface] setting, if the destination IP of the packet matches the [Original IP], it will be changed to the [Mapped IP] IP address and port range.
 - h. **Mapped IP:** Enter the IP address and port range the [Original IP] will be mapped to. This is usually a private IP address within your local network.
 - i. (Optional) **Enable NAT Loopback:** Use the toggle to enable or disable NAT loopback.
4. Click **Ok** to close the Create Rule window.
 5. On the Rules overview page, click **Save** to save your settings.

Application-layer Gateways (ALG)

An application-layer gateway (ALG) allows client applications with server applications through server ports that are opened to client applications. These ports are usually dynamically assigned in the application protocol. An ALG understands application protocols, recognizes application-specific commands, and helps open device ports to enable communications. Without ALG, client applications like FTP would be unable to transfer files when the FTP client is located within a NAT network.

Use the [ALG Settings] tab to configure the following settings:

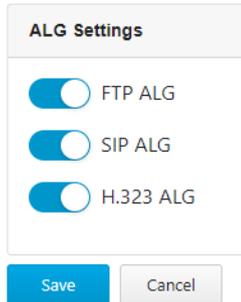
- Enable or disable the FTP, SIP, and H.323 ALG

Configuring ALG Settings

Steps:

1. Go to [NAT] > [ALG].

The ALG Settings tab will appear.



ALG Settings

FTP ALG

SIP ALG

H.323 ALG

Save Cancel

2. Use the toggles to enable or disable the FTP, SIP, and H.323 ALG.
3. Click **Save**.

The Routing Screens

This chapter describes how to configure and view static routes on the device.

The following topics are covered in this chapter:

- ▣ **Static Routes**

- Configuring Static Routes

Static Routes

Static routes are generally used when no appropriate dynamic route is available, or when you want traffic to follow a specific route as opposed to following the dynamic route that is automatically learned and generated by the device.

Use the [Static Route] tab to view a list of all configured static routes on the device and create new or edit existing static routes.

The following table describes the basic tasks you can perform from the [Static Route] tab.

Task	Description
Add a static route	Click Add to create a new static route.
Edit a static route	Click on the name of an existing static route to edit it.
Delete a static route	Select one or more static routes and click Delete .
Copy a static route	Select one or more static routes and click Copy .

Configuring Static Routes

Steps:

- Go to [Routing] > [Static Route].
The Static Route tab will appear.
- Do one of the following:
 - Click **Add** to create a new static route.
 - Click on the name of an existing static route to edit it.
- Configure the following settings:

- Enable Static Route:** Use the toggle to enable or disable the route.
- Rule Name:** Enter a name for the route.
- (Optional) **Description:** Enter a description for the route.
- Destination Address:** Enter the route's destination address.
- Subnet Mask:** Enter the subnet mask. If the destination is a single IP address, the subnet should be set to 255.255.255.255. If the destination is a subnet, enter the subnet mask to match the destination IP range, for example 255.255.255.0.
- Configure the Next Hop Type.

- i. **Gateway IP Address:** If the next hop is a gateway, enter the gateway's IP. The gateway must be in the same network as the forwarding interface.
 - ii. **Network Interface:** If the next hop is an interface on the device, select the interface from the drop-down menu.
 - g. **Metric:** Enter a metric for the route. This determines which static route to use based on the specified metric. A lower number represents a higher priority.
4. Click **Ok**.
 5. Click **Save** to save the route.

The Object Profiles Screens

Object profiles simplify policy management by storing configurations that can be used by the IEF-G9010 Series.

You can configure the following types of object profiles for this device:

- **IP Object Profile:** Contains the IP addresses that you can apply to a policy rule.
- **Service Object Profile:** Contains the service definitions that you can apply to a policy rule. TCP port range, UDP port range, ICMP, and custom protocol number are defined here.
- **Protocol Filter Profile:** Contains more sophisticated and advanced protocol settings that you can apply to a policy rule. Details of ICS (Industrial Control System) protocols are defined here.

The following table describes the tasks you can perform when you view a list of the profiles:

Task	Description
Add a profile	Click [Add] to create a new profile.
Edit a profile	Click a profile name to edit the settings.
Delete a profile	Select one or more profiles and click [Delete].
Copy a profile	Select on profile and click [Copy].

The following topics are covered in this chapter:

- **Configuring IP Object Profile**
- **Configuring Service Object Profile**
- **Configuring Protocol Filter Profile**
 - Specifying Commands Allowed in an ICS Protocol
 - Advanced Settings for Modbus Protocol

Configuring IP Object Profile

You can configure the IP address in an IP object profile, which can be used by other policy rules. The types of IP address you can assign are:

- Single IP address
- IP ranges
- IP Subnets

Steps:

1. Go to [Object Profile] → [IP Object Profile].
2. Do one of the following:
 - Click [Add] to create a profile.
 - Click a profile name to edit settings.

Create IP Object Profile

IP Object Name* ⓘ

Description ⓘ

IP Profile List (Max: 8 IP list)

No.1* +

3. Type a descriptive name for the IP Object Name field.
4. Type a description.
5. Under the [IP Object List], specify an IP address, an IP range, or an IP subnet.
6. If you want to add another entry, click the button.
7. Click [OK].

Configuring Service Object Profile

In a service object profile, you can define the following:

- TCP protocol port range
- UDP protocol port range
- ICMP protocol type and code
- Custom protocol with specified protocol number

NOTE The term 'protocol number' refers to the protocol number defined in the internet protocol suite.

Steps:

1. Go to [Object Profile] → [Service Object Profile].
2. Do one of the following:
 - Click [Add] to create a profile.
 - Click a profile name to edit settings.

Create Service Object Profile

Service Object Name* ⓘ

Description ⓘ

Service Object List (Max: 8 service list)

No.1*	Protocol	Protocol Number	Service Port	~	Service Port	
	TCP	6	0	~	0	+

3. Type a descriptive name for the Service Object Profile.
4. Type a description.
5. Provide one of the following definitions:
 6. TCP protocol and its port range
 7. UDP protocol and its port range
 8. ICMP protocol and its type and code
 9. Custom protocol with specified protocol number
10. If you want to add another entry, click the  button.
11. Click [OK].

Configuring Protocol Filter Profile

A protocol filter profile contains more sophisticated and advanced protocol settings that you can apply to a policy rule.

