

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

The Cisco® Connected Grid router portfolio is designed specifically for the harsh, rugged environments often found in the energy and utility industries. These routers 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 fourth-generation (4G) cellular technologies and are backwards-compatible with older technology. Suitable as both primary and secondary WAN connections, 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; General Packet Radio Service (GPRS); and 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, and LTE GRWIC.

Figure 1. CDMA, EVDO, and LTE GRWIC



These cards support various technologies, frequency bands, and regions around the world (see Table 1).

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 1. Supported frequency bands and regional support for GRWICs

| SKU | Region | Supported frequency bands |
|--|--------------------|--|
| GRWIC-4G-LTE-LA, GRWIC-4G-LTE-LA= | Latin America APJC | 2100 MHz (band 1), 1800 MHz (band 3), 850 MHz (band 5), 2600 (band 7), 900 (band 8), 850 (band 18, band 19), 1500 (band 21), 700 (band 28) and TDD LTE 2600 (band 38), 1900 (band 39), 2300 (band 40), and 2500 (band 41) at Category 4 LTE speeds Backward compatibility: UMTS and HSPA+: 2100 MHz (band 1), 850 MHz (band 5), 800 MHz (band 6, band 19), 900 MHz (band 8), 1700 MHz (band 9), and TD-SCDMA 1900 MHz (band 39) |
| GRWIC-4G-LTE-EA, GRWIC-4G-LTE-EA= | North America EMEA | 2100 MHz (band 1), 1900 MHz (band 2, band 25), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5, band 26), 2600 MHz (band 7), 700 MHz (band 12, band 13, band 29), 700 MHz (band 17), 800 MHz (band 20), 1900 MHz (band 25), 850 MHz (band 26), 700 MHz (band 29), and TDD LTE 2500 MHz (band 41) at Category 4 LTE speeds Backward compatibility: UMTS and HSPA+: 2100 MHz (band 1), 1900 MHz (band 2), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5), 900 MHz (band 8) |

Table 2 highlights the data rates for the cellular GRWICs.

Table 2. 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.

Cisco 2G/3G/4G Multimode LTE GRWICs can be deployed in many environments found in the worldwide 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 3 provide details on the supported antennas.

Table 3. Antenna specifications

| Item | Specification |
|-------------------------|--|
| ANT-4G-DP-IN-TNC | <p>Description</p> <ul style="list-style-type: none"> Dipole, swivel-mount, indoor Note: Requires stand and integrated 15 ft. cable (CAB-L195-15-TNC) <p>Electrical specifications</p> <ul style="list-style-type: none"> Frequency range: 698-960 MHz, 1710-2700 MHz Gain: 0 dBi, 2 dBi Gain (with cable): -1 dBi, 0 dBi Power handling: 3W VSWR: 2.5:1 max Nominal impedance: 50 Ω Polarization: linear, vertical Radiation pattern: omni-directional in H-plane <p>Mechanical specifications</p> <ul style="list-style-type: none"> Connector type: TNC male Material: PC/ABS, black Dimensions (L X W X H): 230 mm X 29 mm X 11 mm Weight: 56 grams <p>Environmental specifications</p> <ul style="list-style-type: none"> Operating temperature: -30 to +70 °C Storage temperature: -40 to +85° C IP rating: IP 30 |
| ANT-4G-CM-IN-TNC | <p>Description</p> <ul style="list-style-type: none"> Ceiling mount, indoor low-profile antenna Integrated 15 ft. LMR-195 cable <p>Electrical specifications</p> <ul style="list-style-type: none"> 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: 3W VSWR: 2.0:1 maximum Nominal impedance: 50 Ω Polarization: linear, vertical Radiation pattern: omni-directional in H-plane |

| Item | Specification |
|--------------------------|---|
| | <p>Mechanical specifications</p> <ul style="list-style-type: none"> • Connector type: TNC male • Radome material: PC/ABS (Poly-carbonate), off-white • Dimensions (OD x H): 200 mm X 87 mm • Weight: 340 grams <p>Environmental specifications</p> <ul style="list-style-type: none"> • Operating temperature: -30 to +70° C • Storage temperature: -40 to +85° C • IP rating: IP 50 |
| ANT-4G-OMNI-OUT-N | <p>Description</p> <ul style="list-style-type: none"> • Omni-directional, stick antenna • Outdoor <p>Electrical specifications</p> <ul style="list-style-type: none"> • Frequency range: 698-960 MHz, 1710-2700 MHz • Gain: 1.5 dBi, 3.5 dBi • Maximum RF power: 10W • VSWR: 2.5:1, 2.0:1 • Nominal impedance: 50 Ω • Polarization: Vertical • Radiation pattern: omni-directional <p>Mechanical specifications</p> <ul style="list-style-type: none"> • Connector type: N(f) • Radome material: polycarbonate, UV-resistant, white • Dimensions: 9.8 in. long, 1.0 in. diameter • Weight: 156 grams <p>Environmental specifications</p> <ul style="list-style-type: none"> • 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 | <p>Description</p> <ul style="list-style-type: none"> • Available in Q2 CY2012 • Flat-panel antenna • Outdoor |
| ANT-4G-SR-OUT-TNC | <p>Description</p> <ul style="list-style-type: none"> • Available Q2 calendar year 2012 • Low-profile outdoor saucer antenna |

Table 4 lists the RF cable options for direct GRWIC connections.

Table 4. 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 5 lists additional RF cables available for different deployment scenarios.

Table 5. 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, see the [Connected Grid Antennas Installment Guide](#).

