Cisco 2010 Connected Grid Router

Cisco has recently announced The Cisco Connected Grid portfolio of products & solutions designed specifically for a Smart Grid network. These solutions include the Cisco 2010 Connected Grid Router (CGR 2010) and the Cisco 2520 Connected Grid Switch (CGS 2520). These platforms are optimized for use in power substations and meet substation compliance standards including IEEE 1613 and IEC 61850-3. The Cisco Connected Grid portfolio is designed for high availability, integrated security management, and scalability in mind.

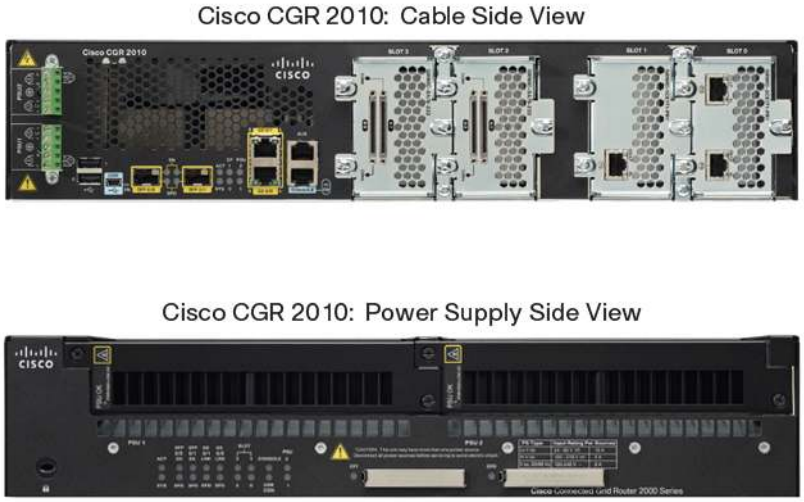
The Cisco CGR 2010 is a rugged router optimized for use in transmission & distribution (T&D) power substations. The Cisco CGR 2010 is designed for substation networks to meet the harsh environments common in transmission & distribution substations. In addition, The CGR 2010 provides the substation operator with the benefits of improved security, manageability, and network reliability. The CGR 2010 uses Cisco IOS software which is the operating system powering millions of Cisco routers deployed worldwide. Cisco IOS software delivers the benefits of integrated security for NERC/CIP compliance, quality of service, and network management to ensure integrity and priority of operational data communications.

Primary Cisco CGR 2010 features:

- Rugged industrial design and substation compliance with IEC-61850-3 and IEEE 1613 for utility substation environments
- Integrated security to help utilities address compliance with critical infrastructure protection mandates
- High availability design for maximum network up time and redundancy
- Network and device management tools for deployments, upgrades, and remote monitoring
- Advanced quality of service (QoS) capabilities to support mission-critical substation communications such as SCADA (Supervisory Control and Data Acquisition)

