

Telecommunication for Distributed Generation & Micro Grids

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The Problem for Many Utilities...

- Utilities often start by considering **Evolutionary Solutions** for...
 - Metering
 - SCADA
 - Protection

Often applications also reflect “silos” within the utility organization.
- But Micro Grids and Distributed Generation represent **Revolutionary Changes** to “the grid” and the industry itself.
- Take time to look closely at where you want to go.
- Failing to plan is like planning to fail!



New Challenges—New Solutions?

- Using “legacy” solutions for communications can mean:
 - A variety of solutions, some using potentially dated technology.
 - More effort to commission, troubleshoot, operate, and maintain.
 - Artificial “silos” based on traditional utility solution topologies may not be the best fit for emerging utility solution topologies.
- Do legacy solutions have advantages? Sometime yes...
 - Already understood and proven.
 - Processes and Systems may already be in place.
- It is not that legacy telecom solutions have no role, but rather that a careful evaluation and a conscious decision are needed
 - Pick what is best, not what is easiest or what has always been used.

Examples of Applications

- Metering Data
 - Hourly kW Hour Accounting
 - Monthly Revenue Metering
- Analog Data & Status
 - Required by SCADA
 - Sources may include RTUs, meters, or relays.
- Protection
 - Shunt Trip Operation or Transfer Trip
 - Recloser Status/Control

Applications & Requirements

Metering Data

- Hourly metering data is required for sites 800 kVA and above in size. Current flow is often required every four hours and is not a mandatory option.
- Hourly information is required by IEC61850.
- This metering data is obtained from a RTU or meter by the SCADA system. For sites with a 600-800 volt RTU this is done through the RTU otherwise the meter is polled directly.
- The electrical meter supports DNP3 communications. Status items include current, etc. occur on an hourly poll cycle every five (5) seconds.
- Revenue metering data is currently gathered manually and processed through the MVX system.

Applications & Requirements

Analog Data & Status

- Required by SCADA.
- The 800V mini RTU will be used at a maximum connected sites larger than 800 kVA.
 - Current data is obtained from the RTU or meter.
 - Approximately 20 data points are gathered every 5 seconds.
 - The mini RTU can provide shunt trip operation where needed.
- At primary connected Level 3 sites the RTU or meter is polled directly to the SCADA system.

Applications & Requirements

Breaker Shunt Trip Operation

- Required by IFL on 11kV Level 2 sites 1.5 to 2.0 MW DO sites. These sites are already connected.
- An 800V mini RTU is used to provide shunt trip operation for secondary (480V) breakers.
- Some designs the 800V site provides information from the 480V side including energy, terminal voltage, and current data.

Applications & Requirements

Transfer Trip

- Required by IFL on 11kV Level 3 10 to 15 MW DO sites.
- IEEE 1547 requires detection and elimination of unintentional islanding within two seconds. When minimum conditions for a local DO is satisfied by D to D, transfer trip is needed to meet this requirement.
- Typically implemented through coordination of reclose control with the substation feeder protection. Feeder relay settings are changed to remove instantaneous trip and provide a 3 second delay.

Applications & Requirements

Recloser Control

- Required for Level 3 sites. These sites are primary connected.
- DO site owner provides, installs, owns, and maintains the reclosers installed at their site.
- In addition to being used for Transfer Trip coordination, reclosers are used for remote open / close out to longer operate as conventional reclosers.
- Equipment has DO (reclose) capability as IEC 61850 control.
- IFL standard for reclose communications is the GOV 900 line mesh network.

With Distributed Generation, the details of the requirements typically vary by the size of the installation.

Telecom Solutions Overview

- **Fiber Optics**
 - Can have a higher capital cost initially, but typically has reasonably O&M costs.
 - Often already in use by most utilities.
 - Tremendous bandwidth enables additional applications such as video surveillance.
- **Carrier Wireless (Cellular)**
 - Easy to install and low cost.
 - Coverage can be an issue for remote sites.
 - Problems can be difficult to get resolved because much of the infrastructure is outside the utility's span of control.
 - But wireless carriers are focusing more on M2M communications which has helped.
 - Solution cannot always handle the stringent requirement of protection applications.
- **Carrier "Wired"**
 - Many copper based solutions are being retired by carriers resulting in short (3 to 5 years at most) technology refresh cycles for some utilities.
 - Financial analysis during recent work with several different utilities has shown this option can be one of the more expensive ones.
 - Solutions cannot always handle the stringent requirements of protection applications.
- **Private Wireless**
 - Price points have plummeted while ease of installation and reliability have improved.
 - Recent work with several different utilities has shown that finding a solution that reasonably fits a number of applications (instead of single-purpose wireless solutions) can be attractive solution.
 - Some solutions (including "high site" solutions such as Point-to-Multipoint) can have lead times and initial investments that require careful consideration and planning.

As with many things, telecom solutions are not "one size fits all" ...

Summary

- Don't let momentum or “business as usual” get in the way of finding the best telecom solution.
- Choosing to not make a decision is actually a decision itself.
- Look holistically—at Micro Grid and Distributed Generation applications as well as other applications across the business where synergies may exist.
- And, again, failing to plan is like planning to fail.

