Advanced Control Systems Upgrade Solutions for Legacy RTUs

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Every substation or SCADA engineer will face the choice of upgrading or replacing a legacy remote terminal unit at one time or another. Let's address some of the many reasons this decision might be necessary:

— Lack of component availability for vendor spare or repair service support

— Lack of ability to interface to Intelligent Electronic Devices (IEDs)

— Poor reliability of legacy remote terminal units (RTUs)

— Master system replacements or upgrades support modern communications and protocols that are not supported in most legacy RTUs

— Legacy protocols have limitations that do not allow you to take advantage of the quantity, resolution, and accuracy of modern data acquisition

— Increased availability of modern communications media that are not supported by most legacy RTUs

— Limited ability of multiple master communication ports and protocols to share data with other utilities

— Inability to segregate data into multiple RTU addresses based on priority

The next step is to determine the technical and financial reasons to upgrade or replace legacy RTUs. An expensive replacement was usually the only option most RTU vendors offered—until now.

Advanced Control Systems has always stressed continual incremental migration of its master and RTU hardware and firmware to minimize the effects of rapid obsolescence prevalent in the microelectronics industry. Although the expected life span of a modern RTU can be more than 20 years, with a support life of at least 10, the practical technological life span is closer to 5 years.

Fifteen years ago, we began an upgrade program to address our MPR-3000 series RTUs, which were built in the 1970s and 1980s. When we introduced the NTU-7500 series RTUs, we expanded the upgrade program to include our MPR-7000 series RTUs, which were built in the 1980s and 1990s. The upgrade program has been very successful, allowing us to upgrade the electronics of literally thousands of Advanced Control Systems legacy RTUs across six generations that date back to 1976.

Technical Considerations

When considering a legacy RTU for upgrade, you need to answer several questions:

1. Are the existing wiring terminations active or inactive assemblies? If they are inactive, the RTU is usually a good upgrade candidate.
2. If the termination assemblies are active, are they considered reliable and/or repairable?
3. Are the existing Control Interposing Relays considered reliable and/or repairable?
4. Is the existing cabinet or rack considered usable with an upgrade?
5. Can the original vendor or Advanced Control Systems provide an upgrade kit for this RTU?

The choice to maintain the original I/O Termination Boards on a legacy RTU depends on whether the present wiring terminations are reliable. This makes up the bulk of the cost savings with an upgrade and should be considered when answering questions 1, 2, and 5.

If you answered negatively to all five questions, your only choice is replacement. However, while a negative answer to one or two of these questions will affect the total financial gains realized with an upgrade, it does not necessarily negate all the advantages. A complete replacement requires more than just budgeting for a new RTU. You must also consider the additional budget needed for project management, substation wiring diagram revisions, field installation, re–testing labor, and possible changes to the existing master databases and displays. With an upgrade, these costs can be greatly reduced, and possibly eliminated.

Upgrade versus Replacement: A Proven Business Case

Once we had successfully upgraded our own RTU designs, we began looking at legacy RTUs from other manufacturers to see where we could repeat these successes. We began with the Landis & Gyr/TeleGyr/Moore Systems RTUs that were formally dropped from support by the original product vendor. These products have a card file design similar to our NTU-7510A. We successfully implemented an L&G/Moore Systems MPS-9000 and MPS-9000S upgrade at a large Midwestern utility, at a tremendous cost saving to the utility versus the projected replacement cost. The utility had previously replaced seven similar L&G legacy RTUs with another vendor's RTUs—a project which took over two years to complete. The Advanced Control Systems upgrade took less than one day per site to implement, and the savings realized versus replacement were in excess of $34,000 each. Compared to costs for the two previous years (during which full replacements were installed), the upgrade strategy resulted in significant overall project savings:

— project cost reduced by 59%

— engineering time reduced by 97%

— total field crew labor reduced by 92%

According to the customer: "Advanced Control Systems delivered on its promise to significantly reduce the installed cost of (our) RTU upgrades. The field installations went faster and more smoothly than we had expected."

This project was such a success that the utility took three RTUs they had previously ordered from another vendor as full replacements and put them into stock as spares. Then they purchased and installed our upgrades at these three substations. In each case, they found the savings in labor and cost to be similar to their first round of upgrades.

Our Upgrade Solution

The key to the vast savings in time and money lies in the Advanced Control Systems upgrade solution, which allows you to leave the local I/O terminations and original field I/O wiring in place. If any of the I/O interfaces are active PCB modules that are unreliable or not adaptable to an NTU-7500 series interface, we can replace the original vendor's I/O terminations with form and fit blank termination boards that have the same terminal block layout. This still results in a significant savings in

installation and test labor (even if the original wiring has to be moved to the replacement termination boards), as well as long–term maintenance cost savings for these sites.

With NTU-7500 series RTUs, you can configure the RTU master communications database, through Virtual RTU addressing, to duplicate the legacy RTU database in its original protocol envelope. This solution lets you:

— Greatly reduce wiring and test labor, and engineering costs associated with RTU replacement

— Eliminate substation wiring drawing revisions

— Eliminate master station database and display revisions

— Eliminate the most failure–prone or unsupported electronics with extremely reliable and fully–supported NTU-7500 series hardware and software

— Reduce the time required to modernize existing installations from weeks to hours

— Obtain many more years of useful life from existing equipment and installations

— Take advantage of the latest RTU technology, such as modern open protocols; high–capacity, high–speed master and slave gateways (serial and/or TCP/IP); modern Windows PC–based configuration and diagnostic tools

— Take advantage of modern communications digital interface mediums

— Segregate vast amounts of data into separate Virtual RTU addresses; supply this data and control capabilities to multiple master stations at no additional cost

— Integrate IEDs inside and outside the existing substations

Note that this list addresses all the issues raised in the introduction. An Advanced Control Systems NTU-7500 series RTU upgrade solves the majority of problems faced by substation engineers responsible for unsupported legacy RTUs that might fail.

Conclusion

Our success with upgrading L&G legacy RTUs led us to explore other upgrade opportunities. We have implemented programs at several utilities, upgrading these RTU models:

— BBC/CSI 7000 series

— L&G/Moore Systems MPS-9000 and MPS-9000S

— L&G TeleGyr 5300, 5500 and 5520

— L&N C200 and C300

— ILEX 8200

— SNW SR-8600, SR-8500/8550 and SR-8000

We can help you with your upgrade decision. Contact an Advanced Control Systems Substation Integration/Automation specialist at 770–446–8854. Describe your specific legacy RTU configuration to the Applications Engineer assigned to assist you, and explain the system requirements that triggered the upgrade consideration. We will help you determine a sensible and economical upgrade/replacement path, and provide you with a quotation. References are available upon request.

Once your upgrade is complete, you'll be fully prepared for the challenges of 21st century data management.

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