

M-7651A D-PAC Protection, Automation and Control System for Power Distribution Applications

Additional Unique Features beyond Protection

Communications

- **Multiple concurrent sessions (up to 8)** -- SCADA, engineering access, VVO and IT administrators can access M-7651A simultaneously with only one physical Ethernet port. Each of the sessions can have either MODBUS (up to 4 sessions), DNP (up to 4 sessions) or IEC 61850 (up to 4 sessions) protocols simultaneously.
- **Secure Digital (SD) card interface** – Very powerful user interface which reduces maintenance time and minimizes operator errors by allowing updates of setpoints, DNP maps, firmware with very few front panel key strokes. Role based authentication is used for passwords with IEEE 1686 (see below) and these are applicable to SD card interface also making it secure.

Advanced Cybersecurity features implemented at the IED

- **Supports complex passwords to comply with IEEE 1686 standard** – Supports user ID/complex password generation with upper case/lower case, numbers and special characters to make it very hard for hackers to break into the control.
- **Supports Role Based Authentication at the device level** -- Access is controlled on a need to know basis. Only authorized services of a given user are allowed.
- **Supports centralized password management using RADIUS** – Eliminates the need for managing passwords at thousands of devices by incorporating the password management at a central location on a server.
- **Manage Authentication, Authorization and Accounting of services using RADIUS** – Provides authentication of user credentials, authorize the user for the allowed services and accounting of user activities.
- **Supports IPsec VPN** -- Public/private keys using IKE V2 (with Diffie-Hellman Key Exchange), several encryption algorithms (Triple DES, AES) for encrypting the data and keys to keep the user data confidential when routed through public networks.
- **Supports Certificates for Authentication** -- Each tunnel must have a Remote Public certificate, Local public certificate and a Local private certificate. The Remote Public certificate is used for the outbound authentication when the tunnel

is being established. The Local Public certificate and the Local private certificate is used for the inbound authentication when the tunnel is being established.

- **Intrusion Detection through a micro switch mounted on the cabinet door** – Allows immediate reporting to SCADA by DNP report by exception for any physical intrusion in to the cabinet by hackers.

Data Recording and PQ monitoring

- **Records IEEE 446 ITIC (CBEMA) curve violations** -- Created to specify computer or industrial power supply operation during input power sags or swells. This feature can help utilities in keeping power quality metrics by recording power interruptions.
- **Oscillographic Recording** - selectable 16, 32, 64 and 128 samples per cycle. Total of 100 oscillographs with 8 sec each (at 128 samples/cycle) giving a total of 800 sec of high resolution fault records. Replacing expensive digital fault recorders for many applications.
- **Sequence of Events Recorder (SOE)** – 3,500 events. Each event log holds several operating parameters with time stamp; voltage, current, real power, reactive power, frequency. It also records voltage and current harmonic spectrum. Can help diagnose fault analysis, settings coordination issues, harmonic issues related to system events etc.
- **Harmonic Analysis** -- 128 samples per cycle, reporting even and odd harmonics up to the 63rd of both voltage and current signals, as well as THD and TDD. Graphical User Interface (GUI) displays the harmonic spectrum in virtual real-time, acts like a spectrum analyzer. Alarm levels of any one or more of the harmonics can be used to trigger Alarms, Oscillography, and SOE. Harmonic analysis assists in locating harmonics due to PWM drives; helps with mitigation measures to determine corrective filter design and location.
- **Data logging** – Records all the measured analog values and binary inputs and outputs along with function status information for more than two years with 5 min intervals. Analog values include min, Max and average values of 3-phase voltages and currents. Records are downloaded in COMTRADE format and in CSV. Download can be selective with a selected duration and parameters to minimize down load time. This feature which is generally available in RTUs and SCADA systems eliminates continuous polling of data by SCADA systems freeing up clogged airwaves and enhancing communications throughput for high priority protection and control functions.