

IRM-1100-4S8I expansion module

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Expansion module for IR1101 routers

The IRM-1100-4S8I expansion module, introduced in Cisco IOS XE Release 17.18.1a, is a hardware add-on with these capabilities:

- adds four SFP ports and 8 Digital IO connections,
- expands the networking and interface capabilities of the IR1101 router,
- supports advanced configurations like jumbo frames and alarm management.

The table displays supported hardware interfaces and naming conventions.

Table 1: Hardware interfaces

Hardware interface	Naming convention
Gigabit Ethernet SFP port on Expansion Module	gigabitethernet 0/0/5 gigabitethernet 0/0/6 gigabitethernet 0/0/7 gigabitethernet 0/0/8
GPIO on Expansion Module	alarm contact 1 to 8

Table 2: Feature History Table

Feature name	Release information	Feature description
IRM-1100-4S8I Expansion Module	Release 17.18.1a	This release introduces the IRM-1100-4S8I Expansion Module for IR1101 routers, adding four SFP ports and eight Digital IO connections for enhanced networking capabilities.

Guidelines and limitations

Follow these guidelines and understand the limitations for using SFPs on the IRM-1100-4S8I Expansion Module:

- Supports both 1G and 100M speeds for fiber SFPs.
- Supports only 1G speed and full-duplex operation for copper SFPs. They do not support 10/100M speed or half-duplex modes.
- Compatibility is restricted to the Expansion Module (EM) and is not available on the Compute Module (CM).
- Online Insertion and Removal (OIR) is not supported (similar to the other expansion modules on Base IR1101).

Support for jumbo frames

Jumbo frames are Ethernet frames that improve network efficiency by reducing the overhead caused by headers.

Advantages of jumbo frame support

On the IRM-1100-4S8I Expansion Module, jumbo frames allow each port to handle larger packets with a Maximum Transmission Unit (MTU) size of up to 9216 bytes, compared to the default Ethernet MTU of 1500 bytes.

- Improved efficiency: Fewer frames are required to transmit the same amount of data, reducing the processing workload on the device.
- Optimized bandwidth usage: A smaller percentage of each frame is dedicated to headers, leaving more room for payload data.

For instance, when sending packets larger than 1500 bytes on GigabitEthernet interfaces, enabling jumbo frames ensures seamless transmission without fragmenting the data into smaller packets.

Configure the MTU size on a router interface

This task enables you to configure the Maximum Transmission Unit (MTU) size on a router interface.

Procedure

Step 1 Enter the global configuration mode.

Example:

```
Router#configure terminal
```

Step 2 Access the interface configuration mode and specify the interface where you want to configure the MTU size.

Example:

```
Router(config)#interface gigabitEthernet0/0/6
```

Step 3 Set the MTU size.

You can choose the MTU size from **1500** to **9216**.

Example:

```
Router(config-if)#mtu 9216
```

Step 4 Exit global configuration mode.

Example:

```
Router#end
```

Step 5 (Optional) Save the configuration.

Example:

```
Router#copy running-config startup-config
```

Step 6 Verify the configuration. Use the **show running-config interface** command to confirm the MTU size.

Example:

```
Router#show running-config interface gigabitEthernet0/0/6
```

Output:

```
Building configuration...
Current configuration : 96 bytes
!
interface GigabitEthernet0/0/6
no switchport
mtu 9216
no ip address
negotiation auto
end
```

Digital IOs

Digital IOs function as electrical connectors that provide various capabilities such as:

- Enable General Purpose Input/Output (GPIO) functionality,
- Support both dry and wet contact configurations, and

- Provide flexible input or output capabilities.

Technical summary of Digital IO features

Digital IOs are designed to facilitate event signaling or power delivery through configurable connections.

