

Solution Brief

2G and PSTN Replacement for Remote Monitoring

Keep critical remote assets connected after 2G and copper services are decommissioned.

Many remote monitoring solutions for mission-critical infrastructure rely on 2G modems connected to a remote terminal unit (RTU) or controller through a simple RS-232 serial cable. When a mobile operator retires 2G circuit-switched data, or a copper public switched telephone network (PSTN) service is decommissioned, the devices that relied on it can lose their connectivity overnight.

RAD SecFlow-1p emulates these legacy interfaces and carries their traffic over cellular (LTE/5G) or wired (IP/Ethernet/MPLS) networks, leaving the field equipment and the application behind it untouched.

The Challenge

- Generic LTE modems are not drop-in replacements. Legacy applications expect the exact AT-command behavior of the original modem.
- Replacing field equipment at scale is costly and disruptive.

Many organizations run telemetry and monitoring systems that were designed around a specific modem and dial-up-style communication. These systems may have operated reliably for years. Even small differences in how a replacement responds to AT commands can break the link. Re-engineering or replacing thousands of dispersed field devices is rarely practical, especially when the service is decommissioned with little warning.

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The Solution

The RAD SecFlow-1p IoT gateway is an edge device with LTE/5G and wired network connectivity, two RS-232 serial ports and container support. It hosts a software application that emulates the original modem. The legacy device connects over serial as before, and its SMS and data calls travel over the network as IP traffic. The same approach applies to PSTN dial-up modems, so devices that once dialed over copper lines keep working without changes.

Over cellular networks, the SecFlow-1p maintains a permanent IP connection. A container on the device takes control of one serial port and runs an application that behaves like the original modem, handling SMS and data calls but not voice. The emulated modem is defined by a profile, built from the original modem's documented AT-command set and expected responses, so the connected device sees the behavior it was designed for. The second serial port of the SecFlow-1p remains available for local management.



SecFlow-1p



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How It Works

Step	Description
1. Connect	The legacy device attaches to the SecFlow-1p RS-232 serial port, as it did to the old modem.
2. Emulate	The SecFlow-1p runs a modem-emulation application, configured with a profile that mirrors the original modem's AT commands and responses.
3. Resolve	A central registration point maps each legacy phone number to an IP address, replacing the old numbering plan.
4. Transport	SMS and data calls are carried as packet-based traffic to the central site. On cellular networks, a private access point name (APN) can be used.

Traffic models are flexible. A deployment can use SMS only, data calls only, or a combination of both, in either direction. Because each emulated modem registers its number with the central registration point, the network behaves like the original numbered network, while the traffic itself is carried as encrypted IP data. At the central site, the customer can choose between a pool of dedicated SecFlow-1p units, as in the case study below, or a set of virtual modems hosted on a single platform.

Case Study: Remote Monitoring of 1,000+ Generators for a Critical Emergency Communications Network

Scale: SecFlow-1p IoT gateways are deployed at more than 1,000 generator sites, connecting them to the central monitoring system.

Edge computing: SecFlow-1p features edge computing capabilities for hosting a variety of container-based software functions and applications. In this deployment, each unit hosts the modem-emulation application in a container, so the existing RTUs and the monitoring application operate exactly as before.



