REMOTE

SITE & EQUIPMENT MANAGEMENT

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Why Land-Lines May Still be the Best Option for Your Remote Monitoring Network

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Organizations that need to manage the status of equipment operation or the supply of consumables at many remote locations face the problem of collecting and analyzing large amounts of data from sites that are often difficult or inconvenient to visit. The introduction of low-cost remote monitoring systems automated the manual task of checking equipment or site status, enabling organizations to deploy large data collection networks that deliver huge amounts of near real-time operational data from various sources to key personnel and decision makers as well as to various logistics, maintenance and financial applications for statistical analysis and control.

Critical to the operation of any remote monitoring network is a reliable communications service that transports data from every monitored point to the people and systems that need it. What was once accomplished almost exclusively by telephone land-line is now more commonly accomplished with a variety of tethered and wireless IP-based solutions. The driving force behind this shift, of course, is connectivity that enables data to be shared in ways never before possible.

Land-line technology, however, continues to be a viable alternative that offers its own set of unique advantages. In some circumstances, land-lines may serve as a reliable backup channel; in others, it can serve as the primary connection for remote monitoring systems.

Types of Communications Failures

As organizations become increasingly reliant on remote monitoring networks to maintain efficient and precise operations, so does their need to understand how remote monitoring networks can fail. Two types of failure must be considered: network-wide failures (that impact all or most of your remotely monitored sites) and last mile failures (that usually affect just a single remote location).

Consider the following example (shown in Figure 1) in which pressure gauge data from multiple locations passes through a wireless data service and several Internet-based services on its way to a browser. A failure that occurs between the wireless data provider and the browser disconnects you from all of your remote sites; whereas, a failure that occurs between the wireless data provider and your remote site, the so called last mile failure, affects just a single site.

Figure 1.

The most dreaded failure is the network-wide failure that suddenly disconnects you from all of your remotely monitored sites and adversely affects the operation of your organization. Such failures can occur whenever data flow from all remote sites must funnel through a node of high centrality within your network (often referred to as a chokepoint).

The seemingly simple and direct data path illustrated in Figure 1 has many chokepoints, including the communications service provider, multiple ISPs, a web hosting service, cloud services, and various proprietary and third-party software applications. A failure at any of these chokepoints breaks the flow of all data from all remote sites. Complicating the issue is that chokepoints are often controlled by different entities, so there is no single point of responsibility.

Keep in mind, that the reliability of the Internet is not being questioned. The Internet has proven to be a reliable and robust communications backbone. Security and technical issues that threaten the Internet are resolved by the massive resources of corporations, governments and organizations that have a vested interest in its reliable operation.

What needs to be questioned, however, is the reliability of the various services attached to the Internet (cloud-based application platforms, third-party data sources, web hosting services and the like) that are critical to the operation of a remote monitoring network. In many cases, such services are operated by companies that may not have the resources or resolve to respond to service interruptions that affect you. But, even the most robust cloud services operated by large corporations with significant resources can fail and take down an entire remote monitoring network for extended periods of time.

In April 2011, for example, a cloud-service failure caused by a software upgrade took down a web service operated by the U.S. Department of Energy as well as a number of commercial websites. The problem took five days to fully resolve. More recently, in April 2012, a utility power failure, coupled with an overheated backup generator and a problem with a redundant backup generator, caused an interruption to Amazon's EC2 Cloud that affected many different commercial websites and web services for several hours.

The second type of failure, the last mile failure, occurs along the path from the actual condition being monitored (for example, a pressure gauge as shown in Figure 1) to the communications service provider. This path could be as straightforward as a wireless signal from the monitoring system to a nearby cell tower, or as convoluted as a Wi-Fi link to a corporate LAN to a router through a firewall.

In either case, last mile failures are by far the most common type of failure and can be the most difficult and costly to resolve. Problems encountered are often unique or obscure and require technical expertise to resolve or the involvement of disinterested parties (such as property managers and IT departments). In most cases, the responsibility of troubleshooting and repairing last mile failures is with the person in charge of the remote monitoring network.