The following can be configured in a protocol filter profile:

- Details of ICS protocols, including:
 - Modbus
 - CIP
 - S7COMM
 - S7COMM_PLUS
 - PROFINET
 - SLMP
 - FINS
- General Protocols, including:
 - HTTP
 - FTP
 - SMB
 - RDP
 - MQTT

▼ ICS Protocol		
<input type="checkbox"/> Protocol Name	Advanced Settings	Information
<input type="checkbox"/> Modbus	<input type="button" value="Settings"/>	Any
<input type="checkbox"/> CIP	<input type="button" value="Settings"/>	Any
<input type="checkbox"/> S7COMM	<input type="button" value="Settings"/>	Any
<input type="checkbox"/> S7COMM_PLUS	<input type="button" value="Settings"/>	Any

▼ General Protocol
<input type="checkbox"/> Protocol Name
<input type="checkbox"/> HTTP
<input type="checkbox"/> FTP
<input type="checkbox"/> SMB
<input type="checkbox"/> RDP

Specifying Commands Allowed in an ICS Protocol

When configuring an ICS protocol, you can specify which commands will be included in the protocol profile, as the following picture shows.

EtherNetIP/CIP Advanced Setting

Command / Function category access permission ⓘ

Any
 Basic

Read Only
 Read / Write
 Admin Config
 Others

Advanced Settings for Modbus Protocol

The device features more detailed configurations for the Modbus ICS protocol. Through the [Advanced Settings] pane, you can further specify the code/function, unit ID, and address/addresses range against which the function will operate.

Modbus Advanced Setting
✕

Command / Function category access permission ⓘ

Any
 Basic
 Read Only Read / Write Admin Config Others

Professional Setting

Function list: 0x01: Read Coils ▼

Function Code: 0x01 ⓘ

Unit ID: 0 ⓘ

Address: Any ▼ ⓘ

Max: 8 function code list

	No	Function Code	Function Code List	Unit ID	Address
No data to display					

Steps:

1. Go to [Object Profile] → [Protocol Filter Profile].
2. Click [Add] to add a protocol filter profile, and the [Create Protocol Filter Profile] screen will appear.

Create Protocol Filter Profile
✕

Protocol Filter Profile Name* ⓘ

Description ⓘ

▼ ICS Protocol

	Protocol Name	Advanced Settings	Information
<input type="checkbox"/>	Modbus	<input type="button" value="Settings"/>	Any
<input type="checkbox"/>	CIP	<input type="button" value="Settings"/>	Any
<input type="checkbox"/>	S7COMM	<input type="button" value="Settings"/>	Any
<input type="checkbox"/>	S7COMM_PLUS	<input type="button" value="Settings"/>	Any

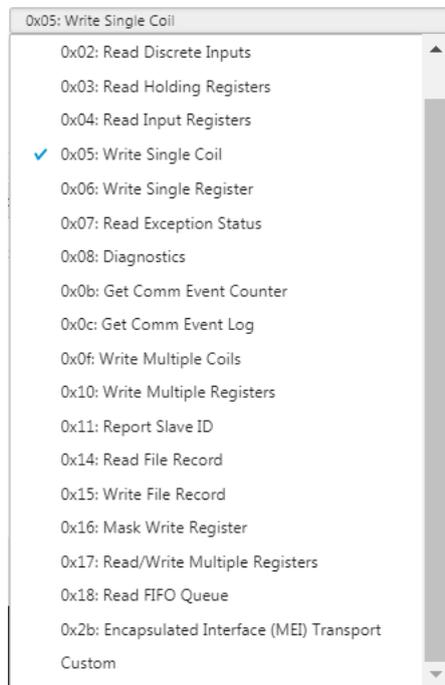
▼ General Protocol

	Protocol Name
<input type="checkbox"/>	HTTP
<input type="checkbox"/>	FTP
<input type="checkbox"/>	SMB
<input type="checkbox"/>	RDP

3. Type a protocol filter profile name.
4. Type a description.

8-5

5. In the [ICS Protocol] pane, select the protocols you want to include in the protocol filter.
 - a. Click [Settings] next to a protocol, and select one of the following:
 - **Any** - Specify all available commands or function access in this protocol.
 - **Basic** - Multiple selections of the following:
 - **Read Only:** Read commands sent from HMI (Human-Machine Interface) / EWS (Engineering Work Station) / SCADA (Supervisory Control and Data Acquisition) to PLC (Programmable Logic Controller).
 - **Read/Write:** Read and write commands sent from HMI/EWS/SCADA to PLC.
 - **Admin Config:** Firmware update commands sent from EWS to PLC, Project update (i.e., PLC code download) commands sent from EWS to PLC, and administration configuration relevant commands from EWS to PLC.
 - **Others:** Private commands, un-documented commands, or particular protocols provided by an ICS vendor.
 - b. If you have selected [Modbus], you can optionally configure advanced settings for this protocol:
 - Click [Settings] besides [Modbus], and select [Advanced Matching Criteria].
 - At the [Function list] drop-down menu, select a function for this protocol.



- If you want to specify a function code by yourself, then select [Custom] and input a function code in the [Function Code] field.
 - Type a unit ID in the [Unit ID] field.
 - Type the address or range of addresses against which the function will operate.
 - Click [Add].
 - Repeat the above steps if you want to add more protocol definition entries.
 - Click [OK].
6. In the [General Protocol] pane, select the protocols you want to include in the protocol filter.
 7. Click [OK].

The Security Screens

This chapter describes cybersecurity and policy enforcement.

The following topics are covered in this chapter:

❑ **Security General Settings**

❑ **Configuring Security Operation Mode**

❑ **Cybersecurity**

- Configuring Cybersecurity - Intrusion Prevention Setting
- Configuring Cybersecurity - Denial of Service Prevention

❑ **Policy Enforcement**

- Configuring Policy Enforcement
- Adding Policy Enforcement Rules
- Managing Policy Enforcement Rules

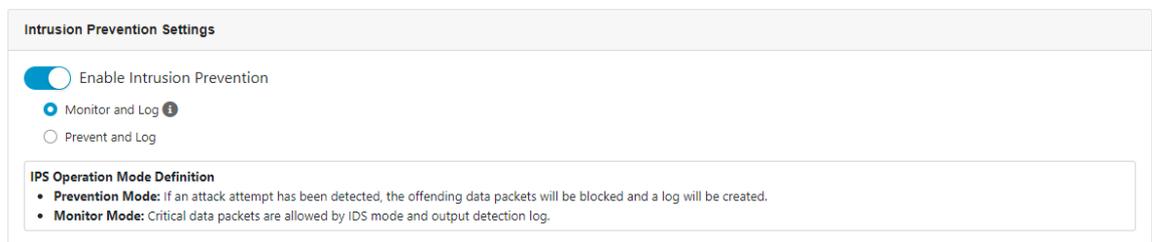
Cybersecurity

This device features cybersecurity, which covers both intrusion prevention and denial of service attack prevention. The signature rules of intrusion prevention are called 'DPI (Deep Packet Inspection) Pattern'. This pattern can be regularly updated through SDC as well by manual import via the device's web management UI.

