

The business benefits of automated infrastructure management in connected and efficient buildings

July 2017

Executive summary

“It’s fair to say that facility networks now resemble IT networks.”

— Facility Executive,
May/June 2015

Automated infrastructure management (AIM) solutions are hardware/software systems that monitor, map and document connectivity across an entire network, even a diverse and complex network as found in an intelligent building. As more applications and services come to market—each offering time, money or efficiency advantages—it soon becomes impractical to monitor and manage the network manually. Thanks to published TIA-606, ISO/IEC 14763-2 and ISO/IEC 18598 standards, the role and potential of AIM solutions in the modern connected and efficient building are now established, unlocking a world of potential for enterprises.

Connectivity, efficiency and AIM

As the intelligent building evolves, its scope, capabilities and even its definition continue to change as well. What truly is an “intelligent” or “smart” building today? While the specifics will vary widely from place to place, they will all have two characteristics in common: connectivity and efficiency. In connected and efficient buildings, the focus is on leveraging emerging technologies to connect people, information and devices in order to drive greater productivity and efficiency.

The newest infrastructure found in today’s connected and efficient buildings supports audio/visual systems, sensors, lighting, IT, security, and building management applications. This is all in addition to the building’s wired and wireless technologies—sharing space, in many instances, with the broader Internet of Things (IoT). Still, this diverse ecosystem all boils down to enabling person-to-person, person-to-machine and machine-to-machine communications.

This advanced connectivity’s goal—increased efficiency—can be achieved only with the inclusion of equally advanced monitoring and management capabilities. This capability is delivered by automated infrastructure management (AIM) solutions. An AIM solution automatically tracks and documents every connection and connected asset within the infrastructure, providing IT and facility personnel key information such as operational status, location and movement.



A touch screen controller provides graphical connectivity information at each rack in CommScope’s imVision® AIM solution

Companies in North America lose up to \$100 million per year to downtime related to information and communication technology.

— IHS, Inc. report, Feb. 2015

Automated infrastructure management comes of age

While today’s building network infrastructure is wholly dependent on IT connectivity, an estimated 90 percent of IT networks are still documented using manual tools like spreadsheets, which are laborious to create and maintain and prone to a typical rate of human error around 10 percent. Compounding this challenge is the fact that manual monitoring and management of a vast number of connections, ports and connected devices is also inefficient and expensive.

To manage the connectivity within a building accurately and efficiently, a growing number of facility and IT managers are using AIM solutions. An AIM solution automatically monitors and documents the location and status of connections and connected assets, providing real-time insight into—and control over—virtually everything happening within the building IT infrastructure.

AIM uses intelligent hardware and software components to collect specific data regarding the identity, location and status of every port within the building’s infrastructure and compare it to existing connectivity baselines. All this intrinsic information—that is, information about what is happening within the cabling infrastructure—enables facility and IT personnel to see and manage the connected environment in real time, discover networked devices and pinpoint their physical location.

AIM solutions also integrate with external applications and processes, enabling IT and facilities staff to manage and optimize network and building management systems. Integrated work order management allows the AIM solution to generate trouble tickets and direct technicians to the precise location of a problem, saving the organization time and money.

Automated, real-time visibility and documentation of the connected environment also eliminate the need for manual network audits, which are time consuming and have the potential for human error. Typically, enterprise IT departments spend an average of six hours per month manually auditing network assets like PCs and printers. AIM software automatically and continuously uploads changes to the connectivity database, helping the enterprise reclaim those non-productive hours.



The ISO/IEC 18598 standard was published in 2016

Growing adoption of AIM drives industry standard

The need for accurate and automated infrastructure management—combined with the scope and capabilities of today’s AIM solutions—has accelerated the adoption of AIM in connected and efficient buildings. This has led to the inclusion of AIM references in various standards covering infrastructure administration, such as TIA-606 and ISO/IEC 14763-2. The Joint Technical Committee (JTC) of ISO and IEC also recently published the ISO/IEC 18598 standard defining AIM’s functional requirements, its intrinsic and extrinsic benefits, and establishing the definition of an open data exchange framework. This standard was also recently adopted by TIA and was published as ANSI/TIA-5048.