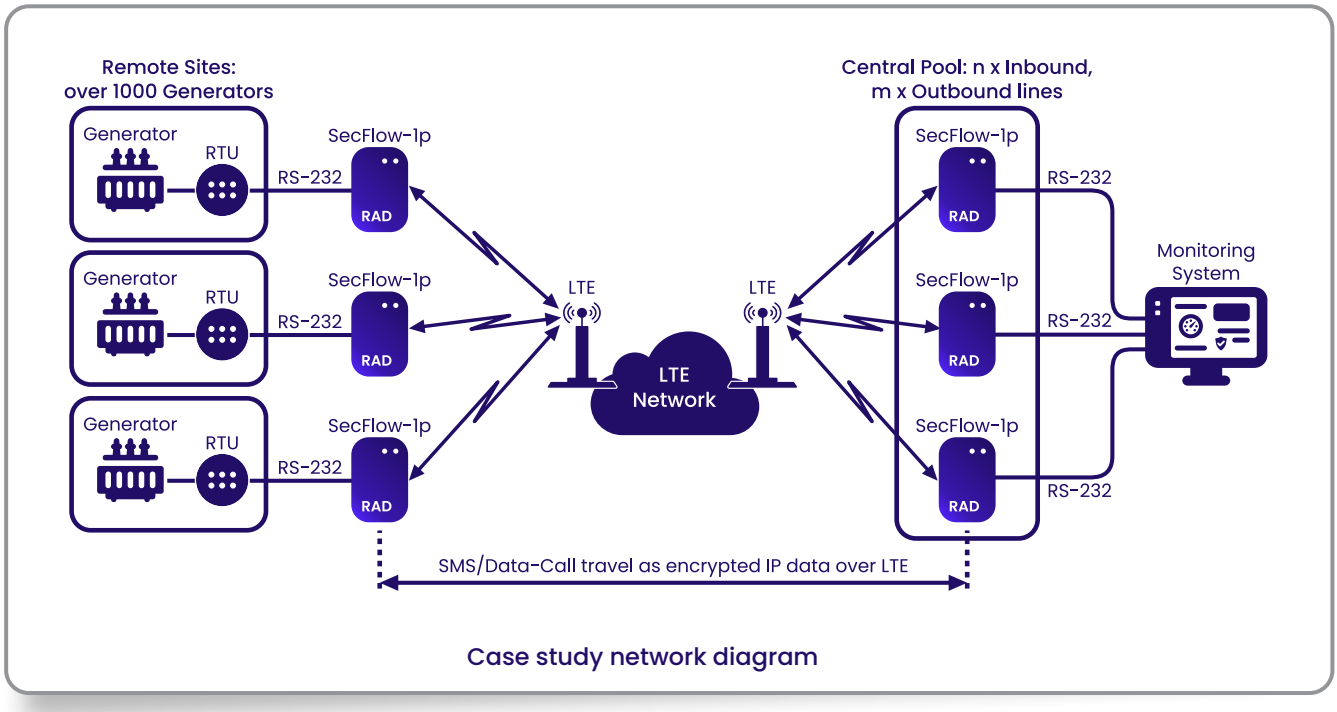
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IoT security: As the point where field equipment meets the network, the SecFlow-1p is built with layered cybersecurity controls:

- Access control, firewall, and certificates
- Minimal privileges for services and applications
- Microservices-based architecture that isolates services, limiting the impact of any compromised component
- No root access
- Data encryption services

Item	Detail
Challenge	When the 2G network was retired, the customer faced losing the ability to monitor its remote generators.
Remote side	RTU connected to a SecFlow-1p over RS-232.
Central side	A pool of identical SecFlow-1p units acting as inbound and outbound modems.
Transport	LTE, selected for its broad coverage, lower cost than 5G, and the very small data volumes involved.
Outcome	The existing RTUs and monitoring application run unchanged across more than 1,000 sites.



Case study network diagram



Each remote RTU connects to a SecFlow-1p over RS-232. SMS flows from the remote units to the central inbound unit, and data calls flow from the central outbound units to individual RTUs.

Case Study Traffic Model

The application uses SMS in one direction and data calls in the other. Each SecFlow-1p presents itself to the RTU as the original modem, so the existing protocols are unchanged.

Flow	Direction	Description
Status and alarm reporting	Remote to central	On startup, the RTU sends a status SMS with its current alarms and sends a further SMS whenever an alarm occurs. A dedicated central SecFlow-1p with a fixed number receives these messages. A server connected to it collects them and passes them to the monitoring applications.
Remote monitoring and control	Central to remote	The central application places a data call to a specific RTU through one of the outbound units. The RTU detects the call and a session opens. The application can then read status and alarms and retrieve or push configuration. When finished, the application closes the call.
Number resolution	Both	Each emulated modem registers its number and IP address with a central registration point. When an SMS or data call is initiated, the number is resolved to an IP address and the traffic is sent to it over LTE.



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Solution Benefits

The solution is designed to minimize change for the people and systems that depend on the connection.

Benefit	Detail
No forklift upgrade	No need to replace existing RTUs and monitoring applications
Compatibility	Legacy devices see the exact AT-command behavior they were designed for
Minimal training	Field teams keep their current workflows
Simple deployment	Units can ship preconfigured, so the customer only enters the phone number
Flexible traffic model	SMS and data calls (voice not supported), in either or both directions
Cost-effective	Uses the most economical connectivity at each site, ideal for low-bandwidth telemetry
Minimal exposure	The unit can operate as a transparent modem replacement, with no management interface exposed if required
Scalable	Capacity at the central site grows by adding identical units, with no change to the design

To learn more about how RAD's solution can help you maintain uninterrupted operation and real-time remote monitoring and control of critical assets, contact us at: market@rad.com

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