ICR-2400

IEC 101/104 Gateways with IEC 60870-5 Protocol Conversion for Energy Distribution

- LTE Cat.4/Cat-M/Cat-NB with 450 MHz support
- Cost-effective solution for Energy Applications
- IEC 60870 - 101/104 protocol conversion
- Up to 2x IEC 101 connected to one gateway
- Ethernet, Serial RS232, RS485 connectivity
- Exceptionally resilient connection for 24/7 operating energy applications
- VPN Tunnels and advanced routing features

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RouterApp

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ICR-2400 101/104 GATEWAYS

INTRODUCTION

The **Advantech ICR-2400** industrial cellular routers are designed for reliable wireless connectivity in energy infrastructure and industrial IoT applications. All models operate on **LTE Cat. 4**, except for the **ICR-2413**. Models **ICR-2413** and **ICR-2437** support operation in the **450 MHz LTE bands**, known for their superior signal penetration and extended coverage, making them ideal for remote or hard-to-reach locations.

The **ICR-2413** utilizes **LTE Cat-M** and **Cat-NB (Narrowband IoT)** technologies, which are optimized for low power consumption and efficient data transmission in IoT scenarios. In contrast, the **ICR-2437** supports LTE Cat. 4, delivering higher data rates suitable for applications requiring more bandwidth. The **450 MHz frequency** bands (such as **B31**, **B72**, and **B73**) are particularly valuable for utilities and industrial-energy networks due to their ability to maintain stable connections over long distances and through obstacles. All routers feature multiple **Ethernet ports**, **serial interfaces**, and **digital I/O**, providing flexibility for diverse industrial integration needs. Their open **Linux-based ICR-OS** allows for custom application development and easy integration with cloud and industrial platforms. These features make the ICR-2400 series robust solutions for **secure**, **scalable**, and **future-proof** industrial wireless networking. See the table with the **MODELS** on page 3.

THE SOLUTION

The **ICR-2400 IEC101/104** gateways enable fast and cost-efficient coupling between control stations and **SCADA** systems using the **IEC 60870-5-101** and **IEC 60870-5-104** communication standards, while profiting from the extensive compatibility of the protocols at the application level. **See schematic diagram below.**

