GE
Intelligent Platforms

Hardware Reference Manual

NETernity* CP921RC–30X

CompactPCI Gigabit Switch — PICMG® Layers 2 and 3
IPv6 Compatible, OpenWare* Switch Management

Fourth Edition

Part No: 87003002-820

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Preface

This document provides technical information for the NETernity[1] CP921RC-30X Gigabit Ethernet Switch, which is a member of the NETernity family of Gigabit Ethernet Switches available from GE Intelligent Platforms, Inc. The NETernity CP921RC-30X is a fully-managed Layer 2 and Layer 3 (L2/L3) Ethernet embedded switch that offers full Internet Protocol, version 6 (IPv6), with non-blocking wire-speed switching and routing, and full management capabilities with 24 rear input/output (I/O) Gigabit Ethernet ports. Optionally, two built-in front-panel 10Gigabit Ethernet (GbE) ports and two 1GbE ports provide high-speed connections with copper or fiber interfaces. The NETernity CP921RC-30X is designed for installation in a Compact Peripheral Component Interconnect (cPCI) chassis.

The software that runs on the NETernity CP921RC-30X is described in the*"OpenWare* Switch Management Control for NETernity* Configuration Managed Switch Formalization's Reference Manual."*

Purpose

The purpose of this manual is to describe the NETernity CP921RC-30X hardware.

Audience

This manual is intended for users who design, configure or install the NETernity CP921RC-30X in a network, such as an engineer, technician, or network designer.

It is assumed that the user is familiar with:

- Standard cabling
- Configurations of operating systems and networks
- Compact PCI technology

Referenced Documentation

Documentation referenced in this manual includes the following industry standard and vendor-specific documentation:

Industry Standard Specifications:

- *IEEE 802.3-2008 IEEE Standard for Information Technology—Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*, Institute of Electrical and Electronic Engineering (IEEE), 2008.
- *IPMI — Intelligent Platform Management Interface, Version 1.5.* Intel Corporation, Hewlett-Packard Company, NEC Corporation, Dell Inc, 2004.
- *RFC2460— IPv6 Internet Protocol, Version 6*, Internet Engineering Task Force (IETF) Internet Society (ISOC), 1998.

1. An asterisk indicates a trademark of GE Intelligent Platfroms, Inc. and/or its affiliates. All other trademarks are properties of their respective owners.

Vendor Specific Documentation:

- *BCM54885 Octal -Port 10/100/1000BASE-T Gigabit Ethernet Transceiver*, Broadcom® Corporation, 2005.
- *BCM56300 24-Port GbE Multilayer Switch with Four 10-GbE/HIGig+ Uplink Ports*, Broadcom® Corporation, 2009.
- *PPC405E PowerQuiCC III Integrated Processor Hardware Specification - Revision* 1.06, Applied Micro Circuits© Corporation, 2008.

Associated Documentation

GE Intelligent Platforms' documentation associated with this manual includes the following:

- *OpenWare® Switch Management Control for NETernity® Configuration Managed Switch Families — Operator's Reference Manual*.

Manual Organization

This manual contains the following chapters:

- *"**Chapter 1 • Getting Started**,"* presents an overview of the product. and provides directions for installing the CP921RC-30X in a chassis.
- **"*Chapter 2 • Product Description*,"** provides information on the featured hardware components.
- "***Chapter 3 • Connectors and Pin Assignments***," contains descriptions of pin assignments for connectors.
- ***"Chapter 4 • Temperature and Power,"*** describes temperature sensors and power supplies.
- "***Chapter 5 • Hardware Specifications and Certifications***," provides a listing of the hardware specifications. and regulatory certifications.

This document also includes a glossary and an index.

Notation Conventions

This manual uses the following notation conventions:

- *Italics* emphasizes words in text, register field names, and documentation or chapter titles.
- Notes, cautions, and warnings call attention to essential information:

NOTE

A Note calls attention to important information, such as tips and advice.

CAUTION

A Caution alerts you to conditions that could damage a device, system, or data.

WARNING

A Warning calls attention to actions that can cause risk of personal injury.

- Specific term definitions, as applied in this manual include:
  - "May" means that there is flexibility that does not affect the outcome or result of the action.
  - "Should" means that the user has flexibility but it is strongly recommended to perform the specified action to achieve an optimal outcome or result.
  - "Must" means that there is no flexibility and the user is required to perform the action to achieve an optimal outcome or result.

Warranty and Repair

GE Intelligent Platforms, Inc. provides a comprehensive web site on the World Wide Web (***http://www.ge-ip.com***.) This web site contains up-to-date information including current and new products, such as the NETernity family of Ethernet switches. The web site also contains sales office locations, copyrights, trademarks, press releases, warranties, and technical support information.

Warranty

Warranty information is described on the GE Intelligent Platforms' web site at ***http://www.ge-ip.com/embeddedsupport/warranty***. This site provides current product warranty and repair services as well as information on out-of-warranty services. For additional information on specific product warranty, contact a GE Intelligent Platforms sales representative.

Customer Technical Support

GE Intelligent Platforms' dedicated team of Customer Technical Support Engineers is committed to providing quality support to all their customers. Customer Technical Support Engineers are trained to assist GE Intelligent Platforms customers in the development, integration, and use of GE products in customer applications, systems, and products to facilitate timely product development. The Customer Technical Support Service Center is staffed weekdays (except holidays) between the hours of 8:00 AM and 5:00 PM Central Time (CT).

Use one of the following methods to contact technical support:

Email:	support.embeddedsystems.ip@ge.com
Telephone:	1-800-433-2682
Address:	GE Intelligent Platforms, Inc. 12090 South Memorial Parkway Huntsville, AL 35803-3308 USA
Hours:	8:00 AM to 5:00 PM (CT)

Before contacting technical support, make sure you have the following information available:

- Model and Revision number
- Purchase receipt
- Software version
- Description of problem

CAUTION

User level repairs are ***not*** recommended. The illustrations in this manual are for reference purposes only.

1 • Getting Started

The NETernity CP921RC-30X is a fully-managed L2/L3+ Ethernet embedded switch. The NETernity CP921RC-30X offers full IPv6 support with wire-speed switching and routing, and full management capabilities via local or remote access.

The NETernity CP921RC-30X Switches comply with the PICMG 2.16 specifications and are designed for installation in a Compact Peripheral Component Interconnect (cPCI) chassis in standard or rack-mount configurations. Select models can support industrial temperature environments.

NETernity CP921RC-30X Switches provide integrated Layer-2/3+ switching capabilities as well as the ability to support higher Layer 4-7 functionality, when required.

NETernity CP921RC-30X Switches offer configurations with either:

- 24 rear I/O 10/100/1000BASE ports, or
- 22 rear I/O 10/100/1000BASE-T port and four front panel copper or fiber ports via:
  - Two 10Gigabit Ethernet (GbE) connections via SFP+ transceivers, and
  - Two 1GbE connections via SFP transceivers

Optionally, in conjunction with the TRCP9xx-5RC rear transition module, the NETernity CP921RC-30X provides 19 ports for use in accordance with the PICMG 2.16 specification, while the remaining 5 ports are available as additional links through the rear I/O.

NETernity CP921RC-30X Switches provide an on-board Processor with extensive value-added software. The fully managed software package provides seamless integration into the shelf and shelf management with Intelligent Platform Management Interface (IPMI) version 1.5 support including hot-swap capabilities and basic Fabric reset. Software is described in a separate manual entitled, the*"OpenWare* Switch Management Control for NETernity Configuration Managed Switch Families — Operator's Reference Manual."*

1.1 Handling Precautions

Read the following ElectroStatic Discharge (ESD) and laser/optical precautions before handling any GE Intelligent Platforms component.

NOTE

GE Intelligent Platforms, Inc. assumes no liability for the user's failure to comply with these required precautions.

1.1.1 ESD Precautions

Always take the necessary precautions to prevent ESD. ESD can damage the CP921RC-30X, which has ESD sensitive components.

All products should be in an anti-static plastic bag or conductive foam for storage or shipment. Work at an approved anti-static workstation when unpacking the CP921RC-30X. Also, **always** use anti-static grounding straps to prevent damage due to ESD.

Use the following precautions to prevent ESD when removing or inserting the board from the antistatic packaging.

CAUTION

Always ground yourself *before* touching the board. You can ground yourself by either touching a grounded unpainted metal surface for at least two seconds, or by using an ESD-protective wrist strap from your wrist to a bare, unpainted metal section of the grounded chassis or rack. This prevents electrostatic discharge from damaging the board.

Always keep the board in its static-protective packaging when it is not installed in the system.

Always hold the board by its handles or edges. Avoid touching the components or connections on the board.

When working with a chassis, if the chassis cannot be placed upon a grounded antistatic mat, connect a grounding strap between the electrical input ground and the facility electrical service ground.

WARNING

Depending on the chassis, open equipment enclosures and chassis can expose hazardous voltage which may cause electric shock to the installer. Make sure line power to the equipment is disconnected before servicing the chassis and components.

1.1.2 Laser/Optical Precautions

This product may or may not be provided with an optical device and/or fiber optic transceivers. Each optical/laser devices contains a laser that is classified as Class 1 Laser Product in accordance with US FDA regulations and IEC 60825-1.

WARNING

1. For this product use only Class 1 laser devices that have the following approvals:
   - FDA 21 CFR 1040.10, 11
   - IEC 60825-1

   Use of controls or adjustments or performance or procedures other than those specified herein, or in the laser product's installation guide, may result in hazardous radiation exposure.

2. An optical/laser transmitter is a Class 1 device. Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments as this may permanently damage your eyes.

CAUTION

1. It is important to disconnect or remove all cables before removing or installing an optical/laser transceiver. Failure to do so may result in damage to the cable or device.

2. Do not leave an optical/laser transceiver uncovered except when inserting or removing a cable. The safety/dust plugs keep the port clean and prevent accidental exposure to laser light.

NOTE

Protect optical/laser devices by inserting clean dust plugs into the device after the cables are extracted from them. Be sure to clean the optic surfaces of the fiber cables before plugging the dust plugs back into the optical bores of another device. Avoid getting dust and other contaminants into the optical bores of your device. The optics will not work correctly when obstructed with dust.

1.1.3 Safety Precautions

The following general safety precautions must be observed during all phases of the operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of this product.

- Ground the System

  To minimize shock hazard, the chassis and system cabinet must be connected to an electrical ground.

  Refer to the documentation that accompanies the chassis or system cabinet for specific grounding information.

- Do Not Operate in an Explosive Atmosphere

  
  CAUTION
  Do not operate the system in the presence of flammable gases or fumes. Operation of any electrical system in such an environment constitutes a definite safety hazard.

- Keep Away from Live Circuits

  
  CAUTION
  Operating personnel must not remove product covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

- Do Not Substitute Parts or Modify System

  
  CAUTION
  Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to GE Intelligent Platforms for service and repair to ensure that safety features are maintained.

