Introduction

The Cisco MWR 2941 Mobile Wireless Router is a cell-site access platform specifically designed to aggregate and transport mixed-generation radio access network (RAN) traffic. The router is used at the cell site edge as a part of a 2G, 3G, or 4G radio access network (RAN). The Cisco MWR 2941 includes the following models:

- Cisco MWR 2941-DC
- Cisco MWR 2941-DC-A

This chapter includes the following sections:

- Hardware Description, page 1-1
- Compact Flash Memory, page 1-6
- Power Supply, page 1-6
- Environmental Monitoring Temperature Sensor, page 1-8
- System Specifications, page 1-8
- Cisco MWR 2941 Router Interface Numbering, page 1-8
- Regulatory Compliance, page 1-10

Hardware Description

Contained in a standard shelf-rack enclosure, the Cisco MWR 2941 router weighs approximately 12 pounds (5.44 kg). It measures 1.72 inches high x 17.5 inches wide x 12.5 inches deep (4.37 cm or 1 RU x 44.45 cm x 31.75 cm). These dimensions do not include the rack-mount brackets.

The Cisco MWR 2941 router is mounted in a standard (EIA-310D) 19-inch (48.3 cm) equipment rack (using the rack-mount brackets provided).

The Cisco MWR 2941 router includes the following features:

- 16 fixed T1/E1 ports

Note: A mix of T1s and E1s is not supported. All ports must be configured as either T1s or E1s.

- DS0 Time Slot Interchange available to all T1/E1 ports including HWIC slots (24 ports maximum)
- Support for structured and unstructured T1/E1s
- 4 ports of 100/1000 Copper Ethernet (RJ45 connectors)
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Hardware Description

- 2 ports of 1000 Ethernet with pluggable 802.3- and 802.3U-compliant SFP slots (SFP Transceivers)
- 2 HWIC interface card slots
- 2 miniature coaxial connectors for 10Mhz and 1PPS timing. You can use these interfaces with an external GPS device to send or receive clocking from the router.

**Note**

10Mhz and 1PPS timing connectors are only included on the Cisco MWR 2941-DC-A router.

- 1 Console/Auxiliary port (RJ45)
- 1 BITS clock input port (RJ45) or BITS/ToD port (RJ48)

**Note**

The BITS/ToD port is only included on the Cisco MWR 2941-DC-A router.

- Support for Timing over Packet (ToP) features, including Active Clock Recovery, Precision Time Protocol (PTP), and synchronous Ethernet
- Distributed Processing: Dedicated communications processor to provide feature processing for features such as IP packet generation, L2 encapsulation, ATM, and MLPPP.
- Line protection; T1 ports compliant to IEC60950-1; design to meet GR-1089 and GR-63 core requirements
- Chassis: 1RU, 12.5 inch depth
- Dual feed supply with additional redundant DC inputs plus redundant power supply (RPS) input
- Operating temperature range is -4 to 140°F (-20°C to 60°C). If HWICs are installed, the operating temperature range is 14 to 131°F (-10°C to 55°C).
- Front to back airflow
- Two LEDs for each T1/E1 port
  - C—indicates out of service or not configured, carrier condition, and loop condition
  - AL—no alarm, or alarm condition
- Two LEDs for each Ethernet port
  - L—indicates activity, lack of activity, or no link
  - S—indicates speed (100 or 1000) or off
- One compact flash LED—indicates activity or lack of activity
- One link activity LED for each SFP port—indicates whether link is active or not enabled
- Four chassis LEDs:
  - Power—indicates whether power supply is operational
  - Status—indicates whether software is up and running
  - Activity—indicates whether interrupts or packet transfers are running
  - BITS Activity—indicates whether BITS is in service and working properly
- Mounting brackets—The Cisco MWR 2941-DC router is shipped with mounting rack-mount brackets already installed and the Cisco MWR 2941-DC-A includes the rack-mount brackets in the accessory kit.
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Cisco MWR 2941 Router Front View

Figure 1-1 shows a front view of the Cisco MWR 2941-DC router without HWICs; Figure 1-2 shows a front view of the Cisco MWR 2941-DC-A router with HWICs installed.