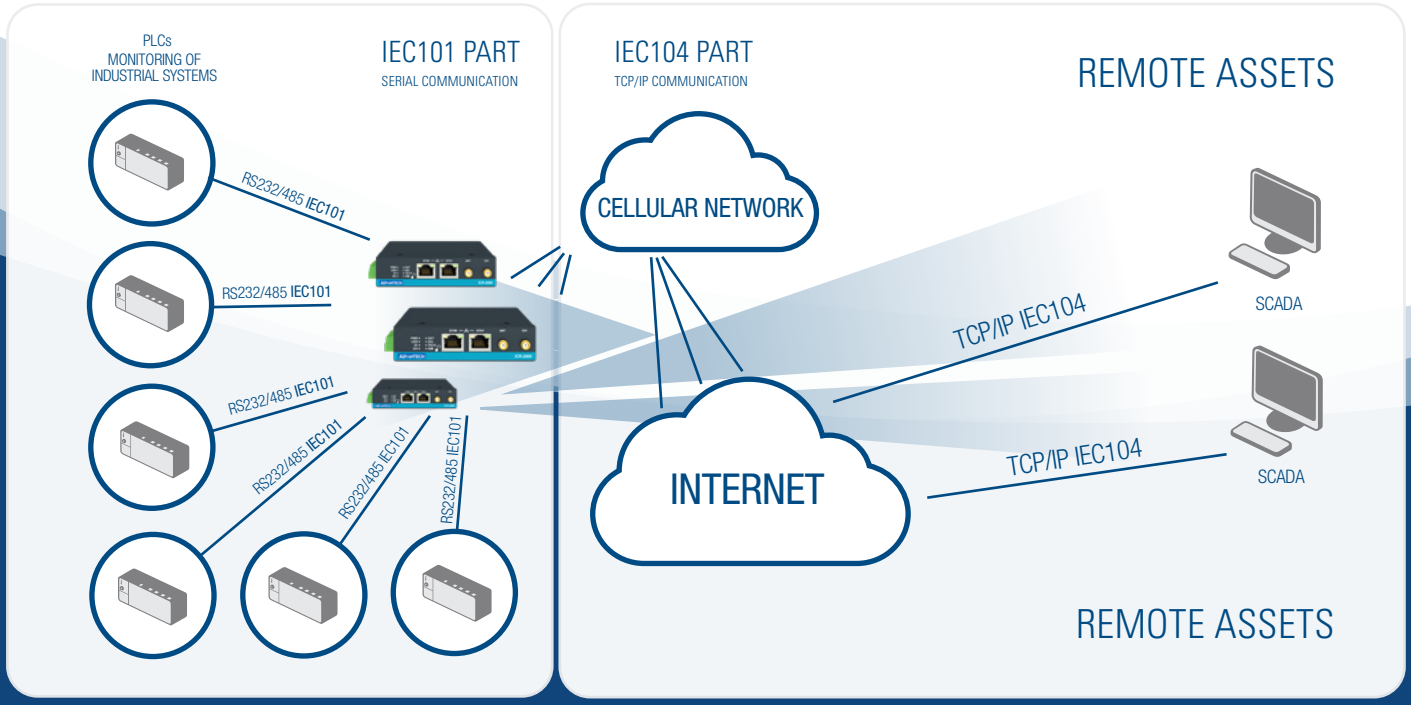
The **ICR-2400 IEC101/104** gateways provide a bidirectional conversion between **IEC101** and **IEC104** protocols, as specified by the **IEC 60870-5** standard. This conversion functionality is delivered to the router through the dedicated **Router App**, which manages the translation of IEC101 serial communication to IEC104 TCP/IP communication and vice versa.

Selected parameters of **IEC101** and **IEC104** can be configured via the web interface of the router. The parameters of serial communication and the parameters of the IEC101 protocol can be set separately for each serial port of the router. If a network is using both serial ports of the router, there will be **two instances of the Router App** running, and two independent IEC101/104 conversions can be performed.

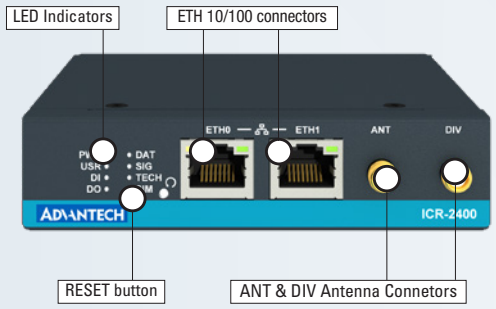
IEC 101/104 RouterApp

THE CHALLENGE

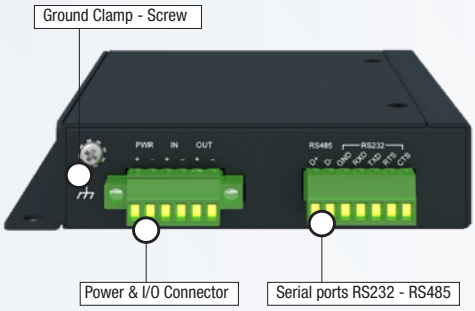
To connect any number of **substations using the IEC 60870-5** communication protocol, with one or more master control rooms, in the most effective way. This is a significant challenge for many energy companies, and one that we can solve easily, with the **ICR-2400 Gateways IEC 101/104**.
The most effective solution, from the perspectives of communication, safety and cost, is to connect substations with control rooms via TCP/IP and Ethernet with IEC 870-5-104 protocol, which allows the service of several devices and operations at the same time, delivering a large reduction in cost compared to the use of costly leased serial lines on the LAN side of a substation to connect **RTU's using IEC 870-5-101 protocol**.
The IEC101/104 gateways offers 24/7 operational remote management and diagnostic features for substations with the possibility to secure data with VPN Tunnels, and advanced networking features including **IP tables** and **Firewalls**. Wireless fallback, allowing the use of two independent mobile carriers, reduces the number of required service journeys to the substations.



