

## Cisco 4-Port Clear Channel T1/E1 High-Speed WAN Interface Card

The Cisco® 4-Port Clear Channel T1/E1 High-Speed WAN Interface Card provides  $n \times$  T1/E1 connectivity in a compact form factor and reduces deployment and management costs for the Cisco 2800, 3800, 2900 and 3900 Series Integrated Services Routers.

As more data and voice services are enabled in branch offices, the demand for WAN bandwidth increases accordingly. Multilink Point-to-Point Protocol (PPP) and Multilink Frame Relay enable customers to scale their leased lines from single T1/E1 to multiples of T1/E1, adding bandwidth as their needs increase. The Cisco 4-Port Clear Channel T1/E1 High-Speed WAN Interface Card (HWIC) integrates four T1/E1 ports in a singlewide HWIC to facilitate  $n \times$  T1/E1 connectivity in a compact form factor (Figure 1).

**Figure 1.** Cisco 4-Port T1/E1 Clear Channel High-Speed WAN Interface Card



With the Cisco 4-Port Clear Channel T1/E1 HWIC with integrated channel service unit and data service unit (CSU/DSU), you can consolidate customer premises equipment (CPE). The modules support balanced and unbalanced E1 connectivity and conform to G.703 and G.704 standards for unframed and framed E1 modes. The module supports both T1 and E1 modes, selectable by software configuration.

### Features At-A-Glance

- 4 ports of RJ-48 connectors
- Cisco IOS® Software configurable for T1 or E1 operation
- Integrated CSU/DSU per port
- Balanced or unbalanced E1 termination in the same module
- E1 unframed and framed modes (G.703 and G.704)
- Independent clocking for each port
- Multilink PPP or Multilink Frame Relay (FRF.16) for T1/E1 ports on the same module and across different modules

## Key Benefits

### Reduced Footprint

If you are using multiple 1- or 2-port T1/E1 modules for n x T1/E1 connectivity, you can now replace the modules with a single Cisco 4-Port Clear Channel T1/E1 HWIC, and you can make the HWIC slots available for other interfaces and services. If you use a single T1/E1 today and plan to scale up to 4 T1/E1 modules in the future, you can install the 4-port HWIC today and turn on the additional T1/E1 ports as you need them.

### Deployment Flexibility

The Cisco 4-Port Clear Channel T1/E1 HWIC is software-configurable between E1 or T1 operation, balanced or unbalanced E1 termination, and CSU/DSU. You no longer need to buy a specific module for T1 support and then another card for E1 connectivity. If you have branch offices across the world, ordering, inventory and management are much simplified.

### Reliability

Integrating the external E1/T1 terminating device (CSU/DSU) increases the overall system reliability. Possible points of failure are reduced by eliminating the second power supply, additional fans, extra cabling, and other equipment that accompany a "two-box" solution. This increase in reliability allows service providers to more easily and cost-effectively meet the requirements of their customers' service-level agreements (SLAs) and offers enterprises maximum equipment uptime.

## Product Numbers and Ordering Information

Table 1 lists the product numbers of the Cisco 4-Port Clear Channel T1/E1 HWIC and the cables for balanced and unbalanced E1.

**Table 1.** Product Numbers of Cisco 4-Port Clear Channel T1/E1 HWIC and E1 Converter Cables

Product Number	Description
HWIC-4T1/E1	4 Port Clear Channel T1/E1 High Speed WAN Interface Card
CAB-E1-RJ45BNC	E1 Cable RJ-45 to Dual BNC (Unbalanced)

## Platform Support

### Software and Memory Requirements

Refer to the software release notes or the Cisco IOS Software Upgrade Planner, or ask your local Cisco representative for information about software and memory requirements. Table 2 shows the minimum Cisco IOS Software requirements for each platform.

**Table 2.** Minimum Cisco IOS Software Requirements

	Cisco 2821, 2851, and 3800 Series	Cisco 2911, 2921, 2951, and 3900 Series
Minimum IOS Release	12.4(20)T	15.0(1)M
Minimum IOS Technology Package	IP Base	IP Base

## Supported Platforms and Number of Modules per Platform

Table 3 shows the platform support and the maximum number of Cisco 4-Port Clear Channel T1/E1 HWICs supported on each platform.