Note

HWICs are not included with the Cisco MWR 2941-DC-A router; you must order them separately.

The front panel of the Cisco MWR 2941 router has the following components:

- 16 T1/E1 ports, labeled T1/E1 (positions 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15)
- 4 RJ-45 jacks for copper Ethernet ports, labeled “100/1000” Ethernet (positions 2, 3, 4, and 5)
- 2 HWIC slots, labeled “HWIC0” and “HWIC1”
- 1 compact FLASH Type-II connector, labeled “Compact Flash”
- 2 SFP connectors for optical GE ports, labeled “GE0” and “GE1”
- 2 miniature coaxial connectors for 10MHZ and 1PPS timing

Note

Timing connectors are only included on the Cisco MWR 2941-DC-A.

- 1 RJ-45 connector for Console/Auxiliary, labeled “CON/AUX”
- 1 BITS port:
  - 1 RJ-45 jack for the BITS interface, labeled “BITS” (Cisco MWR 2941-DC)
  - 1 RJ-48 jack for the BITS/ToD interface, labeled “BITS/SYNC” (Cisco MWR 2941-DC-A)
- The following LEDs
  - T1/E1 ports
  - Ethernet ports
  - Compact flash
  - SFP ports
  - Chassis: Power, Operating status, and Activity
  - BITS activity

Note

For a more detailed description of the LEDs, see the “Reading the LEDs” section on page A-5.
**Chapter 1      Introduction**

**Hardware Description**

**Figure 1-1     Cisco MWR 2941-DC Router—Front View**

- Compact flash LED
- Link Activity LEDs
- Console/Auxiliary port
- 16 T1/E1 ports (RJ45 100/1000 Ethernet)
- 4 GE ports (RJ45 100/1000 Ethernet)
- Compact flash slot
- BITS port
- 2 GE ports (SFP 1000BT)
- Power Status Activity BITS Activity
- Chassis LEDs

**Figure 1-2     Cisco MWR 2941-DC-A Router—Front View**

- Compact flash LED
- Link Activity LEDs
- Console/Auxiliary port
- 16 T1/E1 ports
- 4 GE ports (RJ45 100/1000 Ethernet)
- Compact flash slot
- 2 GE ports (SFP 1000BT)
- 2 Mini-coax connectors (10MHZ and 1PPS)
- Power Status Activity BITS Activity
- BITS/SYNC port
- Chassis LEDs

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**Note**

The HWICs shown in **Figure 1-2** are not included with the Cisco MWR 2941-DC-A router; you must order them separately.
Cisco MWR 2941 Rear View

Figure 1-3 shows the rear panel of the Cisco MWR 2941 router, including the orientation of the following components:

- Four exhaust fans
- Mounting point for 2-hole lug. For more information, see the “Connecting the Chassis Ground and Power” section on page 3-6.
- Cisco MWR 2941 router power connector. For more information, see the “Wiring the DC-Input Power Source” section on page 3-9.

Hardware Configuration Options

The Cisco MWR 2941 router supports has the following hardware configuration options:

- HWIC Cards
- SFP Modules

HWIC Cards

Two HWIC slots allow you to configure the chassis with any two supported HWIC interface cards. HWIC support varies according to the software version installed on the router. The HWIC slots are labeled HWIC0 and HWIC1 on the faceplate of the Cisco MWR 2941 router. The HWIC slots can accommodate 2 T1/E1 HWICs, expanding the number of T1/E1 ports from 16 to 24 ports. You can configure HWIC T1/E1 ports for use as a GSM short-haul connection or an IP RAN backhaul connection.