1.2 Required Tools

A wrist strap or anti-static mat or device is necessary when handling the CP921RC-30X and components.

A small Phillips head screwdriver is required to secure two mounting screws.

1.3 Kit Contents

The CP921RC-30X Kit contains the following components:

- CP921RC-30X
- RS-232 Serial Cable

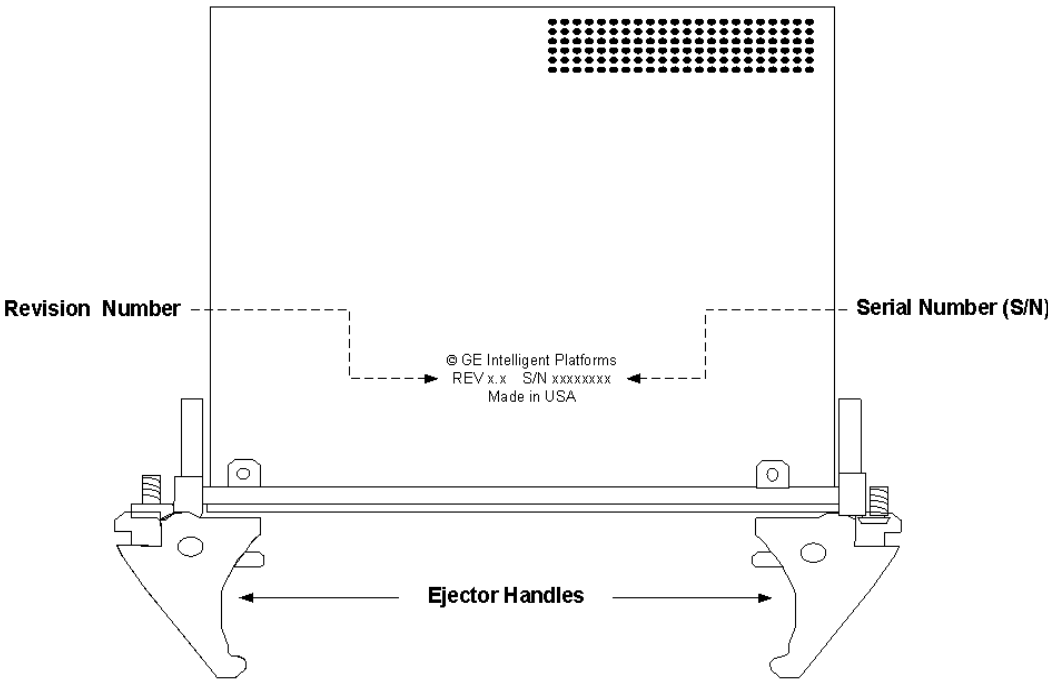
1.4 Unpacking Procedures

Always observe any precautions found in the shipping container. All items should be carefully unpacked and thoroughly inspected for damage that might have occurred during shipment. The board should be checked for broken components, damaged printed circuit board, heat damage and other visible contamination. All claims arising from shipping damage should be filed with the carrier and a complete report sent to GE Intelligent Platforms Customer Technical Support.

1.5 Identifying the Board

The CP921RC-30X has an etched or printed label that contain the Serial Number and board Revision Number in addition to copyright information, similar to that shown in Figure 1-1. Use this information to make sure that the model and version are the product that you ordered. This information is also useful should you need to contact Customer Technical Support.

Figure 1-1 Identifying the Board



1.6 Connector Keys

Within the J4 Connector, there is a connector cavity that allows the CP921RC-30X to offer keying for standard and extended fabric connections.

Standard Chassis Key

All models of the CP921RC-30X contain the standard Fabric keying, which is a Blue/Lilac Key in the connector cavity. This key is used to connect the CP921RC-30X to a standard 19 -Slot chassis backplane.

Extended Chassis Key

Configuration requiring the insertion of the CP921RC-30X into an Extended Chassis with 24 slots, must order the optional Yellow/Ochre Key available from GE Intelligent Platforms (Part No. 42G-8519-1). Contact your GE Intelligent Platforms sales representative for more information about the optional Yellow/Ochre Key.

1.7 System Requirements

The CP921RC-30X installation requires the following:

- Size 6U chassis with appropriate slots, power supply, and fan(s).
- One fabric slot in PICMG 2.16 Packet Switching Backplane backplane.
- Appropriate J4 Connector Key.

1.8 Installation Procedure

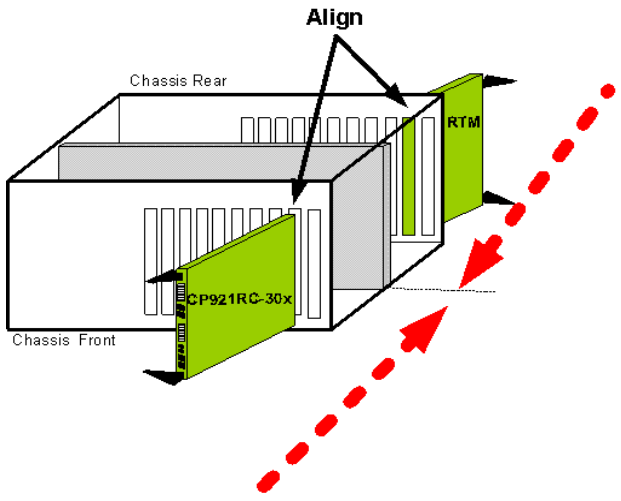
It is assumed that the installer is the service personnel familiar with commonly accepted procedures for integrating electronic equipment. This installation also assume you are installing the CP921RC-30X in a standard configuration.

Before installing the CP921RC-30X and, optional RTM, identify the slots in which the boards are to be placed. The RTM slot must align with the slot for the CP921RC-30X in the front of the chassis as shown in Figure 1-2.

CAUTION

The RTM must be installed *before* the CP921RC-30X.

Figure 1-2 Selecting Aligned Slots



To install the CP921RC-30X or the RTM into the cPCI chassis, perform the following steps:

1. Make sure you are grounded and are following all the safety precautions.
2. Remove the board from its anti-static packaging, and place the board on an anti-static mat. Save the packaging for future use.
3. Turn OFF power to the chassis. (For hot swap versions, the board can be plugged in while the chassis is powered on.)

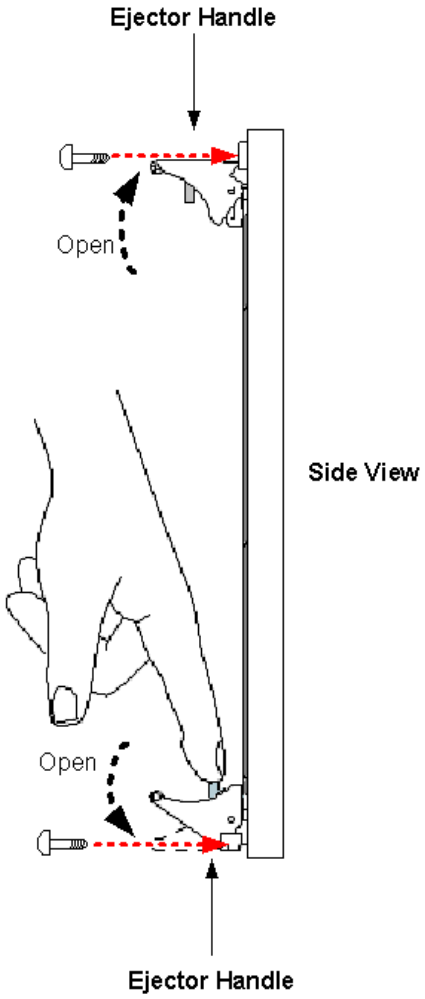
   Remove the power cable to reduce the risk of residual power in the power supply.
4. Locate the slot in the chassis in which you want to install the CP921RC-30X or the RTM.
5. Observing proper anti-static procedures, slide the board into the desired slot. Use the Ejector Handle to gently, but firmly, push the board into the slot. Make sure the board is fully seated in the backplane.

   CAUTION

   Do not force the connectors on the board to mate with the backplane as this may cause permanent damage to the board.
6. When the board is seated properly and securely in the chassis, attach the two screws as shown in Figure 1-3.
7. Connect cables as appropriate.
8. Power-up the system.
   Refer to the "*OpenWare Switch Management Control for Neternity Configuration Managed Switch Families — Operator's Reference Manual*" for software installation information.

Figure 1-3 TRCP921RC-30X Screw Attachment



1.9 CP921RC-30X Front Panel

After you have successfully installed the CP921RC-30X in a chassis, and connected appropriate cables, apply power to the system. Before applying power, become familiar with the front panel for the CP921RC-30X model you have selected.

1.9.1 Front Panel LEDs and Button

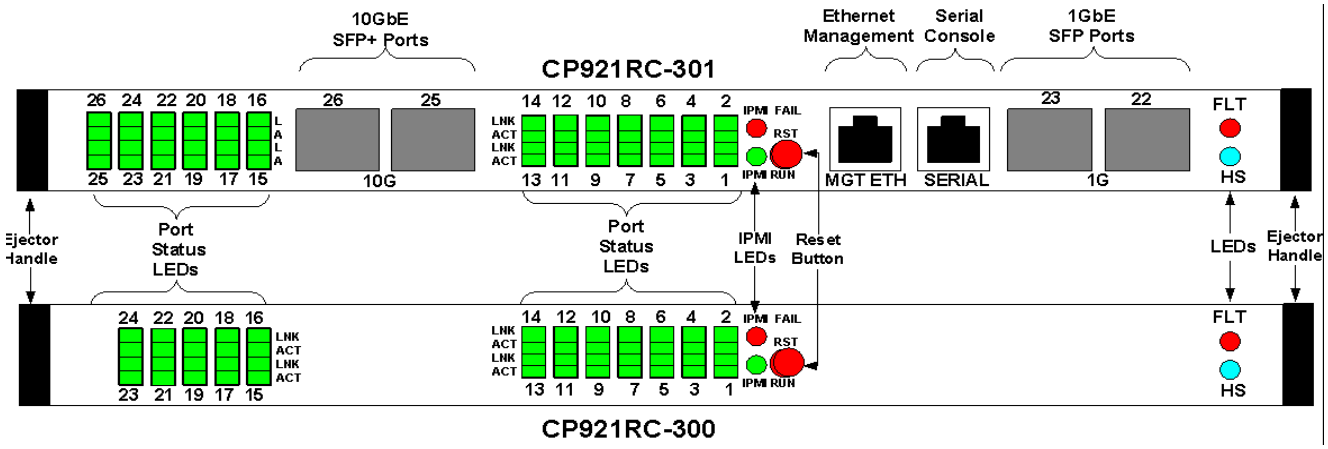
As shown in Figure 1-4, the CP921RC-300 and CP921RC-301 models contain two front panel board status LEDs: one to indicate hot swap (HS) status and one for (FLT) faults. There is also an IPMI RUN LED and an IPMI FAIL LED, and link (LNK) status and activity (ACT) LEDs.

