Connected Support - Wireless M2M is the Enabler for High-value Product Support

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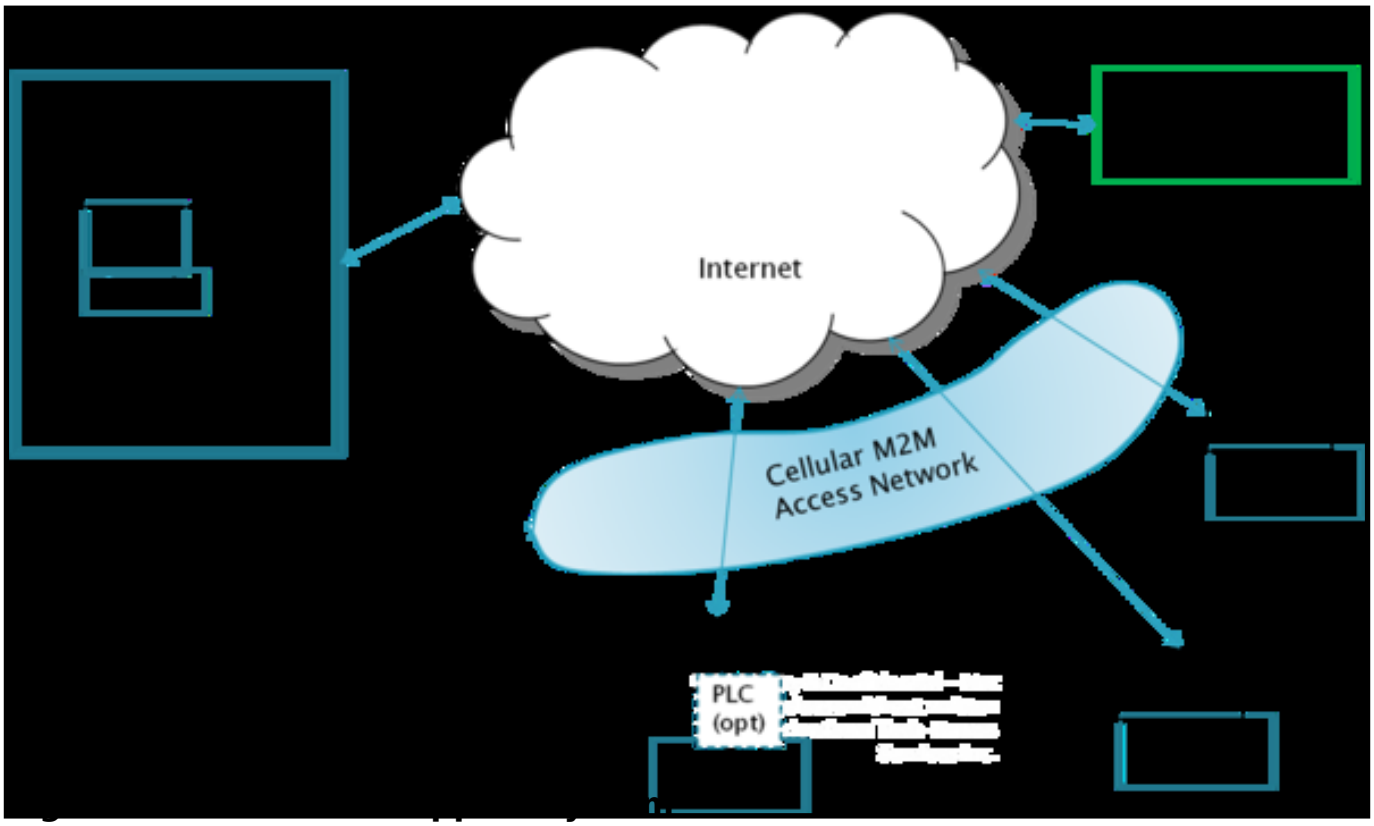
Many businesses sell specialized industrial process equipment to a global set of customers and have remote support problem. These businesses are often small and medium sized enterprises with specialized skills, and are the only true experts capable of maintaining their customers' specialized equipment in the field. For such companies key personnel time and money consumed to diagnose customer problems – either in person, which is costly; or via the telephone, which can be a difficult medium to address complex problems. M2M communications and remote monitoring promise to alleviate this support issue for industrial product companies.