Configuring Cybersecurity - Intrusion Prevention Setting

Steps:

1. Go to [Security] → [Cyber Security].
2. At the [Cyber Security] screen you will see the [Intrusion Prevention Setting] pane.
3. Use the toggle to enable or disable the intrusion prevention feature.
4. Select an action (Monitor and Log, or Prevent and Log) for the intrusion prevention feature.



The screenshot shows the 'Intrusion Prevention Settings' configuration page. At the top, there is a toggle switch labeled 'Enable Intrusion Prevention' which is currently turned on. Below this, there are two radio button options: 'Monitor and Log' (which is selected) and 'Prevent and Log'. An information icon is next to the 'Monitor and Log' option. Below the radio buttons, there is a section titled 'IPS Operation Mode Definition' with two bullet points: 'Prevention Mode: If an attack attempt has been detected, the offending data packets will be blocked and a log will be created.' and 'Monitor Mode: Critical data packets are allowed by IDS mode and output detection log.'

5. Click [Save].

Configuring Cybersecurity – Denial of Service Prevention

Steps:

1. Go to [Security] → [Cyber Security].
2. At the [Cyber Security] screen you will see the [Denial of Service Prevention] pane.

Deny of Service Prevention Setting

Deny of Service prevention

Monitoring and Log ⓘ

Prevention and Log

<input checked="" type="checkbox"/> TCP SYN Flood	Threshold	<input type="text" value="10000"/>	packet ⓘ	<input checked="" type="checkbox"/> UDP Flood	Threshold	<input type="text" value="10000"/>	packet ⓘ
<input checked="" type="checkbox"/> ICMP Flood	Threshold	<input type="text" value="10000"/>	packet ⓘ	<input checked="" type="checkbox"/> IGMP Flood	Threshold	<input type="text" value="10000"/>	packet ⓘ
<input checked="" type="checkbox"/> UDP Port Scan	Threshold	<input type="text" value="250"/>	packet ⓘ	<input checked="" type="checkbox"/> TCP Port SYN Scan	Threshold	<input type="text" value="1800"/>	packet ⓘ
<input checked="" type="checkbox"/> TCP Port FIN Scan	Threshold	<input type="text" value="1800"/>	packet ⓘ	<input checked="" type="checkbox"/> TCP Port NULL Scan	Threshold	<input type="text" value="1800"/>	packet ⓘ
<input checked="" type="checkbox"/> TCP Port Xmas Scan	Threshold	<input type="text" value="1800"/>	packet ⓘ				

3. Use the toggle to enable or disable the denial of service prevention feature.
4. Select an action ([Monitor and Log] or [Prevent and Log]) for the feature.
5. You can optionally configure the thresholds of the denial of service rules.
6. Click [Save].

NOTE Flood/Scan Attack Protection rules utilize the detection period and threshold mechanisms to detect an attack. During a detection period (typically every 5 seconds), if the number of anomalous packets reaches the specified threshold, an attack detection occurs. If the rule action is [Block], the security node blocks subsequent anomalous packets until the end of the detection period. After the detection period, the security node will again allow anomalous packets until the threshold is reached.

The following table summarizes the settings:

IEF-G9010 Series Operation Mode (Security General Setting)	Action Settings	Action Performed
Inline Mode	Monitor and Log	<ul style="list-style-type: none"> • Detects and monitors network attacks, but does not block network attacks. • Generates logs.
	Prevent and Log	<ul style="list-style-type: none"> • Blocks network attacks. • Generates logs.
Offline Mode	Monitor and Log	<ul style="list-style-type: none"> • Passively detects and monitors network attacks. • Generates logs.

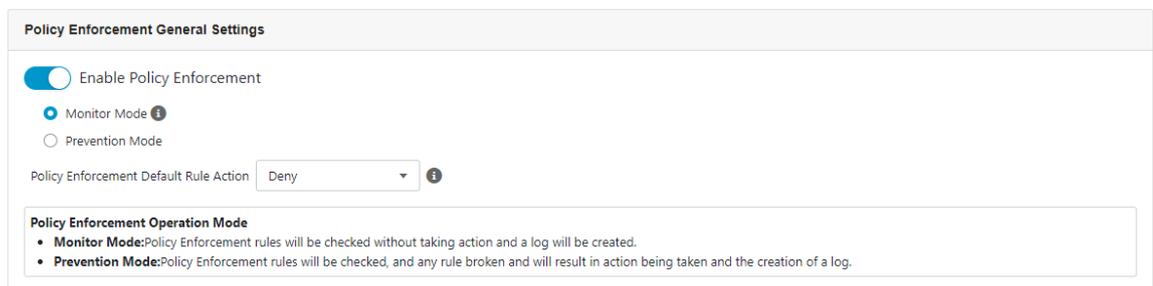
Policy Enforcement

Policy enforcement allows you to define a custom protocol that matches to an industrial protocol, and then whitelist or blacklist activities fitting that protocol in your network environment.

Configuring Policy Enforcement

Steps:

1. Go to [Security] → [Policy Enforcement].
2. On the [Policy Enforcement] screen you will see the [Policy Enforcement General Setting] pane.
3. Use the toggle to enable or disable the policy enforcement feature.
4. Select a mode ([Monitor Mode], or [Prevent Mode]) for the feature.
5. At the [Policy Enforcement Default Rule Action] drop-down menu, select a default action for when no pattern is matched.



Policy Enforcement General Settings

Enable Policy Enforcement

Monitor Mode ⓘ

Prevention Mode

Policy Enforcement Default Rule Action: Deny ⓘ

Policy Enforcement Operation Mode

- **Monitor Mode:** Policy Enforcement rules will be checked without taking action and a log will be created.
- **Prevention Mode:** Policy Enforcement rules will be checked, and any rule broken and will result in action being taken and the creation of a log.

The following table summarizes the settings:

Mode (Policy Enforcement)	Action Performed
Monitor Mode	<ul style="list-style-type: none"> • Detect and monitor abnormal protocol access to OT assets, without blocking network attacks. • Generate logs.
Prevention Mode	<ul style="list-style-type: none"> • Block abnormal protocol access to OT assets. • Generate logs.

Adding Policy Enforcement Rules

Steps:

1. Configure the required object or objects.
 - IP object profiles - For more information, see [Configuring IP Object Profile](#).
 - Service object profiles - For more information, see [Configuring Service Object Profile](#).
 - Protocol filter profiles - For more information, see [Configuring Protocol Filter Profile](#).
2. Go to [Security] → [Policy Enforcement]
3. Under the [Policy Enforcement] screen you will see the following panes.

