

Electrical Substation Perimeter Security

How an investor-owned electric utility protected unmanned substations across an 11-state territory with IRONCLAD fence detection: two zones on one LPU-402 per station, dry contact alarms riding existing SCADA, installed with stations energized throughout.



AERIAL VIEW OF AN UNMANNED TRANSMISSION SUBSTATION. ILLUSTRATIVE IMAGERY; CUSTOMER IDENTITY WITHHELD.

5M+ CUSTOMERS SERVED	11 STATES IN TERRITORY	2 ZONES PER STATION	1 LPU-402 PER STATION	SCADA EXISTING ALARM PATH
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The Challenge

Chronic copper theft at unmanned stations, discovered only when the next crew arrived.

The utility delivers power to more than five million customers across 11 states, through hundreds of substations that are unmanned on a normal day. Thieves cut the fence and strip grounding conductors and control cable, and the damage far exceeds the scrap value: a stripped grounding grid can leave a station unsafe for the next crew.

NERC CIP-014 turned the problem into a mandate: identify critical stations, assess the threats, and put documented detection around them.

WHAT THE FLEET ROLLOUT REQUIRED

- Detection at the fence, not deterrence alone: know at the moment someone is coming through the perimeter.
- A standard package the utility could specify, budget and repeat across an 11-state territory.
- No station outages to install security equipment.

The Solution, IRONCLAD Fence Alarm System

A typical station uses one LPU-402 processor running two zones, each covering up to approximately 1,000 ft (305 m) of fence: the front fence and gate on one zone, the remaining sides on the other. One cable run per fence line covers fences up to 10 ft, with the processor in a NEMA 4X (IP66) enclosure inside the yard.

- **Per-zone sensitivity:** the gate zone that sees legitimate traffic is tuned separately from back fence lines that should see no one.
- **Fence-line work only:** nothing about the installation touches primary equipment.
- **SCADA alarm path:** zone relays land as dry contacts on the station RTU, and alarms ride the existing SCADA channel to the control center.
- **Repeatable install:** a security integrator completes a typical station in a few days, energized throughout.

The Results

Fence alarms now appear where operators already look: the control center.

An attempt on the fence is designed to raise an alarm in the control center at the moment it happens, instead of being discovered by the next crew visit.

- Operators can dispatch security or law enforcement while an intruder is still at the fence, with the zone contact naming the fence line.
 - RBtec has not published measured before and after theft or alarm counts for this utility.
- Each alarm is a timestamped event in the utility's own systems, the kind of documented detection capability CIP-014 security plans are built around.
 - Fleet estimating is close to linear: one package per station, plus cable to match the fence.

"Substations are the clearest case for keeping the alarm path simple. The station already reports to the control center over SCADA, so we hand the processor's output to the RTU as a dry contact and the utility's own infrastructure carries it from there. There is nothing new to maintain between the fence and the operator."

RBtec engineering team

IRONCLAD at a Glance

System	IRONCLAD Fence Alarm System
Sites	Unmanned transmission and distribution substations
Typical site	One LPU-402 processor, two zones
Zone length	Up to approximately 1,000 ft (305 m) per zone
Enclosure	NEMA 4X, IP66
Integration	Dry contacts to the station RTU, alarms carried over existing SCADA
Installation	Security integrator, a few days per site, station in service throughout
Warranty	2 years



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