Comprehensive network security features based on open standards

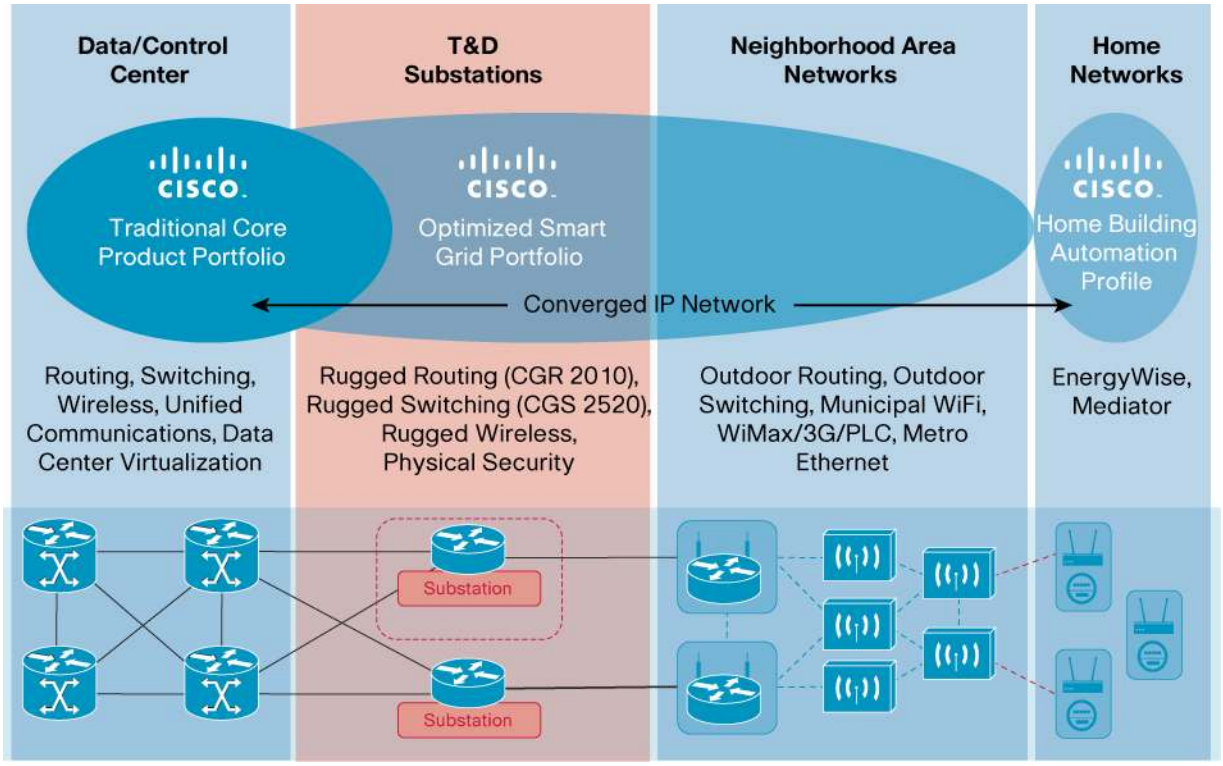
Figure 1. Cisco CGR 2010



Networking Solutions and the Cisco CGR 2010: Substation Automation Example

Substation automation promises to bring more automation and intelligence to the power grid network to address a myriad of utility challenges. Utilities are focused on how to improve grid reliability, enhance network security to meet regulatory requirements, and reduce operational expenses. The Cisco Connected Grid Router & Switch offer utilities a rugged networking solution to enable reliable and secure two-way communication for substation automation. Figure 1 shows a converged end-to-end IP network from the data center to the home. The CGR 2010 and the CGR 2520 are deployed in both transmission and distribution substations. Networking these points of presence provide network operators with greater visibility into grid assets and help identify, isolate and restore outages more efficiently.

Figure 2. Places in the Network



Product Overview

The Cisco CGR 2010 builds upon the award winning Integrated Services Routers G2 (ISR G2) platforms to deliver best in class routing, security, management, and network intelligence. With embedded hardware encryption acceleration, optional firewall, and intrusion prevention, the CGR 2010 delivers integrated security to help utilities comply with cyber security requirements such as the North American Electric Reliability Corporation's (NERC) Critical Infrastructure Protection (CIP) mandates. In addition, the platform supports T1/E1 WAN interfaces with integrated CSU/DSU interfaces, synchronous & asynchronous serial RS-232 interfaces, copper and fiber Gigabit Ethernet.

Key Business Benefits

The CGR 2010 is designed for network security, scalability, durability, and investment protection. The modular architecture facilitates upgrades to your substation network without requiring a fork lift upgrade of the routing platform. New modules can be added over time as communications requirements change. Table 1 lists the business benefits of the CGR 2010.

Table 1. Key Business Benefits of the CGR 2010

Benefits	Description
Services integration	• The CGR 2010 offers integrated services including advanced data routing, firewall, traffic shaping, quality of service, & network segmentation
Ruggedized for substation compliance	• Compliant with IEEE1613 and IEC61850-3 substation standards for ruggedization • Natural convection cooled with no moving parts or fans for maximum reliability • Extended EMI and surge protection for protection in substation environments
Services on demand	• A single Cisco IOS® Universal Software image is installed on each CGR 2010. The Universal image contains *all* of the Cisco IOS technology sets which can be activated with a software license. This allows your business to quickly deploy advanced features without downloading a new IOS image. Additionally, larger default memory is included to support the new capabilities.
Network management	• CiscoWorks LMS and Cisco Configuration Profession (CCP) network management tools to help utilities provision and diagnose network issues • Embedded management tools capable of event detection and recovery offered directly in a Cisco IOS Software device. For more information, please see Tables 5 & 6 for details on Cisco network management solutions offered with the CGR 2010
Network agility	• Designed to address customer business requirements, the CGR 2010 Series modular architecture offers increased capacity and performance as your network needs grow. • Modular interfaces and power supplies offer increased bandwidth, a diversity of connection options, and network resiliency. • Modular hotswappable power supplies supported on both The Cisco CGR 2010 and the Cisco CGS 2520 switches • Modular design allows ease of serviceability with spare components • Supports front or reverse cabling for maximum installation flexibility
Energy efficiency	• The CGR 2010 architecture provides energy-saving features that include the following: ◦ Services integration and modularity on a single platform performing multiple functions, optimizes raw materials consumption and energy usage. ◦ Platform flexibility and ongoing development of both hardware and software capabilities lead to a longer product lifecycle, lowering all aspects of the total cost of ownership, including materials and energy use. ◦ High efficiency power supplies are provided with each platform. ◦ Natural convection uses no power for cooling
Investment protection	• The CGR 2010 maximizes investment protection: ◦ Modular design supporting current and future interface cards ◦ Flexible design capable of hosting network applications

