# Metasys system

The Metasys system is the industry-leading building automation system (BAS) and the foundation of modern building efficiency. It enhances occupant comfort, health, safety, security, and productivity, and it provides more system control and easier access to information than other building automation systems. It is a complete family of hardware and software control components designed to work together as one cohesive system. A time-tested industry leader, the Metasys system has proven reliable for the most demanding customer scenarios.

New features and enhancements at Metasys Release 11.0

Johnson Controls® is pleased to announce a new release of the Metasys system. Its substantial enhancements are designed to deliver better space utilization and planning, maximize operator efficiency, and enhance overall system performance and reliability.

Figure 1: Metasys Release 11.0
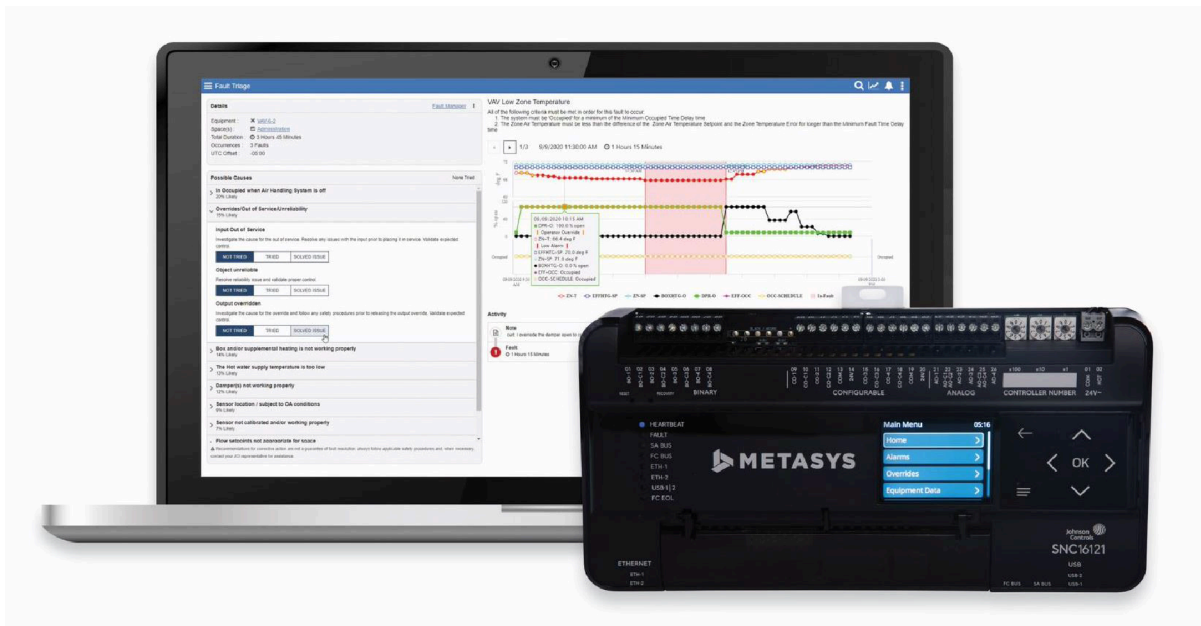
The following table outlines the features associated with Metasys Release 11.0.

Table 1: New features and enhancements at Metasys Release 11.0

Features and enhancements	Description
Metasys Server and User Interface (UI) enhancements	• **Fault Detection**—identifies and lists building system-related faults in order of severity to help operators quickly fix issues and avoid equipment failure, energy waste, and comfort complaints. • **Fault Triage**—an add-on to Fault Detection, it provides fault duration and occurrence information and corrective action recommendations to improve fault prioritization and assist less experienced building operators with problem solving. • **Show Involvement**—identifies from one screen what an object is serving and what serves it, provides real-time values on each connection point and distinguishes between operator commands and references; helps operators quickly identify root cause issues. • **Send Announcement**—provides ability to send announcements to select users through email, login banner and homepage banner so Metasys operators can easily share critical information and collaborate, right from within Metasys. • **Add/Delete/Configure Objects**—provides the ability to add, delete, and configure objects from directly within Metasys and creates a familiar experience for legacy SMP users. • The Metasys Application Server software also supports **FIPS 140-2 Level 1 compliance** and **ADFS two-factor authentication** at Release 11.0, to help prevent unauthorized access to systems and data, which, if not prevented, could result in financial and reputational loss, system disruption, and other negative consequences.
New models and enhancements to next-generation network control engine and network engine series	New and updated **SNC series network control engines** include: • M4-SNC16122-0 and M4-SNC16122-04 • M4-SNC16122-0H and M4-SNC16122-04H • M4-SNC25152-0 and M4-SNC25152-04 • M4-SNC25152-0H and M4-SNC25152-04H Updated **SNE series network engines** include: • M4-SNE10501-0 • M4-SNE11001-0 and M4-SNE110L1-0 • M4-SNE22001-0 Also at Release 11.0, all SNE and SNC series network engines are FIPS 140-2 Level 1 certified to help prevent unauthorized access to systems and data and will support BACnet Protocol Revision 18 for interoperability with third-party BACnet devices.