- The IRM-1100-4S8I includes a Digital IO connector with:
  - 8 GPIO connections, and
  - 1 Return connection
- Dry contact configurations:
  - Isolated from a voltage source (**No Volt**).
  - Embedded relay function (NPN transistor).
  - Typically used to indicate events, for example, open or close states, alarms.
- Wet contact configurations:
  - External power applied (+3.3V to +60V, max 150mA at high voltage).
  - Typically used to energize devices, for example, solenoids and lights.
- Comparison with IR800 Series:
  - The IR800 series routers support **ALARM IN** (dedicated input) and **ALARM OUT** (dedicated output) with an external power applied (+3.3V to +60V, max 150mA at high voltage).
  - Digital IOs on the IR1101 differ as they allow configurable input or output modes.
  - **ALARM OUT** on the IR800 series includes a relay for **Normally Open** (NO) or **Normally Closed** (NC) terminals; Digital IOs do not include a relay.
- Limitations:

  Digital IOs do not generate traps for alarms concerning GPIO.

For more details on Digital IO hardware capabilities, see Cisco Catalyst IR1101 Rugged Series Router Hardware Installation Guide.

Configure and manage alarms on the router

Set up and customize alarm configurations on the IR1101 router using the CLI.

Before you begin

Familiarize yourself with the IR1101 alarm ports and their locations:

- Alarm contact 0 is located in the base unit and operates in Output Mode.
- Alarm contacts 1 to 8 are in the IRM-1100 4S8I Expansion Module and can operate in Input or Output mode.

Procedure

Step 1 Enter the global configuration mode.

Example:

```
Router#configure terminal
```

Step 2 Enable an alarm contact by specifying its contact number (1 to 8) on the IRM-1100 4S8I Expansion Module.

Example:

```
Router#alarm contact 1 enable
```

Step 3 Configure additional parameters such as application mode, description, output state, severity, threshold, and trigger condition.

See Configure additional parameters on the router.

Step 4 Exit the global configuration mode.

Example:

```
Router#end
```

Step 5 (Optional) Save the configuration to the startup configuration file.

Example:

```
Router#copy running-config startup-config
```

Configure additional parameters on the router

The purpose of this task is to configure and customize alarm contact parameters on the router to ensure proper monitoring and alerting functionality. This includes setting the application mode, providing descriptive information, defining output states, assigning severity levels, establishing threshold values, and specifying trigger conditions for alarm contacts 1-8.

Procedure

Step 1 Set the application mode for alarmcontacts 1-8 with **alarm contact contact-number application {dry | wet}** command.

- **dry**: Default application mode.
- **wet**: Alternate application mode.

Example:

```
Router#alarm contact 1 application dry
```

Step 2 Add a description of up to 80 alphanumeric characters with **alarm contact contact-number description <description>** command.

Example:

```
Router#alarm contact 1 description test
```

Step 3 Specify the output state for alarm contacts 1-8 with **alarm contact contact-number output {1 | 0}** command.

- **1**: High state
- **0**: Low state

Example:

```
Router#alarm contact 1 output 1
```

Step 4 Define the severity level with **alarm contact contact-number severity {critical | major | minor | none}** command.

Example:

```
Router#alarm contact 1 severity minor
```

Default severity: **minor**

Step 5 Set the threshold value with **alarm contact contact-number threshold <value>** command.

Range: **1600-2700** mV (default: **1600** mV)

Example:

```
Router#alarm contact 1 threshold 1600
```

Step 6 Configure the trigger condition with **alarm contact contact-number trigger {closed | open}** command.

Example:

```
Router#alarm contact 1 trigger closed
```

Configuration and verification examples

Alarm contacts in the IR1101 router are configurable monitoring elements that generate system messages when triggered. They allow you to monitor the status and respond to events.