In addition to LEDs, the front panels also contain a Reset (RST) Button and ejector handle mechanisms.

NOTE

The CP921RC-300-IND model does have front panel LEDs.

Figure 1-4 CP921RC-30x Front Panels



1.9.2 Reset Button

Pressing the red Reset (RST) Button asserts the local reset, which causes all components to reset. The Switch Fabric devices are put into a reset state, and the Processor is reloaded.

1.9.3 Front Panel LEDs

The front panel has Module and Link Status LEDs.

Module Status LEDs

There are four LEDs on the CP921RC-30X: one blue Hot Swap (HS) and one red Fault (FLT). One green IPMI RUN and one red IPMI FAIL LED. Table 1-1 describes these LEDs.

The blue hot swap (HS) LED is located on the bottom of the front panel. This LED blinks when a hot-swap is initiated, and lights steadily when it is safe to remove the CP921RC-30X from the chassis.

There are two IPMI LEDs. The IPMI FAIL LED lights up when the IPMI Hot Swap (HS) Controller detects a fault.

The IPMI RUN LED indicates that the IPMC is functioning properly.

Table 1-1 LED Indications

LEDs	Color	Indicator	State	Description
HS	Blue	Hot Swap	Off	Not okay to remove the board.
			On	Okay to remove the board.
FLT	Red	Hot Swap Fault	On	IPMI Hot Swap Controller fault detected.
			Off	Normal operations,
IPMI RUN	Green	IPMI Running	On	IPMI Hot Swap Controller is performing normal operations.
			Off	IPMI is not operational.
IPMI FAIL	Red	IPMI Fault	On	IPMI fault event detection.
			Off	Normal operation.

Link/Activity Status LEDs

As shown in Figure 1-4, quad-stackable LEDs are used to indicate the port status (two LEDs per port.) One LED is used to indicate a valid Link (LNK) and the other indicates port Activity (ACT). For the front SFP and SFP+ ports, the two LEDs are placed adjacent to the cage.

LEDs	Color	Indicator	State	Description
LNK	Green	Link Status	Off	No link.
			On	Valid links.
ACT	Green	Port Activity	On	Port is in transmitting or receiving activity.
			Off	No activity on port.

1.9.4 Front Panel Connectors

On select models, connectors on the CP921RC-30X include two 10GbE SFP+, two 1 GbE SFPs, and two RJ-45s.

Continue by reading "***Chapter 2 • Product Description***" and "***Chapter 3 • Connectors and Pin Assignments***" for information on connectors, jumpers, and pin assignment.

2 • Product Description

The NETernity CP921RC-30X Switches are 24-port managed L2/L3 Gigabit Ethernet switches, which provide cost-effective, high-speed network connectivity in both standard and industrial grade construction. All ports are fully managed solutions and comply with PICMG 2.16 specifications.

Optionally, through the front panel, the NETernity CP921RC-30X Switch can provide two 10Gigabit Ethernet interfaces using Small Form-factor Pluggable Plus (SFP+) modules and two Gigabit Ethernet SFP ports while routing 22 Gigabit Ethenet ports to the rear I/O.

2.1 Features

The NETernity CP921RC-30X Switches feature the following standard and optional components:

- Management Board — with Processor and EEPROM:
  - 32-bit, 66 MegaHertz (MHz) PCI interface from Processor to Switch
  - Access through Serial Console Interface or remote 10/100Mbps port
- Base Switch Board — with the following, depending on the model:
  - 24-Port GbE Switch Fabric with three octal GbE PHYs
- Optional, four Ethernet ports accessible via front panel:
  - Two 10GbE SFP+ ports with 10GbE PHY
  - Two 1GbE SFP ports
- Front panel LEDs for link/activity status
- Hot Swap insertion and removal support per PICMG 2.1 R2.0
- IPMI Controller for PICMG 2.9-compliant shelf management through IPMB-0 serial bus
- Power regulators onboard for power distribution

All NETernity CP921RC-30X Switches are factory installed with default settings and configuration. The NETernity CP921RC-30X Switches (hereafter referred to as CP921RC-30X) are available in the models listed in Table 2-1. Table 2-2 lists supported Rear Transition Modules (RTM), which are used in conjunction with the CP921RC-30X.

All CP921RC-30X and RTM models are available with polyurethane conformal coating (–CC) or acrylic conformal coating (—CCA).

NOTE

For additional configurations, please contact a GE Intelligent Platforms' sales representative.

Table 2-1 NETernity CP921RC-30X Switch Models

Models	Rear I/O Ports with F-Link Support	Front Panel		Temperature
		SFP GbE Ports	SFP+ 10GbE Ports	
CP921RC-300	24	0	0	Standard
CP921RC-300-IND	24	0	0	Industrial
CP921RC-301	22	2	2	Standard

Table 2-2 Supported RTMs

Model	Size (Slots)	10/100/1000Base-TX Ports via RJ-45 connectors	Fabric-to-Fabric Link
TRCP9xxRC	Double	24	No
TRCP9xxRC-12	Single	12	No
TRCP9xx-5RC	Single	5	No
TRCP9xx-5RC-F	Single	4	Yes

2.2 Hardware Description

The CP921RC-30X hardware design is comprised of two boards:

- Base Switch Board
- Management Board

Figure 2-1 shows a simple block diagram of the CP921RC-30X.

Base Switch Board

The Base Switch Board incorporates a highly-integrated Gigabit Ethernet multi-layer Switch Fabric from the Broadcom® BCM563xx family to provide 10/100/1000 Gigabit Ethernet wire-speed switching. The Switch Fabric supports IPv6 routing functions.

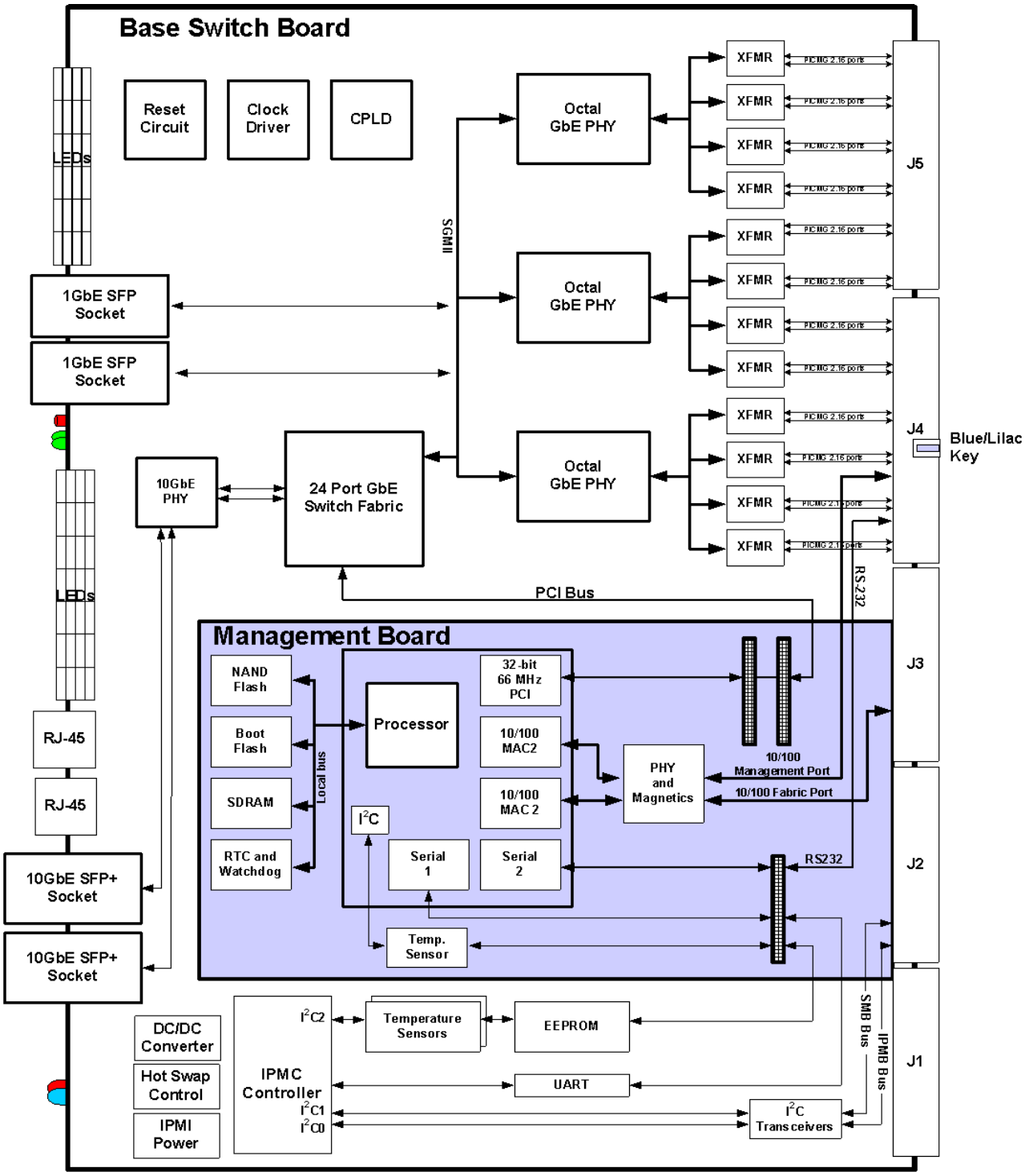
Management Board

The Management Board contains a Processor. This Processor configures and manages both the switch and port controllers, and provides command and status information for each port. The Processor is able to terminate packets that are sent to it. The Processor can be accessed through a serial cable console or remotely using the 10/100Mbps port. (The MAC address of the CP921RC-30X is stored in EEPROM.) The Processor interfaces to the Switch Fabric through the 32-bit PCI bus running at 66 MHz.

The Management Board supports 8-bit Error Correction Code (ECC) interfaces.

The Management Board also contains an IPMI Controller for communications with an external shelf manager.

Figure 2-1 CP921RC-30X Simple Block Diagram



2.3 Base Switch Overview

The CP921RC-30X features the following components on the Base Switch board:

- 24-Port GbE Switch Fabric with three Octal 1GbE PHYs
- Complex Programmable Logic Device (CPLD)
- IPMI Controller (IPMC)
- 10Gigabit/1Gigabit options, including:
  - Two 10GbE ports with 10GbE PHY and SFP+ cages
  - Two 1GbE ports with GbE PHY and SFP cages
- Front panel LEDs for link/activity status and reset
- Temperature sensors

2.4 24-Port GbE Switch

The Base Switch Board incorporates a Switch that can operate at 10/100/1000 Mbps for 24 Gigabit Ethernet ports, and on select models includes two 10GbE ports and two GbE ports. This Switch integrates sophisticated advanced L3 switching features for cost-effective, highly-manageable enterprise networks. The Switch performs IPv6 routing and transition services in hardware, allowing deployment of L3 switches that are future-proof, highly-manageable L3 networks, and enable cost-effective transition from IPv4 to IPv6.