Table 1: New features and enhancements at Metasys Release 11.0

Features and enhancements	Description
New models and enhancements to next-generation equipment controller family	New **CG series and CV series equipment controllers** include: • M4-CGM04060-0: 10 point, General Purpose Application MS/TP Equipment Controller • M4-CGE04060-0: 10 point, General Purpose Application Ethernet Equipment Controller • M4-CGE09090-0: 18 point, General Purpose Application Ethernet Equipment Controller • M4-CVM03050-0P: 8 point, VAV Box MS/TP Controller with an integrated potentiometer for damper position feedback • M4-CVE03050-0P: 8 point, VAV Box Ethernet Controller with an integrated potentiometer for damper position feedback New **XPM series input/output (I/O) expansion modules** include: • M4-XPM04060-0: 10 point I/O Expansion Module • M4-XPM09090-0: 18 point, I/O Expansion Module • M4-XPM18000-0: 18 point Input Expansion Module Additionally, new features are available for several equipment controller models. Updates include factory-loaded, field-selectable applications in CV series controllers offering an alternative streamlined configuration workflow, a generic SA Bus object to enable a more nimble integration of approved BACnet MS/TP end devices on the SA Bus, SA Bus Provisioning to streamline upgrade workflows, and support for BACnet Protocol Revision 18 for interoperability with third-party BACnet devices.
Enhancements to the Metasys Tool suite	• **System Configuration Tool (SCT)**—Provides simplified NCE-to-SNC upgrade and migration process, and it is also enhanced to automatically fill the **Type** field in the Equipment Definition, to simplify the migration of legacy sites from SMP to Metasys UI. • New Global Standards library, enabling controls engineers and technicians to store, document, and share branch and customer standards. The ASHRAE 36 sequences will be deployed through the Global Library.

Features and benefits

Operational savings

- Enhance productivity and effectiveness with the simple and intuitive user interface.
- Access your Metasys system anytime, anywhere with mobile device compatibility.
- Enable quick decision-making with data displayed through graphics.
- Reduce programming, commissioning, and troubleshooting time with Tailored Summaries.

- Collect, summarize, present, and report building data in relevant and usable ways with Advanced Search and Reporting.
- Schedule the collection of historical data, including alarm, audit, and trend data with the Scheduled Reports feature and Export Utility.
- Extend building management capability with wireless sensors and controllers.
- Integrate with other systems in your facilities using both industry standard communication protocols and REST-based APIs.
- Automate tasks for facility managers and staff.
- Increase effectiveness and lower operational costs with Alarm Management.
- Lower operational cost by correctly maintaining building systems guided by Fault Detection and Fault Triage.

Energy savings

- Save energy using the Metasys scheduling and occupancy detection features to operate equipment only when needed.
- Achieve more energy savings by using additional features such as Trend Summaries and Demand Limiting/Load Rolling.
- Convert building data into energy spent. Measure and validate savings with Energy Essentials.
- Get top performance from your energy and central plant equipment with Central Plant Optimization (CPO).
- Seamlessly integrate with cloud-based applications for peak building performance.
- Use Interlocks to automatically coordinate control between equipment and systems.
- Reduce energy use by addressing common building system issues such as equipment running constantly, simultaneous heating and cooling, extreme setpoints, and others, as guided by Fault Detection and Fault Triage.

IT and platform security

- Utilization of standard IT messaging communication protocols to enable efficient transportation of massive amounts of data.
- Enhanced Metasys system security with password management processes to match best industry standard practices.
- Compatibility with current operating system and platform technologies, including newer versions of Microsoft® operating systems, SQL Server® database system, and industry-leading web browsers.
- Secure, encrypted data exchange between your mail client and the Metasys server or network engine with a digital security certificate with HTTPS over a Transport Layer Security (TLS) 1.2 connection.
- A dashboard that informs and educates system administrators of user account and system information to understand and address potential cyber security concerns.
- Compliance with Federal Information Processing Standard Publication 140-2 (FIPS PUB 140-2), a United States government computer security standard used to approve cryptographic modules in software components.