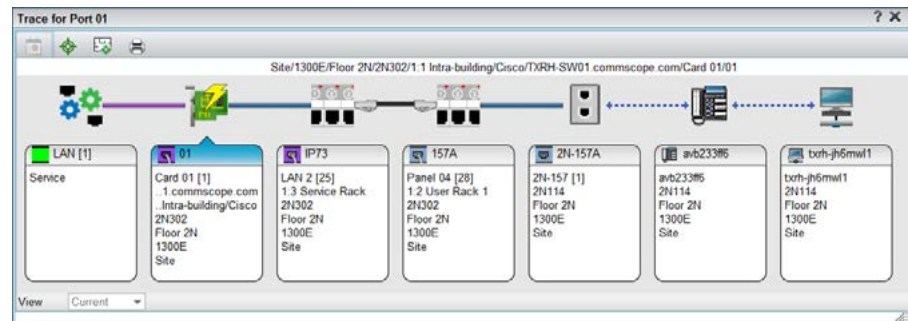
The inclusion of an open data exchange framework that enables integration with external applications and systems is expected to further accelerate adoption of AIM solutions globally as their reach and capabilities continue to expand into more applications, devices and services. The ongoing and rapid evolution of the IoT likewise figures prominently into the growing applicability of AIM solutions in diversely-populated device ecosystems that characterize the most modern connected and efficient buildings.

Intrinsic benefits of an AIM solution

The intrinsic capabilities of AIM provide real-time monitoring and automated management of the building’s structured cabling infrastructure and networked devices. The ISO/IEC 18598 standard subdivides these intrinsic benefits into the following areas:

Accurate documentation

This is the system’s ability to detect and document connections within the infrastructure and automatically update its database as changes occur. This includes the ability to automatically document a device’s entire connectivity trace from end to end, map the physical location of all connected elements, and display their location on building plans and layouts. The automated documentation capabilities of an AIM solution can virtually eliminate the expected error rate associated with manually managed infrastructure systems, which can run about 10 percent.



A detailed end-to-end trace from CommScope's imVision® AIM solution

Asset management

An AIM solution also provides detailed information on all network switches and end devices. According to ISO/IEC 18598, this includes identifying the physical location of every networked asset—room, rack, server, and port—as well as device properties like host name, MAC address, WWN and IP address. Among the obvious OpEx benefits of this granular capability are a faster mean time to repair (MTTR) and much less time spent on network audits. Additionally, asset management makes it easier to support and enforce bring-your-own-device (BYOD) policies, enabling IT personnel to quickly identify and locate unauthorized devices.

Capacity management

To lower CapEx, it's critical to optimize the use of connectivity assets such as switch ports. By monitoring the real-time utilization and status of all ports, patch panels, shelves and work area outlets, AIM solutions identify inactive switch ports, find available rack space and locate unused panel ports. Armed with this information, IT personnel are able to maximize existing resources and defer costly capacity upgrades.



A capacity management dashboard from CommScope's imVision® AIM solution

Change management

More than ever, employees and their connected devices are constantly on the move. An important section of the ISO/IEC AIM standards outlines the system's ability to handle the moves, adds and changes of connected assets within the network. The standards specify the need for accurate and real-time connectivity information, technical guidance to minimize human errors, and the ability to support electronic work orders and track work order history. The standard also encourages users to look for systems with intelligent service and circuit provisioning, which eliminates the need to manually select connectivity paths and/or elements when adding devices.

Incident management

In the context of IT infrastructure, an “incident” is typically defined as any unscheduled or unauthorized change in connectivity status. According to the ISO/IEC 18598 standard, AIM solutions must be able to detect all incidents and create an audit trail that documents them as well as the corrective actions taken. This requires a sophisticated set of automated steps that must be completed across various components of the infrastructure, in real time. An example of the automated incident management capabilities of AIM is shown in Figure 1.