The Switch interfaces to the Management Board via a 32-bit PCI bus running at 66 MHz, through which the Processor on the Management Board configures the Switch.

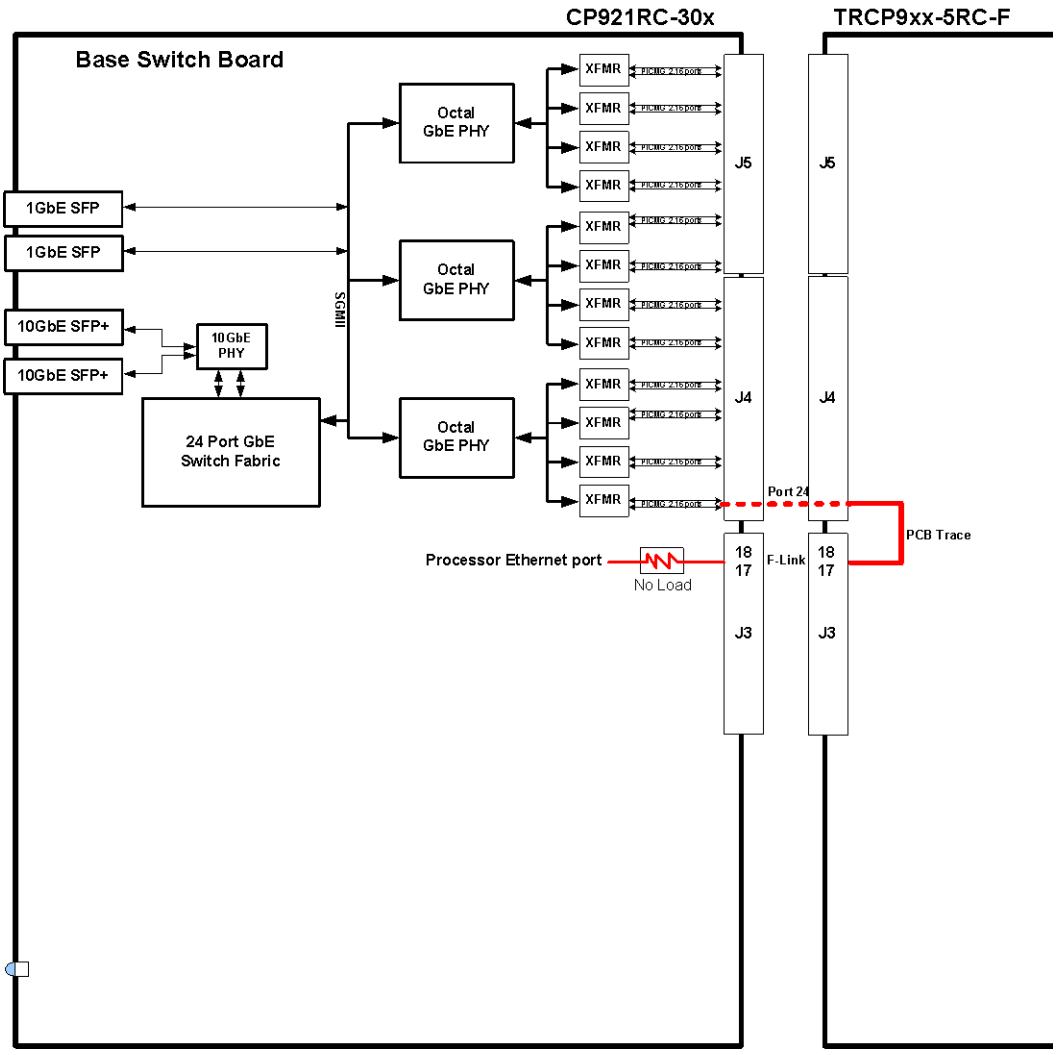
The Switch interfaces to the three octal PHYs through the Serial Gigabit Media Independent Interface (SGMII) interface. The Switch supports PHY management through the serial Management Data Input/Output (MDIO) / Management Data Clock (MDC) interface.

Fabric Link Connection

As shown in Figure 2-1, all 24 ports are routed to the Rear Transition Module (RTM) for the CPC921RC-300 and CPC921RC-300-IND. For the CP921RC-301, Ports 1–21 and Port 24 are routed to the RTM. Ports 22 and 23 are routed to the front panel 1GbE SFP ports.

Port 24 is routed to the Fabric-to-Fabric link of the PICMG 2.16 backplane only when using the TRCP9xx-5RC-F RTM as shown in Figure 2-2.

Figure 2-2 Fabric Link Connection



2.5 Octal GbE PHYs

The Base Switch Board uses three octal 10/100/1000Base-T Gigabit Ethernet transceivers to perform automatic MDI crossover during Auto-Negotiation phase. Auto-negotiation is an optional function of the IEEE 802.3u Fast Ethernet standard, which enables devices to automatically exchange information about speed and duplex abilities over a link PHY addresses are given in Table 2-3.

Table 2-3 PHY Addresses

PHY	Address
PHY1	00001xb
PHY2	01001xb
PHY3	10001xb

2.6 10GbE PHY

The CP921RC-30X uses dual-channel Gigabit Ethernet SFI-to-XAUI (SerDes Framer Interface to 10 GBps Attachment Unit Interface) transceiver that incorporate an Electronic Dispersion Compensation (EDC) qualifiers supporting SFP+, SR, LR, and LRM optical interfaces. It also supports up to 15meters over SFP+ copper twin-axial cable.

The 10GbE PHY interfaces to the Switch Fabric through the XAUI interfaces, which contains 4-lane, 3.125Gbps differential line. The receiver path accepts 10.3125 Gbps serial Physical Medium Dependent (PMD) data and reformats the data for transmission on 4-lane 3.125Gbps XAUI transmitters. The transmit path collects four-lane 3.125 Gbps data at the XAUI receivers and reformats the data for 10.3125 Gbps serial transmission at the PMD differential Current Mode Logic (CML) drivers. An external 156.25MHz differential Low-Voltage Positive/Pseudo Emitter-Coupled Logic (LVPECL) oscillator is provided for the reference clock input.

The 10GbE PHY contains a management data I/O interface that provides access to the internal registers via the MDIO/MDC pins. It also provides a two-wire serial interface that allow the system to access external slave devices through the MDIO interface.

The 10GbE PHY has an Auto-Detect feature. The Auto-Detect feature reads the SFP+ module information automatically upon insertion of module. Using this module information, this feature sets the appropriate mode.

The 10GbE PHY also provides the direct interface to the SFP+ Optical Transceiver Control/Status Interface for the following signals:

- OPRXLOS
- Module Absent
- TX Fault
- TX reset
- TX enable

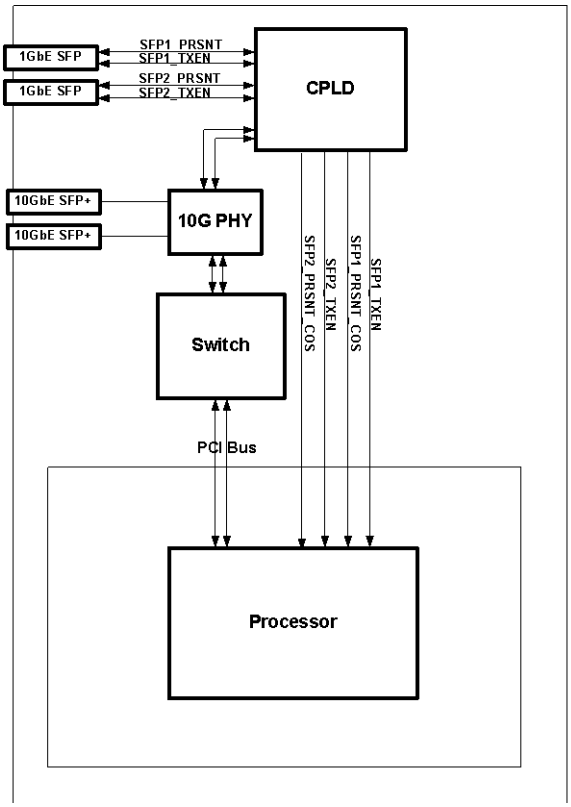
Two GPIO pins on each channel drive the Link (LNK) and Activity (ACT) status LEDs on the front panel.

2.7 CPLD

A CPLD implements the following:

- All logic for the reset function
- CompactPCI hot swap requirements
- Link and Activity status LEDs for the two front panel 10 GbE SFP ports
- Control and status for the 1GbE SFP I/O functions such as SFP_PRSNT, SFP_TXEN, SFP_RXLOS. As shown in a simple diagram in Figure 2-3, the CPLD monitors the SFP_PRSNT signal from each 1GbE SFP. When a 1GbE SFP is inserted into the socket, the CPLD asserts the SFP_PRSNT signal to the Processor. The CPLD also asserts the Change-of-State interrupt request (COS_IRQ) and other control and status signals.

Figure 2-3 Status and Control Functions



2.8 IPMI Controller

The Intelligent Platform Management Controller (IPMC) on the Management Board of the CP921RC-30X provides management and identification functions of the CP921RC-30X using the Intelligent Platform Management Interface (IPMI) protocol.

The IPMC Subsystem (hereafter referred to as the IPMC) provides the common interface to the CP921RC-30X for hardware health monitoring and system management. The IPMC monitors the physical health of the CP921RC-30X including air inlet and outlet board temperature and on-board power supply voltage levels.

The IPMC complies with industry standards to provide an *always available* board that supports the following features:

- Monitoring of hardware information, such as voltage and temperature
- Monitoring of hardware sensors and alarm generation (alerts)
- Field Replaceable Unit (FRU) hot swap functions

All configuration for the CP921RC-30X is performed by the IPMC. IPMI signals are routed to backplane and pin assignment are described in ***Chapter 3 • "Connectors and Pin Assignments"***.

The CP921RC-30X supports IPMI as a satellite controller and complies with IPMI specification to provide the Baseboard Management Controller (BMC) functions. The BMC is the intelligence in the IPMI architecture. The BMC manages the interface between system management software and platform hardware to provide monitoring, event logging and recovery control.

The CP921RC-30X supports IPMI version 1.5, which the BMC and user management software must also support.

Refer to the ***Intelligent Platform Management Interface*** specification, version 1.5, for more information including a listing of IPMI commands.

