

Smart Monitoring

Global Monitoring of Industrial Power Generators

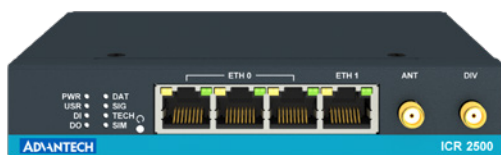
Advantech partnered with a global power-generation manufacturer to unify and strengthen remote monitoring across its worldwide generator fleet.

Background

The industrial generator sector is rapidly evolving. Operators are moving from isolated, manually serviced units toward globally distributed fleets requiring unified digital oversight and reliable remote access.

Diesel and gas generator operators face recurring challenges: unpredictable failures, limited on-site diagnostics, high maintenance costs, and inconsistent connectivity in remote regions. Predictive maintenance — including integration of external vibration monitoring modules for detecting bearing and rotor issues — is increasingly important for preventing mechanical failures before they escalate.

To support this shift, fleet owners require a **globally deployable industrial router** that supports wide LTE band coverage, provides secure and stable connectivity, withstands harsh environmental conditions, and enables centralized, scalable fleet management.



ICR-2545



WebAccess/DMP

System Requirements

The customer needed a compact global industrial router with remote access solution that could provide:

- Stable LTE Cat.4 connectivity across a broad set of global frequency bands for global deployment
- Carrier compatibility for international deployments, including North American operators such as Verizon and AT&T
- Dual SIM redundancy with automatic failover
- Low power consumption suitable for generator environments
- Secure remote access to generator controllers
- Remote configuration, diagnostics, and firmware management
- Local event logic for handling alarms and automation
- Rugged hardware rated for -40 to $+75$ °C
- Digital I/O suitable for alarms, run/stop signals, and vibration-threshold events from external sensors
- Seamless centralized device provisioning and monitoring tool
- Consistent operation across a fleet deployed in multiple regions and climates
- Optional Wi-Fi or GNSS support when specific deployment scenarios require it

The solution needed to scale efficiently from tens to hundreds of generators worldwide.

System Description

To achieve these goals, the customer implemented The Advantech **ICR-2545** delivered the required functionality, offering a globally compatible LTE router with robust industrial features:

- **Global LTE Cat.4 modem** (150/50 Mbps) with 3G/2G fallback supporting numerous worldwide LTE bands, enabling deployment across international regions
- **Certified compatibility** with major U.S. carriers such as Verizon and AT&T
- **Dual SIM slots** providing operator redundancy and improved resilience in areas with uneven coverage
- **4× Ethernet 10/100 Mbps ports** for generator controllers, ATS modules, and external vibration monitoring hardware
- **1× Digital Input and 1× Digital Output**, usable for status alarms, external relay triggering, or vibration-threshold event signals
- **Open Linux platform** supporting custom applications in Python, C/C++, and Router Apps
- **Advanced VPN tunneling options** enabling secure global remote access
- **Automatic watchdog, connectivity monitoring, and failover reconnection** to maintain stable operation in demanding environments
- **Optional Wi-Fi** for local wireless access, useful during commissioning or maintenance
- **Optional GNSS receiver**, useful when generators are mobile or require precise positional data

Inside each generator, the **ICR-2545** served as the primary communication gateway, linking internal control systems, customer-specific PLCs and any external diagnostic modules to the supervisory environment.

A key component of the deployment was

WebAccess/DMP, used for:

- VPN remote access
- centralized provisioning of globally distributed routers,
- monitoring device status and connectivity health,
- remote troubleshooting,
- bulk firmware delivery to maintain configuration consistency across worldwide deployments.

Project Implementation

Pilot installations

Initial deployments in Europe and North America demonstrated the stability of the router's global LTE connectivity under varying operator coverage. Dual SIM failover minimized downtime and ensured continuous remote access.

Integration with supervisory systems

Through **WebAccess/DMP**, the customer unified connectivity monitoring, configuration management, and diagnostic access.

Secure remote service access

Using **WebAccess/DMPs WireGuard**, technicians accessed generator controllers and connected vibration-monitoring modules securely from anywhere, significantly reducing the number of on-site interventions.

Event logic and automation

- The router's event engine enabled lightweight automation, including:
- SNMP traps for critical alarms
- remote reset workflows implemented via the DO output (using an external relay interface)

Global rollout

After proving the stability of global LTE operation and the efficiency of centralized **WebAccess/DMP** management platform, the solution was deployed across hundreds of generator units in Asia, Europe, and North America.

