

CIP and MODBUS Configuration Guide, Cisco Catalyst IE31xx Series Switches

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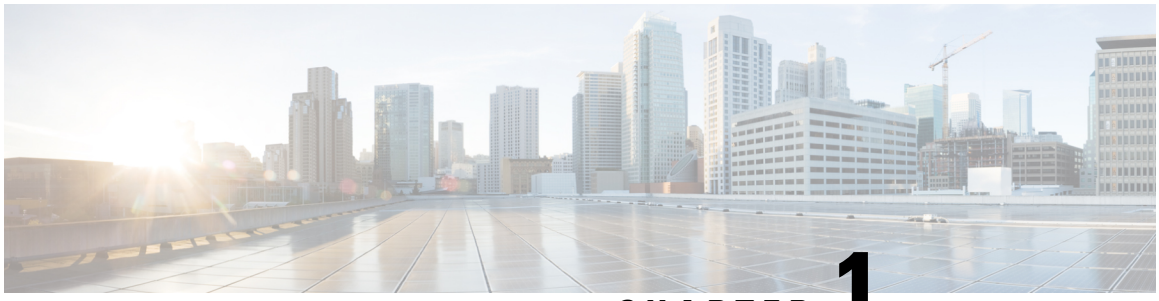
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CHAPTER 1

Common Industrial Protocol (CIP)

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Common Industrial Protocol

The Common Industrial Protocol (CIP) is an industrial protocol that supports a suite of messages and services for manufacturing automation applications, including control, safety, synchronization, motion, configuration, and information.

CIP is supported by the Open DeviceNet Vendors Association (ODVA), which endorses network technologies that utilize CIP. These include:

- DeviceNet
- EtherNet/IP
- CIP Safety
- CIP Sync.

CIP enables users to integrate these manufacturing applications with enterprise-level Ethernet networks and the Internet.

CIP Restrictions

CIP can only be enabled on one VLAN on the switch.

Enabling CIP

Before you begin

By default, CIP is not enabled.

Procedure

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Use the **cip security** {**password** *password* | **window timeout** *value*

Example:

```
Device(config)# cip security password *******
```

Step 3 Use the **interface vlan** *vlan-id* command to create an interface and enter interface configuration mode.

Example:

```
Device(config)# interface vlan 20
```

Step 4 Use the **cip enable** command to enable CIP on the interface.

Example:

```
Device(config-if)# cip enable
```

Step 5 Use the **end** command to return to privileged EXEC mode.

Example:

```
Device(config-if)# end
```

Step 6 Use the **show running-config** to verify the entries.

Example:

```
Device# show running-config
```

Step 7 (Optional) Use the **copy running-config startup-config** command to save changes in the configuration.

Example:

```
Device# copy running-config startup-config
```

Step 8 (Optional) Use the **show cip** {**connection**| **faults**| **file**| **miscellaneous**| **object**| **security** | **session** |**status**} command to display information about the CIP subsystem.

Example:

```
Device# show cip status
```

Step 9 (Optional) Use the **debug cip** {**assembly**| **connection manager**| **dlr**| **errors**| **event**| **file** | **io** |**packet**| | | **infra** |**security**| **session** |**socket**} to enable debugging of the CIP subsystem.

CIP password encryption

Common Industrial Protocol (CIP) password encryption is a security feature for industrial environments that

- protects CIP credentials within device configuration files,

- uses the Type 8 (SHA256) hashing algorithm to meet modern security standards, and
- ensures that stored credentials are irreversible and resistant to cryptographic attacks.

Type 8 encryption is a strong, irreversible hashing method that replaces the legacy Type 7 encryption to improve the security posture of industrial deployments.

Table 1: Feature history table

Feature name	Release information	Description
CIP password encryption	26.2.1	This feature provides enhanced security by converting legacy CIP passwords to the irreversible Type 8 (SHA256) algorithm to resist cryptographic attacks. It ensures credential integrity and uninterrupted authentication across industrial deployments.