**Compact Flash Memory**

The Cisco MWR 2941 router supports one compact flash slot on the front panel. The slot is intended to house a memory card using the compact flash standard file system. The most common usage is for storage of the system image or core dumps for diagnostic purposes. The Cisco IOS image and troubleshooting logs reside on the flash memory.

This compact flash device is not field upgradeable, it is only installed at the factory.

The front panel connector supports both Type I and Type II 3.3V Compact Flash devices. The compact flash controller has the following features:

- Operating mode: PCMCIA-compatible PC card in memory mode
- Auto power removal on removal of compact flash from the slot
- Write protection
- Support Cisco qualified 128MB compact flash devices

**Note**  
The interface supports any size compact flash device. The size limit is a statement on test coverage and qualification time limits.

Please refer to the industry standard for compact flash for details on internal registers. All compact flash follow the ATA standard for internal register access.

**Power Supply**

The Cisco MWR -DC router is equipped with an Internal +27/-48 volts Direct Current (VDC) (±20 to 60 VDC supply tolerance).

**Safety Precautions**

Observe the following general safety precautions and recommendations in planning the source power requirements for the Cisco MWR 2941 router (for additional safety information, see the “Safety Guidelines” section on page 2-1):

- Check the power at your site before router installation (and periodically after installation) to ensure clean power (free of spikes and noise) is being received.
Always disconnect the power source and unplug the power cable before working on the router.

Install proper grounding for the site to avoid damage from lightning and power surges.

### Warning
To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021

Table 1-1 lists DC power supply specifications for the Cisco MWR 2941 router.

#### Table 1-1 Cisco MWR 2941 Router Power Supply Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>+27/–48 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage, DC power supply</td>
<td>±20 to 60 VDC</td>
</tr>
<tr>
<td>Maximum input current</td>
<td>3.5 A (current rating = 4 A)</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td></td>
</tr>
<tr>
<td>If the input voltage drops below 18.5 VDC, the router goes into shut down mode.</td>
<td></td>
</tr>
<tr>
<td>Wire gauge for DC input power connections</td>
<td>18-AWG</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>65 W (maximum), 45 W (typical)</td>
</tr>
</tbody>
</table>

The Cisco MWR 2941 router uses a 4-pin terminal block (part number 27-2030-01) for input to the power supply. The terminal block is part of the accessory kit (part number 53-3085-01 for the MWR-2941-DC, part number 53-3295-01 for the MWR-2941-DC-A), which ships with the Cisco MWR 2941 router.

Note that the ground wire connects to a 2-hole lug, which connects to the corresponding mounting point.

With the connector installed in the chassis, the pins are for two separate input power sources named A and B. From left to right, the pins are for rail A+, rail A–, rail B–, and rail B+.

Table 1-2 and Table 1-3 list the pinout configurations for the connector, based on the power source.

#### Table 1-2 Power Supply Connector Pinouts (+27 VDC Application)

<table>
<thead>
<tr>
<th>Pin</th>
<th>+27 VDC Power Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+27 VDC A</td>
</tr>
<tr>
<td>2</td>
<td>RTN A</td>
</tr>
<tr>
<td>3</td>
<td>RTN B</td>
</tr>
<tr>
<td>4</td>
<td>+27 VDC B</td>
</tr>
</tbody>
</table>
Environmental Monitoring Temperature Sensor

The Cisco MWR 2941 router has a temperature sensor to detect overtemperature conditions inside the chassis. The overtemperature detection trips at 70°C +/- 5%. This condition is reported to the processor as an interrupt, where software takes action to generate the appropriate alarms.

System Specifications

Table 1-4 lists the system specifications for Cisco MWR 2941 router.

