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DA 3 Phase Recloser Cellular Communication Kit

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Related/Referenced Documents

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Version History

Version	Date	Revision
01	Sep. 18, 2023	Initial release
02	April 24, 2025	New hardware added (CELL ANTENNA BRACKET)
03	April 29, 2025	Warehouse Catalog number correction.
04	May 1, 2025	Warehouse Catalog number correction.
05	May 2, 2025	Warehouse Catalog number correction.

Warehouse Catalog #	Asset Suite #	Version	Date
032-85320	85320	5	May 2, 2025
032-85321	85321	5	May 2, 2025
002-87482	87482	4	May 2, 2025

1. Introduction

This specification covers cellular routers that will be installed in LUMA reclosers. The cellular routers will provide reliable and secure communications to the primary equipment for the acquisition of operational and non-operational data. The routers will support secure communication with the LUMA enterprise using IPSEC tunnels and support secure peer to peer communication for decentralized automation schemes.

The specification calls for a recloser communication retrofit kit including cables, surge protection, brackets and antenna required for installation in S&C Intellirupter recloser communication modules.

The specification includes a communication network management system to manage a large fleet of over 4000 cellular routers.

2. Special Requirements

Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this equipment/material to LUMA in previous orders will not have to furnish samples at bid opening. The equipment/material will be received at LUMA's general warehouse (011) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.

3. Literature

3.1. Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature must include, but is not limited to, details of material, drawings, documented testing, and instructions for use and installation. **The literature must be an official document from and certified by the manufacturer.** Failure to submit documents on time and duly certified by the manufacturer will cause bidder disqualification.

3.2. If required by LUMA, final drawings and documentation shall be submitted by the vendor before the manufacturing and shipping process for approval.

4. Compatible with

For compatible manufacturer and model see Table 1. These models are examples of the equipment/material described in this document and do not represent a preference. LUMA will evaluate equally any model not listed here during any acquisition event.

5. Markings

5.1. Containers shall be marked outside with LUMA Energy's purchase order and item number.

5.2. Individual package(s) shall be clearly marked with manufacturer name and item information (part number, serial number, quantity, etc.). Packaging labels and tags shall be waterproof.

6. Packaging

6.1. All equipment/material shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.

6.2. A list of all parts included in the container and/or package must be provided at the time of delivery so that the receiving personnel can verify that everything requested is present, avoiding any delay in the receiving process.

7. Number Per Package (Logistics)

The supplier shall indicate the logistics regarding the opening bid or as required by LUMA Energy, as outlined in Table 1, or as otherwise specified by LUMA.

8. Acceptance Criteria

8.1. Test required: certified by external qualified laboratories.

8.2. Product shall be manufactured in accordance with the latest issue below (section 9). When conflicts occur between purchaser's specifications and the latest issue below, the purchaser's specification shall prevail.

8.3. Latest applicable codes, standards, and other regulations

9. Description

9.1. Cellular Router

a. The cellular router will be installed in an S&C Intellirupter communication module and must be of the size to fit the available space.

b. Dimensions:

1. Length < 7,6 inches
2. Width < 3.4 inches
3. Height < 1.9 inches

c. Security

1. Support for X.509 PKI Certificates
2. Encrypted device management interfaces
3. IKEv2 IPsec VPN (IPv4, IPv6)
4. OpenVPN
5. AES-128, AES-256 encryption schemes
6. HA-384, SHA-512 hashing algorithms
7. Integrated Zone-based Firewall and MAC address filtering
8. 802.1x authentication for Ethernet clients
9. ole-based access using centralized RADIUS authentication.

d. Provisioning Support

1. Device management using secure HTTPS web interface.
2. Central FCAPS and firmware management

e. Monitoring

1. SNMP
2. Syslog

f. Availability

1. Dual boot partitions
2. Over-the-air firmware upgrades

3. Dual SIMs for automatic failover to alternative cellular network
4. Routing and IP Services
5. Support up to 32 IPsec Tunnels
6. IPv4 and IPv6
7. Border Gateway Protocol (BGP)
8. Generic Routing Encapsulation (GRE)
9. Network Address Translation (NAT)
10. Dynamic Host Configuration Protocol (DHCP) Server
11. Access Control Lists (ACL)
12. Raw and interpreted serial data encapsulation in IP
13. System time from GPS or from built-in NTP Client
14. Port Forwarding

g. Ethernet Services
   1. Untagged and 802.1q VLAN tagged (access and trunk modes).
   2. Maximum of 32 VLANs

h. Environmental
   1. Operating temperature range: -40°C to 70°C / -40°F to 158°F
   2. Storage temperature range: -40°C to 85°C / -40°F to 185°F
   3. Humidity: 90% RH @ 60°C (140°F)
   4. IP30 rated enclosure: UL579/IEC 60529
   5. Shock & vibration: MIL-STD-810G; 514.7

i. Power
   1. 8-30 Volt DC

j. Power Consumption
   1. Typical – 2. 5W
   2. Maximum (Bootup) – 5 W

k. GPS/GNNS
   1. GPS (1575.42 MHz)