The most serious threat to the ongoing operation of your remote monitoring network, however, are chokepoints intentionally created by others to control the flow of your data in order to safeguard their own business interests. Equipment manufacturers, for example, often require the use of free or fee-based monitoring service to access data from your remote sites. In a worst-case scenario, that monitoring service shuts down for business, legal or technical reasons and you are permanently disconnected from your entire remote monitoring network. Never give anyone exclusive control of any chokepoint in your remote monitoring network!

Land-Lines Solve Critical Remote Monitoring Issues

Use a land-line? Are land-lines still used? Are they cost-effective? Can I access data via the web? Are you serious? These are a few of the typical reactions to the suggestion of using a land-line to communicate with a monitoring system at a remote site and the answer to all of these questions is yes.

Although the total number of land-lines in use throughout the world dropped drastically from 1990 to 2010, their numbers have stabilized and are actually increasing in certain areas. Flat-rate billing makes the land-line economically viable and land-lines eliminate many of the risks associated with IP-based communications systems.

Advances to land-line based remote monitoring systems allow for a full range of Internet connectivity options while preserving the core benefits of the land-line. While much has been gained as a result of the transition from land-line to IP-based communications services, much has been lost in reliability, integrity and security, making a case for designing remote monitoring networks that combine the advantages of both technologies.

Land-line technology has evolved during the past 100 plus years to

overcome virtually every technical, natural and political assault threatened by the world at large. It has survived the test of time. Here are some of its distinct advantages:

Elimination of Chokepoints - Consider an application in which your remotely monitored locations are connected by land-line to a regional phone company (see Figure 2).

Figure 2.

What is immediately apparent is the elimination of the chokepoints. Instead, a single entity, the phone company, with a well-established track record, has sole responsibility for maintaining end-to-end communications with every device in your land-line based remote monitoring network. If a monitoring network extends beyond a regional territory, several phone companies and long-distance carriers may be involved. However, those entities work closely together and share a similar track record of reliability and service.

Web-Based Connectivity - Advances to land-line based remote monitoring systems enable you to access their data from browsers and smart phones and to interface their information to the cloud (see Figure 3). For those cloudless days, when a server failure, service provider interruption or cyber-attack can take down your entire remote monitoring network, you'll still be able to connect with your land-line sites by phone, fax or modem.

Reliability - During the past 10 years, how many times have you picked up a phone and not heard a dial-tone? Compare that to the number of times you've been unable to access the Internet or place a cellular phone call.

Pervasiveness - Land-lines remain the most universally available method of communication between fixed locations. They can be installed virtually anywhere – even underground. Satellite and cellular services, on the other hand, have geographic limitations and blind spots within their coverage areas.

Electrical Independence – During natural disasters and power outages, land-lines often remain operational long after other modes of communication go offline.

Figure 3.

Last Mile Installation and Maintenance – Make a call to the phone company and you can get a jack installed almost anywhere. Land-lines are easy to troubleshoot by non-technical personnel. Most repair issues are handled by the phone company.

Land-lines do have a few limitations that need to be mentioned. In many cases though, there are effective workarounds.

Bandwidth – The overwhelming majority of remote monitoring applications transmit small amounts of data. The few applications that involve high-speed data capture will require a broadband communications network. Land-lines, however, can be used in conjunction with broadband to provide redundant access to the key capabilities of a broadband system.

Mobility – Any application that monitors conditions of a moving asset generally requires wireless communications. In certain cases, a short-distance, point-to-point wireless link, connected to a land-line based monitoring system, is the best alternative.

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Latency - Unlike most IP-based solutions, land-line communications are not always on. Information is gathered at short intervals, stored and then, forwarded. Alarms and critical conditions, however, are handled as exceptions that can be delivered in about a minute.

What About Cost?

Maintaining communication with every location in a remote monitoring network can be the single largest cost incurred during its life cycle. An accurate total cost analysis requires careful scrutiny of installation and maintenance costs in addition to recurring monthly costs and unknowns such as rate changes, taxes and changes brought on as a result of changing technology.

