Cisco Connected Grid 3G Cellular Modules for the Cisco 1000 Series Connected Grid Router

The Cisco® Connected Grid 2G/3G Cellular Modules are 3G wireless WAN connections for the Cisco 1000 Series Connected Grid Routers (CGR 1000 Series). The ruggedized 3G cellular modules and CGR 1000 routers together provide a versatile communications platform for a diverse set of field area network (FAN) and Internet of Things (IoT) deployments. They also support and extend utility applications such as Advanced Metering Infrastructure (AMI), Distribution Automation (DA), integration of Distributed Energy Resources (DER), and Remote Workforce Automation to endpoints in the grid.

Product Overview

Cisco Connected Grid 2G/3G Cellular Modules deliver service provider–based (public) wireless WAN connectivity for Cisco 1000 Series Connected Grid Routers (CGR 1000). These modules support the 3G standards for evolved High-Speed Packet Access (HSPA+) and Evolution-Data Optimized (EV-DO) Rev A. They're also backward-compatible with the following 2G/3G cellular network technologies:

- High-Speed Packet Access (HSPA)
- Universal Mobile Telecommunications Service (UMTS)
- Enhanced Data Rates for Global Evolution (EDGE)
- General Packet Radio Service (GPRS)
- EV-DO Rev 0/1xRTT

Connected Grid Cellular Modules have two variants:

- Global System for Mobile Communications (GSM) and UMTS models are based on 3GPP. They support HSPA+, HSPA, UMTS, EDGE, and GPRS.The ruggedized cellular module and the CGR1000 routers provide a versatile communications platform for a diverse set of FAN and IoT deployments for smart utility grids.
- Code Division Multiple Access (CDMA) models are based on 3GPP2. They support EV-DO Rev A/Rev 0 and 1xRTT.

Figure 1 displays the Cisco Connected Grid 2G/3G Cellular Modules

Figure 1. Cisco Connected Grid 2G/3G Cellular Modules

There are five SKUs in the Cisco Connected Grid 2G/3G Cellular Module family. They offer utilities a choice of different technologies, carriers, and regions, as defined in Table 1.

Table 1. Cisco Connected Grid 2G/3G Cellular Modules for CGR 1000 Series

SKU	Description	Region	Technology & Supported Frequency Bands
CGM-3G-HSPA-AB-G	Connected Grid Module - 3G (all bands) HSPA+/UMTS/GSM/EDGE	Global	GSM, GPRS, EDGE: 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 900 MHz, and 2100 MHz
CGM-3G-HSPA-G	Connected Grid Module - 3G (global) HSPA+/UMTS/GSM/GPRS/EDGE	North America and rest of world (900 MHz AMI)[1]	GSM, GPRS, EDGE: 850 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 2100 MHz
CGM-3G-HSPA-A	Connected Grid Module - 3G AT&T HSPA+/UMTS/GSM/GPRS/EDGE	AT&T (USA)	GSM, GPRS, EDGE: 850 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 850 MHz, 1900 MHz, and 2100 MHz
CGM-3G-EVDO-V	Connected Grid Module - 3G Verizon EV-DO Rev A/0/1xRTT	Verizon (USA)	CDMA/EVDO: 800-900 MHz cellular band and 1800-1900 MHz PCS band
CGM-3G-EVDO-S	Connected Grid Module - 3G Sprint EV-DO Rev A/0/1xRTT	Sprint (USA)	GSM, GPRS, EDGE: 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz UMTS, HSPA+: 850 MHz, 1900 MHz, and 2100 MHz

[1] For 900 MHz-based AMI deployments, a CGM-3G-HSPA-G cellular module should be used (CGM-3G-HSPA-AB-G should not be used).

Utilities that need to improve business continuity and reduce operating costs should consider these modules. When they add a service provider wireless data plan, utilities gain a rapidly deployable solution for remote sites. And these modules make full use of the network services provided by Cisco CGR 1000 routers.