2. Location reporting accuracy: < 2 m (50%); < 5 m (90%)

l. Ethernet Port

1. Two RJ45 10/100/1000BASE-T IEEE 802.3
2. Auto-negotiated duplex mode and speed
3. LEDs for link and activity

m. Cellular radio

1. 4G LTE Cat-4, Rel 10:
   - Supported bands: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B19, B20, B26, B28
2. 3G UMTS:
   - Supported bands: B1, B2, B4, B5, B8, B19
3. Regulatory approvals: FCC, CE,
4. Carrier certifications: AT&T

n. Certifications

1. Safety:
   - UL 62368-1
   - CSA 22.2 No. 62368-1
2. EMC - Electromagnetic Compatibility:
   - FCC CFR 47 Part 15
   - IEEE 1613 / IEC 61850
3. Environmental
   - ANSI/ISA 12.12.01 (Class 1, Div 2)
   - CSA 213 (Class 1, Div 2)
   - ATEX Zone 2 (UL 60079-0, UL60079-15)

9.2. Communication Network Management System (CNMS)

a. The CNMS will provide visibility and an ability to manage a large fleet of cellular routers.

b. The system must provide the following.

1. Visibility of performance and usage.
2. Gather information from all devices in the network.

3. The CNMS must include collection processes that will not lead to flooding the network with excess traffic.
4. Device management services.
5. Provide historical data for analysis and trending.
6. Network provisioning tools to manage many device configuration changes and upgrades.
7. Network monitoring and troubleshooting tools.
8. Remote access to CNMS through secure web interface.
9. CNMS must run on a Linux-based server.

c. Management Interface must provide:

1. Overview of network / system
2. Analytics to identify heavy users for example.
3. Statistics
4. Trends
5. Cellular router connectivity.

9.3. Cellular Router Antenna

a. The M2M antenna must provide optimal 4G/3G LTE MIMO coverage in a single, low-profile housing. The antenna must be designed for installation on surfaces with limited surface space.
b. The antenna must provide no tune, multi-band coverage: dual 4G LTE and GSM/3G frequencies. IP67 compliant design must provide maximum protection against water ingress, UV-resistant housing and cables, corrosion resistant for near coastal high salinity areas as found in Puerto Rico.
c. The antenna will be mounted using a bracket on the recloser by LUMA as indicated in Figure 1. The scope includes the supply of the bracket to the dimensions as indicated in Figure 1. The bracket edges will be rounded and finished to ensure that there are no sharp edges to and cause injury.

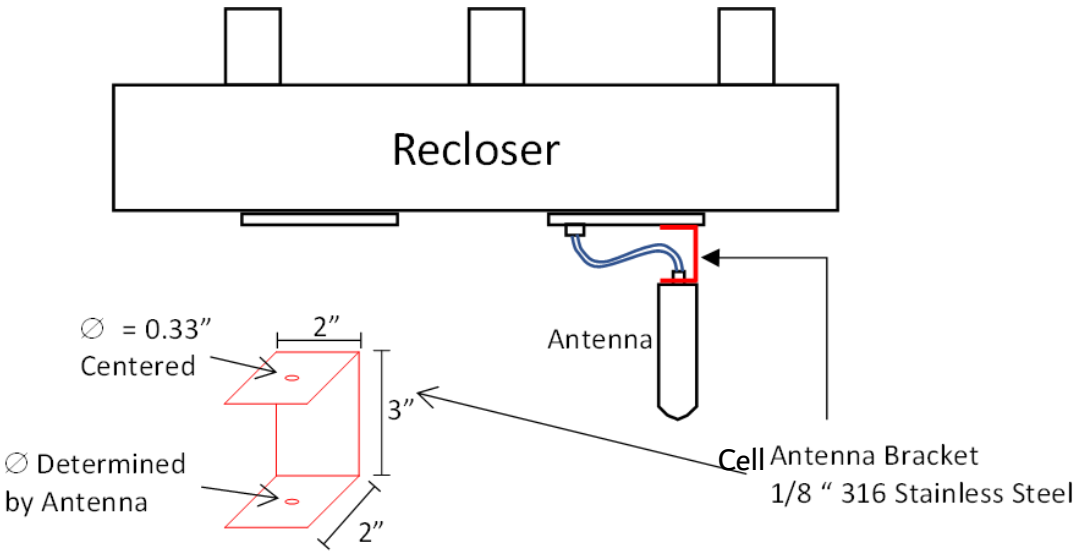

Figure 1

d. Specification:

1. Frequency: 2x 698-960/1710-2700MHz
2. Gain: 2x 2x 5dBi
3. Radiation: Omni-Directional
4. Polarization: Vertical
5. Maximum Input Power: 50W
6. Connector: 2x RP SMA Male
7. Cable Length:2x 24 inches
8. RoHS Compliant
9. Stainless Steel Mounting Bracket (See Figure 1)

9.4. Cables and materials

a. The following material will be supplied with the router and packaged in a single box before shipment to LUMA. The box will be labeled to LUMA specification to clearly identify the router type, firmware version, serial number and IMEI number.

1. Four 20-inch Coaxial antenna jumper cables with SMA male weatherproof connectors.
2. Two lightning arrestor coax surge protectors with SMA Female to SMA Female Connector. A 12-inch green 14-gauge flexible multistrand wire will be crimped to a ring terminal and secured to each lightning arrestor.
3. One Han-Modular Compact cover, for housings part number 09 14 001 5401 with two RF coaxial antennas through connector type adapters with SMA-Female plug to SMA-Female jack that is waterproof for bulkhead panel mounting. The vendor should work with Harting to provide a predrilled and fitted part.

9.5. Type Testing

a. The vendor will be responsible to perform a type test on the kit. The devices must be connected as indicated in figure 2.

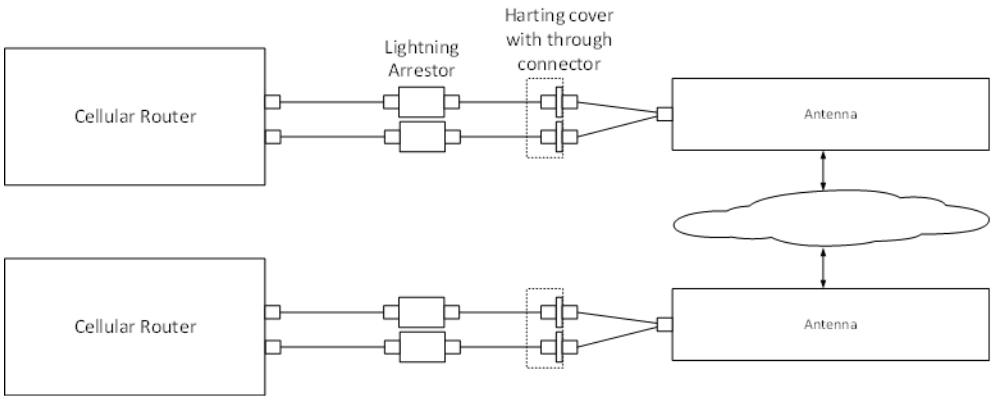

Figure 1

1. The type test will be to prove full functionality of the router, antenna, cables, and connectors.
2. The type test will prove that all materials used will function in the field.
3. The type test will prove acceptable industry standard data throughput form the router to router through a cellular provider.
4. If any part in the kits is changed due to material shortages or product discontinuation the kits must be retested.
5. The latest type test report will be supplied to LUMA.

10. Inspection

10.1. Upon inspection of incoming equipment/material, the purchaser reserves the right to refuse product shipments and to determine the acceptability or rejection of the product received. The supplier shall be liable for all costs incurred for a product that is rejected.

10.2. The acceptance of any equipment/material shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such equipment/materials were found later to be defective.

11. Proposal Information

11.1. Submitted proposals must include:

a. Technical information, drawings, and tests.

b. Table of Compliance completed by the bidder with reference (see Appendix 1).