Configuration example

```
Router#conf terminal
Enter configuration commands, one per line.   End with CNTL/Z.
Router(config)#alarm contact 1 description

Your Descriptive Text Here
Router#(config)#alarm contact 1 severity critical

Router(config)#alarm contact 1 trigger closed
```

Verification example

```
Router#show alarm
Alarm contact 1:
Enabled: Yes
Status: Not Asserted
Application: Dry
Description: test
Severity: Critical
```

```
Trigger: Open
Threshold: 2000
```

Example of an alarm being generated:

```
Router#show alarm
Digital I/O 1:
Enabled: Yes
Status: Asserted
Application: Dry
Description: External digital I/O port 1
Severity: Critical
Trigger: Closed
Threshold: 1600
```

Example of an alarm being asserted:

```
Router#
*Jun 17 08:38:26.709: %IIOT_ALARM_CONTACT-5-EXTERNAL_ALARM_CONTACT_ASSERT_MINOR: External
alarm/digital IO port (External digital I/O port 1) asserted
```

Example of an alarm being cleared:

```
Router#
*Jun 17 08:38:22.979: %IIOT_ALARM_CONTACT-5-EXTERNAL_ALARM_CONTACT_CLEAR_MINOR: External
alarm/digital IO port (External digital I/O port 1) cleared
```

Support for L2/L3 SFP interfaces

SFP interfaces support different types of transceivers, allowing users to choose the appropriate module for their specific requirements, such as speed, distance, or media type.

Table 3: SFP features in base and expansion modules

Feature	Base Module (IR1101)	Expansion Module
Interface name	GigabitEthernet0/0/0 (combo port)	GigabitEthernet0/0/5 GigabitEthernet0/0/6 GigabitEthernet0/0/7 GigabitEthernet0/0/8
Default configuration	Layer-3	Layer-2
Layer-3 functionality setup	Default	Use the **no switchport** command to convert these ports to layer 3 mode.

The L2/L3 features supported on IRM-1100-4S8I interfaces are on parity with the GigabitEthernet0/0/0.

For more details on the supported ethernet SFP modules, see Cisco Small Form-Factor Pluggable (SFPs) modules in Cisco Catalyst IR1101 Rugged Series Router Data Sheet.

