

Automation IT implements Network Control System for the new Gold Coast University Hospital



The Gold Coast University Hospital under construction

The new Gold Coast University Hospital (GCUH) is at the forefront of expansion to the Queensland public health service infrastructure, and at one stage held the title of the largest construction project in the country. The hospital is a vital component in Queensland Health's vision to deliver state-of-the-art health facilities and services that cater for the extraordinary population growth in South East Queensland.

The specialist level hospital is equipped with leading edge technology to assist staff to provide the highest level of care and comfort to the patients.

Running 24 hours a day, 365 days a year, it is imperative that it has a reliable power supply, which requires a state-of-the-art Network Control System (NCS) in order to maintain power to the building during a mains power failure. As well as controlling supply during mains failures, it is crucial to operate efficiently and minimize the hospital's carbon footprint.



One of the NCS Master PLC Panels ready for Factory Testing, in excess of 20 of these produced for the project

THE CHALLENGE

Being the largest hospital development ever undertaken in Queensland, this project contained a number of unique challenges.

Given the complex supply network, the main challenge was working out and accounting for each possible utility supply fail and restoration scenario that could happen within the system and ensuring that the NCS would be able to adjust accordingly.

THE SOLUTION

The solution required a redundant GE RX3i PLC solution with a network of distributed, redundant communication adapters at each of the main switchboards. In the result of a network failure, each substation is able to continue processing via a fully redundant communications path. These PLCs are connected over a redundant Ethernet N-Tron N-Ring, which is also connected to two redundant SCADA Servers to allow the operators to monitor and control the entire system.



An overview of the Gold Coast Hospital NCS system diagram

PLC OVERVIEW

The GE RX3i platform used for this system is able to provide discrete, drives, motion, process and fully redundant control together with communication and state-of-the-art I/O in a small and cost-competitive package, making it an ideal choice for this project.

The RX3i PLC was specifically designed for its reliability, high speed and high performance in critical environments.



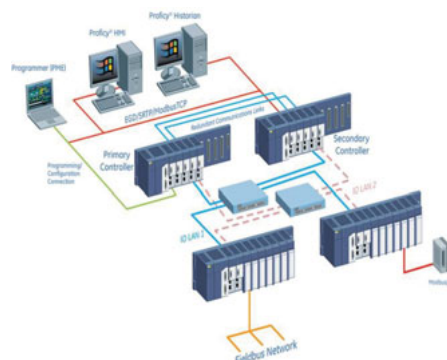
The GE Intelligent Platforms RX3i PLC

The PLCs at GCUH are able to communicate to each other using reflective memory technology at 2.12GBaud. This technology enables the systems to be synchronized at the beginning and end of each logic scan execution to keep all variable data the same providing truly bump less switchover.

In order for the PLCs to be able to communicate to specific HLI devices such as meters and relays, the PLCs used Modbus Master/Slave Communication natively at each remote rack location. This was a major advantage for the RX3i platform as it eliminated the need for any third party communication cards to be installed in the racks. The net result was the most reliable solution possible at an excellent price and a happy customer!



A RX3i Control Memory Exchange module



A Typical redundancy application segment using GE RX3i PLC's

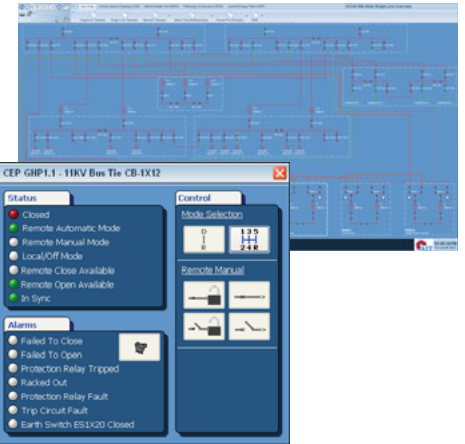
SCADA SYSTEM

The chosen SCADA software for this project was CitectSCADA. Citect is able to provide high graphic process visualisation, superior alarm management and built-in reporting, which were all features that were essential for an NCS system of this size.

The SCADA system is able to monitor and control the redundant PLC's via the Ethernet network. All NCS status information and control functions are able to be accessed using the SCADA system. Similarly, the SCADA servers were configured as a redundant pair so that if one PC fails, the other is able to immediately take over all necessary tasks and maintain control over the system.

For each switchboard the SCADA system is able to provide:

- A graphical single line representation
- Device status (Inc Health, Fault, Open, Closed, Remote, Local, & Trip)
- Bus & Device energisation status
- Incomer voltage & current
- Bus 3-phase voltages
- Substation control voltage and trip circuit supervision health status
- Bus zone trip status
- Circuit Breaker Pop-up Pages, providing the following additional information:
 - Device Status
 - Synchronisation Status
 - CB Control Status
 - Protection Relay Data
 - Metering Relay Data



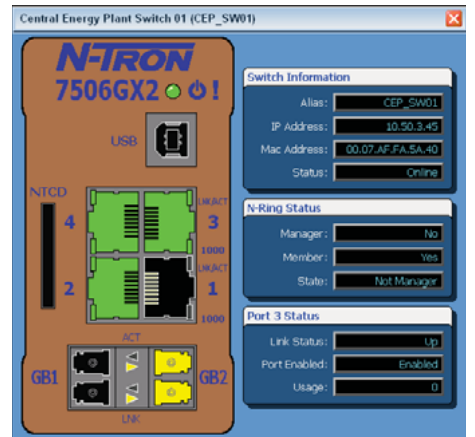
A substation mimic screen and popup

COMMISSIONING

Before the final commissioning could take place, it was important to liaise with several different parties in order to overcome security precautions and scheduling issues. Scheduling was critical to ensure that commissioning of the existing switchboards and functional testing across the whole control network would not cause any power outages.

The commissioning process involved testing of all of the field and switchboard PLC IO, as well as full operational checks of all circuits and checking the operation of all equipment on the NCS.

In the same way, each utility supply failure scenario was tested to ensure that the system operated correctly at each stage of the load shedding process. Each switchboard was tested to ensure a safe power down and restore sequence once the generators had powered up including the transfer of load back to mains power.



The SCADA view of the Gigabit Network Ring Coupling Switch

DOCUMENTATION

As with all Automation IT projects a fully documented project solution included monthly progress reports throughout, detailed software programming specification, electrical drawing package, full test documentation, safety procedures and operation manuals.

To maintain site design consistency for the future, all PLC and SCADA site standards were met.

CONCLUSION

As Network Control Systems are different for each application and environment, Automation IT was able to make a fully customised NCS solution for the Gold Coast University Hospital that was able to meet each of the specific requirements for the site.

With the use of the NCS, Automation IT was able to ensure the safety of everyone, as well as maintain vital operations at the hospital whenever a mains power failure occurs. Similarly, the NCS was also able to save Queensland Health money almost immediately after the system was brought online by decreasing the potential for human operation errors as well as reducing the overall site energy consumption.

Ask Automation IT to create an NCS Solution for you today!