

NEED/OPPORTUNITY STATEMENT (NOS)



Fault Data Interrogation System

NOS- 000000001402 revision 1.0

Ellipse project description:

TRIM file: [TRIM No]

Project reason: Fault Data Interrogation System

Project category: Prescribed - NCIPAP

Approvals

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Date submitted for approval	6 July 2016	

1. Background

TransGrid's network comprises approximately 100 substations and nearly 13000km of transmission lines and cables, the workforce to maintain these assets are concentrated in a small number of depots. If a fault occurs on the network, the cause of the fault and subsequent return to service is not always apparent until a staff member has been called to site and the relay interrogated locally. The cost and time to respond to a loss of supply directly impacts on both the cost of supply to the end consumer and the reliability of the services provided.

The protection systems installed within TransGrid's network are currently comprised of electromechanical, solid state, and microprocessor based protection relays. As the infrastructure ages and relays are identified for replacement, the network will in future be comprised of mainly microprocessor based units as outlined in *Substation Automation Systems – Renewal, Maintenance and Disposal Strategy and Objectives*.

Microprocessor relays have the capability to store and export fault data that is associated with the particular unit. Different relay manufacturers use proprietary communications and software which make remote interrogation of the data difficult to accomplish with TransGrid's currently available systems.

TransGrid's current methodology for the extraction of fault data from protection relays involves sending a technician to the sites affected to extract the data through a direct physical connection to the relay. This approach to fault data extraction is cumbersome and expensive. Often the relays use communication ports that are increasingly difficult to find in modern laptops (in particular RS-232) and often the proprietary software requires obsolete operating systems (Windows 2000/XP).

The current practice used by TransGrid in accessing fault data from field devices is an inefficient method as it does not utilise the capabilities of a growing percentage of the protection relay population. This practice also presents resourcing issues with staff as a fault data extraction incident may require the removal of staff from active projects to carry out data retrieval.

TransGrid has purchased a number of licences to install the Tarigma GEM software under the previous NCIPAP scheme (Ref. NS-0700 Rev 0 – IED Fault Data Interrogation System). This has been completed at 11 sites and currently 176 relays are able to be remotely interrogated and provide a range of data about a fault such as fault type, faulted phase, flagging details, distance to fault, and fault waveforms are able to be remotely accessed.

Because of the remote nature of some sites and because of the unavailability of staff, a number of FEORs are left with no flag and fault clearance time details. In this instance no review can be carried out of the correct operation of the protection systems and whether TransGrid meets NER requirements for fault clearance times. It is also noted that modern protection systems only show flagging for the most recent fault. Therefore if subsequent faults occur only the latest flagging is available.

Unlike flags, events are available for an extended period until they are also overwritten. This is advantageous when multiple faults are recorded, but only if Protection staff are retrieving the details.

Installing Tarigma GEM would resolve all the above issues.

The costs associated with collecting flags, events and fault traces would be eliminated. Remote locations would no longer be an issue as no travelling will be required. Flags, events and fault traces could be retrieved as soon as available and if there is a quick succession of faults on the same equipment, flags, events and fault traces would not be lost because they will be stored in the Tarigma Gem server.

2. Need/opportunity

The protection of the transmission network will remain necessary within TransGrid's network into the foreseeable future as a requirement under S5.1.9 of the *National Electricity Rules* (NER).

The analysis of fault data is a critical component in maintaining a reliable and efficient transmission network as outlined in the NER. There is a need for TransGrid to operate the collection of Fault Data in an efficient and decentralised manner. This need extends to the development of standardised designs for the implementation of fault interrogation system into all future projects.

There is an opportunity to extend the remote interrogation of protection relays to more sites to more accurately determine the cause of a fault, and where TWFL relays are not available, give an indication of the distance to fault and be able to dispatch the appropriate resources with the appropriate equipment, materials and spares to rectify the fault.

It is proposed to extend the rollout of the Tarigma GEM software to the remainder of TransGrid's sites. This will necessitate the purchasing licences, installing Substation Maintenance PCs at a small number of sites that don't have a PC, downloading the Software to these PC's and establishing links to all available protection relays.

3. Related needs/opportunities

NS-0700 Rev 0 – IED Fault Data Interrogation System

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

Attachment 1 Risk costs summary

Estimated Cost savings to collect Protection Details

There are approximately 560 FEORs per year (based on data Jan to Dec 2015). Each FEOR could have relays at multiple sites and because multiple relays can be collected at the same time this is assumed to be equivalent to 560 site visits. If approximately 50% of relays (from interrogable relay list) are able to be remotely interrogated, this would be 280 site visits that could be avoided if Tarigma GEM was fully implemented.

Based on 4 hours to travel to site including setup, connecting and retrieveing flags, events and fault traces, the total annual avoided cost is:

Estimated 280 avoided site visits per year x \$175 for a junior Protection staff member (prescribed burdening) = \$49,000 per year.