Understanding Why the Most Common Maintenance Approach Isn't Enough for Overcoming the Inherent Deficits of Time-Based Maintenance

Executive Summary

Data Center Infrastructure Management (DCIM) can be defined as the integration of information technology (IT) and facility management disciplines to centralize critical infrastructure management processes including monitoring. The DCIM market is changing due to the desire of data center managers to have greater insight into their systems. In fact, Gartner predicts a 60 percent market penetration of DCIM by 2014, driven by increased power and heat density, data center consolidation, virtualization and cloud computing.

Regardless of market vertical, company size, or geographic considerations, the use of DCIM is most often in support of core business objectives such as the requirements to reduce operating costs, while simultaneously increasing efficiency and availability. Software, hardware, firmware, or business processes that support these objectives are routinely evaluated and implemented.

In this white paper you will learn how Emerson Network Power has developed a technology that achieves these key business objectives by allowing customers to move from time-based maintenance cycles to a proactive maintenance program that improves their Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR). You will also better understand how to leverage remote diagnostics and other remote services through embedded LIFE™ technology to receive a notably higher level of service.

What is LIFE™ Technology?

LIFE technology, developed by Emerson Network Power and embedded into its data center equipment, is an advanced diagnostics and IP-based communications system. It performs comprehensive data collection in order to provide early warning of alarm or out-of-tolerance conditions, allowing for effective and proactive maintenance of power protection infrastructures.

This technology allows IT and facilities teams, who are often responsible for managing the critical infrastructure, yet aren't experts in the varied technologies present in their complex data centers, to augment their staff. LIFE technology gives them direct access to the domain expertise without having to hire additional resources within their own enterprise. It also provides a tool for these teams to use in order to directly influence two key measures of availability—MTBF and MTTR.

Using LIFE Technology to Improve MTBF

Adhering to time-based maintenance cycles is the most common practice in managing MTBF. While this approach is common, data centers still see equipment failures between the maintenance cycles, sometimes within days of scheduled maintenance. How can this happen?

When technicians perform activities on a unit, they are visually inspecting the equipment to evaluate the operational health of that device in addition to analyzing the log history for alarms. Trended or historical data is typically unavailable to technicians, as it is commonly saved on the Building Management System or the Network Management System.

One example of this shortcoming could occur when measuring resistance of your batteries against a predefined threshold. The reading is below the threshold, yet with a time-based program, this would be a normal event. On the other hand, if you have access to the historical data, you may see that the battery has maintained a low resistance over the last couple of months, and now it has recently increased significantly. Though the current measurement is below the alarm threshold, which would not be a cause of alarm in a time-based maintenance program, a quick rise in resistance of a battery is a highly accurate indicator that this battery will fail in the near future—possibly before or after the next preventive maintenance cycle.

With the trending capabilities of LIFE technology, service providers are able to identify anomalies by monitoring environmental conditions and usage history and using that data—along with maintenance and service histories—to build data center and equipment profiles. Those profiles help system engineers identify conditions in which a unit may be at greater risk of failure so they may implement corrective actions before a failure occurs. Armed with this information, service providers can transition you from time-based maintenance cycles to a proactive maintenance program, which will ultimately increase MTBF on your critical equipment.

Traditional Service Model

Many service providers employ a traditional service strategy that is sequential, time-based, and one that begins with an event such as a UPS in bypass alarm, a battery failure, or loss of communications alarm. Each of these events warrants a set of actions both from the IT/facility manager and the service provider. The manager acknowledges the event and contacts his service provider. As seen in Emerson's Customer Resolution Center, the average time for this action alone can exceed eight hours due to simple unawareness that an event has occurred. The service provider assesses the situation, and as necessary, dispatches a technician. At arrival the technician performs a series of investigative and diagnostic activities to identify and isolate the issue. Replacement parts are then ordered for the necessary components, which can delay a repair by hours or even days. Once the parts arrive, the technician replaces the components; performs a series of diagnostic tests on the new components, and restores the unit to its proper operating condition. Given the sequential nature of this gated process, there are a limited number of improvements that can be made to shorten it. In the traditional model, there are two methods to decrease the time necessary to restore a unit to its proper operating condition—reduce the time associated with completing each step or compress the time interval between each step. The intended result of either action is to lower the MTTR.