Table 2-4 IPMI Status Code

Status Code	Description
0x80	Application get message command, no data available
0xB0	Firmware Error — Bug
0xB1	Hardware Error
0xC1	Invalid command
0xC2	Invalid Logical Unit number (LUN)
0xC3	Timeout processing command
0xC4	Out-of-storage space
0xC5	Invalid reservation
0xC8	Request data length limit exceeded
0xC9	Parameter out-of-range
0xCB	Requested device, or data not present
0xCC	Invalid data files in request
0xCE	Command response cannot be provided (not implemented)
0xD3	Destination unavailable
0xFF	Unspecified error

2.8.1 Platform Events

A platform event is an event that is originated directly from platform firmware or platform hardware independently of the state of the operating system or system management hardware. The CP921RC-30X does *not* send a Platform Event until a BMC sends the switch IPMI *Set Event Receiver* command with an Event Receiver Slave Address that is *not* 0xFF. The default Event Receiver Slave Address is 0xFF, which disables event messages.

The Platform Event message generated by the CP921RC-30X contains three bytes of Event Data. The discrete sensor class data is returned. Event Data byte 3 is an OEM (vendor specific) value, which is set to the sensor reading value for the sensor that generated the event message.

Table 2.9 describes Sensor information for the CCP921RC-30X. Sensor events returned per sensor include:

- Normal
- Non-Critical
- Critical

Table 2-5 Sensors Information

CP921RC-300		
SDR Record	Sensor Number	Description
2	2	5.0 volt power
3	3	3.3 volt power
4	4	2.5 volt power
5	5	1.8 volt power
6	6	3.3 IPMI power
7	7	1.25 volt power
8	8	1.2 volt power
9	9	IPMI temp
10	10	Switch temp
11	11	CPU temp

CP921RC-301		
SDR Record	Sensor Number	Description
2	2	5.0 volt power
3	3	3.3 volt power
4	4	2.5 volt power
5	5	1.8 volt power
6	6	3.3 IPMI power
7	7	1.25 volt power
8	8	1.2 volt power
9	9	1.0 volt power
10	10	IPMI temp
11	11	Switch temp
12	12	CPU temp

2.9 Temperature Sensors

The CP921RC-30X contains two temperature sensors. Both sensors are accessed by the IPMC. One measures inlet air temperature and one measures egress air temperature. See ***Chapter 4 • "Temperature and Power"*** for more information on these sensors.

2.10 10Gigabit and 1Gigabit Ports

Optionally, two 10Gigabit and two 1Gigabit ports are available with SFP and SPF+ transceivers supported on select models of the CP921RC-30X front panel. In this flexible configuration, the CP921RC-30X provides:

- Two GbE ports with SFP cages
- Two 10GbE ports with SFP+ cages

2.10.1 1GbE SPF Ports

The CP921RC-301 routes two GbE ports (22 and 23) to the front panel as pluggable ports using two SFPs. The SFP uses a 20-pin connector for the media interface. Table 2-6 lists the supported SFPs.

Table 2-6 Supported SFP Transceivers

Transceiver Type	Wavelength	Connector	Manufacturer Part Number
1000Base-SX	850nm	LC	Finisar FTLF8519P2BCL
1000Base-LX	1310nm	LC	Finisar FTLF1318P2BCL
1000Base-T	n/a	RJ-45	Finisar FCLF-8521-3

The SFPs contain a Two-Wire Serial Interface that reads SFP identification information stored in the internal EEPROM on the SFP. This Serial Interface uses the I2C protocol. Because there are no address bits on the SFPs, both SFPs have the same hardware address - 0xA0 (1010 000x). A Two-Wire Serial Bus is buffered to each SFP, and the buffer is enabled thru bits from the I2C I/O expander.

The Processor I2C Bus reads and writes to the I2C I/O expander. The Processor I2C Bus has eight GPIO pins (GPIO 0-7). GPIO4 and GPIO5 control the I2C buffer enable as described in Table 2-7.

Table 2-7 GPIO4 and GPIO5 Settings

Pin	Settings
GPIO4	0 = Buffer to SFP1 disabled. 1 = Buffer to SFP1 enabled.
GPIO5	0 = Buffer to SFP2 disabled. 1 = Buffer to SFP2 enabled.

2.10.2 10GbE SFP+ Ports

The CP921RC-301 also supports two 10GbE SFP+ modules. SFP+ modules use the same 20-pin connector as the SFP for the transceiver interface. Table 2-6 lists supported SFP+ transceivers.

Table 2-8 Supported SFP+ Transceivers

Transceiver	Wavelength	Connector	Manufacturer Part Numbers
10GBase-SR	850nm	LC	Finisar FTLX8571D3BCL Avago AFBR-703SDZ
10GBase-LR	1310nm	LC	Finisar FTLX1471D3BCL Avago AFCT-701SDZ
10G Copper	n/a	Attaches directly to cable assembly	Molex 74752-2151 (1.5m length)

Contact you GE Intelligent Platforms sales representative for information on ordering SFP/SFP+ modules.

2.11 Rear Transition Modules

This section describes the rear transition modules, which provide rear-panel I/O access to all CP921RC-30X ports. The following are compatible Rear Transition Modules, which are IEEE 802.3 compliant:

- TRCP9xxRC
- TRCP9xxRC-12
- TRCP9xx-5RC
- TRCP9xx-5RC-F

Depending on the model, up to 24 Gigabit Ethernet ports of the CP921RC-30X are accessible from the copper RJ-45 connectors. Each Ethernet port is routed on the Base Switch Board as well as on the transition module as four 100 Ohm differential pairs.

On select models, there is a 10/100 Fast Ethernet Fabric Port and/or a 10/100 Fast Ethernet Local Management Port.

An RS-232 connector provides access to the local command console.

2.11.1 TRCP9xxRC

Figure 2-4 shows the faceplate of the TRCP9xxRC RTM. Table 2-9 describes the connectors.

Figure 2-4 TRCP9xxRC Faceplate

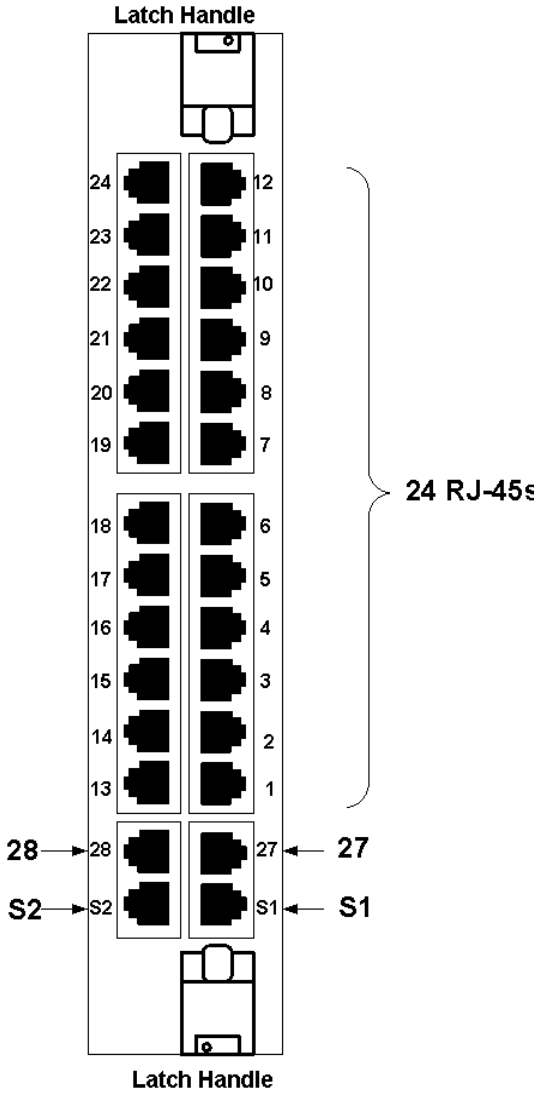


Table 2-9 TRCP9xxRC Faceplate Connectors

Connectors	Description
1–24	Gigabit Ethernet Ports
27	10/100 Fast Ethernet Fabric Port
28	10/100 Fast Ethernet Local Management Port
S1	Local RS-232 Command Console
S2	Reserved

2.11.2 TRCP9xxRC-12

Figure 2-5 shows the faceplate of the TRCP9xxRC-12 RTM. Table 2-11 describes the connectors.

Figure 2-5 TRCP9xxRC-12 Faceplate

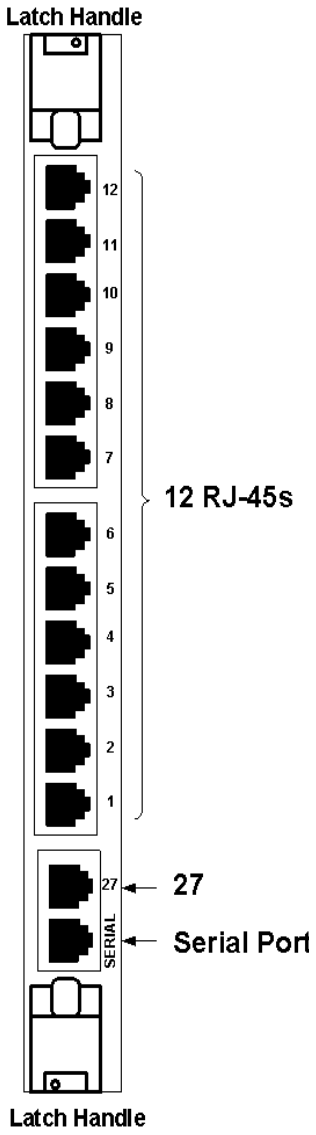


Table 2-10 TRCP9xxRC-12 Connectors

Connectors	Description
1–12	Gigabit Ethernet Ports
27	10/100 Fast Ethernet Fabric Port
Serial	Local RS-232 Command Console

2.11.3 TRCP9xx-5RC

Figure 2-6 shows the faceplate of the TRCP9xx-5RC RTM. Table 2-11 describes the connectors.

Figure 2-6 TRCP9xx-5RC Faceplate

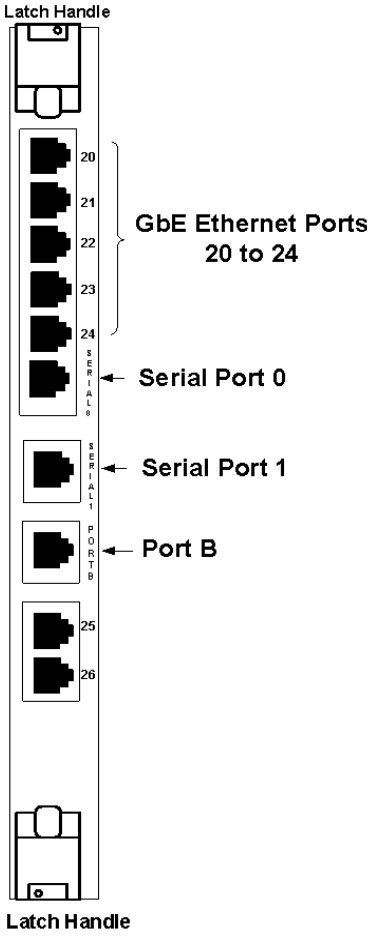


Table 2-11 TRCP9xx-5RC Connectors

Connectors	Description
20—24	Gb Ethernet Ports
Serial 0	Local RS-232 Command Console 10/100 Fast Ethernet Fabric Port
Serial 1	Reserved
Port B	10/100 Fast Ethernet Local Management port
25, 26	Reserved

2.11.4 TRCP9xx-5RC-F

Figure 2-7 shows the faceplate of the TRCP9xx-5RC-F RTM. Table 2-10 describes the connectors.

