Cisco Connected Grid 2G/3G/4G Multimode Long Term Evolution (LTE) GRWIC Modules for the Cisco 2010 Connected Grid Router

The Cisco® Connected Grid portfolio of solutions is designed specifically for the harsh, rugged environments often found in the energy and utility industries. These solutions include the Cisco 2010 Connected Grid Router (CGR 2010), which is designed to support the communications infrastructure needs of the energy delivery infrastructure across the generation, transmission, and distribution sectors. Designed for highly secure, reliable, and scalable infrastructure, the CGR 2010 is an ideal platform to support Smart Grid and other energy delivery infrastructure needs of customers. The CGR 2010 has been extensively tested to meet the challenging substation compliance standards, including IEEE 1613 and IEC 61850-3. The CGR 2010 offers four module slots to utilize Grid Router WAN Interface Cards (GRWIC). These modules allow for WAN connectivity to both legacy networks such as ISDN, DSL, Serial, etc., as well as new WAN technologies such as 4G Long Term Evolution (LTE).

Product Overview

The Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC modules are designed for use with the Cisco 2010 Connected Grid Router (CGR 2010). These GRWICs provide second-generation (2G), third-generation (3G), and now fourth-generation (4G) cellular technologies and are backwards-compatible with the older technology. Suitable as both a primary and secondary WAN connection, these GRWICs support the latest 4G standards (3GPP Release 8 LTE) as well as 3GPP and 3GPP2-based 3G and 2G access technologies, and transparent handoff from 2G/3G to 4G LTE.

These GRWICs support the 3GPP2 technologies of Code Division Multiple Access (CDMA) such as CDMA 1xRTT, Evolution-Data Optimized, or EVDO Rev 0 and Rev A. They also support the 3GPP technologies of the Global System for Mobile Communications (GSM) and Universal Mobile Telecommunications Systems (UMTS) such as GSM, EDGE or Enhanced Data Rates for Global Evolution, GPRS or General Packet Radio Service, high-speed packet access (HSPA) which included High-Speed Uplink Packet Access (HSUPA), and High-Speed Downlink Packet Access (HSDPA). In addition, the new LTE 4G technology is supported.

Figure 1 displays the CDMA, EVDO, LTE GRWIC

Figure 1. CDMA, EVDO, and LTE GRWIC

These cards support various technologies, frequency bands, and regions in the world. There are three SKUs, which are defined in Table 1 below.

Table 1. GRWIC SKUs

SKU	Description	Technology
GRWIC-4G-LTE-V	Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for Verizon Wireless	CDMA 1xRTT, EVDO Rev 0, EVDO Rev A, LTE
GRWIC-4G-LTE-A	Available in Q3/Q4 CY2012: Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for North America and AT&T	GSM, GPRS, EDGE, UMTS, HSPA+, LTE
GRWIC-4G-LTE-G	Available in Q3/Q4 CY2012: Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for Global	GSM, GPRS, EDGE, UMTS, HSPA+, LTE

The Cisco 2G/3G/4G Multimode GRWICs are tightly integrated with the services provided on the Cisco 2010 Connected Grid Router. Utility and energy companies are looking for ways to reduce costs, increase revenue, and improve business continuity. The Cisco 2G/3G/4G LTE Multimode GRWICs, when coupled with a service provider wireless data plan, provide a cost-effective, rapidly deployable, reliable, and highly secure backup solution for primary and remote sites. With wireless data rates surpassing T1 speeds, 4G networks provide an alternative to wire-line backup solutions such as ISDN, cable, and DSL. If a network fails, the Cisco CGR 2010 routes mission-critical data to the Cisco 2G/3G/4G GRWIC for transmission across the wireless infrastructure. In addition, the router can distinguish different types of traffic and allow only mission-critical traffic to flow over the backup interface.

Table 2. Supported Frequency Bands and Regional Support for GRWICs

SKU	Region	Supported Frequency Bands
GRWIC-4G-LTE-V	North America	LTE: 700 MHz (B13) CDMA/EVDO: 800-900 MHz Cellular Band and 1800-1900 MHz PCS Band
GRWIC-4G-LTE-A	North America	LTE: 700 MHz (B17) GSM, GPRS, EDGE: 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 850 MHz, 1900 MHz, 2100 MHz

GRWIC-4G-LTE-G	Global	LTE: 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz GSM, GPRS, EDGE: 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 900 MHz, 2100 MHz

Table 3. Data Rates for Cellular GRWIC

Technology	Maximum Throughput*
3G (EVDO 0, A)	Peak download rate: 3.1 Mbps Peak upload rate: 1.8 Mbps
3G (UMTS/HSPA+)	Peak download rate: 7.2 Mbps Peak upload rate: 5.76 Mbps
4G (LTE)	Peak download rate: 100 Mbps Peak upload rate: 50 Mbps

Note: Throughput depends on multiple factors such as RF interference, carrier network load and network optimization.