<input type="checkbox"/>	Rule No	On / Off	Rule Na...	Source ...	Source ...	Destina...	Destina...	Service ...	Service ...	Action
No data to display										

Max: 64 Policy Enforcement Rules

4. Click the [Add] button to add a new policy rule.
5. Toggle to enable or disable the policy rule.

Create Policy Rule

Enable Policy Rule

Name*

Description

Source and Destination Selection

Source IP / IP Object Profile*

Destination IP / IP Object Profile*

Service Object Selection

Service Object*

Action

6. Input a descriptive [Rule Name].
7. Input a descriptive [Description] for the rule.
8. At the [Source IP / IP Object Profile] drop-down menu, select either one of the following for the source IP address(es):
 - Any
 - Single IP
 - IP Range
 - IP Subnet
 - Object

NOTE If you select [Object], then you need to select the IP object from an IP object profile that has been created previously.

9. At the [Destination IP / IP Object Profile] drop-down menu, select either one of the following for the destination IP address(es):
 - Any
 - Single IP
 - IP Range
 - IP Subnet
 - Object
10. At the [Service Object] drop-down menu, select either one of the following for the layer 4 criteria:
 - TCP - You can further specify the port range for this protocol.
 - UDP - You can further specify the port range for this protocol.
 - ICMP - You can further specify the Type and Code for this protocol.
 - Custom - You can further specify the protocol number for this protocol. The term protocol number refers to the one defined in the internet protocol suite.
 - Service Object

NOTE You need to select the service object from a service object profiles that have been created previously.

11. At the [Action] drop-down menu, select one of the following:
 - Accept: Select this option to allow network traffic that matches this rule.
 - Deny: Select this option to block network traffic that matches this rule.
 - Protocol Filter: The node will take further actions based on the protocol filter:
 - a. Under the [Protocol Filter Profile] drop-down menu, select a protocol filter profile you have defined beforehand.
 - b. Under the [Protocol Filter Action] drop-down menu, select whether to allow or deny network traffic that matches the protocol filter.
12. Click [Save] to save the configurations.

Managing Policy Enforcement Rules

The following table lists the common tasks that are used to manage the policy enforcement rules.

Task	Action
To delete a policy enforcement rule	Click the check box in front of the policy enforcement rule and click the [Delete] button.
To duplicate a policy enforcement rule	Click the check box in front of the policy enforcement rule and click the [Copy] button.
To edit a policy enforcement rule	Click the name of the rule, and an [Edit Policy Rule] windows will appear.
To change the priority of a policy enforcement rule	Click the check box in front of the policy enforcement rule, click the [Change Priority] button, and specify a new priority for this rule.

NOTE When more than one policy enforcement rule is matched, the IEF-G9010 Series takes the action of the rule with the highest priority, and ignores the rest of the rules. The rules are listed on the table of the UI screen by priority with the highest priority rule listed on the first row of the table.

The Pattern Screens

This chapter describes how to view the pattern information and how to import a DPI (Deep Packet Inspection) pattern to the IEF-G9010 Series device.

The DPI pattern contains signatures to enable the intrusion prevention feature on the device. The intrusion prevention feature detects and prevents behaviors related to network intrusion attempts or targeted attacks at the network level.

The following topics are covered in this chapter:

- ❑ **Viewing Device Pattern Information**
- ❑ **Manually Updating the Pattern**

Viewing Device Pattern Information

Steps:

1. Go to [Pattern] → [Pattern Update]
2. At the [Pattern Update] screen you will see the following pane.
3. The [Device Pattern Information] pane shows the [Current Pattern Version] and [Pattern Build Date]

Device Pattern information	
Pattern Version:	MX_200120_14
Pattern Build Date:	2020-01-20T06:45:02Z

Manually Updating the Pattern

Steps:

1. Go to [Pattern] → [Pattern Update].
2. At the [Pattern Update] screen you will see the following pane.
3. Click [File Selection] or [Upload].
4. Manually select the pattern to be deployed to the device.

Pattern Update	
Manually Update	
Pattern File Path	<input type="text"/>
	<input type="button" value="Select"/> <input type="button" value="Upload"/>

5. Click [Ok]

NOTE The patterns can be downloaded at <https://netsecuritylicense.moxa.com>.

The Log Screens

This chapter describes the system event logs and security detection logs you can view on the management console.

You can view the following logs on the operational technology defense console:

- ❑ **Viewing Cybersecurity Logs**
- ❑ **Viewing Policy Enforcement Logs**
- ❑ **Viewing Protocol Filter Logs**
- ❑ **Viewing Asset Detection Logs**
- ❑ **Viewing System Logs**
- ❑ **Viewing Audit Logs**

Viewing Cybersecurity Logs

The cybersecurity logs will include logs detected by both intrusion prevention and denial of service prevention features.

Steps:

Go to [Logs] → [Cyber Security Logs].

The following table describes the log table.

Field	Description
Time	The time the log entry was created.
Rule ID	The ID of the policy enforcement rule.
Event ID	The ID of the matched signature.
Security Category	The category of the matched signature.
Security Severity	The severity level assigned to the matched signature.
Security Rule Name	The name of the matched signature.
Source MAC Address	The source MAC address of the connection.
Source IP Address	The source IP address of the connection.
Source Port	The source port of the connection.
Destination MAC Address	The destination MAC address of the connection.
Destination IP Address	The destination IP address of the connection.
Destination Port	The destination port of the connection.
VLAN ID	The VLAN ID of the connection.
Ethernet Type	The Ethernet type of the connection.
IP Protocol Name	The IP protocol name of the connection.
Action	The action performed based on the policy settings.
Count	The number of detected network packets within the detection period after the detection threshold is reached.

Viewing Policy Enforcement Logs

The policy enforcement logs cover logs created by the [Policy Enforcement] feature without [Protocol Filter] being enabled, i.e., the [Action] of the policy enforcement rule is either to allow or to deny. The protocol filter is not used in the policy rule.

Steps:

Go to [Logs] → [Policy Enforcement Logs].

The following table describes the log table.

Field	Description
Time	The time the log entry was created.
Rule Name	The name of the policy enforcement rule that was used to generate the log.
Rule ID	The ID of the policy enforcement rule.
Source MAC Address	The source MAC address of the connection.
Source IP Address	The source IP address of the connection.
Source Port	The source port of the connection.
Destination MAC Address	The destination MAC address of the connection.
Destination IP Address	The destination IP address of the connection.
Destination Port	The destination port of the connection.
IP Protocol Name	The IP protocol name of the connection.
Action	The action performed based on the policy settings.

Viewing Protocol Filter Logs

The protocol filter logs cover logs detected by the [Protocol Filter] feature. Protocol filter is the advanced configuration when you configure the [Policy Enforcement] settings.

