

This document provides information regarding radio frequency (RF) of the ORION[®] Cellular endpoint.

Badger Meter is the market leader for utility cellular solutions, having deployed millions of endpoints with thousands of customers.

Cellular technology for machine-to-machine applications is designed to ensure transmission accuracy, immunity from outside interference and other forms of attenuation to avoid the loss of customer data. Likewise, the ORION Cellular endpoint is designed to eliminate interference from outside electromagnetic and RF energy fields. As its primary communication, the ORION Cellular endpoint utilizes licensed frequencies that are specifically set aside for its cellular communications, recognized as one of the most secure approaches to network communication available. Specific configurations also transmit an RF message to facilitate troubleshooting in the field.

| Endpoint | Troubleshooting Message |
|-----------------------|--|
| ORION Cellular LTE-M | Includes RF and IR messages for troubleshooting |
| ORION Cellular LTE-MS | Secondary carrier; includes RF and IR messages for troubleshooting |
| ORION Cellular C | Includes RF and IR messages for troubleshooting |
| ORION Cellular HLA | Includes IR message for troubleshooting |

NOTE: For the ORION Cellular LTE-MP endpoint, see the *ORION Cellular LTE-MP Endpoint product data sheet*, available at www.badgermeter.com.

TERMS

| | |
|------------|--------------------|
| dBm | decibel-milliwatts |
| IR | infrared |
| RF | radio frequency |
| W | watts |

FAQ**What frequencies do ORION Cellular endpoints utilize?**

As its primary communication, the ORION Cellular endpoint utilizes licensed frequencies that are specifically set aside for its cellular communications. Unlike many AMI solutions that use shared frequencies and bandwidth, ORION Cellular endpoints utilize licensed frequencies to avoid interference from unauthorized users. Endpoint configurations that support the RF message for troubleshooting communicate on the FCC-regulated 902-928 MHz frequency. ORION Cellular endpoints comply with Part 15, Part 22, Part 24, and Part 27 of FCC Rules.

Are ORION Cellular endpoints certified by the FCC?

The ORION Cellular endpoint device meets all applicable legal requirements of Part 15, Part 22, Part 24, and Part 27 of the Federal Communications Commission (FCC).

What is the output power of the ORION Cellular endpoint during a data transmission?

The ORION Cellular endpoint ensures reliable, long distance data delivery at a maximum transmission power that is governed by the cellular standard, 23 dBm (0.20 W).

For configurations that support the RF message for troubleshooting, the RF backup broadcast will be at approximately 10 dBm.

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Are there any health hazards from an ORION Cellular endpoint transmission?

The radio frequency signals broadcast from the ORION Cellular endpoint are well below the levels most people come into contact with on a typical day in their home. Devices such as television sets, wireless phones, and cell phones all utilize radio frequency technology that provides much greater contact to radio frequency signals. The endpoint operates like a cell phone and under normal operation will awaken several times per day (four transmissions per day is expected) to communicate data. Under typical operation, the endpoint transmits reading data for seconds per day, meaning that the endpoint transmits as little energy as a brief cell phone call.

The ORION Cellular endpoint meets the following RF exposure standards:

FCC

In the United States, FCC and CTIA are the bodies responsible for regulating domestic wireless telecommunications, programs and policies, including licensing, and are responsible for implementing rules and regulations regarding frequency allocations, operating and design characteristics of equipment, power limits and testing/certification requirements, among other responsibilities. As its primary communication, the ORION Cellular endpoint utilizes licensed frequencies that are specifically set aside for its cellular communications. Unlike many AMI solutions that use shared frequencies and bandwidth, ORION Cellular endpoints utilize licensed frequencies to avoid interference from unauthorized users. For its RF back-up message, the ORION Cellular endpoint communicates on the FCC-regulated 902-928 MHz frequency. ORION Cellular endpoints comply with Part 15, Part 22, Part 24, and Part 27 of FCC Rules.

OSHA

Under Federal Occupational Safety and Health Administration (OSHA) regulations, batteries used in ORION endpoints are classified as a manufactured article and do not require a Safety Data Sheet (SDS). While batteries within ORION endpoints are completely encapsulated in a hardened epoxy, if desired, an SDS or information sheet for 'lithium thionyl chloride batteries' can be obtained via internet search.

To help provide general guidance for utilities interested in disposing of endpoints that contain lithium thionyl chloride batteries, Badger Meter has created a handling and recycling safety guide, available upon request.

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