Northern Ireland Water Telemetry Outstation Project

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Agenda

• Background
• Project Team & Plan
• WITS Outstations Installation
• Issues
• Next Steps
• Benefits
• Q&A?
Background

• NI Water use Schneider Electric’s ClearSCADA Telemetry system to monitor approximately 4,500 assets.
• Of these 4,500 assets, approximately 2,500 are Serck Telemetry Outstations communicating via radio, GSM or PSTN.
• Of the 2,500 outstations, approximately 900 are aged / obsolete and need to be replaced.
• NI Water decided to pursue adopting the Water Industry Telemetry Standard (WITS) DNP3 Telemetry protocol.
• NI Water began WITS Outstation Tests May 2013 focusing on radio.
• The outstation tests provided NI Water with assurance in adopting WITS DNP3.
Background

• NI Water launched tender December 2013 for supply and installation of WITS DNP3 Telemetry Outstations.
• Following tender process contract Lots awarded Nov 2014 (5 to 7 Years):
  • Outstation Supply – Schneider Electric Ltd
  • Outstation Installation – EMR
  • Outstation Spares – Schneider Electric Ltd
• Project to replace 900 obsolete / aged Telemetry outstations
• 2 Year Project outstation replacement from Feb 2015
• Capital Budget £4.24M
Telemetry Outstation Talus T4e

- Telemetry outstation – Schneider Electric’s Talus T4e
- WITS DNP3 Protocol (Water Industry Telemetry Standard)
Telemetry Outstation Project Team

- Project Board
- Project Manager
- Project Coordinator
- Telemetry Configuration Technicians (3 off)
- Schneider Electric – Outstation Supplier
- EMR – Outstation Installer
Telemetry Outstation Project Plan

- Replace 900 aged / obsolete Telemetry Outstations over a 2 year period beginning Feb 2015
- Replacing all Serck 2000M, PS1, PS5, PS21, PIMs
- Replacing some PX24s – Sites TBC
- All radio scanners dual protocol, dual baud rate i.e. Proteus 2400 baud and WITS DNP3 9600 baud
- Replace 1 outstation on every scanner
- Replace aged outstations on all scanners – Rotating schedule through each area
- CLEARSCADA V6.74
- WITS DNP3 VERSION 1.2
- RADIO SERIAL CONNECTIVITY
- APRISA SR DIGITAL RADIOS
- WITS OUTSTATION 9600 BAUD
- PROTEUS OUTSTATION 2400 BAUD
- SHARED RADIO CHANNEL
Configuration

• Use existing panel if possible
• Using Aprisa SR Digital Radios
• Shared Radio Channel – WITS 9600, Proteus 2400
• Polled Mode i.e. not Unsolicited
• Integrity Polling 5 Mins
• Logged Data 15 Mins
• Security currently not enabled
Installation

• T4e outstations at small assets - Wastewater Pumping Stations and Leakage Monitoring Stations

• 1st scanner 10 WITS T4e outstations at 9600 baud and 58 Serck Proteus outstations at 2400 baud

• End April - 34 T4e outstations installed across 8 radio scanners

• End May – 80 T4e outstations installed across 16 radio scanners
Download Performance Test

- Scanner with 58 Serck Proteus outstations and 10 T4e WITS DNP3 outstations
- For 1 T4e outstation - WWPS
- Bulk Configuration File 4602 Bytes
- Proteus Scan Time 73 Secs
- Downloading ‘All Configuration’ - Bulk and Incremental Configuration Files – 3 Mins 2 Secs
- Proteus Scan Time increased to 118 Secs and returned to 73 secs
Issues

• Channels shared between proteus and WITS DNP3 can become ‘locked’. Requires manual restart of channel.
• WITS DNP3 does not have a concept of a scan time.
• Intermittently a point will change state from ‘0’ (Normal) to ‘1’ (Alarm State) and back to ‘0’ but will still flag as being in the Alarm State.
Issues

• Import T4e configuration into ClearSCADA, delete 1 point of each type (Binary and Analogue Inputs/Outputs), re-import the configuration that it will successfully import all the deleted points except the Binary Input Points.

• WITS DNP3 does not provide significant change alarming, eventing or logging.

• Noted ‘spike’ in Proteus scan time when upload or download of bulk and incremental files
Next Steps

• Increase roll-out of T4e outstations across all scanners
• 40/50 Outstations per month
• Include larger assets e.g. treatment works
• T4e to PLC Modbus communications
• R&D T4e communicating IP radio – Aprisa SR / SRx radios
• Aprisa SRx Radios 20K
Radio TCP Connectivity

• Using NI Water’s Telemetry Test and Development System
• Bench Test conducted using 3 Talus T4e WITS DNP3 outstations
• Using Aprisa SR Digital Radios
• Aprisa SR radios L2 filtering applied to only permit traffic to / from the Test and Dev Server
• Successfully achieved radio TCP comms
- CLEARSCADA V6.74
- WITS DNP3 VERSION 1.2
- RADIO TCP CONNECTIVITY
- APRISA SR DIGITAL RADIOS
Radio TCP Communications

• Next Steps:
  • Implement the same arrangement on the live system
  • On a new scanner implement radio TCP comms (only 7 outstations)
  • Bench test radio UDP connectivity to the Talus T4e
Benefits

• Helps maintain a robust Telemetry structure for NI Water both for now and the future
• Telemetry Standardisation
• Reduce the different types of outstations to be maintained
• Ensure that NI Water is employing Water Industry Telemetry Standard protocol for Telemetry outstations WITS DNP3
• Enhance Telemetry Communications Infrastructure e.g. backup and fallback communication paths
• Pump run times, start/stop, rate-of-change, chatter etc. algorithms all available and configurable as default
Telemetry Outstation Project

Thank You

Any Questions?

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