Type 8 password encryption advantages

Type 8 password encryption provides security and operational advantages by automatically converting legacy passwords during the Cisco IOS XE software upgrade. This irreversible method reinforces credential security by preventing the system from converting passwords back to plaintext. During migration, the system handles invalid or corrupted data gracefully to ensure data integrity. By storing these passwords in the configuration file, the system maintains consistency across reboots and device transfers. It also integrates with the CIP module to provide uninterrupted authentication and communication.

CIP password encryption transitions

When you upgrade the software image to release 26.2.1 or later, the system automatically detects existing CIP passwords stored with Type 7 encryption. The system converts these passwords to the strong, irreversible Type 8 hashing algorithm and saves them into the device configuration file.

Guidelines and restrictions of CIP

Guidelines

- Downgrading to a software version earlier than 26.2.1 removes the CIP password from the configuration.
- Plaintext passwords must be stored externally as they cannot be retrieved once encrypted.
- Manual configuration transfers preserve CIP password.

Restrictions

Type 8 encryption is irreversible, and the original plaintext password cannot be recovered from the device.

Configure CIP password encryption

Set a password to secure CIP communications.

You can enter a plaintext password, which the system automatically converts to Type 8 encryption in the configuration file, or you can manually enter a pre-encrypted Type 8 (SHA256) hash.

Before you begin

Ensure the device is running release 26.2.1 or later to support Type 8 encryption.

Procedure

Step 1 Use the `configure terminal` command to enter global configuration mode.

Example:

```
Switch# configure terminal
```

Step 2 Use the **cip security { password** <*pass_word*> **| password 8** < *SHA256-encrypted-password*> } command to configure the password based on your available credential format.

Example:

```
Switch(config)# cip security password cisco
```

Use the **cip security password 8** < *SHA256-encrypted-password*> command to enter a pre-encrypted Type 8 hash.

Step 3 Use the **exit** command to return to privileged EXEC mode.

Example:

```
Switch(config)# exit
```

Step 4 Use the **copy running-config startup-config** command to copy the running configuration to NVRAM.