Building a Connected Support Network

There are several pieces to a Connected Support network, most of which already exist and are waiting to be tied together:

1. M2M access network – usually cellular
2. Sensors inside the equipment
3. An optional PLC (Programmable Logic Controller)
4. Gateway with a data filtering and wireless connectivity
5. Internet
6. Support & Maintenance Centre



The Connected Support System

The Sensors

Most every sophisticated piece of industrial equipment has sensors to optimize its operation. Knowing what to monitor and how to adjust equipment and process operating parameters based on this information is a key piece of a specialized product company's intellectual property, and the key to providing high quality support. The Connected Support solution leverages this knowledge by enabling remote monitoring of equipment performance.

Wireless Connectivity

There are potentially two types of wireless connectivity in a Connected Support system, in-plant and wide area (cellular). Although it is possible to build a network that is entirely wired it is the less likely scenario as using a Cellular network to access equipment has significant advantages over wired access.

The primary advantage of using a cellular network access is that one need not interconnect with the client's Local Area Network (LAN). By avoiding the customer's network there are fewer customer security concerns. From the equipment provider's perspective there will be fewer issues with the customer's firewall getting in the way of the Connected Support system's communications. Within the shop floor there may be multiple pieces of equipment that require monitoring. These may be wired or wirelessly connected to the on-site cellular gateway. The advantage of wireless connectivity is that one need not have the customer's electricians maintain wired connectivity between pieces of equipment.

Access Network

The Access Network is the network that interconnects the field-installed equipment to the Internet and then on to the Support & Maintenance Center. The most ubiquitous and straight forward method is to use the local cellular network as the access network. The cellular network is global and available in every country. Within a country there are locations that are not covered, but these days any small town with an industrial facility is likely to have no worse than 2G cellular connectivity, and will likely have 3G service. The decision to use 2G, 3G or LTE is one of the decisions to be made in designing a Connected Support system.

Remote Gateway

The Remote Gateway is the device that ties the field equipment data and its command and control functions to the cellular network and ultimately to the Support & Maintenance Center. The gateway performs the following functions:

1. Compresses data heading towards the Support & Maintenance Center (inbound) and decompress data traveling in the opposite direction (outbound).

2. Control outbound transmissions so that cellular data limits are not violated.

3. Provide error control and data security.

4. Provide local monitoring of data parameters that would indicate that an immediate message needs to be sent to the Support & Maintenance Center.

The implementation and configuration of the Remote Gateway is important to balance the volume of data flowing in the system against the real-time requirements of different operating scenarios.

Wide Area Network

The wide area network of choice will usually be the Internet. For large customer with very large data volumes or very strong security needs a leased line or virtual leased line services might be warranted.

Support & Maintenance Center

The Support & Maintenance Center is where the equipment is monitored and sensor data logged. This is also where operators can cooperatively troubleshoot issues with field equipment the customer by effectively looking over their shoulder when system reconfigurations and tests are performed. The three elements of this center include:

1. Communications Gateway

2. Server

3. Console

The Communications Gateway provides the reverse functions to the Remote Gateway, but while there are potentially many Remote Gateways in a Connected Support network there will be only one or two Support & Maintenance Centers. The Communications Gateway provides the following functions:

1. Controls the outbound traffic to each Remote Gateway in order to stay within contracted data volume.

2. Processes and massages data in order to create meaningful information for the operators and support experts.

3. Compresses outbound traffic and decompresses inbound data traffic.

4. Provide error control and data security.

The data servers may be locally located or remotely located via a cloud service. The servers provide the data storage and processing power to run the Connected Support system.

Conclusion

Putting together a Connected Support system requires many of the usual skills and activities of other corporate IT projects, plus the addition of specialized wireless communications knowledge in order to make the system a reality. The promise of Connected Support systems is that they provide the means for small and medium sized companies to provide great support with a global footprint at a low cost.

About the author: Lee Vishloff is a 30 year wireless veteran with many system designs under his belt. He has led the development of a wide variety of wireless systems including cellular data, microwave radio, rural communications, satellite and aeronautical. His current focus is M2M communications. He may be reached at Lee@Vishloff.ca [1]

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