Platform Architecture and Modularity

The CGR 2010 is architected to meet the demanding environments of utility substations while offering reliable network services and performance required across the utility's network. A modular design allows for forward flexibility to support future applications and interfaces for maximum investment protection. The modular architecture is designed to support increasing bandwidth requirements, various interface types, and fully integrated power distribution. Table 2 lists the architectural features and benefits of the CGR 2010.

Table 2. Architectural Features and Benefits

Architectural Feature	Benefits
Substation hardened design	• Industrial grade components used in design of platform • Hardware design and architecture developed to meet strict environmental, surge and EMI requirements of IEC61850-3 and IEEE1613.
High availability	• The Cisco CGR 2010 is a highly modular platform with 4 slots to accommodate field replaceable Grid Router WAN Interface Cards (GRWIC) to add connectivity and services for substation communications. • The CGR offers an LAN and WAN connectivity options for redundant communications to substations. • Hot-Standby capabilities in dual-router configurations • Modular design accommodate field upgrades for existing and/or future technologies without requiring a platform replacement. • Performance Routing (PfR) improves application performance and availability by selecting the best path for each application based upon advanced criteria such as, reachability, delay, loss, jitter, and Mean Opinion Score (MOS). • Bi-directional Fowarding Detection provides a low-overhead, sub second capabilities of detecting failures in the forwarding path between two routers allowing for minimal disruptions from failover scenarios • Dual hot-swap power supplies allow for network redundancy and maximum up time. • Power supplies supported across Cisco's portfolio of rugged routing and switching products. Power supplies used

Architectural Feature	Benefits
	with the CGR 2010 are also used on the Cisco Connected Grid Switch 2520 for ease of serviceability.
Processors	• The CGR 2010 platform is powered by a high-performance multi-core processor that can support high-speed WAN connections while also running multiple concurrent services.
Embedded IP security with Security Sockets Layer (IPSec/SSL) VPN hardware acceleration	• Embedded hardware encryption acceleration is enhanced to provide higher scalability, which combined with an optional Cisco IOS Security license, enables WAN link security and VPN services (both IPSec and SSL acceleration).
Integrated Gigabit Ethernet ports	• Dual Gigabit Ethernet WAN interfaces supporting 2 GE Fiber, or 2 GE Copper, or 1 of each interface. • All onboard WAN ports are Gigabit Ethernet WAN routed ports. • Both Ethernet WAN ports on the CGR 2010 support the Small Form-Factor Pluggable (SFP)-based connectivity in lieu of a RJ-45 port
Innovative universal-serial-bus (USB)-based console access	• A new, innovative USB console port offers management connectivity for devices without a serial port such as modern laptop computers. • Traditional console and auxiliary ports are also available.
Wide Range of Power Supply Options	• Supports 1) a low voltage DC power supply (24-60VDC) and a high voltage AC or DC power supply (88-300VDC, 85-264VAC) • Load sharing power supplies in a dual power supply configuration; a single power supply is capable of supporting a fully configured router • The CGR 2010 platform provides maximum flexibility allowing the user to choose a single power supply or any combination of power supplies for the system. • Power supply capable of supporting inline power (802.3af-compliant PoE and Cisco Inline Power) • Both power supplies are universally interchangeable with the Cisco CGS 2520
Designed for flexible deployments	• Reverse mounting options provide flexibility of providing rear cabling mounting options. • LEDs are duplicated on both ends of the CGR 2010 to provide ease of use in either mounting option.