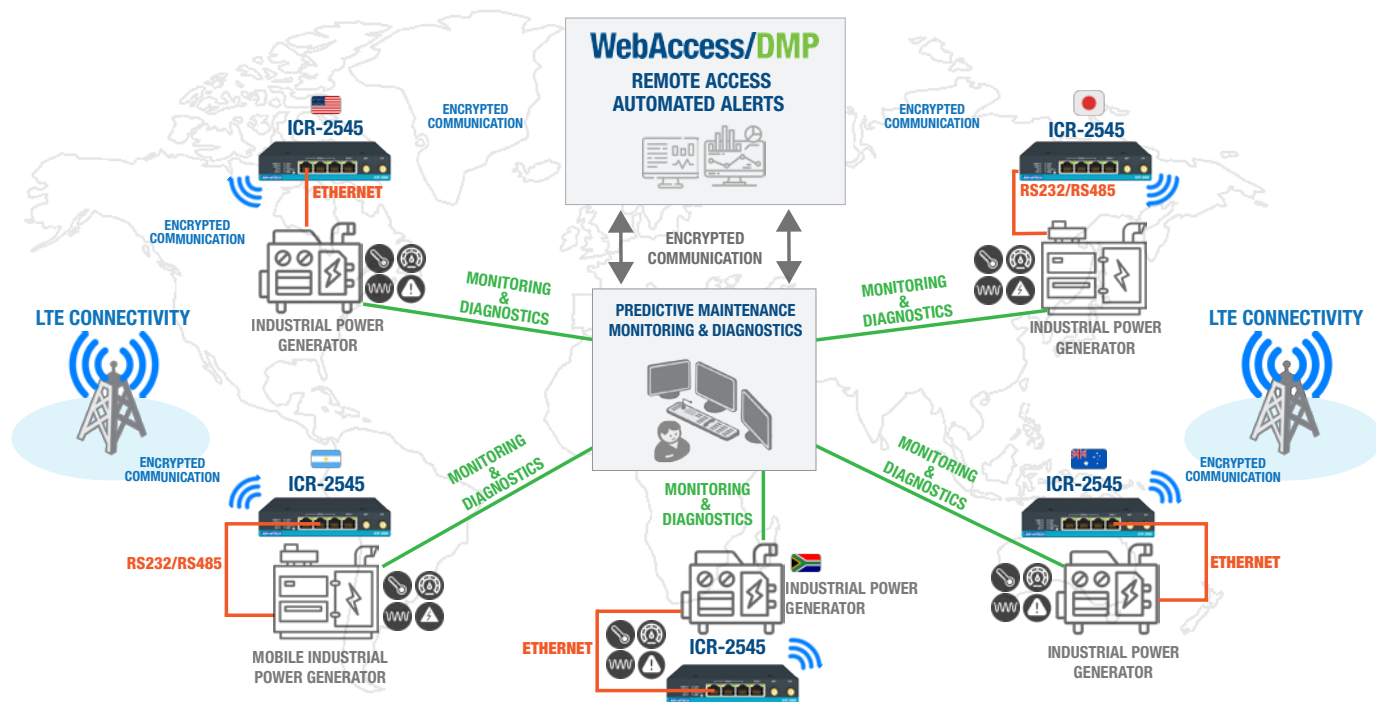
ICR-2545 features:

- LTE Cat.4 with 3G/2G fallback
- 2× SIM slots for redundancy
- 4× Ethernet ports
- 1× DI, 1× DO
- Wide operating temperature range
- USB Host 3.0



- Wall and DIN rail mounting options
- Linux-based OS with software customization options
- Carriers support: Verizon, AT&T
- Optional WiFi 802.11
- Optional GNSS receiver

System Diagram



Conclusion

With the Advantech **ICR-2545** and **WebAccess/DMP**, the customer unified connectivity and remote management across a global fleet of industrial power generators. The combination of global LTE support, rugged hardware, strong security features, and centralized fleet management through **WebAccess/DMP** provided a resilient communication backbone that:

- reduced service and maintenance costs,
- improved diagnostic accuracy and response speed,
- supported predictive maintenance through integration of external vibration-monitoring systems,
- increased generator availability across all regions.



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