Figure 2-7 TRCP9xx-5RC-F Faceplate

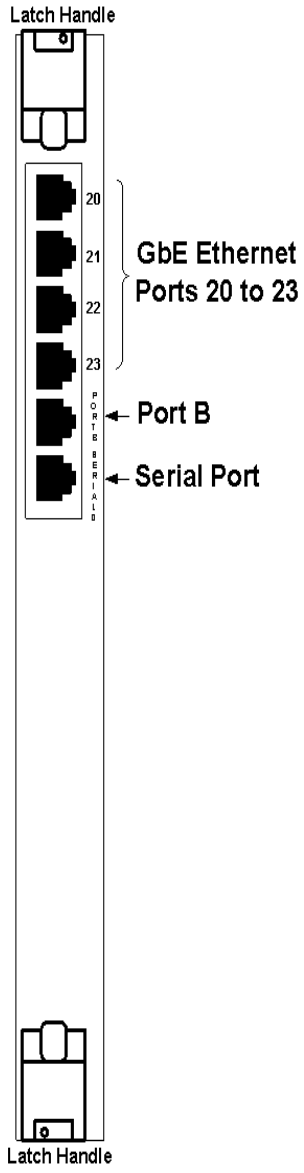


Table 2-12 TRCP9xx-5RC-F Connectors

Connectors	Description
20—23	Gigabit Ethernet Ports
Port B	10/100 Fast Ethernet Local Management port
Serial	Local RS-232 Command Console

3 • Connectors and Pin Assignments

This chapter describes the pin assignments for cPCI backplane connectors and RJ-45 connectors on select models of the CP921RC-30X. This chapter also describes the RS-232 serial cable for the H1 Header on the rear transition module.

3.1 CompactPCI Backplane Connectors

The cPCI backplane connectors include the IPMI bus and the J1 through J5 connectors.

3.1.1 IPMI Bus

The CP921RC-30X supports the main IPMI bus (IPMB-0). IPMB-0 connects to the IPMC through an I2C buffer. Table 3-1 describes the cPCI backplane pin assignment for IPMB-0.

Table 3-1 cPCI Backplane Pin Assignment for IPMB-0

Characteristic	IPMB-0		Vsm
	SCLK (I2C Clock)	SDAT (I2C Data)	
Pin Name	IPMB-SCL	IPMB-SDA	IPMB_PWR
System Slot	B17	C17	A4
Peripheral Slot	B17	C17	A4

3.1.2 J1, J2, J3, J4, and J5 Connector Pin Assignments

This section contains the pin assignments for the J1, J2, J3, J4 and J5 Connectors. A dash (—) in a field indicates that the pin is not used.

Table 3-2 J1 Connector Pin Assignments

Pin	A	B	C	D	E	F	G
25	+5V	—	ENUM#	+3.3V	+5V	GND	—
24	—	+5V	—	—	—	GND	—
23	+3.3V	—	—	+5V	—	GND	—
22		GND	+3.3V	—	—	GND	—
21	+3.3V	—	—	—	—	GND	—
20		GND	—	—	—	GND	—
19	+3.3V	—	—	GND	—	GND	—
18		GND	+3.3V		—	GND	—
17	+3.3V	IPMB_SCLH	IPMB_SDAH	GND	—	GND	—
16		GND	—	—	—	GND	—
15	+3.3V	—	—	BD_SEL1	—	GND	—
14	—	—	—	—	—	GND	—
13	—	—	—	—	—	GND	—
12	—	—	—	—	—	GND	—
11	—	—	—	—	—	GND	—
10	—	GND	+3.3V	—	—	GND	—
9	—	—	—	GND	—	GND	—
8	—	GND	—	—	—	GND	—
7	—	—	—	GND	—	GND	
6	—	PCI_PRESENT	+3.3V	—	—	GND	
5	—	—	CHRSTX	—	—	GND	GND
4	IPMB_PWR	HEALTHY#	—	—	—	GND	—
3	—	—	—	+5V	—	GND	—
2	—	+5V	—	—	—	GND	—
1	+5V	—12V	—	+12V	+5V	GND	—

where:

IPMB_PWR = IPMB power pin.
HEALTHY = Monitor the health of the CP921RC-30X.
PCI_PRESENT = CompactPCI board is present.
GND = Circuit Ground.
IPMB_SCHL = I2C clock for IPMB.
IPMB_SDAH = I2C data for IPMB.
ENUM = System enumerations driven by CP921RC-30X after insertion and prior to removal.
BD_SEL1 = Board select.
V = Volatge for power supply.

Table 3-3 J2 Connector Pin Assignments

Pin	A	B	C	D	E	F
22	GA4	GA3	GA2	GA1	GA0	GND
21	—	—	—	—	—	GND
20	—	—	—	—	—	GND
19	—	—	SMB1_SDA	SMB1_SCL	—	GND
18	—	—	—	—	—	GND
17	—	—	—	—	—	GND
16	—	—	—	—	—	GND
15	—	—	—	—	—	GND
14	—	—	—	—	—	GND
13	—	—	—	—	—	GND
12	—	—	—	—	—	GND
11	—	—	—	—	—	GND
10	—	—	—	—	—	GND
9	—	—	—	—	—	GND
8	—	—	—	—	—	GND
7	—	—	—	—	—	GND
6	—	—	—	—	—	GND
5	—	—	—	—	—	GND
4	—	—	—	—	—	GND
3	—	—	—	—	—	GND
2	—	—	—	—	—	GND
1	—	—	—	—	—	GND

where:

GA*n* = Geographic Address Bit (0—4).
SMB1_SDA = I2C data for SMB.
SMB1_SCL = I2C clock for SMB.
GND = Circuit Ground.

Table 3-4 J3 Connector Pin Assignments

Pin	A	B	C	D	E	F
19	—	—	—	—	—	GND
18	LPF_DB+	LPF_DB–	—	NC	NC	GND
17	LPF_DA+	LPF_DA–	—	NC	NC	GND
16	LP8_DA+	LP8_DA—	—	LP8_DC+	LP8_DC—	GND
15	LP8_DB+	LP8_DB—	—	LP8_DD+	LP8_DD—	GND
14	LP7_DA+	LP7_DA—	—	LP7_DC+	LP7_DC—	GND
13	LP7_DB+	LP7_DB—	—	LP7_DD+	LP7_DD—	GND
12	LP6_DA+	LP6_DA—	—	LP6_DC+	LP6_DC—	GND
11	LP6_DB+	LP6_DB—	—	LP6_DD+	LP6_DD—	GND
10	LP5_DA+	LP5_DA—	—	LP5_DC+	LP5_DC—	GND
9	LP5_DB+	LP5_DB—	—	LP5_DD+	LP5_DD—	GND
8	LP4_DA+	LP4_DA—	—	LP4_DC+	LP4_DC—	GND
7	LP4_DB+	LP4_DB—	—	LP4_DD+	LP4_DD—	GND
6	LP3_DA+	LP3_DA—	—	LP3_DC+	LP3_DC—	GND
5	LP3_DB+	LP3_DB—	—	LP3_DD+	LP3_DD—	GND
4	LP2_DA+	LP2_DA—	—	LP2_DC+	LP2_DC—	GND
3	LP2_DB+	LP2_DB—	—	LP2_DD+	LP2_DD—	GND
2	LP1_DA+	LP1_DA—	—	LP1_DC+	LP1_DC—	GND
1	LP1_DB+	LP1_DB—	—	LP1_DD+	LP1_DD—	GND

where:

LP1_D*n* = Port 1, Circuit D(*A*—*D*)±
LP2_D*n* = Port 2, Circuit D(*A*—*D*)±
LP3_D*n* = Port 3, Circuit D(*A*—*D*)±
LP4_D*n* = Port 4, Circuit D(*A*—*D*)±
LP5_D*n* = Port 5, Circuit D(*A*—*D*)±
GND = Circuit Ground
NC = No connection, or option Load Connection to ETH1. The Fabric Link port is accessed only when connected to TRCP9xx-5RC-F.

Table 3-5 J4 Connector Pin Assignment

Pin	A	B	C	D	E	F
25	LP20_DB+	LP20_DB–	–	LP20_DD+	LP20_DD–	GND
24	LP20_DA+	LP20_DA–	–	LP20_DC+	LP20_DC–	GND
23	LP21_DB+	LP21_DB–	–	LP21_DD+	LP21_DD–	GND
22	LP21_DA+	LP21_DA–	–	LP21_DC+	LP21_DC–	GND
21	LP22_DB+	LP22_DB–	–	LP22_DD+	LP22_DD–	GND
20	LP22_DA+	LP22_DA–	–	LP22_DC+	LP22_DC–	GND
19	LP23_DB+	LP23_DB–	–	LP23_DD+	LP23_DD–	GND
18	LP23_DA+	LP23_DA–	–	LP23_DC+	LP23_DC–	GND
17	LP24_DB+	LP24_DB–	–	LP24_DD+	LP24_DD–	GND
16	LP24_DA+	LP24_DA–	–	LP24_DC+	LP24_DC–	GND
15	–	–	–	RXD1	TXD1	GND
14	–	–	–	–	–	GND
13	–	–	–	–	–	GND
12	–	–	–	–	–	GND
11	ETH0_RXP	ETH0_RXN	–	–	–	GND
10	ETH0_TXP	ETH0_TXN	–	–	–	GND
9	–	–	–	–	–	GND
8	–	–	–	–	–	GND
7	–	–	–	–	–	GND
6	–	–	–	–	–	GND
5	–	–	–	–	–	GND
4	–	–	–	–	–	GND
3	–	–	–	–	–	GND
2	RTM_SENSE	–	–	–	–	GND
1	BPIO_A1	BPIO_B1	BPIO_C1	BPIO_D1	–	GND

where:
LP20_D*n* = Port 20, Circuit D(*A*—*D*)±
LP21_D*n* = Port 21, Circuit D(*A*—*D*)±
LP22_D*n* = Port 22, Circuit D(*A*—*D*)±
LP23_D*n* = Port 23, Circuit D(*A*—*D*)±
LP24_D*n* = Port 24, Circuit D(*A*—*D*)±
GND = Circuit Ground
ETH0_TXP/N = 10/100Mbps TX± (management port)
ETH0_RXP/N = 10/100Mbps RX± (management port)
RXD1 = Receive data (serial port)
TXD1 = Transmit data (serial port)
BPIO_A1 = Backplane I/O, optionally connected to +3.3V (default is No Connect)
BPIO_B1 = Backplane I/O, optionally connected to +3.3V (default is No Connect)
BPIO_C/D1 = Backplane I/O, optionally connected to +5V (default is No Connect)
RTM_SENSE = RTM board status, when RTM is inserted