Examples for SFP modules insertions

Use **show interfaces transceiver detail** command to display details about SFP interfaces.

```
Router#show interfaces transceiver detail
```

```
IDPROM for transceiver Gigabitethernet0/0/0:
  IDPROM for transceiver Gigabitethernet0/0/5:
  Description                               = SFP or SFP+ optics (type 3)
  Transceiver Type:                         = GE T (26)
  Product Identifier (PID)                  = GLC-T-RGD
  Vendor Revision                           = 1.0
  Serial Number (SN)                        = ACW26400ZX0
  Vendor Name                               = CISCO-ACCELINK
  Vendor OUI (IEEE company ID)              = 00.1C.AD (7341)
  CLEI code                                 = COUIBG2CAA
  Cisco part number                         = 3010016701
  Vendor part number                        = RTXL185-200-C87
  Device State                              = Enabled.
  Date code (yy/mm/dd)                      = 22/10/07
  Connector type                            = Unknown.
  Encoding                                  = 8B10B (1)
  Nominal bitrate                           = GE (1300 Mbits/s)
  Minimum bit rate as % of nominal bit rate = not specified
  Maximum bit rate as % of nominal bit rate = not specified

Socket Verification


  SFP IDPROM Page 0xA0:
        000:        03 04 00 08 00 00 00 00 00 00
        010:        00 01 0D 00 00 00 00 00 64 00
        020:        43 49 53 43 4F 2D 41 43 43 45
        030:        4C 49 4E 4B 20 20 01 00 1C AD
        040:        52 54 58 4C 31 38 35 2D 32 30
        050:        30 2D 43 38 37 20 31 2E 30 20
        060:        41 0C C2 C7 00 10 00 00 41 43
        070:        57 32 36 34 30 30 5A 58 30 20
        080:        20 20 20 20 32 32 31 30 30 37
        090:        20 20 00 00 00 D5 00 00 1F 0E
        100:        8A 32 FB 13 F9 88 DA E0 71 05
        110:        DB 26 4D F3 C7 00 00 00 00 00
        120:        00 00 00 00 EC D6 6D 8E 43 4F
        130:        55 49 42 47 32 43 41 41 33 30
        140:        31 30 30 31 36 37 30 31 56 30
        150:        31 20 CA D8 55 00 00 00 00 71
        160:        00 00 00 00 00 00 00 00 00 00
        170:        00 00 00 00 00 00 00 00 00 00
        180:        00 00 00 00 00 00 00 00 00 00
        190:        00 00 47 4C 43 2D 54 2D 52 47
        200:        44 20 20 20 20 20 20 20 20 20
        210:        20 20 00 00 00 00 00 00 00 00
        220:        00 00 00 C1

  SFP IDPROM Page 0xA2:
        000:        00 00 00 00 00 00 00 00 00 00
        010:        00 00 00 00 00 00 00 00 00 00
        020:        00 00 00 00 00 00 00 00 00 00
        030:        00 00 00 00 00 00 00 00 00 00
        040:        00 00 00 00 00 00 00 00 00 00
        050:        00 00 00 00 00 00 00 00 00 00
        060:        00 00 00 00 00 00 00 00 00 00
        070:        00 00 00 00 00 00 00 00 00 00
        080:        00 00 00 00 00 00 00 00 00 00
        090:        00 00 00 00 00 00 00 00 00 00
        100:        00 00 00 00 00 00 00 00 00 00
        110:        00 00 00 00 00 00 00 00 00 00
        120:        00 00 00 00 00 00 00 00 00 00
        130:        00 00 00 00 00 00 00 00 00 00
        140:        00 00 00 00 00 00 00 00 00 00
```

```
      150:        00 00 00 00 00 00 00 00 00 00
      160:        00 00 00 00 00 00 00 00 00 00
      170:        00 00 00 00 00 00 00 00 00 00
      180:        00 00 00 00 00 00 00 00 00 00
      190:        00 00 00 00 00 00 00 00 00 00
      200:        00 00 00 00 00 00 00 00 00 00
      210:        00 00 00 00 00 00 00 00 00 00
      220:        00 00 00 00 00 00 00 00 00 00
      230:        00 00 00 00 00 00 00 00 00 00
      240:        00 00 00 00 00 00 00 00 00 00
      250:        00 00 00 00 00 00
Link reach for 9u fiber (km)                    = SX(550/270m) (0)
                                                  1xFC-MM(500/300m) (0)
                                                  2xFC-MM(300/150m) (0)
                                                  ESCON-MM(2km) (0)
Link reach for 9u fiber (m)                     = SX(550/270m) (0)
                                                  1xFC-MM(500/300m) (0)
                                                  2xFC-MM(300/150m) (0)
                                                  ESCON-MM(2km) (0)
Link reach for 50u fiber (m)                    = SR(2km) (0)
                                                  IR-1(15km) (0)
                                                  IR-2(40km) (0)
                                                  LR-1(40km) (0)
                                                  LR-2(80km) (0)
                                                  LR-3(80km) (0)
                                                  DX(40KM) (0)
                                                  HX(40km) (0)
                                                  ZX(80km) (0)
                                                  VX(100km) (0)
                                                  1xFC, 2xFC-SM(10km) (0)
                                                  ESCON-SM(20km) (0)
Link reach for 62.5u fiber (m)                  = SR(2km) (0)
                                                  IR-1(15km) (0)
                                                  IR-2(40km) (0)
                                                  LR-1(40km) (0)
                                                  LR-2(80km) (0)
                                                  LR-3(80km) (0)
                                                  DX(40KM) (0)
                                                  HX(40km) (0)
                                                  ZX(80km) (0)
                                                  VX(100km) (0)
                                                  1xFC, 2xFC-SM(10km) (0)
                                                  ESCON-SM(20km) (0)
Nominal laser wavelength                    = 16652 nm.
DWDM wavelength fraction                    = 16652.194 nm.
Supported options                                = Tx disable
Supported enhanced options                       = none
Diagnostic monitoring                            = none
```

For more details on the supported SFP Interfaces, see Cisco Catalyst IR1101 Rugged Series Router Hardware Installation Guide.