Connected Grid 2G/3G Modules offer embedded intelligence (such as intelligent WAN sensing and modem reset). Links can be restored automatically, with no need for a service visit.

In addition, Connected Grid 2G/3G Modules provide detailed diagnostic information about the 3G WAN link so that utilities can troubleshoot connectivity issues and provide detailed performance logs to their service providers. Please refer to the software specifications in Table 3 for more details.

Since Connected Grid 2G/3G Cellular Modules can be deployed in many utility environments worldwide, they offer a variety of antenna and cabling options. They support indoor- and outdoor-rated antennas, omnidirectional stick antennas, flat-panel antennas, low-profile saucers, ceiling-mounted antennas, and standard dipole antennas.

Refer to the antenna specifications (Table 4), cable specifications (Table 5), and accessories specifications (Table 6) for more details.

Table 2 shows the hardware specifications for Cisco Connected Grid 2G/3G Cellular Modules, plus a partial listing of regulatory compliance and safety data.[1]

Table 2.   Hardware Specifications for Cisco Connected Grid 2G/3G Cellular Modules

Feature	Description
Form Factor	• Single 2G/3G cellular module per platform; no slot placement restrictions
Dimensions (H x W x D)	• 1.50 in. x 4.24 in. x 5.25 in. • 3.81 cm x 10.77 cm x 13.34 cm
Weight	• 0.5 lb

External Interfaces	• Cellular radio frequency (RF)
	  ◦ M0/MAIN – Primary RF port; QMA – female
	  ◦ M1/DIV – Diversity RF port; QMA – female

Subscriber Identity Module (SIM) Card	• Dual SIM[2] card socket; compliant with ISO-7816-2 (SIM mechanical)

LEDs	• Wireless WAN modem status: LED color (green)
	  ◦ 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): LED color (green/amber; bi-color)
	  ◦ Off: RSSI less than or equal to –110
	  ◦ Solid amber: –110 less than RSSI less than or equal to -90
	  ◦ Fast green blink: -90 less than RSSI less than or equal to -75
	  ◦ Slow green blink: –75 less than RSSI less than or equal to -60
	  ◦ Solid green: RSSI greater than -60
	• SVC: LED color (green/amber; bi-color)
	  ◦ Solid green: (HSPA+) service is enabled
	  ◦ Blinking green: EV-DO service is enabled
	  ◦ Off: neither HSPA+ nor EVDO service is available

Operating Conditions	
Operating Temperature	CGR1120/CGR1240: –25º C to +65º C (-13º F to 140º F) continuous operating temperature range CGR1240 with 3 BBUs: -40º C to +65º C (-40º F to 140º F) continuous operating temperature range
Shock and Vibration	30 G at 11 ms Class Cm IEEE 1613 CLASS VS3 IEC 870-2-2 CLASS Cm
Operating Seismic Earthquake	IEC 61850-3, Class S3
Altitude	10,000 ft. (3048 m) optimum operating temperature is derated with increasing altitude per IEEE1613a-2008
Relative Humidity	5 to 95 percent non-condensing
Non-Operating Conditions	
Temperature	–40º to +185º F (–25º C to +85º C)
Non-Operating Relative Humidity	5 to 95 percent non-condensing
Altitude	10,000 ft. (3000 m); optimum operating temperature is derated with increasing altitude per IEEE 1613a-2008
Non-Operating Free-fall Drop	4 in. (100 mm) per ENG-339611
Non-Operating Shock and Vibration	50 - 60 G (3.76 m/s minimum)