Example:

```
Switch# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS XE commands	Cisco IOS XE Command Reference

Standards and RFCs

- No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.

- No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.

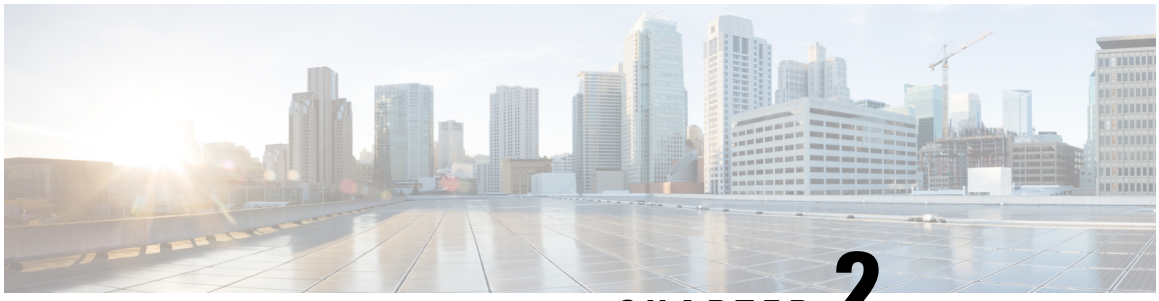
MIBs

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

https://snmp.cloudapps.cisco.com/Support/SNMP/do/BrowseMIB.do?local=en

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support



CHAPTER 2

MODBUS

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MODBUS

Modicon Communication Bus (MODBUS) is an application layer protocol that facilitates client-server communication between a switch (server) and a device running MODBUS client software (client). It operates effectively over a serial line, allowing you to connect a computer to a remote terminal unit (RTU) in supervisory control and data acquisition (SCADA) systems.

MODBUS over Ethernet TCP/IP

MODBUS also functions on Ethernet TCP/IP networks. Use MODBUS TCP over an Ethernet network to connect the switch to devices such as intelligent electronic devices (IEDs), distributed controllers, and substation routers. It is also used to connect IP phones, wireless access points, and other network devices including redundant substation switches.

Role of clients and servers

The client in this setup can be an IED or a human-machine interface (HMI) application that remotely configures and manages devices running MODBUS TCP. In this scenario, the switch serves as the server.

Message communication using MODBUS TCP

The switch encapsulates a request or response message within a MODBUS TCP application data unit (ADU). Clients communicate by sending messages to TCP ports on switches.

Cisco Catalyst IE31xx Modbus TCP Registers

This document lists the read-only registers for IE31xx models. MODBUS clients use them to communicate with a MODBUS server (the switch). There are no writable registers.

Table 2: System Info Registers

Address	# of registers	Description	R/W	Format
800	64	Product ID	R	Text
840	64	Software Image Name	R	Text
880	64	Software Image Version	R	Text
8C0	64	Host Name	R	Text
900	64	Alarm 1 – Description	R	Text
940	64	Alarm 2 – Description	R	Text
980	1	Alarm 1 – Status	R	Uint16
981	1	Alarm 2 – Status	R	Uint16
982	1	Number of 10/100 Ethernet Ports	R	Uint16
983	1	Number of Gig Ethernet Ports	R	Uint16
984	1	Number of Alarms	R	Uint16
985	1	Number of Power Supplies	R	Uint16
986	1	PS1 – Status	R	Uint16
987	1	PS2 – Status	R	Uint16
988	1	System Temperature (in Celsius)	R	Uint16

Table 3: 10 Port Registers

Address	# of Register	Description	R/W	Format
0x1000	64	Port 1 Name	R	Text
0x1040	64	Port 2 Name	R	Text
0x1080	64	Port 3 Name	R	Text
0x10C0	64	Port 4 Name	R	Text
0x1100	64	Port 5 Name	R	Text
0x1140	64	Port 6 Name	R	Text
0x1180	64	Port 7 Name	R	Text
0x11C0	64	Port 8 Name	R	Text
0x1200	64	Port 9 Name	R	Text
0x1240	64	Port 10 Name	R	Text
0x1280	1	Port 1 State	R	Unit16

Address	# of Register	Description	R/W	Format
0x1281	1	Port 2 State	R	Unit16
0x1282	1	Port 3 State	R	Unit16
0x1283	1	Port 4 State	R	Unit16
0x1284	1	Port 5 State	R	Unit16
0x1285	1	Port 6 State	R	Unit16
0x1286	1	Port 7 State	R	Unit16
0x1287	1	Port 8 State	R	Unit16
0x1288	1	Port 9 State	R	Unit16
0x1289	1	Port 10 State	R	Unit16
0x128A	4	Port 1 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x128E	4	Port 2 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1292	4	Port 3 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1296	4	Port 4 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x129A	4	Port 5 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x129E	4	Port 6 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x12A2	4	Port 7 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x12A6	4	Port 8 Statistics – Number of packets received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x12AA	4	Port 9 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x12AE	4	Port 10 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x12B2	4	Port 1 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12B6	4	Port 2 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12BA	4	Port 3 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12BE	4	Port 4 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12E2	4	Port 5 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12C6	4	Port 6 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12CA	4	Port 7 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12CE	4	Port 8 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12D2	4	Port 9 Statistics – Number of packets sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x12D6	4	Port 10 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x12DA	4	Port 1 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12DE	4	Port 2 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12E2	4	Port 3 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12E6	4	Port 4 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12EA	4	Port 5 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12EE	4	Port 6 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12F2	4	Port 7 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12F6	4	Port 8 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12FA	4	Port 9 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x12FE	4	Port 10 Statistics – Number of bytes received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1302	4	Port 1 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1306	4	Port 2 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x130A	4	Port 3 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x130E	4	Port 4 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1312	4	Port 5 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1316	4	Port 6 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x131A	4	Port 7 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x131E	4	Port 8 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1322	4	Port 9 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1326	4	Port 10 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x132A	2	Port 1 Statistics – Number of packets received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x132C	2	Port 2 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x132E	2	Port 3 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1330	2	Port 4 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1332	2	Port 5 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1334	2	Port 6 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1336	2	Port 7 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1338	2	Port 8 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x133A	2	Port 9 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x133C	2	Port 10 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x133E	2	Port 1 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1340	2	Port 2 Statistics – Number of packets sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1342	