An important factor to consider is the cost of responding to last mile service outages. Sending a communications technician to an unattended or difficult-to-reach site is something that you want to avoid since it can cost hundreds, if not thousands of dollars, per incident. Insuring the operation of land-line service to the facility in question is guaranteed by the phone company. A reasonable fee may be charged in the rare instance of a wiring problem inside of your remote facility.

In the case of a wireless data service, the provider's responsibility ends at the cell tower. If communications are lost due to changes in reception patterns brought on by local construction, foliage or even a truck parked in the wrong location, you'll need to dispatch a technician to rectify the problem. Other IP-based communications can also have issues that extend beyond the provider, especially if the remote device is attached to a local network or shared service. Other cost benefits of land-line service include:

Competitive Pricing - Phone companies are aggressively pricing services to compete with other service providers.

Equipment-Less Installation - Network interface hardware, routers, UPS backups, and external antennas are not required for land-line communication.

Economic Plan B Execution - Every remote monitoring network should have an established back-up plan to ensure that data can still be collected should automated data collection functions become interrupted due an event such as a server failure, fire or flood. Land-line based monitoring systems make this easy by allowing you to use low-cost, off-the-shelf equipment that plugs into any phone jack anywhere to collect information from your remotely monitored locations. The cost to your organization for not having such a Plan B could be immense.

Impact of Ongoing Change

In a counter-intuitive twist, a remote monitoring network deployed today using 100 plus year old land-line communication technology may be more future-proof than one using IP-based communications.

IP-based communications services, cloud services and the Internet are very much a work in progress. Not only are changes to these services likely, they are expected and some of those changes can impact the chokepoints in remote monitoring networks. Consider two possibilities:

- A cloud-based service that serves as a critical link in your remote monitoring network is upgraded and is no longer compatible with your monitoring network.
- Your wireless communications provider eliminates their flat-rate data plan in favor of a tiered usage plan that threatens the economic viability of your network.

When evaluating the communications options for your remote monitoring network, remember that the landline provides reliable, secure and cost-effective communications and the connectivity you need to monitor operations at remote sites without human invention. It can be a viable alternative to wireless and IP-based communications and may be the best overall option for your critical remote monitoring application.

Land lines have been around for over a century and contrary to popular belief, will continue to exist for a long time to come.

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Remote Monitoring System Reduces Downtime and Costs Associated with Groundwater Remediation System

Global Monitoring is now offering the Messenger GMU8120 remote monitoring unit (RMU) for monitoring and control of groundwater remediation systems. Providing real-time operating status of tank level, pumps and other instruments associated with groundwater remediation systems, the Messenger GMU8120 RMU supports remote predictive maintenance, while reducing equipment downtime, labor and costs associated with field equipment repairs. This remote terminal unit (RTU) also retains detailed historical information of equipment operations that can be used to improve new equipment designs and provide proof of operation to end-users.

Configurable to a wide variety of sensor types and expandable to 16 inputs, the GMU8120 tracks a variety of parameters such as liquid level, pressure, temperature and flow to perform various remote control tasks. When detecting a problem, an alarm processor notifies key personnel via telephone or computer, enabling operators to cost-effectively perform equipment repairs and/or schedule preventive maintenance. Using information gathered from the remote monitoring unit, service personnel better understand equipment problems before visiting the site.

The GMU8120 remote monitoring system communicates via standard phone-line interface, or via optional cellular data or Ethernet interfaces. The RMU is also compatible with an optional m2mLive monitoring network for global operations and can place collected data onto a Website for viewing of historical information.

To reduce or eliminate ongoing communications costs, the GMU8120 can share an existing phone or fax line. In addition, the RMU operates autonomously, eliminating the need for a monthly monitoring service. Set-up and operations also are easy-friendly and do not require the expertise of a computer tech or IT professional. Should a remote monitoring unit fail, Global Monitoring can send a pre-configured, plug and play replacement RMU to the site that can be installed by non-technical personnel.