Table 6 details the minimum Cisco IOS® Software requirements.

Table 6. Minimum Cisco IOS Software requirements

| | Cisco CGR 2010 |
|--------------------------------|----------------|
| Minimum IOS Release | 15.8(3)M |
| Minimum IOS Technology Package | IP Base |

Table 7 shows the platform support and maximum number of Cisco 2G/3G/4G Multimode GRWIC modules supported in each platform.

Table 7. 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 8 shows the hardware specifications for the Cisco channelized T1/E1 and ISDN PRI GRWICs.

Table 8. Hardware specifications for the Cisco channelized T1/E1 and ISDN PRI modules

| Feature | Description |
|-------------------------------|--|
| Form factor | <ul style="list-style-type: none"> Single-wide GRWIC, no slot restrictions |
| Dimensions (H x W x D) | <ul style="list-style-type: none"> 2.52 x 3.0 x 7.81 in. (6.4 x 7.6 x 19.8 cm) |
| Weight | <ul style="list-style-type: none"> GRWIC: 0.9 lb (0.4 kg) |
| Connections | <ul style="list-style-type: none"> Cellular RF <ul style="list-style-type: none"> M0/MAIN - primary RF port; TNC - female M1/DIV - diversity RF port; TNC - female GPS* <ul style="list-style-type: none"> SMA - female |
| LEDs | LEDs per port <ul style="list-style-type: none"> Wireless WAN <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> Off - RSSI is under -100 dBm Slow green blink - low RSSI Medium green blink - medium RSSI |

| Feature | Description |
|---------|---|
| | <ul style="list-style-type: none"> ◦ Solid green - high RSSI ◦ Solid amber - no service detected • SVC1 <ul style="list-style-type: none"> ◦ Solid green - LTE is in use ◦ Off - LTE is not in use • SVC2 <ul style="list-style-type: none"> ◦ Solid green - (HSPA+) service is enabled ◦ Blinking green - EVDO service is enabled ◦ Off - neither HSPA+ nor EVDO service is available • SVC3 <ul style="list-style-type: none"> ◦ Solid green - GPS service is available ◦ Off - GPS service is not available |

Regulatory compliance, Safety, Emissions, and EMC/Immunity

Table 9 shows a partial listing of regulatory compliance and safety data.

Table 9. Common specifications

| Feature | Description |
|--|---|
| Environmental specifications | |
| Operating conditions | |
| Operating temperature | -40 to +60C (-40F to +140F) continuous operating temperature range -40 to +85C (-40 to +185F) type test for 100 hours at 85C |
| Shock | 30G @ 11 ms |
| Vibration | |
| Altitude | 10,000 ft. (3,048 m) maximum operating temperature is de-rated with increasing altitude per IEEE1613-2009 |
| Relative humidity | 5 to 95% non-condensing |
| Non-operating conditions | |
| Temperature | -40 to + 85C (-40 to +185F) |
| Non-operating relative humidity | 5 to 95% non-condensing |
| Altitude | 10,000 ft. (~3000 m); maximum operating temperature is de-rated with increasing altitude per IEEE 1613-2009 |
| Non-operating free-fall drop | 4 in. (100 mm) |
| Operating seismic earthquake | IEC 61850-3, Class S3 |
| Non-operating shock | 40-50G (3.26 m/s minimum) |
| Non-operating vibration | |
| Safety | <ul style="list-style-type: none"> • USA: UL 60950-1 • Canada: CAN/CSA C22.2 No. 60950-1 • Europe: EN 60950-1 • China: GB 4943 • Rest of world: IEC 60950-1 |
| Regulatory compliance | |
| Emission | <ul style="list-style-type: none"> • 47 CFR, Part 15: 2016 • ICES-003 Class A: 2016 Iss:6 • EN55032 Class A: 2012 • CISPR32 Class A: 2015:Ed:2 • AS/NZS 3548 Class A: 2012 • VCCI V-3 2010 • CNS 13438: 2006 |

| Feature | Description |
|-----------------|--|
| Immunity | <ul style="list-style-type: none"> • EN55035:2017 • EN55024:2010:A1 • CISPR24: 2010 + A1: 2015 |
| Telecom | <ul style="list-style-type: none"> • EN300 386:2012:V1.6.1 |
| Radio | <ul style="list-style-type: none"> • FCC 47 CFR Part 22,24,27 • RSS 129,132, 133 • AS/NZ ACMA EMR, AS/CA S042.1, 4 • MIC Article 2 Paragraph 1, Item 11-3,7,19 • EN 301 908-1,2,13 • EN 301 489 -1, 52 v2.1.1 • EN 301 489 – 1,3,24 • FCC Part 2.1091 (MPE) • RSS 102 (RF Exposure) • EN 62311 (RF Exposure) |
| GNSS | EN 303 413 v1.1.1 EN 301 489-1,19 |

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

Table 10 outlines the product part numbers.

Table 10. Product part numbers

| SKU | Description |
|-------------------------|--|
| GRWIC-4G-LTE-EA | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for EMEA, N America regions |
| GRWIC-4G-LTE-EA= | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for EMEA, N America regions, spare |
| GRWIC-4G-LTE-LA | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for L America, APJC regions |
| GRWIC-4G-LTE-LA= | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for L America, APJC regions, spare |

Ordering information

These products are available to any Cisco authorized partner. For more information, 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 visit our [CGR 2000 Series Interfaces and Modules page](#).

Find more information on the [Cisco CGR 2010](#).

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