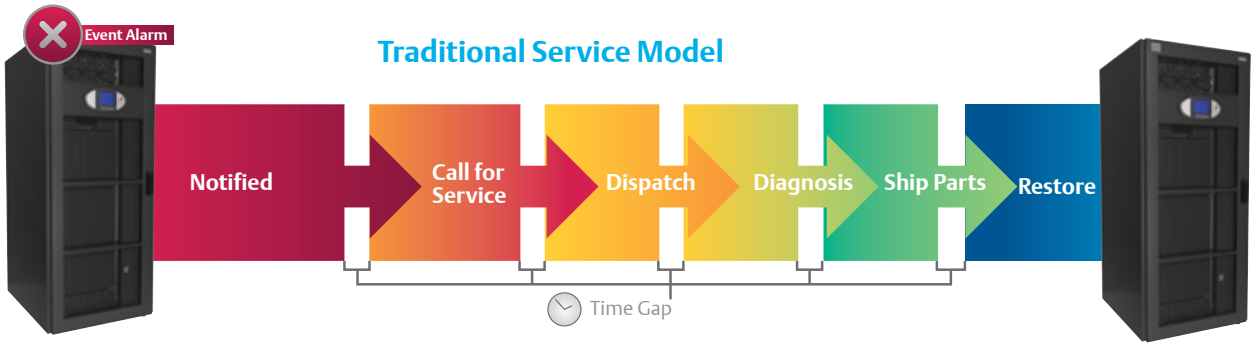

Figure 1. Identification of a service-driven event can take hours with a traditional service model and add to the time lapse that already occurs between each step of the restoration process.

New Service Model with LIFE™ Technology

The traditional approach to MTTR is a sequential process in which time delays are additive. LIFE technology will help minimize the time intervals between a service-driven event and when a call is placed for service. With the communications capability of LIFE technology, service providers can instantly reduce time delay from hours to minutes. Events are recognized immediately. Diagnostic information is then reviewed by a qualified remote system engineer, which in itself can provide additional time savings when compared to diagnosis by less-qualified technicians.

With the ability to pull rich parametric data from the unit, system engineers are able to more quickly and accurately isolate and diagnose the problem, enabling them to implement a corrective action plan within a significantly shorter period of time. When technicians are dispatched they are better prepared and often have the parts needed to fix the problem correctly during their first visit. This takes the traditional sequential-based approach and turns it in to a process that allows for concurrent service efforts focused on reducing the MTTR.

> *For more information on the causes and cost of downtime, see Emerson Network Power's white papers:*
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> - *"Understanding the Cost of Data Center Downtime"*
> - *"Addressing the Leading Root Causes of Downtime."*

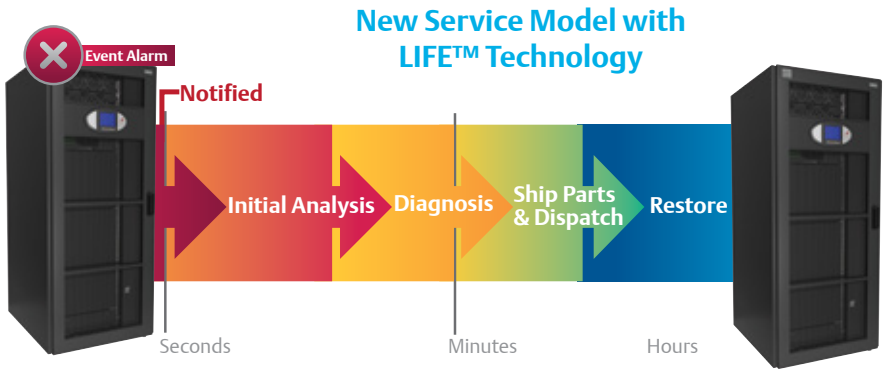

Figure 2. The "call home" functionality of the LIFE technology-enabled service model provides the best MTTR with near-immediate notification of an event, as well as the ability to diagnose a problem before a qualified service technician is dispatched to the site, armed with the parts needed for a first-time fix.