**Table 3.** Number of Cisco 4-Port Clear Channel T1/E1 HWICs Supported per Platform

Cisco Integrated Services Router Platform	Cisco 2821, 2851	Cisco 2911	Cisco 2921, 2951	Cisco 3825, 3845, 3925, 3945	Cisco 3925, 3925E, 3945, 3945E	Cisco 3925E, 3945E
Number of 4-port Clear Channel T1/E1 HWICs Supported	2	1	2	4	4	3

## Software and Management Features

Table 4 shows the software and management features for the Cisco 4-Port Clear Channel T1/E1 HWIC.

**Table 4.** Software and Management Features of Cisco 4-Port Clear Channel T1/E1 HWIC

Feature	Description
<b>Diagnostic Loopback Support</b>	<ul style="list-style-type: none"> <li>E1 loopback modes</li> <li>Controller local loopback</li> <li>Interface local loopback</li> <li>T1 loopback modes</li> <li>Interface local loopback</li> <li>Interface remote loopback</li> <li>Controller local loopback</li> <li>Controller remote loopback</li> <li>CSU loopback modes for T1 CSU</li> <li>Data terminal equipment (DTE) loopback</li> <li>Network loopback</li> <li>Payload loopback</li> </ul>
<b>Alarm Detection</b>	<ul style="list-style-type: none"> <li>Yellow alarm: Receive/send from/to network</li> <li>Blue alarm: Receive alarm indication signal (AIS) from network</li> <li>Red alarm: Loss of network signal</li> </ul>
<b>Relevant MIB Support</b>	<ul style="list-style-type: none"> <li>RFC1406-MIB</li> <li>CISCO-ICSUDSU-MIB</li> </ul>
<b>Remote Management</b>	<ul style="list-style-type: none"> <li>Supported by Cisco WAN Access Performance Management System (WAPMS)</li> <li>Cisco CNS 2100 Series Intelligence Engine (IE2100)</li> <li>CiscoWorks</li> </ul>
<b>Signaling Debugging</b>	<ul style="list-style-type: none"> <li>ISDN Q.921 and Q.931 decode</li> <li>All other previously existing applicable Cisco IOS Software debugs</li> </ul>

## Hardware Specifications

Table 5 shows the hardware specifications for the Cisco 4-Port Clear Channel T1/E1 HWIC.

**Table 5.** Hardware Specifications for Cisco 4-Port Clear Channel T1/E1 HWIC

Feature	Description
<b>Dimensions (H x W x D)</b>	0.75 x 3.08 x 4.74 in. (1.91 x 7.82 x 12.04 cm)
<b>Weight</b>	0.20 lb (0.09kg)
<b>Operating Temperature</b>	32 to 104°F (0 to 40°C) 14 to 131°F (-10C to 55C when installed in the MWR-2941-DC)
<b>Nonoperating Temperature</b>	-40 to 158°F (-40 to 70°C)
<b>Relative Humidity</b>	5 to 95% noncondensing

Feature	Description
<b>LEDs</b>	<b>LEDs per port :</b> <ul style="list-style-type: none"> <li>• Carrier Detect/Loopback (CD/LP): <ul style="list-style-type: none"> <li>◦ Off = No carrier detect</li> <li>◦ Green on = Carrier detect</li> <li>◦ Yellow on = Port in loopback mode</li> </ul> </li> <li>• Alarm (AL): <ul style="list-style-type: none"> <li>◦ Off = No alarms</li> <li>◦ Yellow on = Port in alarm mode</li> </ul> </li> </ul>
<b>Ports</b>	4 T1/E1 ports on RJ-48C connectors
<b>Line Bit Rate (per Port)</b>	<ul style="list-style-type: none"> <li>• E1: 2.048 Mbps</li> <li>• T1: 1.544 Mbps</li> </ul>
<b>Line Coding</b>	<ul style="list-style-type: none"> <li>• E1: High-density bipolar three (HDB3)</li> <li>• T1: Alternate mark inversion (AMI) and bipolar 8-zero substitution (B8ZS)</li> </ul>
<b>Framing Formats</b>	<ul style="list-style-type: none"> <li>• E1: Cyclic redundancy check 4 (CRC4)</li> <li>• T1: Super Frame (SF) and Extended Super Frame (ESF)</li> </ul>
<b>Output Levels</b>	<ul style="list-style-type: none"> <li>• E1: Short-haul/long-haul</li> <li>• T1 (Line build-out [LBO]): -0, -7.5, or -15 dB</li> </ul>

## Regulatory Compliance, Safety, Emissions, and EMC and Immunity

Table 6 shows a partial listing of regulatory compliance and safety data.