Feature	Description
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 and 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:
	  ○ CGM-3G-HSPA-AB-G: Sierra Wireless MC8705; FCC, IC, NCC, CE, GCF-CC, PTCRB
	  ○ CGM-3G-HSPA-A: Sierra Wireless MC8705; FCC, IC, NCC, CE, GCF-CC, PTCRB
	  ○ CGM-3G-HSPA-G: Sierra Wireless MC8705; FCC, IC, NCC, CE, GCF-CC, PTCRB
	  ○ CGM-3G-EVDO-V: Sierra Wireless MC5728; FCC, IC, NCC, CE, GCF-CC, PTCRB
	  ○ CGM-3G-EVDO-S: Sierra Wireless MC5728; FCC, IC, NCC, CE, GCF-CC, PTCRB

[1] For more information, consult the Product Approval Database at http://www.ciscofax.com or consult your local Cisco representative (Cisco.com login required).
[2] Software support for dual SIM only on Cisco IOS® Software Release 15.4(1) CG.

Table 3 shows the software specifications for Cisco Connected Grid 2G/3G Cellular Modules.

Table 3. Software Specifications for the Cisco Connected Grid 2G/3G Cellular Modules

Feature	Description
Software Compatibility	• 15.4(1)CG
Important Software Features	• Auto-switch failover between primary and backup link • Multichannel Interface Processor (MIP) profile configuration • Code Division Multiple Access (CDMA) data retry • Remotely initiated data call back using voice • Remotely initiated data call back using SMS • Remote firmware upgrade over 3G • Virtual diagnostic monitoring • Maintenance End Point (MEP) lock/unlock capability • SIM lock/unlock capability

Feature	Description
MIBs	• 3G MIB and traps • ENTITY MIB • IF MIB • 3G WWAN MIB persistence
Network Management and Diagnostics	• In-band and out-of-band management using Telnet (Cisco IOS Software command-line interface [CL]) and Simple Network Management Protocol (SNMP), including MIB II and other extensions • Industry-standard 3G diagnostics and monitoring tools [QUALCOMM CDMA Air Interface Tester (CAIT), and Spirent Universal Diagnostic Monitor (UDM)]
Wireless Technologies Supported (Performance and Throughput)	

Cisco Connected Grid Module 3G GSM All Band Module: CGM-3G-HSPA-AB-G	• HSPA+: 850, 900, 1900, and 2100 MHz (forward link up to 21.1 Mbps; reverse link up to 5.76 Mbps)
	• Backward compatibility:
	  ◦ HSPA: 850, 900, 1900, and 2100 MHz (forward link up to 7.2 Mbps; reverse link up to 5.76 Mbps)
	  ◦ HSDA: 850, 900, 1900, and 2100 MHz (forward link up to 7.2 Mbps; reverse link up to 384 kbps)
	  ◦ UMTS: 850, 900, 1900, and 2100 MHz (forward link up to 2.0 Mbps; reverse link up to 384 kbps)
	  ◦ EDGE: 850, 900, 1800, and 1900 MHz (forward link up to 236 kbps; reverse link up to 124 kbps)
	  ◦ GPRS: 850, 900, 1800, and 1900 MHz (forward link up to 80 kbps; reverse link up to 42 kbps)

Cisco Connected Grid Module 3G GSM North America Module: CGM-3G-HSPA-A
 	
CGM-3G-HSPA-G
	• HSPA+: 850, 1900, and 2100 MHz (forward link up to 21.1 Mbps; reverse link up to 5.76 Mbps)
	• Backward compatibility:
	  ◦ HSPA: 850, 1900, and 2100 MHz (forward link up to 7.2 Mbps; reverse link up to 5.76 Mbps)
	  ◦ HSDA: 850, 1900, and 2100 MHz (forward link up to 7.2 Mbps; reverse link up to 384 kbps)
	  ◦ UMTS: 850, 1900, and 2100 MHz (forward link up to 2.0 Mbps; reverse link up to 384 kbps)
	  ◦ EDGE: 850, 1800, and 1900 MHz (forward link up to 236 kbps; reverse link up to 124 kbps)
	  ◦ GPRS: 850, 1800, and 1900 MHz (forward link up to 80 kbps; reverse link up to 42 kbps)