The Cisco 2G/3G/4G Multimode LTE GRWIC can be deployed in many environments found in the world-wide energy infrastructure. Therefore, the product comes with a multitude of antenna and cabling options to allow for deployments in multiple environments. The GRWICs support both indoor- and outdoor- rated antennas, and different types such as Omni-directional stick antennas, flat panel antennas, low-profile saucers, ceiling-mounted antennas, and standard dipole antennas. Table 4 below provided details on the supported antennas.

Table 4. Antenna Specifications

Item	Specification
ANT-4G-DP-IN-TNC	Description • Dipole, swivel-mount, indoor • Note: requires stand and integrated 15 ft. cable (CAB-L195-15-TNC) Electrical Specifications • Frequency range: 698-960 MHz , 1710-2700 MHz • Gain: 0 dBi, 2 dBi • Gain (with cable): -1 dBi, 0 dBi • Power handling: 3 W • VSWR: 2.5:1 max • Nominal impedance: 50 Ω • Polarization: linear, vertical • Radiation pattern: omni-directional in H-plane Mechanical Specifications • Connector type: TNC male • Material: PC/ABS, black • Dimensions (L X W X T): 230 mm X 29 mm X 11 mm • Weight: 56 grams Environmental Specifications • Operating temperature: -30 to +70 ℃ • Storage temperature: -40 to +85°C • IP rating: IP 30
ANT-4G-CM-IN-TNC	Description • Ceiling mount, indoor low-profile antenna • Integrated 15 ft LMR-195 cable • Electrical Specifications • Frequency range: 698-960 MHz , 1710-2700 MHz

	• Gain: 1.5 dBi, 3.5 dBi • Gain (with integrated cable): 1 dBi, 0 dBi • Power handling: 3 W • VSWR: 2.0:1 maximum • Nominal impedance: 50 Ω • Polarization: linear, vertical • Radiation pattern: omni-directional in H-plane Mechanical Specifications • Connector type: TNC male • Radome material: PC/ABS (Poly-carbonate), off-white • Dimensions (OD x H): 200 mm X 87 mm • Weight: 340 grams Environmental Specifications • Operating temperature: -30 to +70°C • Storage temperature: -40 to +85°C • IP rating: IP 50
ANT-4G-OMNI-OUT-N	Description • Omni-directional, stick antenna • Outdoor Electrical Specifications • Frequency range: 698-960 MHz , 1710-2700 MHz • Gain: 1.5 dBi, 3.5 dBi • Maximum RF power: 10 W • VSWR: 2.5:1, 2.0:1 • Nominal impedance: 50 Ω • Polarization: Vertical • Radiation pattern: omni-directional Mechanical Specifications • Connector type: N(f) • Radome material: polycarbonate, UV-resistant, white • Dimensions: 9.8 in. long, 1.0 in. diameter • Weight: 156 grams Environmental Specifications • Operating temperature: -40 to +85°C • Storage temperature: -40 to +85°C • Wind rating: 160 Km/H • IP rating: IP 54
ANT-4G-PNL-OUT-N	Description • Available in Q2 CY2012 • Flat panel antenna • Outdoor
ANT-4G-SR-OUT-TNC	Description • Available Q2 CY2012 • Low-profile outdoor saucer antenna

Table 5 lists the RF cable options for direct GRWIC connections.

Table 5. RF Cable Options for Direct GRWIC to Antenna Connection

Item	Specification
CAB-L400-20-TNC-N	20 ft, LMR-400 cable with a TNC male and N female connector
CAB-L400-50-TNC-N	50 ft, LMR-400 cable with a TNC male and N female connector

Table 6 lists additional RF cables available for different deployment scenarios.

Table 6. Additional RF Cables for Deployment Scenarios

Item	Specification
CAB-L400-20-N-N	20 ft, LMR-400 cable with a N male and N male connector
CAB-L195-15-TNC	Dipole stand with integrated 15 ft LMR-195 cable

Note: For an extensive description of antenna and cable options and the potential deployment scenarios, please see the following Deployment Guide:
http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

Table 7 details the minimum Cisco IOS® Software requirements.

Table 7. Minimum Cisco IOS Software Requirements

	Cisco CGR 2010
Minimum IOS Release	15.2(2)T
Minimum IOS Technology Package	IP Base

Table 8 shows the platform support and maximum number of Cisco 2G/3G/4G Multimode GRWIC Modules supported in each platform.