2	Port 3 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1344	2	Port 4 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1346	2	Port 5 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1348	2	Port 6 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x134A	2	Port 7 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x134C	2	Port 8 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x134E	2	Port 9 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1350	2	Port 10 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1352	2	Port 1 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1354	2	Port 2 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1356	2	Port 3 Statistics – Number of bytes received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1358	2	Port 4 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x135A	2	Port 5 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x135C	2	Port 6 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x135E	2	Port 7 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1360	2	Port 8 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1362	2	Port 9 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1364	2	Port 10 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1366	2	Port 1 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1368	2	Port 2 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x136A	2	Port 3 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x136C	2	Port 4 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x136E	2	Port 5 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1370	2	Port 6 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1372	2	Port 7 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1374	2	Port 8 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1376	2	Port 9 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1378	2	Port 10 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Table 4: 20 Port Registers

Address	# of Register	Description	R/W	Format
0x1000	64	Port 1 Name	R	Text
0x1040	64	Port 2 Name	R	Text
0x1080	64	Port 3 Name	R	Text
0x10C0	64	Port 4 Name	R	Text
0x1100	64	Port 5 Name	R	Text
0x1140	64	Port 6 Name	R	Text
0x1180	64	Port 7 Name	R	Text
0x11C0	64	Port 8 Name	R	Text
0x1200	64	Port 9 Name	R	Text
0x1240	64	Port 10 Name	R	Text
0x1280	64	Port 11 Name	R	Text
0x12C0	64	Port 12 Name	R	Text

Address	# of Register	Description	R/W	Format
0x1300	64	Port 13 Name	R	Text
0x1340	64	Port 14 Name	R	Text
0x1380	64	Port 15 Name	R	Text
0x13C0	64	Port 16 Name	R	Text
0x1400	64	Port 17 Name	R	Text
0x1440	64	Port 18 Name	R	Text
0x1480	64	Port 19 Name	R	Text
0x14C0	64	Port 20 Name	R	Text
0x1500	1	Port 1 State	R	Unit16
0x1501	1	Port 2 State	R	Unit16
0x1502	1	Port 3 State	R	Unit16
0x1503	1	Port 4 State	R	Unit16
0x1504	1	Port 5 State	R	Unit16
0x1505	1	Port 6 State	R	Unit16
0x1506	1	Port 7 State	R	Unit16
0x1507	1	Port 8 State	R	Unit16
0x1508	1	Port 9 State	R	Unit16
0x1509	1	Port 10 State	R	Unit16
0x150A	1	Port 11 State	R	Unit16
0x150B	1	Port 12 State	R	Unit16
0x150C	1	Port 13 State	R	Unit16
0x150D	1	Port 14 State	R	Unit16
0x150C	1	Port 15 State	R	Unit16
0x150F	1	Port 16 State	R	Unit16
0x1510	1	Port 17 State	R	Unit16
0x1511	1	Port 18 State	R	Unit16
0x1512	1	Port 19 State	R	Unit16
0x1513	1	Port 20 State	R	Unit16
0x1514	4	Port 1 Statistics – Number of packets received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1518	4	Port 2 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x151C	4	Port 3 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1520	4	Port 4 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1524	4	Port 5 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1528	4	Port 6 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x152C	4	Port 7 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1530	4	Port 8 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1534	4	Port 9 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1538	4	Port 10 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x153C	4	Port 11 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1540	4	Port 12 Statistics – Number of packets received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1544	4	Port 13 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1548	4	Port 14 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x154C	4	Port 15 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1550	4	Port 16 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1554	4	Port 17 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1558	4	Port 18 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x155C	4	Port 19 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1560	4	Port 20 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1564	4	Port 1 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1568	4	Port 2 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x156C	4	Port 3 Statistics – Number of packets sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1570	4	Port 4 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1574	4	Port 5 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1578	4	Port 6 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x157C	4	Port 7 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1580	4	Port 8 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1584	4	Port 9 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1588	4	Port 10 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x158C	4	Port 11 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1590	4	Port 12 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1594	4	Port 13 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1598	4	Port 14 Statistics – Number of packets sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x159C	4	Port 15 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15A0	4	Port 16 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15A4	4	Port 17 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15A8	4	Port 18 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15AC	4	Port 19 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15B0	4	Port 20 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x15B4	4	Port 1 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15B8	4	Port 2 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15BC	4	Port 3 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15C0	4	Port 4 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15C4	4	Port 5 Statistics – Number of bytes received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x15C8	4	Port 6 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15CC	4	Port 7 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15D0	4	Port 8 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15D4	4	Port 9 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15D8	4	Port 10 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15DC	4	Port 11 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15E0	4	Port 12 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15E4	