FRONT VIEW



LEFT SIDE VIEW



MODELS

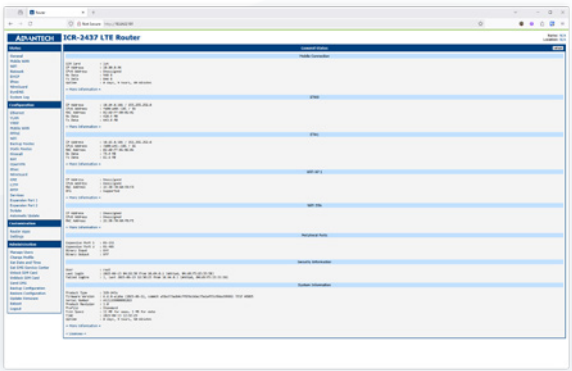
		REGION	2× Ethernet 10/100 Mbps	RS232 RS485	I/O	ANT	2× SIM	WiFi	GNSS
ICR-2413	LPWA Cat-M/Cat-NB with 450 MHz (B31, B72, B73)	EMEA	✓	✓	✓	1×	✓		
ICR-2431	LTE Cat.4 with 3G/2G fallback	EMEA	✓	✓	✓	2×	✓	ICR-2431W	ICR-2431G
ICR-2432	LTE Cat.4 with 3G/2G fallback	LATAM	✓	✓	✓	2×	✓	ICR-2432W	
ICR-2437	LTE Cat.4 with 450 MHz support (B31, B72)	EMEA	✓	✓	✓	2×	✓		
ICR-2438	LTE Cat.4 with 3G fallback	Japan	✓	✓	✓	2×	✓	ICR-2438W	
ICR-2441	LTE Cat.4 with 3G fallback	NAM	✓	✓	✓	2×	✓	ICR-2441W	ICR-2441G

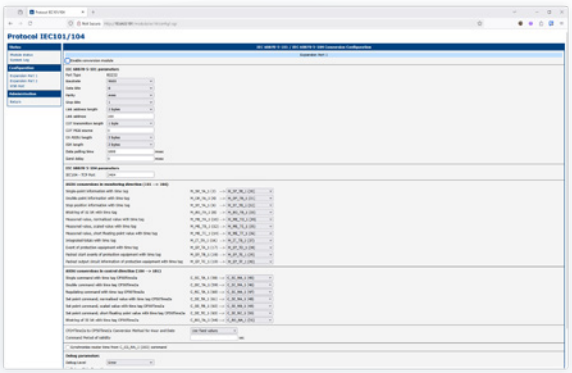
IEC ASDU

The IEC101 protocol (IEC 60870-5-101) defines an Application Service Data Unit (ASDU). In the ASDU, there is an ASDU identifier (with the type of ASDU in it) and information objects. When converting from IEC104 to IEC101 all ASDU types defined in the IEC101 standard, in the compatible 1–127 range of ASDU types are converted accordingly. Proprietary types of ASDU, in the private range of 127–255, are not converted. In addition to standard IEC101 ASDUs some ASDUs defined in IEC104 only are converted. These are ASDUs with a time tag. The numbers of unknown ASDUs are logged and displayed on the status page.

IEC CONVERSION CONFIGURATION

The IEC protocol settings can be configured very easily via the gateway's web interface. The Status section provides real-time communication information and system logs. Within the Configuration section, you can set parameters for both serial ports and manage IEC101/104 conversions—each port supports an independent conversion. The configuration form is divided into two parts, covering IEC101 and IEC104 parameters. All expansion ports share the same parameter options, and you can enable conversion for each port by selecting the appropriate checkbox.





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