Table 3-6 J5 Connector Pin Assignment

Pin	A	B	C	D	E	F
22	LP19_DA+	LP19_DA—	—	LP19_DC+	LP19_DC—	GND
21	LP19_DB+	LP19_DB—	—	LP19_DD+	LP19_DD—	GND
20	LP18_DA+	LP18_DA—	—	LP18_DC+	LP18_DC—	GND
19	LP18_DB+	LP18_DB—	—	LP18_DD+	LP18_DD—	GND
18	LP17_DA+	LP17_DA—	—	LP17_DC+	LP17_DC—	GND
17	LP17_DB+	LP17_DB—	—	LP17_DD+	LP17_DD—	GND
16	LP16_DA+	LP16_DA—	—	LP16_DC+	LP16_DC—	GND
15	LP16_DB+	LP16_DB—	—	LP16_DD+	LP16_DD—	GND
14	LP15_DA+	LP15_DA—	—	LP15_DC+	LP15_DC—	GND
13	LP15_DB+	LP15_DB—	—	LP15_DD+	LP15_DD—	GND
12	LP14_DA+	LP14_DA—	—	LP14_DC+	LP14_DC—	GND
11	LP14_DB+	LP14_DB—	—	LP14_DD+	LP14_DD—	GND
10	LP13_DA+	LP13_DA—	—	LP13_DC+	LP13_DC—	GND
9	LP13_DB+	LP13_DB—	—	LP13_DD+	LP13_DD—	GND
8	LP12_DA+	LP12_DA—	—	LP12_DC+	LP12_DC—	GND
7	LP12_DB+	LP12_DB—	—	LP12_DD+	LP12_DD—	GND
6	LP11_DA+	LP11_DA—	—	LP11_DC+	LP11_DC—	GND
5	LP11_DB+	LP11_DB—	—	LP11_DD+	LP11_DD—	GND
4	LP10_DA+	LP10_DA—	—	LP10_DC+	LP10_DC—	GND
3	LP10_DB+	LP10_DB—	—	LP10_DD+	LP10_DD—	GND
2	LP9_DA+	LP9_DA—	—	LP9_DC+	LP9_DC—	GND
1	LP9_DB+	LP9_DB—	—	LP9_DD+	LP9_DD—	GND

3.2 Port Mapping

This section contains the port mapping for the following:

- Octal GbE PHYs
- IPMI Controller

3.2.1 GbE PHY Port Mapping

The CP921RC-300 use three octal 10/100/100BASE-T PHYs as shown in Figure 2-1. Port mapping enables the creation of a permanent translation entry that maps a specific Switch Fabric port to a specific PHY port.

Table 3-7 lists the address for each PHY. Table 3-8 specifies the port mapping.

Table 3-7 GbE PHY Addresses

PHY	Address
PHY1	00001xb
PHY2	01001xb
PHY3	10001xb

Table 3-8 Octal GbE PHY Port Mapping

Physical Port	24 Port GbE Switch	Octal PHYs	Access	
			Rear	Front
1	1	1—1	Rear	
2	2	1—2	Rear	
3	3	1—3	Rear	
4	4	1—4	Rear	
5	5	1—5	Rear	
6	6	1—6	Rear	
7	7	1—7	Rear	
8	8	1—8	Rear	
9	22	3—6	Rear	
10	23	3—7	Rear	
11	24	3—8	Rear	
12	9	2—1	Rear	
13	10	2—2	Rear	
14	11	2—3	Rear	
15	12	2—4	Rear	
16	13	2—5	Rear	
17	14	2—6	Rear	
18	15	2—7	Rear	
19	16	2—8	Rear	
20	21	3—5	Rear	
21	20	3—4	Rear	
22	19	3—3	Rear for CP921RC-300	Front for CP921RC-301
23	18	3—2	Rear for CP921RC-300	Front for CP921RC-301
24[1]	17	3—1	Rear	

1. Port 24 is used for the F-Link option.

3.2.2 IPMC Port Mapping

The IPMC implements the IPMI functionality. The IPMC firmware is stored in EEPROM. Table 3-9 describes the port mapping for the IPMC.

Table 3-9 IPMC Port Mapping

Port	Signal	Description
P0.0	SPI_CLK	SPI clock.
P0.1	C8051_MISO	SPI Data (Master In — Slave Out).
P0.2	C8051_MOSI	SPI Data (Master Out — Slave In).
P0.3	IPMB_SDA	I2C add for IPMB.
P0.4	IPMB_SCL	I2C clock for IPMB.
P0.5	UART_TX	UART Transmit.
P0.6	UART_RX	UART Receive.
P0.7	*CPCI_BDSEL	CPCI board insertion, where: 0 = Board inserted. 1 = Board not inserted.
P1.0	*C8051_EEPROM_CS	EEPROM Chip Select, where: 0 = Program EEPROM selected. 1 = EEPROM is not selected.
P1.1	TEMP_SEN1_CS	Temperature Sensor #1 Chip Select, where: 0 = Sensor #1 selected. 1 = Sensor #1 not selected.
P1.2	*TEMP_SEN2_CS	Temperature Sensor #2 Chip Select, where: 0 = Sensor #2 selected. 1 = Sensor #2 not selected.
P1.3	GA0_B	CPCI GA (Geographical Address) bit 0.
P1.4	GA1_B	CPCI GA bit 1.
P1.5	GA2_B	CPCI GA bit 2.
P1.6	GA3_B	CPCI GA bit 3.
P1.7	GA4_B	CPCI GA bit 4.
P2.0	*IPMI_RST_OUT	IPMI reset to the rest of the board (except IPMI), where: 0 = Reset the board. 1 = Normal operation.
P2.1	*BLUE_CNTL	Hot Swap control, where: 0 = Okay to power down the unit. 1 = Power down not allowed.
P2.2	BRD_SEL3D	Signal indication from the Latch Handle Switch, where: 0 = Latch is activated. 1 = Latch is open.
P2.3	*FORCEOFF	Switch control, where: 0 = Turn off switch (except IPMI). 1 = Normal operations.
P2.4	*IPMI_INT	IPMI Interrupt, where: 0 = IPMI interrupt asserted. 1 = No interrupt.
P2.5	SDA_2	Optional I2C clock bus for CPCI SMB (IPMB1). I2C bit banging operation required.
P2.6	SCL_2	Optional I2C clock bus for CPCI SMB (IPMB1). I2C bit banging operation required.
P2.7	GPIO_A	GPIO signal routed to the CPLD on the CP921RC-30X
P3.0	GPIO_B	GPIO signal routed to the CPLD on the CP921RC-30X.

Table 3-9 IPMC Port Mapping

Port	Signal	Description
P3.1	*C8051_STATUS	IPMI status signal: 0 = Code is loaded and control is operational. 1 = Code is not loaded. boot failure.
P3.2	*IPMI_ERR	IPMI related error, where: 0 = IPMI error is detected. 1 = No error found.
P3.3	GPIO_PROC	GPIO signal connected to I2C-based buffer. Can be used for control signal between IPMC and the Processor.

* Signal is active low.

3.3 RJ-45 Connectors

As shown in Figure 2-6, the front panel Serial Console, Ethernet Management, and RTM face plates provide standard 8-pin RJ-45 connectors for Ethernet access. Figure 3-1 shows an RJ-45 connector, and Table 3-10 describes the pin assignments with MDI signals.

Figure 3-1 Standard RJ-45 Connector

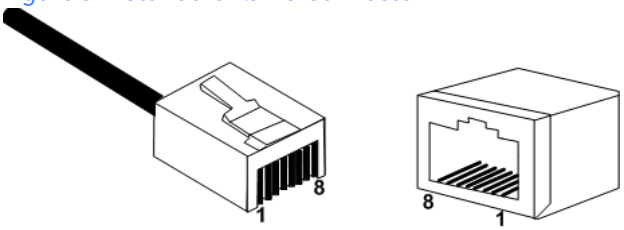


Table 3-10 RJ-45 Pin Assignment

Pin Number	Signal	Description	Pin Number	Signal	Description
1	MDI_DA+	Data Access — Pair A	5	MCI_DC—	Data Access — Pair C
2	MDI_DA—	Data Access — Pair A	6	MDI_DB—	Data Access — Pair B
3	MDI_DB+	Data Access — Pair B	7	MDI_DD+	Data Access — Pair D
4	MDI_DC+	Data Access — Pair C	8	MDI_DD—	Data Access — Pair D