4	Port 13 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15E8	4	Port 14 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15EC	4	Port 15 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15F0	4	Port 16 Statistics – Number of bytes received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x15F4	4	Port 17 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15F8	4	Port 18 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x15FC	4	Port 19 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1600	4	Port 20 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1604	4	Port 1 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1608	4	Port 2 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x160C	4	Port 3 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1610	4	Port 4 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1614	4	Port 5 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1618	4	Port 6 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x161C	4	Port 7 Statistics – Number of bytes sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1620	4	Port 8 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1624	4	Port 9 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1628	4	Port 10 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x162C	4	Port 11 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1630	4	Port 12 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1634	4	Port 13 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1638	4	Port 14 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x163C	4	Port 15 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1640	4	Port 16 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1644	4	Port 17 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1648	4	Port 18 Statistics – Number of bytes sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x164C	4	Port 19 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1650	4	Port 20 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x1654	2	Port 1 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1656	2	Port 2 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1658	2	Port 3 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x165A	2	Port 4 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x165C	2	Port 5 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x165E	2	Port 6 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1660	2	Port 7 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1662	2	Port 8 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1664	2	Port 9 Statistics – Number of packets received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1666	2	Port 10 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1668	2	Port 11 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x166A	2	Port 12 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x166C	2	Port 13 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x166E	2	Port 14 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1670	2	Port 15 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1672	2	Port 16 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1674	2	Port 17 Statistics – Number of packets received using 632-bit counter	R	Unit32
0x1676	2	Port 18 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x1678	2	Port 19 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x167A	2	Port 20 Statistics – Number of packets received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x167C	2	Port 1 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x167E	2	Port 2 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1680	2	Port 3 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1682	2	Port 4 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1684	2	Port 5 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1686	2	Port 6 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1688	2	Port 7 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x168A	2	Port 8 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x168C	2	Port 9 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x168E	2	Port 10 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1690	2	Port 11 Statistics – Number of packets sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1692	2	Port 12 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1694	2	Port 13 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1696	2	Port 14 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x1698	2	Port 15 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x169A	2	Port 16 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x169C	2	Port 17 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x169E	2	Port 18 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x16A0	2	Port 19 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x16A2	2	Port 20 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x16A4	2	Port 1 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16A6	2	Port 2 Statistics – Number of bytes received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x16A8	2	Port 3 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16AA	2	Port 4 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16AC	2	Port 5 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16AE	2	Port 6 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16B0	2	Port 7 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16B2	2	Port 8 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16B4	2	Port 9 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16B6	2	Port 10 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16B8	2	Port 11 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16BA	2	Port 12 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16BC	2	Port 13 Statistics – Number of bytes received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x16BC	2	Port 14 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16C0	2	Port 15 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16C2	2	Port 16 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16C4	2	Port 17 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16C6	2	Port 18 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16C8	2	Port 19 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16CA	2	Port 20 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x16CC	2	Port 1 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16CE	2	Port 2 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16D0	2	Port 3 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16D2	2	Port 4 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x16D4	2	Port 5 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16D6	2	Port 6 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16D8	2	Port 7 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16DA	2	Port 8 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16DC	2	Port 9 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16DE	2	Port 10 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16E0	2	Port 11 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16E2	2	Port 12 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16E4	2	Port 13 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16E6	2	Port 14 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16E8	2	Port 15 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x16EA	2	Port 16 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16EC	2	Port 17 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16EE	2	Port 18 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16F0	2	Port 19 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x16F2	2	Port 20 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Table 5: 6 Port Registers

