

APPLICATION AND MIGRATION OF COMMUNICATION PROTOCOL FROM GI74 TO IEC60870-5-101 BETWEEN SUBSTATION CONTROL SYSTEMS (SCS) AND THE INTEGRATED ENERGY MANAGEMENT SYSTEM (IEMS)

This document is for internal and contract specific use only.

Disclaimer

NGG and NGET or their agents, servants or contractors do not accept any liability for any losses arising under or in connection with this information. This limit on liability applies to all and any claims in contract, tort (including negligence), misrepresentation (excluding fraudulent misrepresentation), breach of statutory duty or otherwise. This limit on liability does not exclude or restrict liability where prohibited by the law nor does it supersede the express terms of any related agreements."

PURPOSE AND SCOPE

This document details National Grid's policy for the application and migration of communication protocols between substation control systems at National Grids' High voltage substations and the iEMS (integrated Energy Management System) at the National Control Centres (ENCC and TNCC).

This policy:

- Identifies the issues with existing protocols (GI74) and identifies the benefits in utilising a modern international standard based protocol (IEC 60870-5-101).
- Defines the strategy to migrate from the existing to the new protocol (and consequent timescale).
- Outlines the policy to be applied regarding event information, consolidation and presentation.

PART 1 – POLICY

1 GENERAL

The communications protocol used by current systems for real time data exchange between substations and control centres (traditionally described as a Supervisory, Control and Data Acquisition (SCADA) protocol) has until 2012 been a bespoke internally developed protocol GI74 (General Indications 1974).

While GI74 has provided reliable communication for a significant number of years it has been identified that there are benefits in using an internationally based, modern, industry standard protocol with increased functional and performance capability and capacity.

Implementation of IEC 60870-5-101 has been successfully trialled and migration to this communication protocol will be undertaken following the required improvements to the iEMS at the most cost effective times, largely when the opportunities associated with other planned work occur (i.e. new build or replacement).

Independent migration of specific sites shall only be implemented where specific business need dictates.

2 BENEFITS OF MIGRATION

The immediate benefits identified to migrate to the new protocol include:

- Removal of obsolescence issues

- Providing clarity with suppliers regarding the use of GI74 / increasing future sustainability
- Enabling communication with a greater diversity of equipment / stations over a wider range of communications media
- Provision of “raw” (at source) time stamped data to control centres
- Enabling data grouping once at control centres (rather than at each control system)
- Potentially lower equipment and communication infrastructure costs in the longer term due to simplified system configuration and maintenance.

The future benefits centre around the ability to develop other applications such as:

- The ability to up/download files, such as Data Base configuration or Fault Records.
- A simple process of migration to a network protocol (IEC 61850, 60870-5-104 etc.), saving communications infrastructure costs.
- Development of smart applications to support operator decisions and creating the potential for the development of other advanced functions in the future for enhanced end user decision support applications and for the collection of additional data, providing information advantageous for Asset Management activities.

3 APPLICATION PRINCIPLES

Where IEC60870-5-101 protocol is deployed for the communication between SCSs and IEMS, consistent information shall be provided at all control points from substation control systems. A hierarchical approach shall be used to ensure that information presented is clear and understandable (originating substation/voltage, plant item, alarm description, status).

Migration to IEC 60870-5-101 provides the ability to supply all raw alarms to the iEMS (ungrouped). While this “raw alarm” data is useful to response staff in determining the root cause of an event, the ability of the control staff to assess and determine the correct response to each situation shall not be compromised by unnecessarily increasing the volume of data provided.

Alarms shall be managed and grouped as defined within TP 127 Lifetime Management of Substation Control Systems.

The grouping of alarms presents a need to identify if another alarm in the same group occurs and requires resolution. This functionality is provided in the SCS with GI74, however it will be provided in future as part of the iEMS using IEC60870-5-101.

Interrogation of specific alarm indications within a group can also be undertaken by access to the specific control system locally or by independent Remote Access systems. While possible and practical, the IEC 60870-5-101 shall be configured with consideration of IEC61850 data models to ensure the compatibility in the future with Common Information models (CIM).

4 IMPLEMENTATION

Implementation of IEC 60870-5-101 is dependent on the ability of the iEMS to accept, and group all raw alarms together with “reflash” functionality for the grouped alarms.