Modularity Features and Benefits

The Cisco CGR 2010 provides modular capabilities (refer to Table 3) offering investment protection for customers. With the advent of a new family of Grid Router WAN Interface Cards (GRWIC), customers will have the capability to interchange modules and interfaces to meet their future requirements. Services and additional interface options enabled by current and future modules will help provide customers with flexible and robust options to upgrade their networks to meet increasing needs for greater bandwidth and intelligence within utility's substation networks.

Table 3. Modularity Features and Benefits

Modules & Switch Platforms	Benefits
Cisco Grid Router WAN interface Card (GRWIC) Slots	• The GRWIC builds upon the popular High Speed WAN Interface Card (HWIC) architecture available on Cisco's ISR G2 family to provide enhanced high throughput and hardening requirements needed within many power utility substations. • The CGR 2010 accommodates up to 4 GRWIC modules providing flexibility for a combination of WAN and LAN interfaces. Through the GRWICs, the CGR 2010 platform has the capability to provide T1/E1 WAN interface options as well as Async/Sync RS-232 serial ports for serial connectivity to RTUs, relays, and other serial based devices within the substation. • Flexibility to support double-wide GRWIC modules is enabled by combining adjacent GRWIC slots. Slots 0 & 1 and slots 2 & 3 are capable of supporting doublewide modules in the future.
GRWIC modules	• The CGR 2010 supports 1 & 2 port T1/E1 CSU modules. For more information on the T1/E1 GRWICs, please visit the T1/E1 CSU/DSU GRWIC datasheets at the following URL http://www.cisco.com/go/cgr2000 • The CGR 2010 supports an 8-port async/sync RS-232 serial module. This provides utilities with an interface between the CGR 2010 and legacy serial devices in the substation.
Compact flash slots	• Two external Compact Flash slots are available on the CGR 2010. Each slot can support rugged high-speed storage compact flash cards upgradeable to 4 GB in density. • The first compact Flash slot supports the IOS software and configuration. • A second compact flash is available for additional memory storage.
USB 2.0 ports	• Two high-speed USB 2.0 ports are supported. The USB ports enable secure token capabilities and additional storage.

Cisco IOS Software

CGR 2010 delivers innovative technologies running on industry-leading Cisco IOS Software. Developed for wide deployment in the world's most demanding, harsh environments, the CGR 2010 platform is supported on Cisco IOS Software release 15.1T. Release 15.1(1)T provides support for a comprehensive portfolio of Cisco technologies, including the functionality and features delivered in releases 12.4 and 12.4T. New innovations in 15.1(1)T span multiple technology areas, including security, high availability, IP Routing and Multicast, quality of service (QoS), Multiprotocol Label Switching (MPLS), VPNs, and embedded management.

Cisco IOS Software Licensing and Packaging

A single Cisco IOS Universal image encompassing all IOS technology feature sets is delivered with the platforms. You can enable advanced features by activating a software license on the Universal image. Technology packages and feature licenses, enabled through the Cisco software licensing infrastructure, simplify software delivery and decrease the operational costs of deploying new features.

Three major technology licenses are available on the CGR 2010 platform; you can activate the licenses through the Cisco software activation process identified at http://www.cisco.com/go/sa. The three licenses are as follows:

- IP Base: This technology package is available as default.
- Data
- Security (SEC) or Security with No Payload Encryption (SEC-NPE)

Integrated Network Security

Cyber security is critical to the reliability of our power grid. Utility operators must ensure data communications used to operate the grid take priority and are not compromised by cyber attacks. Cisco has created a full suite of security features designed to ensure the integrity of grid communications.

The Cisco IOS Software Security technology package for the CGR 2010 offers a wide array of common security features such as advanced application inspection and control, threat protection, and encryption architectures for enabling more scalable and manageable VPN networks. The CGR 2010 offers onboard hardware-based encryption acceleration to provide greater IPSec throughput with less overhead for the route processor when compared with software-based encryption solutions. The CGR 2010 offers a comprehensive and adaptable security solution for transmission & distribution substation networks that includes features such as:

- **Secure connectivity**: Secure collaborative communications with Group Encrypted Transport VPN, Dynamic Multipoint VPN (DMVPN), or Enhanced Easy VPN
- **Integrated threat control**: Responding to sophisticated network attacks and threats using Cisco IOS Firewall, Cisco IOS Zone-Based Firewall, Cisco IOS Intrusion Prevention System (IPS), Cisco IOS Content Filtering, and Flexible Packet Matching (FPM)
- **Identity management**: Intelligently protecting endpoints using technologies such as authentication, authorization, and accounting (AAA) and public key infrastructure (PKI)

Combination Gigabit Ethernet Ports

The CGR 2010 supports 2 on-board gigabit ethernet interfaces for WAN and LAN connectivity. The CGR 2010 comes standard with 2 10/100/1000 Gigabit Ethernet copper interfaces and 2 100/1000Mbps Fiber ethernet interfaces. Of the 4 GE ports available, the CGR 2010 can be configured with a maximum of two GE ports in any combination of ethernet copper or fiber. Both Layer 2 and Layer 3 (IP routing) features are supported on these interfaces for maximum flexibility. For expanded ethernet port requirements, The Cisco CGR 2520 supports up to 24 ports of copper and/or fiber depending on the model chosen.

Application Acceleration

The CGR 2010 seamlessly combines industry leading security, IOS based traffic control and visibility, with Cisco application acceleration solutions. Cisco IOS Software features such as NBAR, IP SLA, and Netflow provide visibility and monitoring of traffic patterns and application performance while IOS features such as Quality of Service (QoS), Access Control Lists (ACLs), and Performance Routing (PfR) intelligently control the traffic to maximize the quality of the user experience and employee productivity.

Managing Your Connected Grid Router

Network management applications are instrumental in lowering operating expenses (OpEx) while improving network availability by simplifying and automating many of the day-to-day tasks associated with managing an end-to-end network. Day-one device support provides immediate manageability support for the CGR 2010 enabling quick and easy deployment, monitoring, and troubleshooting from Cisco and third-party applications.

Organizations rely on Cisco, third-party, and in-house developed network management applications to achieve their OpEx and productivity goals. Underpinning those applications are the embedded management features available in every Connected Grid Router. These routers incorporate deep manageability features such as IP service-level agreement (IP SLA), Cisco IOS Embedded Event Manager (EEM), and NetFlow which allow you to know the status of your network at all times. These features, along with Simple Network Management Protocol (SNMP) and syslog, enable your organization's management applications.

Refer to Tables 4 and 5 below for details about network management and manageability support on The Cisco CGR 2010.

Table 4. Cisco Connected Grid Router IOS Software Features and Protocols Support

Protocols	IPv4, IPv6, static routes, Open Shortest Path First (OSPF), Enhanced IGRP (EIGRP), Border Gateway Protocol (BGP), BGP Router Reflector, Intermediate System-to-Intermediate System (IS-IS), Multicast Internet Group Management Protocol (IGMPv3) Protocol Independent Multicast sparse mode (PIM SM), PIM Source Specific Multicast (SSM), Distance Vector Multicast Routing Protocol (DVMRP), IPSec, Generic Routing Encapsulation (GRE), Bi-Directional Forwarding Detection (BVD), IPv4-to-IPv6 Multicast, MPLS, L2TPv3, IEEE 802.1ag, IEEE 802.3ah, L2 and L3 VPN
Encapsulations	Ethernet, IEEE 802.1q VLAN, Point-to-Point Protocol (PPP), Multilink Point-to-Point Protocol (MLPPP), Frame Relay, Multilink Frame Relay (MLFR) (FR.15 and FR.16), High-Level Data Link Control (HDLC), Serial (RS-232, RS-449, X.21, V.35, and EIA-530), Point-to-Point Protocol over Ethernet (PPPoE), and ATM, DNP3 and MODBUS SCADA Tunneling (BSTUN)
Traffic management	QoS, Class-Based Weighted Fair Queuing (CBWFQ), Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing (PfR), and Network-Based Advanced Routing (NBAR)

Table 5 lists the embedded management features available with Cisco IOS Software.