Address	# of Register	Description	R/W	Format
0x1000	64	Port 1 Name	R	Text
0x1040	64	Port 2 Name	R	Text
0x1080	64	Port 3 Name	R	Text
0x10C0	64	Port 4 Name	R	Text
0x1100	64	Port 5 Name	R	Text
0x1140	64	Port 6 Name	R	Text
0x1180	1	Port 1 State	R	Unit16
0x1181	1	Port 2 State	R	Unit16
0x1182	1	Port 3 State	R	Unit16
0x1183	1	Port 4 State	R	Unit16
0x1184	1	Port 5 State	R	Unit16
0x1185	1	Port 6 State	R	Unit16
0x1186	4	Port 1 Statistics – Number of packets received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x118A	4	Port 2 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x118E	4	Port 3 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1192	4	Port 4 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1196	4	Port 5 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x119A	4	Port 6 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x119E	4	Port 1 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x11A2	4	Port 2 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x11A6	4	Port 3 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x11AA	4	Port 4 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x11AE	4	Port 5 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x11B2	4	Port 6 Statistics – Number of packets sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x11B6	4	Port 1 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11BA	4	Port 2 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11BE	4	Port 3 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11C2	4	Port 4 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11C6	4	Port 5 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11CA	4	Port 6 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x11CE	4	Port 1 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x11D2	4	Port 2 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x11D6	4	Port 3 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x11DA	4	Port 4 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x11DE	4	Port 5 Statistics – Number of bytes sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x11E2	4	Port 6 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x11E6	2	Port 1 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11E8	2	Port 2 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11EA	2	Port 3 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11EC	2	Port 4 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11EE	2	Port 5 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11F0	2	Port 6 Statistics – Number of packets received using 32-bit counter	R	Unit16
0x11F2	2	Port 1 Statistics – Number of packets sent using 32-bit counter	R	Unit16
0x11F4	2	Port 2 Statistics – Number of packets sent using 32-bit counter	R	Unit16
0x11F6	2	Port 3 Statistics – Number of packets sent using 32-bit counter	R	Unit16
0x11F8	2	Port 4 Statistics – Number of packets sent using 32-bit counter	R	Unit16

Address	# of Register	Description	R/W	Format
0x11FA	2	Port 5 Statistics – Number of packets sent using 32-bit counter	R	Unit16
0x11FC	2	Port 6 Statistics – Number of packets sent using 32-bit counter	R	Unit16
0x11FE	2	Port 1 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x1200	2	Port 2 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x1202	2	Port 3 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x1204	2	Port 4 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x1206	2	Port 5 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x1208	2	Port 6 Statistics – Number of bytes received using 32-bit counter	R	Unit16
0x120A	2	Port 1 Statistics – Number of bytes sent using 32-bit counter	R	Unit16
0x120C	2	Port 2 Statistics – Number of bytes sent using 32-bit counter	R	Unit16
0x120E	2	Port 3 Statistics – Number of bytes sent using 32-bit counter	R	Unit16

Address	# of Register	Description	R/W	Format
0x1210	2	Port 4 Statistics – Number of bytes sent using 32-bit counter	R	Unit16
0x1212	2	Port 5 Statistics – Number of bytes sent using 32-bit counter	R	Unit16
0x1214	2	Port 6 Statistics – Number of bytes sent using 32-bit counter	R	Unit16

Table 6: 12 Port Registers

Address	# of Register	Description	R/W	Format
0x1000	64	Port 1 Name	R	Text
0x1040	64	Port 2 Name	R	Text
0x1080	64	Port 3 Name	R	Text
0x10C0	64	Port 4 Name	R	Text
0x1100	64	Port 5 Name	R	Text
0x1140	64	Port 6 Name	R	Text
0x1180	64	Port 7 Name	R	Text
0x11c0	64	Port 8 Name	R	Text
0x1200	64	Port 9 Name	R	Text
0x1240	64	Port 10 Name	R	Text
0x1280	64	Port 11 Name	R	Text
0x12C0	64	Port 12 Name	R	Text
0x1300	1	Port 1 State	R	Unit16
0x1301	1	Port 2 State	R	Unit16
0x1302	1	Port 3 State	R	Unit16
0x1303	1	Port 4 State	R	Unit16
0x1304	1	Port 5 State	R	Unit16
0x1305	1	Port 6 State	R	Unit16
0x1306	1	Port 7 State	R	Unit16
0x1307	1	Port 8 State	R	Unit16

Address	# of Register	Description	R/W	Format
0x1308	1	Port 9 State	R	Unit16
0x1309	1	Port 10 State	R	Unit16
0x130A	1	Port 11 State	R	Unit16
0x130B	1	Port 12 State	R	Unit16
0x130C	4	Port 1 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1310	4	Port 2 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1314	4	Port 3 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1318	4	Port 4 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x131C	4	Port 5 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1320	4	Port 6 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1324	4	Port 7 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1328	4	Port 8 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x132C	4	Port 9 Statistics – Number of packets received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1330	4	Port 10 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1334	4	Port 11 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x1338	4	Port 12 Statistics – Number of packets received using 64-bit counter	R	Unit64
0x133C	4	Port 1 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1340	4	Port 2 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1344	4	Port 3 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1348	4	Port 4 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x134C	4	Port 5 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1350	4	Port 6 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1354	4	Port 7 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1358	4	Port 8 Statistics – Number of packets sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x135C	4	Port 9 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1360	4	Port 10 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1364	4	Port 11 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x1368	4	Port 12 Statistics – Number of packets sent using 64-bit counter	R	Unit64