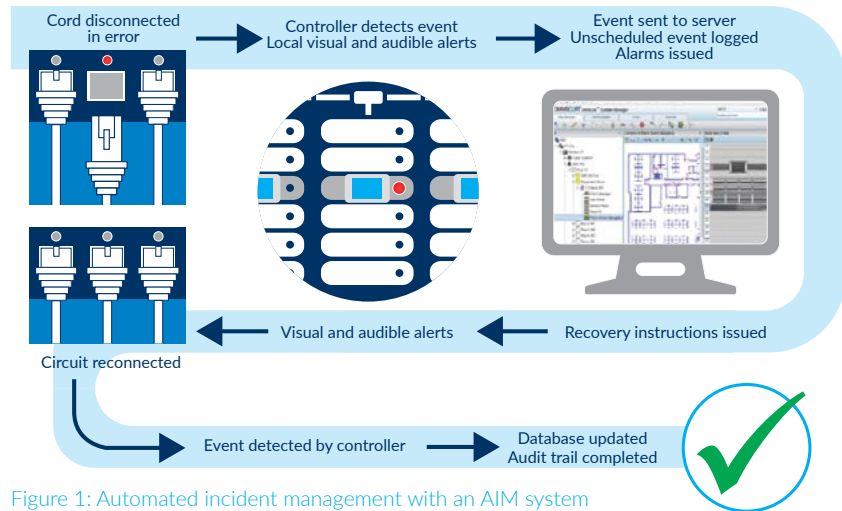


Figure 1: Automated incident management with an AIM system

Extrinsic benefits of an AIM solution

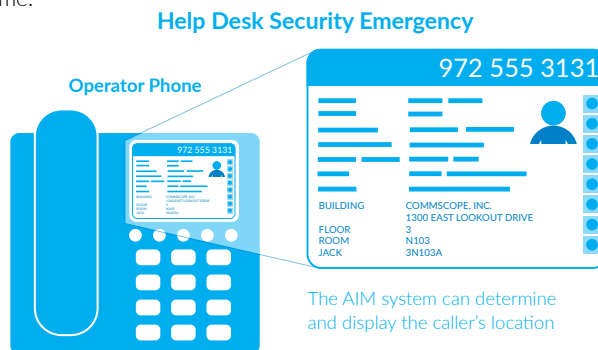
The extrinsic benefits of an AIM solution rest on its ability to communicate seamlessly with a wide range of external applications and systems. The data exchange framework, defined in the ISO/IEC 18598 standard, is responsible for facilitating interoperability between AIM solutions and other third-party applications.

The standard divides the extrinsic benefits into several areas, including IT-related systems, building management systems, and configuration management database (CMDB) support.

IT-related systems

These include IP telephony management as well as the management of other network systems, like helpdesk applications and information security systems.

IP telephony management. In an intelligent building, the IP-based phone system uses the facility’s common IT cabling infrastructure and has access to the connectivity information within the AIM solution. This information includes the exact physical location of all end devices, like VoIP phones, that are connected to the cabling infrastructure. In an emergency, the VoIP system is able to retrieve the location of a specific VoIP caller and reduce critical response time.