12. Table 1: Warehouse and Asset Suite Identification Number.

Warehouse Catalog #	Asset Suite #	Item Type	Compatible Manufacturer & Model
032-85320	85320	Cellular Communication Module	Hitachi Energy
032-85321	85321	Network Management Service	Hitachi Energy
002-87482	87482	Cell Antenna Bracket	Hitachi Energy 1KHY131158M0001

—End of Specification —

Appendix

Appendix 1: Table of Compliance

Line	Description	Pass/Fail	Comments
	Cellular Router		
1	• Length < 7,6 inches • Width < 3.4 inches Height < 1.9 inches		
2	• Support for X.509 PKI Certificates • Encrypted device management interfaces • IKEv2 IPsec VPN (IPv4, IPv6) • OpenVPN • AES-128, AES-256 encryption schemes • SHA-384, SHA-512 hashing algorithms • Integrated Zone-based Firewall and MAC address filtering • 802.1x authentication for Ethernet clients Role-based access using centralized RADIUS authentication.		
3	• Device management using secure HTTPS web interface. Central FCAPS and firmware management		
4	• SNMP Syslog		
5	• Dual boot partitions • Over-the-air firmware upgrades • Dual SIMs for automatic failover to alternative cellular network • Routing and IP Services • Support up to 32 IPsec Tunnels • IPv4 and IPv6 • Border Gateway Protocol (BGP) • Generic Routing Encapsulation (GRE) • Network Address Translation (NAT) • Dynamic Host Configuration Protocol (DHCP) Server • Access Control Lists (ACL) • Raw and interpreted serial data encapsulation in IP. • System time from GPS or from built-in NTP Client Port Forwarding		
6	• Untagged and 802.1q VLAN tagged (access and trunk modes). Maximum of 32 VLANs		
7	• Operating temperature range: -40°C to 70°C / -40°F to 158°F • Storage temperature range: -40°C to 85°C / -40°F to 185°F • Humidity: 90% RH @ 60°C (140°F)		

	• IP30 rated enclosure: UL579/IEC 60529 Shock & vibration: MIL-STD-810G; 514.7		
8	• 8-30 Volt DC • Typical – 2. 5W • Maximum (Bootup) – 5 W		
9	• GPS (1575.42 MHz) Location reporting accuracy: < 2 m (50%); < 5 m (90%)		
10	• Two RJ45 10/100/1000BASE-T IEEE 802.3 • Auto-negotiated duplex mode and speed • LEDs for link and activity		
11	• 4G LTE Cat-4, Rel 10: • 3G UMTS: • Regulatory approvals: FCC, CE, •Carrier certifications: AT&T		
12	• Safety: • EMC - Electromagnetic Compatibility: Environmental		
Communication Network Management System (CNMS)			
	• Visibility of performance and usage. • Gather information from all devices in the network. • The CNMS must include collection processes that will not lead to flooding the network with excess traffic. • Device management services. • Provide historical data for analysis and trending. • Network provisioning tools to manage many device configuration changes and upgrades. • Network monitoring and troubleshooting tools. • Remote access to CNMS through secure web interface. • CNMS must run on a Linux-based server.		
	• Overview of network / system • Analytics to identify heavy users for example. • Statistics • Trends • Cellular router connectivity.		
	Optimal 4G/3G LTE MIMO coverage in a single, low-profile housing.		
	• IP67 compliant design UV and corrosion resistant housing and cables,		
	• Suitable to be mounted using a bracket. This bracket shall be manufactured as describe in Figure 1 of Section 8.3.c. • The bracket shall be included in the package with the rest of the components.		
	Frequency: 2x 698-960/1710-2700MHz		

	• Gain: 2x 2x 5dBi • Radiation: Omni-Directional • Polarization: Vertical • Maximum Input Power: 50W • Connector: 2x RP SMA Male • Cable Length:2x 24 inches • RoHS Compliant • Stainless Steel Mounting Bracket (See Figure		
Cables and Materials			
	• Four 20-inch Coaxial antenna jumper cables with SMA male weatherproof connectors. • Two lightning arrestor coax surge protectors with SMA Female to SMA Female Connector. A 12-inch green 14-gauge flexible multistrand wire will be crimped to a ring terminal and secured to each lightning arrestor. • One Han-Modular Compact cover, for housings part number 09 14 001 5401 with two RF coaxial antennas through connector type adapters with SMA-Female plug to SMA-Female jack that is waterproof for bulkhead panel mounting.		
	• Overview of network / system • Analytics to identify heavy users for example. • Statistics • Trends • Cellular router connectivity.		
Cell Antenna Bracket			
	U shape metal Bracket with minimum dimensions 2” x 3” x 3”		

NOTE: This table is only a checklist for reference. The compliance must be with the complete document. Filling out the table with “PASS” won’t be accepted as a compliance without the technical information required to certify it.

4350.331 Radios for Three Phase Reclosers v5 5 2 2025

Final Audit Report 2025-05-02

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