Table 5. Embedded Management Features Available with Cisco IOS Software

Feature	Description
WSMA	The Web Services Management Agent (WSMA) defines a mechanism through which you can manage a network device, retrieve configuration data information, and upload and manipulate new configuration data. WSMA uses XML-based data encoding that is transported by the Simple Object Access Protocol (SOAP) for the configuration data and protocol messages.
EEM	Cisco IOS Embedded Event Manager (EEM) is a distributed and customized approach to event detection and recovery offered directly in a Cisco IOS Software device. It offers the ability to monitor events and take informational, corrective, or any desired EEM action when the monitored events occur or when a threshold is reached.
IPSLA	Cisco IOS IP Service-Level Agreements (SLAs) enable you to assure new business-critical IP applications, as well as IP services that use data, voice, and video in an IP network
SNMP, RMON, Syslog, NetFlow, and TR-069	CGR 2010 also supports SNMP, Remote Monitoring (RMON), syslog, NetFlow, and TR-069 in addition to the embedded management features previously mentioned.

The Cisco network management applications listed in Table 6 are standalone products that you can download or purchase to manage your Cisco network devices. The applications are built specifically for the different operational phases; you can select the ones that best fit your needs.

Table 6. Network Management Applications

Operational Phase	Application	Description
Device staging and configuration	**Cisco Configuration Professional**	Cisco Configuration Professional is a GUI device-management tool for Cisco IOS Software-based access routers. This tool simplifies router, security, WAN, and basic LAN configuration through easy-to-use wizards.
Network wide deployment, configuration, monitoring, and troubleshooting	**CiscoWorks LMS**	CiscoWorks LAN Management Solution (LMS) is a suite of integrated applications for simplifying day-to-day management of a Cisco end-to-end network, lowering OpEx while increasing network availability. CiscoWorks LMS offers network managers an easy-to-use web-based interface for configuring, administering, and troubleshooting the CGR 2010, using new instrumentation such as Cisco IOS EEM Generic Online Diagnostics (GOLD).
Network wide staging, configuration, and compliance	**CiscoWorks NCM**	CiscoWorks Network Compliance Manager (NCM) tracks and regulates configuration and software changes throughout a multivendor network infrastructure. It provides superior visibility into network changes and can track compliance with a broad variety of regulatory, IT, corporate governance, and technology requirements.
Staging, deployment, and changes of licenses	**Cisco License Manager**	Easily manage Cisco IOS Software activation and licenses for a wide range of Cisco platforms running Cisco IOS Software as well as other operating systems with the secure client-server application Cisco License Manager.
Staging, deployment, and changes to configuration and image files	**Cisco Configuration Engine**	Cisco Configuration Engine is a secure network management product that provides zero-touch image and configuration distribution through centralized, template-based management.

Summary

As your business strives to lower the total cost of ownership in running your network, you will need more intelligent communication solutions to empower the workforce managing the grid. The CGR 2010 offers these solutions by providing enhanced performance and increased modular density to support multiple services. The CGR 2010 is designed to consolidate the functions of many separate devices into a single, compact system.

Table 7. Cisco Connected Grid Router 2010 Product Specifications

Feature	Specification
Substation Hardening Compliance	IEC 61850-3 IEEE1613
Embedded hardware-based cryptography acceleration (IPSec + SSL)	Yes
Total onboard Ethernet WAN Ports	2
RJ-45-based ports (10/100/1000)	2
SFP-based ports (use of SFP port disables the corresponding RJ-45 port)	2 SFP slots supporting 100mbps or 1000mbps rugged SFPs.
Grid Router WAN Interface Card (GRWIC) slots	4
Double-wide capable GRWIC slots (use of a double-wide GRWIC slot will consume two GRWIC slots)	2
Memory DDR2 ECC DRAM – Default	1 GB
Rugged Compact Flash	slot 0: 256 MB (Default) slot 1: 256 MB (Optional Expansion for storage)
External USB 2.0 flash memory slots (Type A)	2
USB Console port (Type B) (up to 115.2 kbps)	1
Serial console port	1
Serial auxiliary port	1
Power-supply options	Two power supply options: 1. Low voltage DC power supply (available in late 2010) 2. AC or high voltage DC power supply Any combination of power supplies can be inserted into the chassis. Dual power supply configurations are load sharing in redundancy mode, although a single power supply is sufficient for supporting power needs for the system.

