

Lesson Learned

Loss of EMS Due to RTU LAN and UPS Failure

Primary Interest Groups

Balancing Authorities (BAs)
Reliability Coordinators (RCs)
Transmission Operators (TOPs)

Problem Statement

A temporary rack-mounted uninterruptible power supply (UPS) failed, resulting in the loss of the remote terminal unit (RTU) local area network (LAN), the loss of system visibility, and the failure of the inter-control center communications protocol (ICCP) link for 50 minutes.

Details

The entity went through a supervisory control and data acquisition (SCADA) and energy management system (EMS) hardware replacement a few years prior and needed to run two simultaneous SCADA/EMS systems during the transition. Since the system UPS was not large enough to handle the hardware associated with two complete SCADA/EMS systems, a rack-mounted UPS had been installed as a temporary solution. When the hardware replacement was complete, the entity decided not to restore the system to its original configuration by removing the temporary UPS, instead deciding to leave it in and use it as an additional layer of backup power.

The rack-mounted UPS failed due to end of life of the battery pack. This specific make/model did not have an internal bypass to allow it to fail over to house power upon any loss of UPS capability. The vendor's technical support indicated only specific models have the internal bypass feature. Therefore, the RTU LAN lost power and failed to communicate.

Due to ambient noise and the unmanned nature of the computer room, it is not known if the UPS attempted to warn of impending battery failure. A contributing factor to the duration of the outage was that the RTU LAN communications network at the backup site was in "listen-only mode," which is an abnormal SCADA/EMS system setup configuration that made the replacement more difficult. The front-end processor (FEP) for the RTU LAN at the backup site was switched to the replacement system, eliminating the ability to fail over EMS capability to the backup site during primary site restoration efforts.

At the time this event took place, the entity was in transition to a new SCADA/EMS system, including hardware and software, and the system UPS had already been upgraded. The new UPS was capable of handling all needed devices, so rack-mounted UPSs were not needed.

Corrective Actions

- The RTU LAN routers were plugged into another UPS and rebooted, restoring EMS visibility and ICCP link connectivity.
- The FEP at the remote site was reconfigured to allow sending data to both the replacement SCADA/EMS and the old SCADA/EMS systems simultaneously by using additional IP addresses.
- The primary and backup routers at the primary site were plugged into alternate UPSs.
- The temporary rack-mounted UPS will be removed upon cutover to the replacement SCADA/EMS system

Lessons Learned

- UPS systems should be checked to verify they have an internal bypass so that power is not interrupted in the event of UPS failure. This may require review of the technical specification or consultation with the manufacturer.
- Where a UPS does not have internal bypass capabilities, investigate the use of a stand-alone automatic transfer switch (ATS).
- Periodic maintenance and monitoring on any UPS system is beneficial. While some UPS systems perform battery maintenance/cycling internally, additional checks and testing may be needed to verify existing bypass capabilities, current loading, and other desired functionality.

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