Cisco Connected Grid Module 3G CDMA Module: CGM-3G-EVDO-V
 	
CGM-3G-EVDO-S
	• CDMA 1xEV-DO Rev A (forward link up to 3.1 Mbps; reverse link up to 1.8 Mbps)
	• Backward compatibility:
	  ◦ CDMA 1xEV-DO Rel 0 (forward link up to 2.4 Mbps; reverse link up to 153.6 kbps)
	  ◦ CDMA 1xRTT (forward link up to 153.6 kbps; reverse link up to 153.6 kbps)

[*] For more information about CGOS software capability support, consult your local Cisco representative (Cisco.com login required).

Table 4 lists the antenna options for Connected Grid 2G/3G Cellular Modules.

Table 4.   Antenna Options for Connected Grid 2G/3G Cellular Modules

Item	Specification
ANT-MP-I-OUT-SS-M	• Multipurpose integrated antenna designed to support Cisco 1240 Connected Grid Router (CGR 1240) • Outdoor
ANT-4G-CM-IN-TNC	• Ceiling mount, indoor low-profile antenna • Integrated 15 ft. LMR-195 cable
ANT-4G-OMNI-OUT-N	• Omnidirectional, stick antenna • Outdoor
ANT-4G-PNL-OUT-N	• Flat-panel antenna • Outdoor
ANT-4G-SR-OUT-TNC	• Low-profile outdoor saucer antenna
ANT-4G-DP-IN-TNC	• Dipole, swivel-mount, indoor

Note: For an extensive description of antenna options and their potential deployment scenarios, see the Antenna Installation deployment guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html.

Table 5 lists the RF cable options for Connected Grid 2G/3G Cellular Modules.

Table 5. RF Cable Options for Connected Grid 2G/3G Cellular Modules

Item	Specification
Indoor RF Cable Options for Cisco 1120 Connected Grid Router (CGR 1120)	
CAB-L240-10-Q-N	10-ft (3 m) low loss LMR 240 cable with QMA and N connectors
CAB-L240-15-Q-N	15-ft (4.5 m) low loss LMR 240 cable with QMA and N connectors
CAB-L240-20-Q-N	20-ft (6 m) low loss LMR 240 cable with QMA and N connectors
Outdoor RF Cable Options for Cisco CGR 1120 and CGR 1240	
CAB-L400-5-N-N	5-ft (1.5 m) low loss LMR 400 cable with N connectors (straight to right angle)
CAB-L400-5-N-NS	5-ft (1.5 m) low loss LMR 600 cable with N connectors (straight to straight)
CAB-L400-20-N-N	20-ft (6 m) low loss LMR 400 cable with N connectors
CAB-L600-30-N-N	30-ft (9.14 m) ultra-low loss LMR 600 cable with N connectors

Table 6 lists additional accessories available for Connected Grid 2G/3G Cellular Modules.

Table 6. Accessories for Connected Grid 2G/3G Cellular Modules

Item	Specification
CGR-LA-NM-NF	Lightning arrestor for CGR 1240
CGR-N-CONN-3G	N connectors (2 QTY) for CGR 1240 for 2G/3G- external antennas
CGR-LA-NF-NF	Lightning arrestor for CGR 1120
ANT-ADPTR-Q-TNC	Connecting adapter for CGR antennas- QMA to TNC for CGR 1120

Note: For an extensive description of antenna and cable options and their potential deployment scenarios, see Antenna Installation deployment guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html.

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

To learn more about Cisco Connected Grid 2G/3G Cellular Modules for the Cisco 1000 series Connected Grid Routers, visit http://www.cisco.com/en/US/products/ps12277/index.html.

Find out more about the Cisco CGR 1000 by visiting http://www.cisco.com/go/cgr1000.

For more information on the Cisco Field Area Network (FAN) solution, visit http://www.cisco.com/go/fan.

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