Feature	Specification
Power Specifications	
AC input voltage (Power Supply Unit 1)	Nominal Range: 100 – 240 VAC Operating Range: 85 to 264 VAC The AC supply also accepts a DC input with an operating range of 88 – 300 VDC
DC input voltage (Power Supply Unit 2)	Nominal Range: 24 – 60 VDC Operating Range: 20 – 75 VDC
AC input frequency	47 to 63 Hz
AC input current range for AC power supply (maximum)	2A
AC input surge current	<50A
DC input voltage	24-60 VDC, extended 88-300VDC (on separate power supply)
System Power consumption (with no modules) (Watts)	30 Watts
Grid Router WIC Power consumption	Typical: 4.5 Watts Maximum: 6 Watts
Physical Specifications	
Dimensions (H x W x D)	3.5 x 17.25 x 15 in. (88.9 x 438.2 x 381 mm)
Rack height	2RU (rack unit)
Rack-mount 19in. (48.3 cm) EIA	Included
Wall-mount	Yes
Weight with 1 power supply (no modules)	19 lbs (8.6kg)
Typical weight fully configured with 2 power supplies & 4 GRWICs	25 lbs (11.4 kg)
Airflow	Convection & conduction cooling (no fans)
Environmental Specifications	
Operating Conditions	
Operating Temperature	-40 ºF to 140ºF (-40 to +60ºC) continuous operating temperature range -40 ºF to 185ºF (-40 to +85ºC) type test for 100 hours at 85ºC
Shock/Vib	30G @11ms
Altitude	10,000 ft (3,048m) Max operating temp is de-rated with increasing altitude per IEEE1613a-2008
Relative humidity	5 to 95% non-condensing
Non-operating Conditions	
Temperature	–40ºF to 185ºF (–40ºC to 85ºC)
Relative humidity	5 to 95% non-condensing
Altitude	16,000 ft (4,876m) Max operating temp is de-rated with increasing altitude per IEEE1613a-2008
Non-Op Free Fall Drop	4" (100mm) per ENG-339611
Operating Seismic/Earthquake	NEBS GR-63 (5.4.1)
Non-Op Shock/Vib	40-50G (3.26m/s minimum)
Regulatory Compliance*	
Environmental Substation Compliance	IEC-61850-3 IEEE1613
Immunity	EN61000-6-2 EN61000-4-2 (ESD) EN61000-4-3 (RF) EN61000-4-4 (EFT) EN61000-4-5 (SURGE) EN61000-4-6 (CRF) EN61000-4-11 (VDI) EN 55024, CISPR 24 EN50082-1

Feature	Specification
EMC	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386
Safety	USA: UL 60950-1 Canada: CAN/CSA C22.2 No. 60950-1 Europe: EN 60950-1 China: GB 60950-1 Australia/New Zealand: AS/NZS 60950-1 Rest of World: IEC 60950-1 CSA certified to UL/CSA 60950-1, 2nd Ed. CB report to IEC60950-1, 2nd Ed., covering all group differences and national deviations.
Telecom	US: TIA-968-A CA: CS-03 EU: TBR1, 2, 4, 12, 13 RTTE Directive Australia: AS/ASIF S016, S038 Japan: JATE
Telecom Interface Standards	T1/E1 GRWIC: ITU-T G.703, G.704, G.706, G.823, ANSI T1.403 8-port Asyn/Sync RS-232 GRWIC: RS232, ITU-T V.11

* For more information consult the Product Approval Database http://tools.cisco.com/cse/prdapp or consult your local Cisco representative (Cisco.com login required)

Part Numbers

SKU Name	SKU Description
Connected Grid Router	
CGR 2010/K9	Cisco CGR2010 w/2GE, 4 GRWIC slots, 256MB CF, 1GB DRAM, IPB
CGR 2010-SEC/K9	Cisco CGR2010 security bundle w/SEC license PAK
Connected Grid Router WIC	
GRWIC-1CE1T1-PRI	1 port channelized T1/E1 and PRI GRWIC (data only)
GRWIC-2CE1T1-PRI	2 port channelized T1/E1 and PRI GRWIC (data only)
GRWIC-8A/S-232	8-Port Async/Sync Serial GRWIC, EIA-232
Connected Grid Power Supplies	
PWR-RGD-AC-DC=	High AC/DC (88-300VDC/85-264VAC) Power Supply for Cisco CGR2010 & CGS2520 switch, Spare
PWR-RGD-LOW-DC=	Low DC (24-60VDC) power supply module for the Cisco CGR 2010 & CGS 2520 switch (available in late 2010)

Ordering Information

These products can only be ordered by a Cisco Authorized Technology Partner for Substation Automation. Please refer to the partner locator on cisco.com: http://www.cisco.com/web/partners/index.html. For more information about product availability, please contact your Cisco representative.

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