0x136C	4	Port 1 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1370	4	Port 2 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1374	4	Port 3 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1378	4	Port 4 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x137C	4	Port 5 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1380	4	Port 6 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1384	4	Port 7 Statistics – Number of bytes received using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x1388	4	Port 8 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x138C	4	Port 9 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1390	4	Port 10 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1394	4	Port 11 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x1398	4	Port 12 Statistics – Number of bytes received using 64-bit counter	R	Unit64
0x139C	4	Port 1 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13A0	4	Port 2 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13A4	4	Port 3 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13A8	4	Port 4 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13AC	4	Port 5 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13B0	4	Port 6 Statistics – Number of bytes sent using 64-bit counter	R	Unit64

Address	# of Register	Description	R/W	Format
0x13B4	4	Port 7 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13B8	4	Port 8 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13BC	4	Port 9 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13C0	4	Port 10 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13C4	4	Port 11 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13C8	4	Port 12 Statistics – Number of bytes sent using 64-bit counter	R	Unit64
0x13CC	2	Port 1 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13CE	2	Port 2 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13D0	2	Port 3 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13D2	2	Port 4 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13D4	2	Port 5 Statistics – Number of packets received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x13D6	2	Port 6 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13D8	2	Port 7 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13DA	2	Port 8 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13DC	2	Port 9 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13DE	2	Port 10 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13E0	2	Port 11 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13E2	2	Port 12 Statistics – Number of packets received using 32-bit counter	R	Unit32
0x13E4	2	Port 1 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13E6	2	Port 2 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13E8	2	Port 3 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13EA	2	Port 4 Statistics – Number of packets sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x13EC	2	Port 5 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13EE	2	Port 6 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13F0	2	Port 7 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13F2	2	Port 8 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13F4	2	Port 9 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13F6	2	Port 10 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13F8	2	Port 11 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13FA	2	Port 12 Statistics – Number of packets sent using 32-bit counter	R	Unit32
0x13FC	2	Port 1 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x13FE	2	Port 2 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1400	2	Port 3 Statistics – Number of bytes received using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1402	2	Port 4 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1404	2	Port 5 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1406	2	Port 6 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1408	2	Port 7 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x140A	2	Port 8 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x140C	2	Port 9 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x140E	2	Port 10 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1410	2	Port 11 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1412	2	Port 12 Statistics – Number of bytes received using 32-bit counter	R	Unit32
0x1414	2	Port 1 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1416	2	Port 2 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Address	# of Register	Description	R/W	Format
0x1418	2	Port 3 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x141A	2	Port 4 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x141C	2	Port 5 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x141E	2	Port 6 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1420	2	Port 7 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1422	2	Port 8 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1424	2	Port 9 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1426	2	Port 10 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x1428	2	Port 11 Statistics – Number of bytes sent using 32-bit counter	R	Unit32
0x142A	2	Port 12 Statistics – Number of bytes sent using 32-bit counter	R	Unit32

Interpreting the Port State Value

This section provides information for determining the port state.

In the following table, the upper byte represents the interface state, and the lower byte represents the line protocol state.

Address	Description	Value
0x1700 to 0x171B	Port state information	Upper byte: • 0x0: Interface is down • 0x1: Interface is going down • 0x2: Interface is in the initializing state • 0x3: Interface is coming up • 0x4: Interface is up and running • 0x5: Interface is reset by the user • 0x6: Interface is shut down by the user • 0x7: Interface is being deleted
		The lower byte: • 0x0: Line protocol state is down • 0x1: Line protocol state is up

Configure MODBUS

By default, the MODBUS TCP server listens for client requests on TCP port 502. The server is disabled by default. If enabled, the server uses this port unless another port is configured for MODBUS communications.

Follow these steps to configure MODBUS.

Before you begin

- Firewall or security services enabled: TCP port might be blocked, preventing communication between the switch and client.
- Firewall or security services disabled: Risk of denial-of-service attack on the switch.
- Security for MODBUS TCP: Configure an ACL for traffic from specific clients or set QoS to rate-limit traffic.

Procedure

Step 1 Use the **configure terminal** command to enter the global configuration mode:

Example:

```
Device# configure terminal
```

Step 2 Use the **scada modbus tcp server** command to enable MODBUS TCP on the switch.

Example:

```
Device(config)# scada modbus tcp server
```

Note
A warning message will appear indicating that starting the MODBUS TCP server is a security risk. You must confirm by entering `yes` to proceed.

Tip
Use the **no scada modbus tcp server** command to disable MODBUS on the switch and return to the default settings.

Step 3 (Optional) Use the **scada modbus tcp server port** *tcp-port-number*command to set the TCP port to which clients send messages.

Example:

```
Device(config)# scada modbus tcp server port 600
```

The `tcp-port-number` can range from 1 to 65535. The default is 502.

Step 4 (Optional) Use the **scada modbus tcp server connection** *connection-requests* command to set the number of simultaneous connection requests sent to the switch.

Example:

```
Device(config)# scada modbus tcp server connection 4
```

The range for *connection-requests* is 1 to 5. The default is 1.

Step 5 Use the **end** command to return to privileged EXEC mode:

Example:

```
Device(config)# end
```

View MODBUS Information

Use the listed commands to view information for MODBUS.

Command	Purpose
show scada modbus tcp server	Displays information and statistics about the MODBUS server.

Command	Purpose
show scada modbus tcp server connections	Shows information and statistics for each client connection
clear scada modbus tcp server statistics	Clears all statistics for the MODBUS server, including those for each client connection.

Example

```
Switch# show scada modbus tcp server
               Summary: enabled, running, process id 142
               Conn Stats: listening on port 801, 4 max simultaneous connections
               0 current client connections
               0 total accepted connections, 0 accept connection errors
               0 closed connections, 0 close connection errors
               Send Stats: 0 tcp msgs sent, 0 tcp bytes sent, 0 tcp errors
               0 responses sent, 0 exceptions sent, 0 send errors
               Recv Stats: 0 tcp msgs received, 0 tcp bytes received, 0 tcp errors
               0 requests received, 0 receive errors
```