By Donald Miccio

Cellular Autodialers

Remote notification technology evolves to remain a crucial industry approach

(((Ring in Alerts)))

Autodialers, one of the earliest and most reliable forms of remote notification in the water/wastewater industry, continue to offer benefits to today's operators of water and wastewater utility systems, especially in budget-constrained rural and smaller communities. Even in larger operations employing SCADA systems, autodialers can provide notifications from areas beyond the networked plant, as well as provide a check on the network itself. As cell phones have become ubiquitous, voice notification of alarm events is now timelier than ever.

ARTICLE SUMMARY

Challenge: Increased reliance on industrial Ethernet and new wireless communication technologies have required autodialers to evolve quite rapidly.

Solution: Rooted in the same technologies common in consumer products, cellular autodialers operate without phone lines and at a lower cost than previous solutions. Some autodialers now incorporate SMS text messaging and Web-based alerts.

Conclusion: New developments have made autodialers an appealing remote notification solution, especially for small and revenue-constrained utilities.

Autodialers Grow Up

Autodialers were introduced in the early 1980s to warn of equipment failures in remote, unattended plants, stations and processes. An autodialer could be placed anywhere the public switched telephone network (PSTN) reached, providing peace of mind to operators.

When equipment malfunctioned or a process or environmental variable deviation occurred, an autodialer would begin placing telephone calls to authorized personnel, reporting the situation via its built-in vocabulary or prerecorded voice messages. Those reached could then acknowledge alarms and perform remote control of pumps and valves by pressing keys on their telephones. This simple concept has proven itself over the past couple of decades by limiting the severity and economic damage caused by failures of unattended equipment in industries ranging from water and wastewater to oil and gas.

As technology matured, autodialers grew in sophistication. Vendors began offering products that included large numbers of inputs and outputs, both digital and analog. Interfaces to computers and fax machines were added. When numeric pagers became common in the 1990s, dialers evolved to incorporate paging alerts. When programmable logic controllers (PLCs) were introduced in process control industries, they offered a low-cost alternative to expensive plant control. Autodialers then began incorporating industrial serial networking protocols such as Modbus in order to report exceptions in PLC control registers. Over the years, autodialers became more like SCADA systems and remote terminal units.

The Rise of Industrial Ethernet

At the same time that autodialers were growing in complexity, larger SCADA systems were moving toward the use of open protocols such as Ethernet. Low-cost, industrial-grade switches and media converters now allow plants in all types of industries to be tied back into an organization's IT infrastructure.

Even legacy systems with serial interfaces—PLCs, for instance—are being migrated to Ethernet through the use of serial device servers. Almost all new industrial equipment incorporates a native 10/100 Base-TX Ethernet port. This rapid proliferation of industrial Ethernet is allowing low-cost, rapid deployment of networked plant assets.

Leveraging Wireless Technologies

Where does this leave autodialers?

Today, by adopting the same wireless technologies now common with consumers, cellular autodialers can operate without the need for phone lines and at lower operating costs than even PSTN-based solutions. Both of these trends enable the use of autodialers in remote locations previously too expensive to monitor, such as bridges, oil wells and where hard-wired networks do not reach.

Even the smallest utility system will include lift stations. In the past, monitoring these meant installing a dedicated phone line to each and paying the ongoing monthly bill of $20 to $40. Today, a system such as Microtel's CellStat cellular dialer can be installed at a lift station without a landline and provide direct voice notifications of a pump failure to city personnel.

Autodialers can enhance Ethernet-based SCADA systems by providing network failure alarms.

By using low-cost prepaid cellular plans, costs are only incurred when cellular minutes are consumed to report alarms. This approach offers a cost-effective remote monitoring solution, even for very small and revenue-constrained communities.

Whereas the common availability of numeric pagers allowed personnel to receive notifications, they still had to find a telephone to call the site to learn the details. Today, the common use of cell phones allows voice alerts to be delivered directly to those responsible for plants and equipment. Cellular dialers such as the CellStat are incorporating e-mail, SMS text message alerts and notifications via newer wireless technologies such as Twitter.

In contrast to cellular voice dialers, which can call a cell phone directly, some vendors have chosen to couple cellular technology with a Web-based approach. These types of systems first transmit alarm messages to central servers, which then relay alerts to personnel. Rather than charging for each alert transmission, most vendors that offer this approach charge a monthly subscription of at least $30 to $40, on par with the operating expense of a PSTN solution.

In all cases, the advancement of low-power microprocessors and electronics has made the use of alternative power sources more feasible. It has become more common today to find solutions offered in a solar-powered package as a standard option.

Adding Value to Industrial Ethernet

Autodialers can add value to newer industrial Ethernet-based SCADA systems by providing alarm notifications when network failures occur. Almost all industrial Ethernet switches, media converters and device servers include a set of fault output contacts. When wired to an autodialer, these cause a critical network failure to be detected and reported by a callout to a network administrator. Not only does this add remote notification capability to simple, unmanaged Ethernet equipment such as copper-to-fiber media converters, it also safeguards more intelligent, managed equipment by answering the question, "Who is watching the network?"

Maintaining Relevance

Autodialers have continuously evolved over the years to remain relevant with the march of technology. The simple value proposition they offer—a direct, spoken alarm report of remote equipment failures—is more valuable than ever before: Almost everyone now carries a cell phone. By eliminating the need for landlines and expensive monthly phone bills, cellular autodialers are particularly cost-effective in today's world of constrained budgets. ᴡᴡᴏ

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