Steps:

Go to [Logs] → [Protocol Filter Logs].

The following table describes the log table.

Field	Description
Time	The time the log entry was created.
Policy Enforcement Rule Name	The name of the policy enforcement rule that was used to generate the log.
Profile Name	The name of the protocol filter profile that was used to generate the log.
Source MAC Address	The source MAC address of the connection.
Source IP Address	The source IP address of the connection.
Source Port	The source port of the connection.
Destination MAC address	The destination MAC address of the connection.
Destination IP Address	The destination IP address of the connection.
Destination Port	The destination port of the connection.
Ethernet Type	The Ethernet type of the connection.
IP Protocol Name	The IP protocol name of the connection.
L7 Protocol Name	The layer 7 protocol name of the connection. The term layer 7 refers to the one defined in the OSI (Open Systems Interconnection) model.
Cmd / Fun No	The command or the function number that triggered the log.
Extra Information	Extra information provided with the log.
Action	The action performed based on the policy settings.
Count	The number of detected network packets.

Viewing Asset Detection Logs

The asset detection logs cover the system status changes of the managed assets.

Steps:

Go to [Logs] → [Assets Detection Logs].

The following table describes the log's fields.

Field	Description
Time	The time the log entry was created.
Event Type	The log event description.
Asset MAC Address	The MAC address of the asset.
Asset IP Address	The source IP address of the asset.

Viewing System Logs

You can view details about system events on the device.

Steps:

Go to [Logs] → [System Logs].

The following table describes the log's fields.

Field	Description
Time	The time the log entry was created.
Severity	The severity level of the logs.
Message	The log event description.

Viewing Audit Logs

You can view details about user access, configuration changes, and other events that occurred when using the device.

Steps:

Go to [Logs] → [Audit Logs].

The following table describes the log's fields.

Field	Description
Time	The time the log entry was created.
User ID	The user account used to execute the task.
Client IP	The IP address of the host used to access the management console.
Severity	The severity level of the logs.
Message	The log event description.

NOTE To view the audit logs, please log in with the default "audit" account.

The Administration Screens

This chapter describes the available administrative settings for the IEF-G9010 Series device.

The following topics are covered in this chapter:

❑ **Account Management**

- Built-in User Accounts
- Adding a User Account
- Changing Your Password

❑ **Configuring Password Policy Settings**

❑ **System Management**

- Configuring Device Name and Device Location Information
- Configuring Control List Access from Management Clients
- Configuring Management Protocols and Ports

❑ **The Sync Setting Screen (Pro Version)**

- Enabling Management by SDC

❑ **The Syslog Screen**

- Configuring Syslog Settings
- Syslog Severity Levels
- Syslog Severity Level Mapping Table

❑ **The System Time Screen**

- Configuring System Time

❑ **The Back Up/Restore Screen**

- Backing Up a Configuration
- Restoring a Configuration

❑ **The Firmware Management Screen**

- Viewing Device Firmware Information
- Updating Firmware
- Rebooting and Applying Firmware

❑ **The Reboot System Screen**

- Rebooting the System

Account Management

NOTE Log in to the management console using the default administrator account ("admin") to access the Accounts screens.

This system uses role-based administration to grant and control access to the management console. Use this feature to assign specific management console privileges to the accounts and present them with only the tools and permissions necessary to perform specific tasks. Each account is assigned a specific role. A role defines the level of access to the management console. Users can log on to the management console using custom user accounts.

The following table outlines the tasks available on the [Account Management] screen.

Task	Description
Add account	Click Add to create a new user account. For more information, see Adding a User Account .
Delete existing accounts	Select preexisting user accounts and click Delete.
Edit existing accounts	Click the name of a preexisting user account to view or modify the current account settings.

User Roles:

The following table describes the permissions matrix for user roles.

		User Roles			
Sub-Screen	Action	Admin	Operator	Visitor	Auditor
System	View	Yes	Yes	Yes	Yes
	All operations	Yes	Yes	Yes	Yes
Visibility	View	Yes	Yes	Yes	No
	All operations	Yes	Yes	Yes	No
Device	View	Yes	Yes	No	No
	All operations	Yes	No	No	No
Object Profiles	View	Yes	Yes	No	No
	All operations	Yes	Yes	No	No
Security	View	Yes	Yes	No	No
	All operations	Yes	Yes	No	No
Pattern	View	Yes	Yes	No	No
	All operations	Yes	Yes	No	No
Logs – not including audit log	View	Yes	Yes	Yes	No
Audit Log	View	No	No	No	Yes
Administration	View	Yes	No	No	No
	All operations	Yes	No	No	No

Built-in User Accounts

The following table lists the built-in user accounts in the device.

Built-in Account ID	User Role	Default Password
admin	Admin	moxa
auditor	Auditor	moxa

NOTE The built-in user accounts cannot be deleted from the device.

NOTE Ensure that the passwords of the built-in accounts are changed when you first set up the device.

Adding a User Account

When you log on using the administrator account ("admin"), you can create new user accounts to access the system.

Steps:

1. Go to [Administration] → [Account Management].
2. Click [Add], and the Add User Account screen appears.
3. Configure the account settings.

Field	Description
ID	Type the user ID to log on to the management console.
Name	Type the name of the user for this account.
Password	Type the account password.
Confirm password	Type the account password again to confirm.
Role	Select a user role for this account. For more information, see User Roles .

4. Click [Save].

Changing Your Password

Steps:

1. On the management console banner, click your account name.
2. Click [Change Password], and the Change Password screen will appear.
3. Specify the password settings.
 - Old password
 - New password
 - Confirm password
4. Click [Save].

Configuring Password Policy Settings

The IEF-G9010 Series provides the following password policy settings to enhance web console access security:

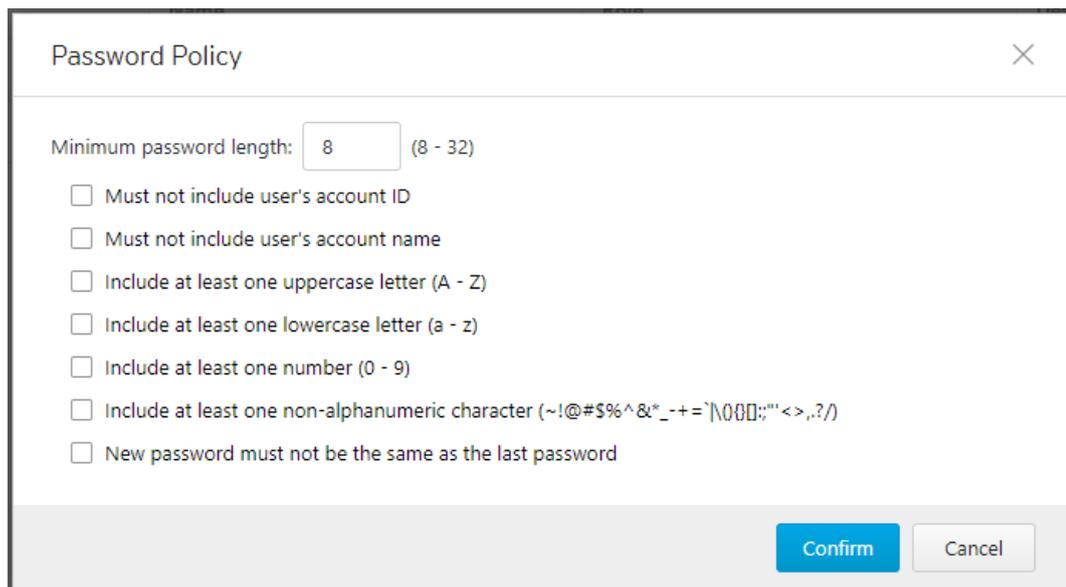
- Password complex settings

Specify password complexity settings to enforce strong passwords. For example, you can specify that users must create strong passwords that contain a combination of both uppercase and lowercase letters, numbers, and symbols, and which are at least eight characters in length.

NOTE When strong passwords are required, a user submits a new password, and the password policy determines whether the password meets your company's established requirements. Strict password policies may sometimes increase costs to an organization when users select passwords that are too difficult to remember. Users call the help desk when they forget their passwords, or keep passwords in easily accessible locations and increase their vulnerability to threats. When establishing a password policy, balance your need for strong security against the need to make the policy easy for users to follow.

Steps:

1. Go to [Administration] → [Account Management].
2. Click the [Password Policy] tab, and the [Password Policy] screen will appear.
3. Select one or more options that meet your required password policy.
4. Click Save.



Minimum password length: (8 - 32)

- Must not include user's account ID
- Must not include user's account name
- Include at least one uppercase letter (A - Z)
- Include at least one lowercase letter (a - z)
- Include at least one number (0 - 9)
- Include at least one non-alphanumeric character (~!@#\$%^&*_-+=`|0{}[];\"<>.,?/)
- New password must not be the same as the last password

System Management

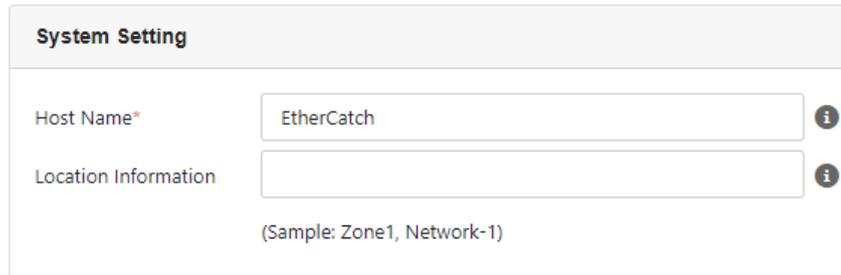
Use the [System Management] screens to do the following:

- Configure the host name and location information of the device.
- Configure the IP addresses that are allowed to manage the device
- Choose the protocols and ports that can be used to manage the device.

Configuring Device Name and Device Location Information

Steps:

1. Go to [Administration] → [System Management].
2. In the [System Setting] pane, provide the host name and location information for the device.

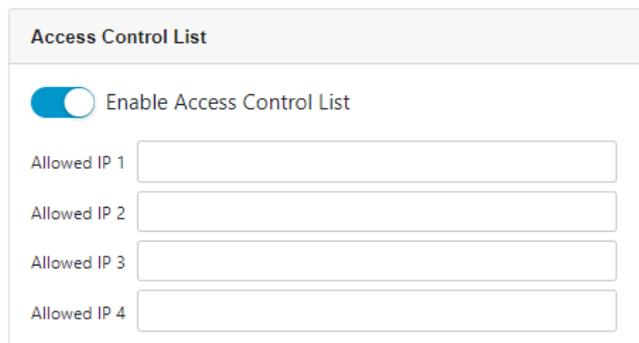


The screenshot shows the 'System Setting' configuration pane. It has a title bar 'System Setting'. Below it, there are two input fields. The first is labeled 'Host Name*' and contains the text 'EtherCatch'. To its right is an information icon (i). The second is labeled 'Location Information' and is currently empty. To its right is also an information icon (i). Below the second field, there is a sample text '(Sample: Zone1, Network-1)'.

Configuring Control List Access from Management Clients

Steps:

1. Go to [Administration] → [System Management].
2. In the [Access Control List] pane, use the toggle to enable or disable access control from the management clients.
3. Provide the IP addresses that are allowed to manage the device.



The screenshot shows the 'Access Control List' configuration pane. It has a title bar 'Access Control List'. Below it, there is a toggle switch labeled 'Enable Access Control List', which is currently turned on. Below the toggle, there are four input fields labeled 'Allowed IP 1', 'Allowed IP 2', 'Allowed IP 3', and 'Allowed IP 4', all of which are currently empty.

Configuring Management Protocols and Ports

Steps:

1. Go to [Administration] → [System Management].
2. In the [Management Method] pane:
 - a. Select the protocols that are allowed to be used.
 - b. Input the port numbers for the protocols.

Management Method

HTTPS / HTTP

HTTP* 80 ⓘ

HTTPS* 443 ⓘ

SSH* 22 ⓘ

Telnet* 23 ⓘ

NOTE The HTTP and HTTPS protocols are used for connecting to the web management console. The SSH and Telnet protocols are used for connecting to the CLI commands.

The Sync Setting Screen (Pro Version)

The IEF-G9010 Series can be managed by Moxa SDC (Security Dashboard Console). Use this screen to register the IEF-G9010 Series to Moxa's SDC.

Enabling Management by SDC

Steps:

1. Go to [Administration] → [Sync Setting].
2. In the [SDC Setting] pane:
 - a. Use the toggle to enable management by SDC.
 - b. Input the IP address of the SDC server.

SDC Setting

Enable SDC Management

SDC Server Address

SDC Sync: Disconnected

Save Cancel

The Syslog Screen

The IEF-G9010 Series system maintains Syslog events that provide summaries of security and system events. Common Event Format (CEF) syslog messages are used in the IEF-G9010 Series.

Configure the Syslog settings to enable the device to send the Syslog to a Syslog server.