Table 1-3 Power Supply Connector Pinouts (-48 VDC Application)

<table>
<thead>
<tr>
<th>Pin</th>
<th>-48 VDC Power Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RTN A</td>
</tr>
<tr>
<td>2</td>
<td>-48 VDC A</td>
</tr>
<tr>
<td>3</td>
<td>-48 VDC B</td>
</tr>
<tr>
<td>4</td>
<td>RTN B</td>
</tr>
</tbody>
</table>

Environmental Monitoring Temperature Sensor

System Specifications

Table 1-4 Cisco MWR 2941 Router System Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (H x W x D)</td>
<td>1.72 x 17.5 x 12.5 in. (4.37 x 44.45 x 31.75 cm) 1 RU (rack unit) in a 19-inch (48.3 cm) rack</td>
</tr>
<tr>
<td>Weight</td>
<td>12 lb (5.44 kg)</td>
</tr>
<tr>
<td>Console and Auxiliary ports</td>
<td>RJ-45 connector</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Operating temperature range is -4 to 140°F (-20°C to 60°C). If HWICs are installed, the operating temperature range is 14 to 131°F (-10°C to 55°C).</td>
</tr>
<tr>
<td>Non-Operational Temperature</td>
<td>-40 to 185°F (-40 to 85°C)</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>5 to 90% RH (non-condensing)</td>
</tr>
<tr>
<td>Operating Altitude</td>
<td>9,842.5 ft. (3000 m) at 113°F (45°C)</td>
</tr>
<tr>
<td>Operating Vibration</td>
<td>0.41 Grms, 3 to 500 Hz/2 hr. per axis</td>
</tr>
<tr>
<td>Non-Operational Vibration</td>
<td>1.12 Grms, 3 to 500 Hz/30 min. per axis</td>
</tr>
<tr>
<td>Operating Acoustics</td>
<td>&lt;63.5 dBA</td>
</tr>
</tbody>
</table>

Cisco MWR 2941 Router Interface Numbering

Each network interface on a Cisco MWR 2941 router is identified by a slot number and a port number. Following is an explanation of the slot/port numbering:
- Logical slot numbers are 0 for all built-in interfaces. The numbering format is Interface type Slot number/Interface number. Interface (port) numbers begin at logical 0 for each interface type.

- Logical interface numbering for the built-in T1/E1 ports runs from 0/0 through 0/15. Interfaces are hard-wired; therefore, port 0 is always logical interface 0/0, port 1 is always logical interface 0/1, and so on. Built-in T1/E1 ports are numbered bottom to top, left to right (bottom row numbered 0-2-4-6-8-10-12-14, top row numbered 1-3-5-7-9-11-13-15).

- When the 2 HWIC slots are used to expand the T1/E1 port density to 20 or 24 ports, logical interface numbering continues from 1/0 through 1/3 and 2/0 through 2/3. Logical interfaces for HWIC0 are always 1/0 through 1/3 and logical interfaces for HWIC1 are always 2/0 through 2/3. Because the interfaces are hard-wired, HWIC0 port 0 is always logical interface 1/0, HWIC0 port 1 is always logical interface 1/1, HWIC1 port 0 is always logical interface 2/0, HWIC1 port 1 is always logical interface 2/1, and so on. Ports are numbered left to right for each HWIC.

- Logical interface numbering for the built-in Ethernet ports runs from 0/0 through 0/5. Because the interfaces are hard-wired, port 0 is always logical interface 0/0, port 1 is always logical interface 0/1, and so on. SFP ports are numbered left to right, 0 and 1; 100/1000 Ethernet ports are numbered left to right, 2 through 5.

Figure 1-4 shows the interface numbering for a Cisco MWR 2941-DC router; Figure 1-5 shows the interface numbering for a Cisco MWR 2941-DC-A router.

**Note**
The HWICs shown are not included with the router; you must order them separately.
Figure 1-5  Cisco MWR 2941-DC-A Router Port Numbers

Regulatory Compliance

For regulatory compliance and safety information, see the Regulatory Compliance and Safety Information for the Cisco MWR 2941 Mobile Wireless Edge Router document.