**Table 6.** Regulatory Compliance and Safety (Partial Listing<sup>1</sup>)

Feature	Description
<b>Telecom Compliance</b>	<ul style="list-style-type: none"> <li>• United States: FCC Part 68 and TIA-968A</li> <li>• Canada: Industry Canada CS-03</li> <li>• European Union: TBR 4, TBR 12, and TBR 13</li> <li>• Australia: AS/ACIF S038 and AS/ACIF S016</li> <li>• Japan: JATE Gray Book</li> <li>• Hong Kong: HKTA 2027 and HKTA 2015</li> <li>• Taiwan: IS6100</li> <li>• Singapore: IDA TS ISDN PRA</li> <li>• Korea: MIC No.2004-15</li> </ul>
<b>Telecommunication Interface Industry Standards</b>	<ul style="list-style-type: none"> <li>• ITU-T G.703</li> <li>• G.704</li> <li>• G.706</li> <li>• G.823</li> <li>• ANSI T1.403</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>• United States: UL60950</li> <li>• Canada: C22.2 No.60950</li> <li>• Europe: EN60950</li> <li>• Australia and New Zealand: AS/NZS3260 and TS001</li> <li>• Other countries: IEC60950</li> </ul>
<b>Network Equipment Building Standards (NEBS)</b>	<ul style="list-style-type: none"> <li>• GR-63</li> <li>• GR-78</li> <li>• GR-1089-CORE Type 1/3</li> </ul>
<b>EMC Emissions and Immunity</b>	<b>47 CFR Part 15:</b> <ul style="list-style-type: none"> <li>• CISPR22: 2005</li> <li>• EN300386: V1.3.3 : 2005</li> <li>• EN55022: 1994 [+ amd 1 &amp; 2]</li> <li>• EN55022: 1998</li> <li>• EN61000-3-2: 2000 [Inc amd 1 &amp; 2]</li> </ul>

<sup>1</sup> For more information, visit the Cisco Compliance home page (listed later in this document in the section "Country Support") or consult your local Cisco representative for further details.

Feature	Description
	<ul style="list-style-type: none"> <li>• EN61000-3-3: 1995 [+ amd 1: 2001]</li> <li>• ICES-003 Issue 4 : 2004</li> <li>• KN 22: 2005</li> <li>• VCCI: V-3/2006.04</li> <li>• CISPR24: 1997 [+ amd 1 &amp; 2]</li> <li>• EN300386: V1.3.3 : 2005</li> <li>• EN50082-1: 1992</li> <li>• EN50082-1: 1997</li> <li>• EN55024: 1998 [+ amd 1 &amp; 2]</li> <li>• EN61000-6-1: 2001</li> </ul>

## Safety, EMC, Telecom, Network Homologation, Power, Environmental Requirements, and Regulatory Approvals

When installed in a Cisco 2800, 2900, or 3800 or 3900 Series Integrated Services Router, the Cisco 4-Port Clear Channel T1/E1 HWIC does not change the standards (safety, EMC, telecom, network homologation, power, environmental requirements, or regulatory approvals) of the router itself. Refer to the Cisco 2800 and 3800 Series data sheets for additional information about mechanical, environmental, and agency certifications.

### Cisco 3900 Series

<http://www.cisco.com/en/US/products/ps10536/index.html>

### Cisco 2900 Series

<http://www.cisco.com/en/US/products/ps10537/index.html>

### Cisco 3800 Series

<http://www.cisco.com/en/US/partner/products/ps5855/index.html>

## Country Support

Refer to the following URL or contact your local Cisco representative for country-specific approval status (Cisco.com login required) <http://www.ciscofax.com>.

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