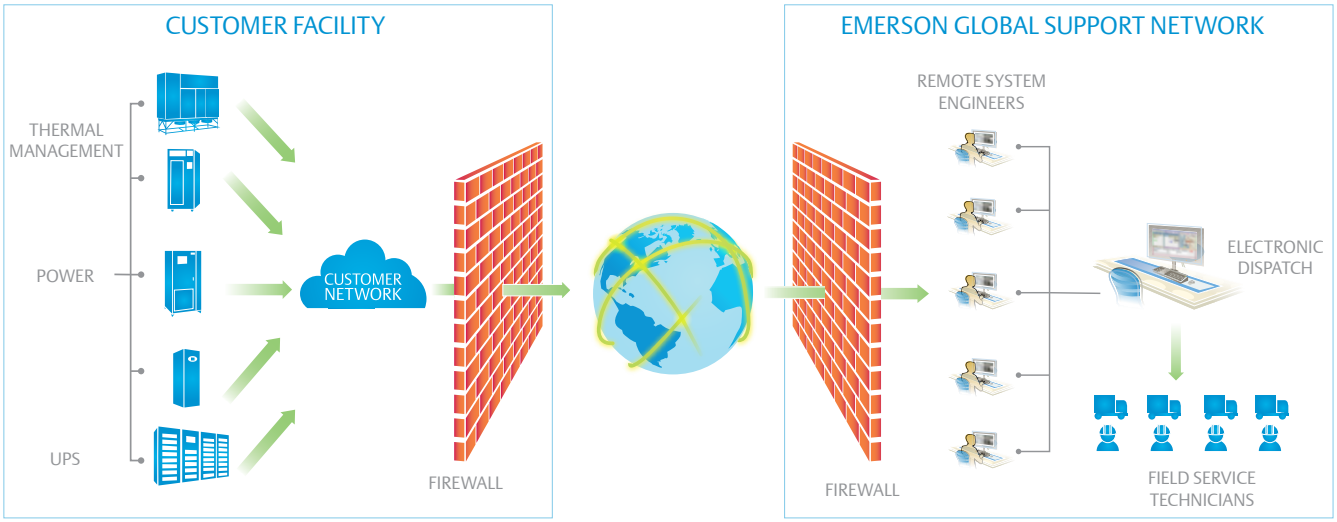

Figure 3. This shows how Emerson uses a safe and efficient, industry-wide protocol—Hypertext Transfer Protocol (HTTP)—to transfer data embedded in each device from the customer's facility to Emerson's remote system engineers—offering an IT-friendly solution that's easy to use.

Safety and Usability with LIFE™ Technology

In addition to proactively managing MTBF and MTTR, data center managers are also concerned about ensuring the safe and reliable transmission of data.

LIFE technology communicates in two ways. First, during an "alarm call" the unit initiates communications notifying remote system engineers of an alarm condition or an anomalous trend requiring an immediate response. The second type of call is a "routine call." During this type of call, the unit initiates communications at pre-determined intervals to confirm normal operation, communicate status and transfer specific parametric data from the device memory. In both instances, the unit sends outbound communication to Emerson Network Power's system experts via the Internet.

Establishing communications between a unit and a service provider like Emerson Network Power can occur in minutes. The communication to the service provider occurs via a POST request, the same request an Internet browser uses to communicate to a Web server when uploading a file or submitting a Web form. The POST request is one of many standard methods supported by the Hypertext Transfer Protocol (HTTP). By employing this common method of HTTP at the site, the need for special configuration outside of a proxy server is minimized, thus allowing for safe communication throughout the data center.

Emerson recognized the importance of utilizing a common, industry-wide protocol that provides a superior level of safety while offering superior customer usability. With LIFE technology, businesses can have both.

Conclusion

With the data center market evolving, there is a greater need for remote communication strategies to support business goals and objectives. Data center managers are striving to reduce operating costs, while simultaneously increasing efficiency and availability. Having a sophisticated diagnostics and IP-based communications system like LIFE™ technology embedded into data center equipment allows for unprecedented communications capabilities that help customers achieve those goals by drastically extending MTBF and reducing MTTR.

Until now, the lack of effective, real-time communication capabilities has limited the performance and wide applicability of today's advanced monitoring and diagnostics systems. LIFE technology removes those limitations ultimately allowing for an advanced level of service.

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Emerson Network Power - Global Headquarters

1050 Dearborn Drive
Columbus, Ohio 43085
Tel: +1 614 888 0246

Emerson Network Power - Liebert Services

610 Executive Campus Drive
Westerville, Ohio 43082 USA
Tel: +1 614 841 6400
Fax: +1 614 841 6405

EmersonNetworkPower.com

Customer Resolution Center

800 LIEBERT (543 2378)

SL-24670 (R09/13)