Configuring Syslog Settings

Steps:

1. Go to [Administration] → [Syslog].

The screenshot shows the 'Syslog Settings' configuration page. It includes a checkbox for 'Send logs to a syslog server' which is checked. Below this are input fields for 'Server address' (1.2.3.4) and 'Port' (514). The 'Protocol' section has radio buttons for 'TCP' and 'UDP', with 'UDP' selected. The 'Facility Level' is set to 'local 4' and the 'Log Level' is set to 'INFO'. At the bottom, there are two lists: 'Available logs' (empty) and 'Selected logs' (CYBER_SECURITY_LOG, PROTOCOL_FILTER_LOG, POLICY_ENFORCEMENT_LOG, ASSET_LOG, SYSTEM_LOG). A double-headed arrow indicates the relationship between these two lists.

2. Select [Send logs to a syslog server] to set the SDC system to send logs to a Syslog server.
3. Configure the following settings.

Field	Description
Server address	Type the IP address of the Syslog server.
Port	Type the port number.
Protocol	Select the protocol for the communication.
Facility level	Select a facility level to determine the source and priority of the logs.
Severity level	Select a Syslog severity level. This device only sends logs with the selected severity level or higher to the Syslog servers. For more information, see Syslog Severity Levels .

4. Select the types of logs to send.
5. Click Save.

Syslog Severity Levels

The Syslog severity level specifies the type of messages to be sent to the Syslog server.

Level	Severity	Description
0	Emergency	<ul style="list-style-type: none"> Complete system failure Take immediate action.
1	Critical	<ul style="list-style-type: none"> Primary system failure Take immediate action.
2	Alert	<ul style="list-style-type: none"> Urgent failures Take immediate action.
3	Error	<ul style="list-style-type: none"> Non-urgent failures Resolve issues quickly.
4	Warning	<ul style="list-style-type: none"> Error pending Take action to avoid errors.
5	Notice	<ul style="list-style-type: none"> Unusual events Immediate action is not required.
6	Informational	<ul style="list-style-type: none"> Normal operational messages useful for reporting, measuring throughput, and other purposes No action is required.
7	Debug	<ul style="list-style-type: none"> Useful information when debugging the application. Note: Setting the debug level can generate a large amount of Syslog traffic in a busy network. Use with caution.

Syslog Severity Level Mapping Table

Policy Enforcement / Protocol Filter Action	Cybersecurity Severity Level	Syslog Severity Level
		0 - Emergency
	Critical	1 - Alert
	High	2 - Critical
		3 - Error
Deny	Medium	4 - Warning
		5 - Notice
Allow		6 - Information
		7 - Debug

The System Time Screen

The Network Time Protocol (NTP) synchronizes computer system clocks across the Internet. Configure NTP settings to synchronize the server clock with an NTP server, or manually set the system time.

Configuring System Time

Steps:

1. Go to [Administration] → [System Time].

Administration > System Time

Date and Time

Current Time: 2019-10-22T14:54:13+08:00 

Synchronize system time with an NTP server

NTP Server: (Default time server: pool.ntp.org)

Time Zone

Time Zone: 

2. In the [Date and Time] pane, select one of the following:
 - Synchronize system time with an NTP server
 - a. Specify the domain name or IP address of the NTP server.
 - b. Click Synchronize Now.
 - Set system time manually
 - a. Click the calendar to select the date and time.
 - b. Set the hour, minute, and second.
 - c. Click Apply.
2. From the [Time Zone] drop-down list, select the time zone.
3. Click Save.

NOTE SDC system synchronizes the system time with its managed instances.

The Back Up/Restore Screen

Export settings from the management console to back up the configuration of your IEF-G9010 Series. If a system failure occurs, you can restore the settings by importing the configuration file that you previously backed up.

We recommend the following:

- Backing up the current configuration before each import operation.
- Performing the operation when the IEF-G9010 Series is idle. Importing and exporting configuration settings affects the performance of the IEF-G9010 Series.

Backing Up a Configuration

Steps:

1. Go to [Administration] → [Back Up / Restore], and the [Backup / Restore] screen will appear.

System > Backup / Restore

Backup Configuration

Backup administration settings to a file on your computer.

Backup

Restore Configuration

Restore the configuration from a backup file. It is recommended that you backup your current configuration before you replace it.

Note: Restoring replaces current configuration settings.

Select File

2. Click the [Backup] button, and a configuration backup file will automatically save in your computer.

Restoring a Configuration

Follow the steps to restore the configurations of the IEF-G9010 Series device.

Steps:

1. Go to [Administration] → [Back Up / Restore].
2. Under the [Restore Configuration] section, click the [Select File] button, and proceed to import the file.

All services will restart. It can take some time to restart services after applying imported settings and rules.

The Firmware Management Screen

Use the [Firmware Management] screen to:

- View the firmware information for the device.
- Upgrade the firmware of the device.

Viewing Device Firmware Information

Steps:

1. Go to [Administration] → [Firmware Management].
2. The [Firmware Management] pane lists the two partitions available. It shows the [Partition #], [Partition Name], [Partition Status], [Firmware Version] and [Firmware Build Date].

No	Partition Name	Partition Status	Firmware Version	Firmware Build Time	Actions
1	boot1	Standby	IEC_G02_0.9.2	2019-12-16T13:14:05Z	
2	boot2	Running	IEC_G02_1.0.5	2020-02-05T07:16:40Z	

NOTE The IEF-G9010 Series can have up to two firmwares installed. Each firmware is installed in its own and separate partition. At any given point in time, one partition will have the status of [Running], which indicates the currently running and active firmware. The other partition will have the status of [Standby] which indicates an alternative or standby partition.

Updating Firmware

Steps:

1. Go to [Administration] → [Firmware Management].

NOTE During a firmware upgrade, firmware will always be installed to the [Standby] partition. As such, the firmware upgrade button is only available in the [Standby] partition row.

2. Click on the Upgrade Firmware button to install it to the [Standby] partition.

No	Partition Name	Partition Status	Firmware Version	Firmware Build Time	Actions
1	boot1	Standby	IEC_G02_0.9.2	2019-12-16T13:14:05Z	
2	boot2	Running	IEC_G02_1.0.5	2020-02-05T07:16:40Z	

3. In the [Update Firmware] pane provide the location of the firmware and click [Upload] to install the firmware to the [Standby partition].

Firmware Update

Local Firmware Update

4. After successfully installing the required firmware to [Standby] partition, click on the [Reboot and Apply firmware] button as shown in the next section.

NOTE Various versions of the firmware can be downloaded at <https://netsecuritylicense.moxa.com>.

Rebooting and Applying Firmware

To boot into an upgraded firmware or to revert to a previous firmware, a user may need to boot into the [Standby] partition and load the firmware from there.