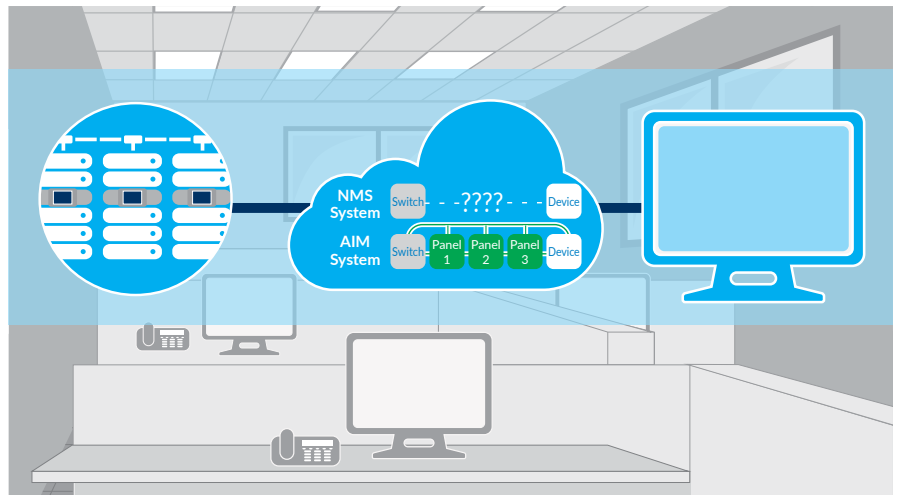


Network management and helpdesk support systems

A standards-compliant AIM solution can help improve the scope and effectiveness of network management systems (NMS) used to track and control connected devices, as well as the helpdesk applications needed to keep them operational.

While the NMS tracks the logical connection between switch and device, the AIM solution provides the physical layer trace in order to monitor and manage complete end-to-end physical connectivity, including cabling segments and connecting points. For example, when AIM-generated alerts about changes in the cabling infrastructure are sent to the NMS, they are consolidated with NMS-based alerts to provide a deeper understanding of how the IT environment may be impacted.

In much the same way, the AIM solution's connectivity information can be accessed and used by helpdesk support systems in facilitating workflows. For example, when the helpdesk system generates a trouble ticket for a connected device, it can automatically access the AIM database to determine the location and connectivity path of the device to help reduce MTTR. The AIM solution can also augment the functionality of the helpdesk system with its own internal workflow management capabilities.



The AIM system can provide detailed end-to-end physical connectivity information to a network management system

Information security

As with IP-based phone traffic, security systems that monitor telecommunication rooms and server racks have easy access to AIM-based connectivity information. AIM solutions provide alerts to information security systems, warning of potential threats at critical patching locations. For example, an alert of a suspicious or unscheduled event can automatically trigger the appropriate IP cameras to display real-time video of what is happening at that physical location. The pre- and post-event video can then be automatically uploaded to a storage server.



Building management systems

The ISO/IEC 18598 standard outlines those key building management applications in which AIM solutions can play a role. They include energy management, lighting management, configuration management database, building security and access control.



Energy and lighting management systems. Increasingly, Power over Ethernet (PoE) technologies are being used to power a wide range of devices in connected and efficient buildings, including VoIP phones, wireless access points, HVAC controllers, sensors, badge readers and lighting systems as well as other IoT devices. An AIM solution can greatly simplify and automate the assignment of PoE-based energy management profiles to specified locations. Using its comprehensive knowledge of the connected infrastructure environment, the AIM solution can assign an energy management policy to the correct switch port based on real-time location and connectivity information. The entire process can be automated and fully documented.

Configuration management database (CMDB) support. The CMDB contains all relevant information about the components used by an organization's IT services and the relationships between those components. Components can include software, hardware, documentation and personnel—or any combination of these. AIM provides real-time data regarding the location and status of networked assets such as VoIP phones and printers, automatically populating the CMDB with location information. The result is a more complete and accurate record of the entire IT environment.



Conclusion

It's a simple truth that the proliferation of IT-networked devices, applications and services has made manual documentation and management largely impractical, as these can incur unacceptably high error rates and heavy costs. AIM solutions relieve these burdens and fully leverage the potential of the connected and efficient building.

Now, under published standards, AIM will continue to expand its role as the indispensable gatekeeper of all that technology has to offer. The development of a standardized API framework, as described in ISO/IEC 18598, opens the door for future integrations with a variety of external applications and systems not yet described in the standard, such as building information modeling (BIM) and IoT applications.

The connected and efficient building will only grow more connected as time goes on. With a standards-compliant AIM solution in place, it will grow more efficient as well—making AIM a business-critical asset no business can easily do without.

[Click here to learn more about Automated Infrastructure Management Systems.](#)

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