Table 8. Number of Cisco 2G/3G/4G Multimode LTE Modules per Platform

Type of Module	Cisco CGR 2010
GRWIC-4G-LTE-X	4

Hardware Specifications

Table 9 shows the hardware specifications for the Cisco Channelized T1/E1 and ISDN PRI GRWICs.

Table 9. Hardware Specifications for the Cisco Channelized T1/E1 and ISDN PRI Modules

Feature	Description
Form Factor	• Single-wide GRWIC, no slot restrictions
Dimensions (H x W x D)	• 2.52 x 3.0 x 7.81 in. • (6.4 x 7.6 x 19.8 cm)
Weight	• GRWIC: 0.9 lb (0.4 kg)
Connections	• Cellular RF ◦ M0/MAIN–Primary RF Port; TNC – Female ◦ M1/DIV–Diversity RF Port; TNC – Female • GPS* ◦ SMA – Female (*GPS software support will be avalable in Q3 CY2012)
LEDs	LEDs per port • Wireless WAN ◦ Off–modem is in reset ◦ Solid green–modem is powered, associated and authenticated on network ◦ Slow blink–modem is powered, searching for service ◦ Fast blink–data is being transmitted • Received signal strength indication (RSSI) ◦ Off–RSSI is under -100 dBm

	◦ Slow green blink–low RSSI ◦ Medium green blink–medium RSSI ◦ Solid green–high RSSI ◦ Solid amber–no service detected • SVC1 ◦ Solid green–LTE is in use ◦ Off–LTE is not in use • SVC2 ◦ Solid green– (HSPA+) service is enabled ◦ Blinking green–EVDO service is enabled ◦ Off–neither HSPA+ nor EVDO service is available • SVC3 ◦ Solid green–GPS service is available ◦ Off–GPS service is not available

Regulatory Compliance, Safety, Emissions, and EMC/Immunity

Table 10 shows a partial listing of regulatory compliance and safety data.

Table 10. Common Specifications

Feature	Description
Environmental Specifications	
Operating Conditions	
Operating Temperature	-40º F to 140º F (-25 to +60º C) continuous operating temperature range
Shock and Vibration	100 m/s @ 11 ms
Altitude	10,000 ft (3,048 m) maximum operating temperature is de-rated with increasing altitude per IEEE1613a-2008
Relative Humidity	5 to 85 percent non-condensing
Non-operating Conditions	
Temperature	-40º to +185º F (-25º C to +85º C)
Non-operating Relative Humidity	5 to 85 percent non-condensing
Altitude	10,000 ft (3000 m); maximum operating temperature is de-rated with increasing altitude per IEEE 1613a-2008
Non-operating Free-fall Drop	4 in. (100 mm) per ENG-339611
Operating Seismic Earthquake	IEC 61850-3, Class S3
Non-operating Shock and Vibration	40-50G (3.26 m/s minimum)
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

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.
Electromagnetic Compliance	• 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
Radio	FCC Part 2, FCC Part 22, FCC Part 24, RSS 129 and RSS 133, RSS 132 and RSS 133, EN 301 511 GSM, EN 301 908-1, and EN 301 908-2 • Wireless Modem and Certification: ◦ GRWIC-4G-LTE-V: Sierra Wireless MC7750; FCC, IC, NCC ◦ GRWIC-4G-LTE-A: Sierra Wireless MC7700; FCC, IC, NCC, PTCRB ◦ GRWIC-4G-LTE-G: Sierra Wireless MC7710; CE, GCF-CC

* For more information, consult the Product Approval Database at http://www.ciscofax.com or consult your local Cisco representative (Cisco.com login required).

Table 11 outlines the product part numbers.

Table 11. Product Part Numbers

SKU	Description
GRWIC-4G-LTE-V	Available in late Q1 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for VZW
GRWIC-4G-LTE-V=	Available in late Q1 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for VZW, spare
GRWIC-4G-LTE-A	Available in Q3/Q4 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for North America and AT&T
GRWIC-4G-LTE-A=	Available in Q3/Q4 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for North America and AT&T, spare
GRWIC-4G-LTE-G	Available in Q3/Q4 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for Global
GRWIC-4G-LTE-G=	Available in Q3/Q4 CY2012 Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for Global, spare

Ordering Information

These products are available to any Cisco authorized partner. For more information, please contact your Cisco representative.

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For More Information

For more information on the Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC Modules for the Cisco 2010 Connected Grid Router please visit http://www.cisco.com/en/US/products/ps10977/products_relevant_interfaces_and_modules.html.

For more information on the Cisco CGR 2010 please visit: http://www.cisco.com/go/cgr2000

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