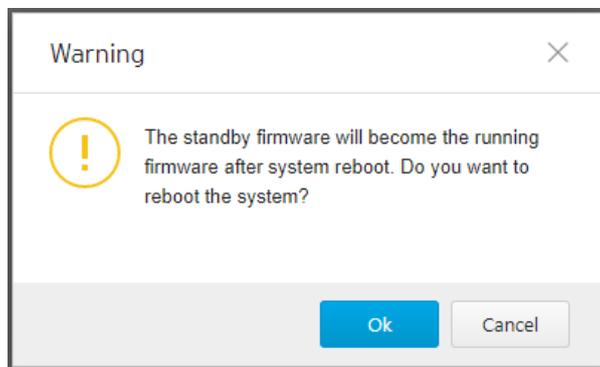
Steps:

1. Go to [Administration] → [Firmware Management].
2. Click on the [Reboot and Apply firmware] button that is available in the [Standby] partition row.

No	Partition Name	Partition Status	Firmware Version	Firmware Build Time	Actions
1	boot1	Standby	IEC_G02_0.9.2	2019-12-16T13:14:05Z	
2	boot2	Running	IEC_G02_1.0.5	2020-02-05T07:16:40Z	

NOTE Only when 2 partitions have their own firmware, and the switch icon appears.

3. Click [OK] to proceed with rebooting into the [Standby] partition and making it the [Running] partition.



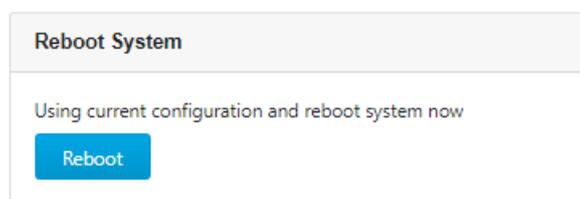
The Reboot System Screen

Use the [Reboot System] screen to reboot the system.

Rebooting the System

Steps:

1. Go to [Administration] → [Reboot System].
2. In the [Reboot System] pane, click [Reboot] to reboot the system.



Supported USB Devices

This chapter describes the USB devices that can be used with the IEF-G9010-2MGSFP Series device for extended or supporting functionality.

To ensure optimal operation, only use the USB listed below.

#	Model	Device Type
1	Moxa Backup Configurator (ABC-02 Series) Model: ABC-02-USB-T	USB Disk Drive

Pattern Loading Function

A DPI pattern file may be easily and quickly loaded via a USB disk device. This functionality allows for a floor operator to update the pattern file on the physical floor of an ICS environment without the need of a client computer to log in to the device.

NOTE Given that this feature allows anyone with a supported USB disk device to update the pattern file, the physical security of the IEF-G9010 device must be considered carefully.

NOTE Only supported USB disk devices can be used for this feature.

Procedure

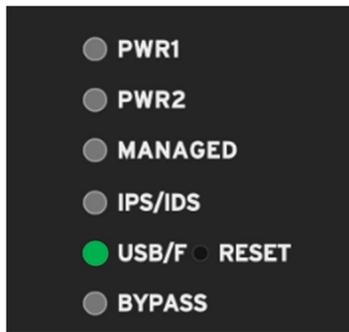
1. Save the pattern file in a USB disk device under the path `"/TXone/pattern/"`. Assuming a pattern file has the name `pattern.acf`, as its file path on the USB disk device the path would be `"/TXone/pattern/pattern.acf"`.

NOTE Saving pattern files under other paths or incorrect folder names will cause the file to not be detected during the pattern load process. Folder names are case-insensitive.

NOTE If multiple pattern files exist in the folder, the newest will be selected in subsequent steps.

2. Plug the supported USB disk device into the IEF-G9010 device's USB port.

- Upon successful detection of the USB disk device, the "IPS/IDS" LED will change to steady green. The system log can also be checked to confirm that a supported USB disk device was properly detected when inserted.

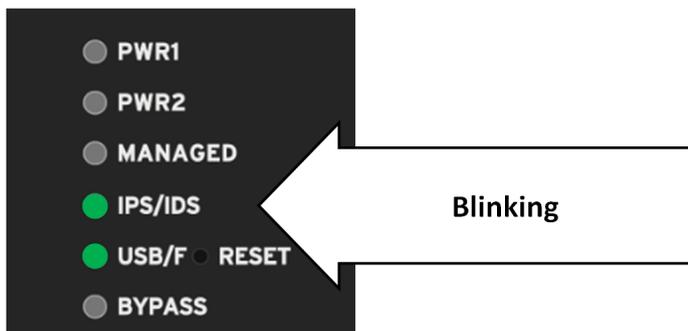


NOTE If a USB device is plugged in that is not supported, it will be ignored and no further action will be taken.

- The functionality of the reset button will also change to support this function until the USB device is unplugged. The reset button will at this time not serve as a reboot/factory reset button. It will instead serve as a button to cycle through a set of possible actions that may be taken when a USB device is plugged in.
- The user can use the reset button to cycle through a set of possible actions. By default, no action is selected. The user must press the reset button at least once to make a selection. The LEDs will indicate which action is currently selected.

Action	LED	COLOR/STATE
Default – No action selected but USB plugged in	IPS/IDS LED	Amber – Steady
Load/Restore Pattern from USB Disk Device	IPS/IDS LED	Green – Blinking (1/sec)

- From the default state, press the reset button once to select "Load/Restore Pattern from USB Disk Device". The IPS/IDS LED will turn green and start blinking.



- After ensuring the correct action is selected, the action must be confirmed by holding down the reset button for more than 3 seconds.

NOTE The action must be confirmed within 10 seconds. If the action is not confirmed within 10 seconds, the LEDs will return to their default state (no action selected) and an action must be selected once again if desired.

- While attempting an action, if there is a USB disk data transfer, the following LED will indicate it as shown below. After the transfer is complete, it will return to its previous state.

Action	LED	COLOR/STATE
Data Transfer Indication	IPS/IDS LED	Amber/Green – Blinking (Once every 0.5 sec)

- If any error occurs when an action is being attempted, the following LED will indicate it as shown below:

Action	LED	COLOR/STATE
Error Indication (any error while action was being processed)	Fault LED	Red – Steady

NOTE The error can only be cleared if: (1) the reset button is pressed once more (LEDs return to default state with no action selected) or (2) the USB disk is unplugged.

10. Relevant system logs can be checked to verify whether an action was completed successfully or not. If an action is successful, LEDs will be restored to their default state when the USB disk device was first plugged in and no action was selected.
11. The USB disk device may be unplugged, after which LEDs will return to their state prior to the USB disk device being plugged in, and a log will be available in system logs.

NOTE Various versions of the pattern files can be downloaded at <https://netsecuritylicense.moxa.com>.