4 • Temperature and Power

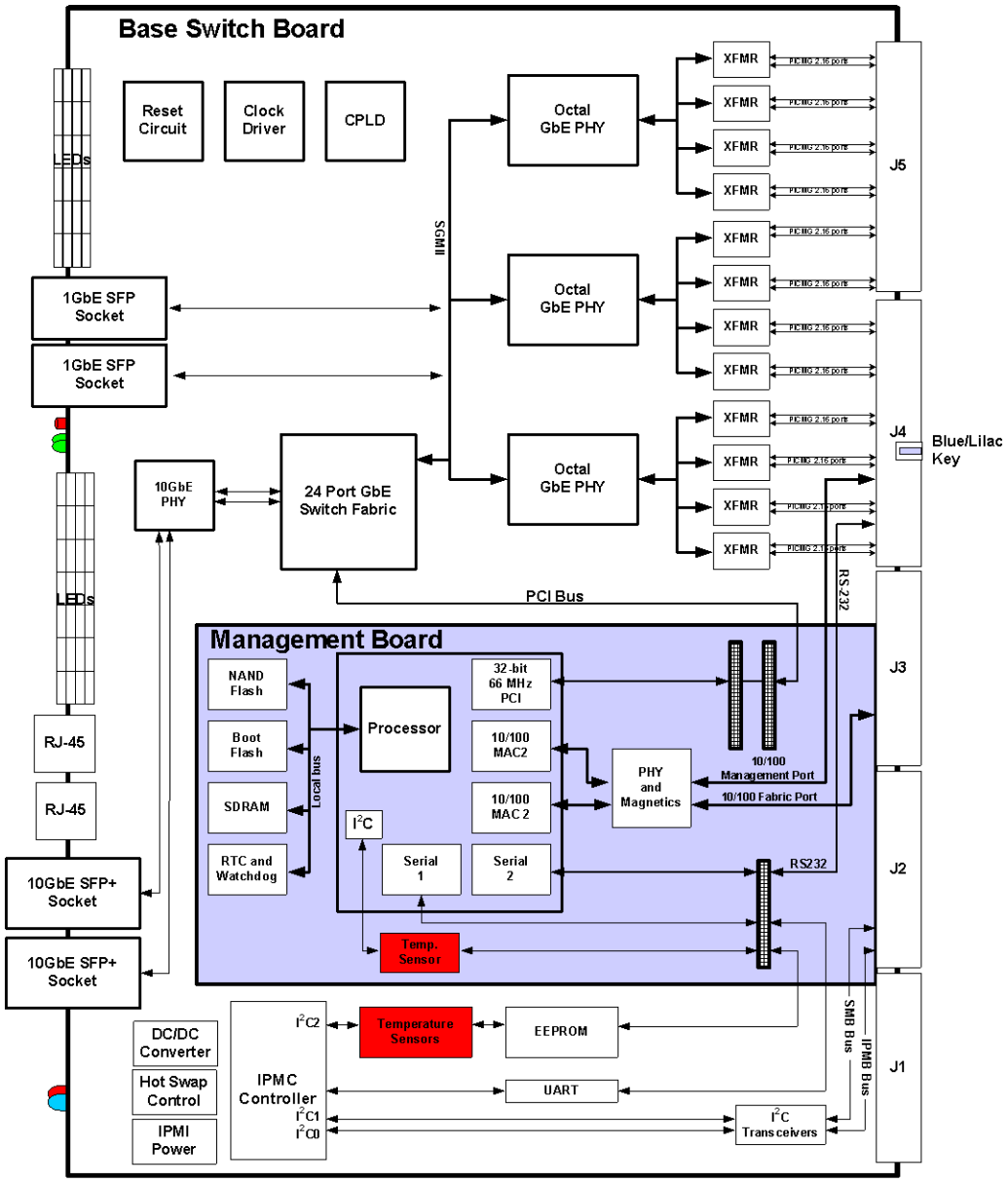
The CP921RC-30X contains two temperature sensors. The CP921RC-30X uses a combination of linear voltage regulators and DC-DC converters to meet the power needs.

4.1 Temperature Sensors

Two temperature sensors are provided to monitor the inlet and outlet temperature of the CP921RC-30X. The Processor on the Management Board can obtain the board temperature from the IPMC through UART0.

Figure 4-1 shows the approximate location of the temperature sensors (in red) on the CP921RC-30X.

Figure 4-1 Location of Temperature Sensors



4.2 Power Distribution

The CP921RC-30X assembly draws all required load current from a combination of linear voltage regulator sand DC-DC converters. The CP921RC-30X generates the following:

- +2.5V
- +1.8V
- +1.25V
- +1.2V
- +1V

Table 4-1 shows the maximum current rating per power rails for all models.

Table 4-1 Power Consumption

Voltage (V)	Current Maximum (Amps)	Power/Rail (Watts)
3.3	2.62	8.63
2.5	1.28	3.20
1.8	5.465	9.84
1.25	13.81	17.26
1.0	3.2	3.2

4.3 IPMC and ADC0 Input

The IPMC uses the ADC0 input (AIN0.0-AIN0.7) to monitor all supply voltages used on the board. The voltage at each ADC0 input pin is the value of a voltage divider circuit between the voltage being monitored and GND. Table 4-2 lists the ADC0 input pins used for monitoring different voltages and the estimate voltage value at the input pins.

Table 4-2 IPMI Controller ADC Interface

ADC0	Monitored Input	Voltage at ADC0 Pin
AIN0.0	5V	1.85V
AIN0.1	3.3V	1.08V
AIN0.2	2.5V	1.01V
AIN0.3	1.8V	1.01V
AIN0.4	IPMI_3.3V	1.08V
AIN0.5	1.25V	1.00V
AIN0.6	1.2V	1.00V
AIN0.7	1.0V	1.00V

5 • Hardware Specifications and Certifications

Specification for the CP921RC-30x are listed in Table 5-1.

Table 5-1 CP921RC-30X Specification

Description	CP921RC-300	CP921RC-300-IND	CP921RC-301
Form Factor	cPCI, 6U Single slot	cPCI, 6U Single slot	cPCI, 6U Single slot
Bus Type	32-bIt PCI @ 66MHz, IPMB	32-bIt PCI @ 66MHz, IPMB	32-bIt PCI @ 66MHz, IPMB
I/O	24-ports	24-ports	24-ports
Power Requirements			
Maximum	41W	41W	48W
Typical	31W	31W	36W
Compliance			
CE Mark	Yes	Yes	Yes
Emissions Class A (See ***Section 5.1 "Emission Compliance Notices"*** and ***Section 5.2 "Optical/Laser Devices Notices"*** for more information.	Australia – AS/NZS CISPR 22 Class A ITE Canada – ICES-003 Issue 4 Class A Europe – EN55022 Class A ITE Japan – VCCI Class A ITE USA – FCC 47 CFR Part 15 Class A	Australia – AS/NZS CISPR 22 Class A ITE Canada – ICES-003 Issue 4 Class A Europe – EN55022 Class A ITE Japan – VCCI Class A ITE USA – FCC 47 CFR Part 15 Class A	Australia – AS/NZS CISPR 22 Class A ITE Canada – ICES-003 Issue 4 Class A Europe – EN55022 Class A ITE Japan – VCCI Class A ITE USA – FCC 47 CFR Part 15 Class A
Immunity	Europe – EN55024:ITE	Europe – EN55024:ITE	Europe – EN55024:ITE
Safety	Canada – CSA C22.2 NO 60950-1 Europe – EN60950-1 USA – UL 60950-1 IEC 60950-1	Canada – CSA C22.2 NO 60950-1 Europe – EN60950-1 USA – UL 60950-1 IEC 60950-1	Canada – CSA C22.2 NO 60950-1 Europe – EN60950-1 USA – UL 60950-1 IEC 60950-1
Environmental Requirements			
Operating Temperature	$+0^{o}$ to $+60^{o}$C ($+32^{o}$ to $+140^{o}$F)	-40^{o} to $+85^{o}$C (-40^{o} to 185^{o}F)	0^{o} to $+60^{o}$C ($+32^{o}$ to $+140^{o}$F)
Storage Temperature	-40^{o} to $+85^{o}$C (-40^{o} to $+185^{o}$F)	-40^{o} to $+85^{o}$C (-40^{o} to $+185^{o}$F)	-40^{o} to $+85^{o}$C (-40^{o} to $+185^{o}$F)
Relative Humidity	5% to 95% (non-condensing)	5% to 95% (non-condensing)	5% to 95% (non-condensing)
Operating Altitude	4.572 Kilometers (15,000 feet) maximum	4.572 Kilometers (15,000 feet) maximum	4.572 Kilometers (15,000 feet) maximum
Mean Time Between Failure (Telecordia SR-332 Issue 2)			
Hours 40^{o}C, ground benign controlled.	292,812	288,416	281,238
Warranty			
Module	Two years	Two years	Two years

5.1 Emission Compliance Notices

This equipment complies with the following international and North American emission requirements:

- **Australia and New Zealand – AS/NZS 3548/CISPR 22 Class A ITE**
- **Canada – ICES-003**

  This Class A digital apparatus complies with Canadian ICES-003.

  (Cet appareil numerique de la class A est conforrme a la norme NMB-003 du Canade.)

- **Europe – EN5022**

  
  WARNING

  This is a Class A product. In a domestic environment, these boards may cause radio interference in which case the user may be required to take adequate measures.

- **Japan – VCCI Class A ITE**

  This is a Class A product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

- **United States of America – FCC Part 15**

  
  NOTE

  The hardware has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction in this documentation, may cause harmful interference to radio communications. Operation of the equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

  Changes or modifications not expressly approved by GE Intelligent Platform, Inc. could void the user's FCC granted authority to operate this equipment.

  Shielded cables (copper interface) must be used with the module to ensure compliance with FCC Class A limits.

5.2 Optical/Laser Devices Notices

This product may or may not be provided with an optical device and/or fiber optic transceivers. Each optical/laser devices contains a laser that is classified as Class 1 Laser Product in accordance with US FDA regulations and IEC 60825-1.

WARNING

For this product, use only the Class 1 laser device that have the following approval:

- FDA 21 CFR 1040.10
- IEC 60825-1

Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure.

Glossary

The following terms and acronyms are found in this manual.

3U A unit of measurement of the height of a rack mount device equal to approximately 1.75 inches. A 3U board is 5.25 inches in height.

Bit Banging A software technique that emulates a serial interface standard (I^2C, SPI, and so forth) by rapidly changing a single output bit, in software, at the appropriate time.

BMC Baseboard Management Controller.

cPCI Compact PCI system is a 3U (or 6U) Eurocard-based industrial computer, where all boards are connected via a passive PCI backplane. Originally designed to support the PCI signaling protocol (hence the name 'CompactPCI'), CompactPCI has grown to include a variety of technologies on a 3U and 6U form factor.

ECC Error Correction Code.

EEPROM Electrically Erasable Programmable Read-Only Memory.

ESD Electro-Static Discharge.

F-Link An "F" (fully associated) link connects two signaling end points (for example, SSPs and SCPs). "F" links are not usually used in networks with STPs. In networks without STPs, "F" links directly connect signaling points.

GbE Gigabit Ethernet.

GND Ground.

IP Internet Protocol.

IPMC Intelligent Platform Management Controller.

IPMI Intelligent Platform Management Interface.

Layer 2 Layer 2 refers to the Data Link layer of the Open Systems Interconnection (OSI) communications model. The Data Link layer is concerned with moving data across the physical links in the network.

Layer 3 Layer 3 refers to the Network layer of the Open Systems Interconnection (OSI) communications model. The Network layer is concerned with knowing the address of the neighboring nodes in the network, selecting routes and quality of service, and forwarding as appropriate.

LED Light Emitting Diode.

Mbps Megabits per second.

MDI Media Direct Interface.

MHz MegaHertz.

OEM Original Equipment Manufacturer.

PCI Peripheral Component Interconnect is an I/O bus (peripheral bus). The PCI bus provides a shared data path between the CPU and peripheral controllers, such as network, display, and storage devices.

PICMG PCI Industrial Computers Manufacturers Group.

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GE Intelligent Platforms Information Centers

Americas:
1 800 322 3616 or 1 256 880 0444

Asia Pacific:
86 10 6561 1561

Europe, Middle East and Africa:
Germany +49 821 5034-0
UK +44 1327 359444

Additional Resources

For more information, please visit the GE Intelligent Platforms Embedded Systems web site at:

www.ge-ip.com