Comfort and security

- Monitor the HVAC, lighting, and security systems through a unified user interface.
- Alert the operators of facility problems by detecting problems before they become an issue.
- Perform a pre-defined action during an alarm event.
- Create action interlocks to occur within the Metasys system when granted access to the control system.
- Initiate a door-open command or trigger a security output point from a single seat operation through our improved unified user experience.
- Coordinate control with fire, security, lighting, and other non-HVAC building systems.
- Use available options to achieve UL/cUL 864 UUKL 10th Edition Smoke Control listing.
- Support your remote monitoring services.
- Support of Microsoft® Active Directory Federation Services (ADFS) with the opportunity for a single sign-on (SSO) experience and two-factor authentication (2FA).

Diagnostics

- Summarize Potential Problem Areas to see all items in alarm, warning, overridden, out of service, and offline within a space in the Metasys UI.
- Perform ad-hoc analysis on equipment or spaces served by equipment, using the most effective diagnostics platform that leverages cohesive dashboards to point out root cause through graphics, trends, equipment activity, schedules, and more.
- Use Fault Detection and Fault Triage to investigate, manage, and solve building system faults that occur on your site.

System architecture

The Metasys system comprises various hardware and software components that work closely together to provide coordinated control over a site's HVAC and other building systems. For more details, see Metasys system architecture.

Distributed

The Metasys system architecture is a distributed architecture. This means that the system components can be located as closely as possible to the equipment they are controlling, to provide optimum performance and reliability.

The distributed Metasys components with their data sources and the equipment they control are connected by:

- direct wiring
- network wiring
- wireless networking

The distributed Metasys components and various connection methods ensure system-wide data sharing, coordination, and remote access.

Scalable

The Metasys system architecture is scalable. This means that you can add components as required to:

- control buildings and systems of varying complexity, size, and scope
- integrate third-party devices to unify their operation with the Metasys system
- integrate earlier generations of Metasys components to modernize and unify their operation

Metasys system architecture

Figure 2: Metasys system architecture
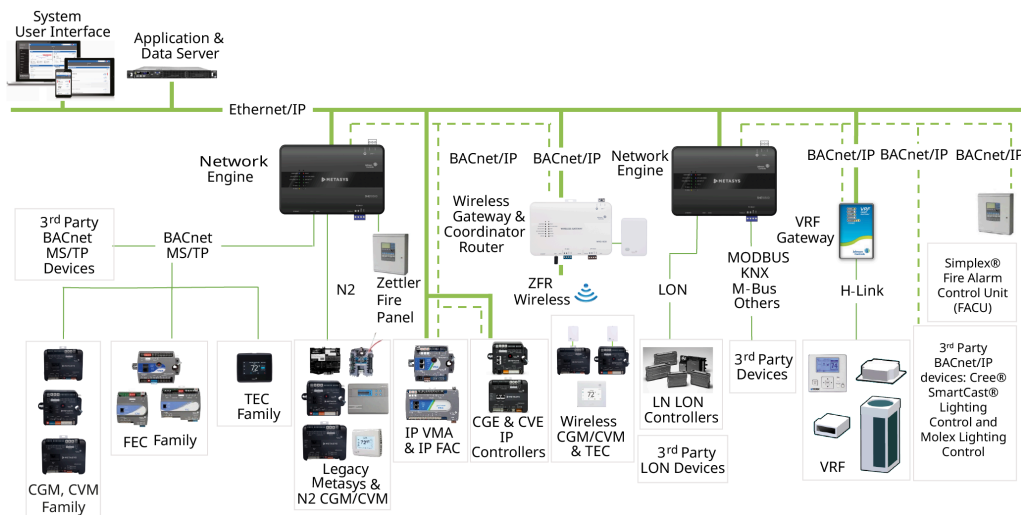
For more variations of the Metasys system architecture, refer to the *Metasys System Configuration Guide (LIT-12011832)*.

System attributes

Open

Because the Metasys system uses the standard data formats and communication protocols of the BAS and IT worlds, it is compatible with the networking infrastructure found in most buildings today. The Metasys system integrates building equipment and systems using BACnet/IP, BACnet MS/TP, N2, LonTalk®, MODBUS, M-Bus, KNX, OPC UA (new at Release 11.0) and web services communication technology. The Metasys system supports BACnet Protocol Revision 18. Johnson Controls BACnet devices and third-party BACnet devices can be connected directly to the IP Ethernet network or to the MS/TP Field Bus. BACnet/IP is also used to integrate SIMPLEX Fire Systems and lighting systems from preferred partners into the Metasys system.

LonWorks® controllers from Johnson Controls or LonMark® certified devices from other manufacturers can integrate into the Metasys system architecture. In a similar fashion, prior generations of N2-based Metasys components can integrate into the newer architecture, helping to modernize legacy Metasys installations. The Metasys system also communicates to third-party devices using MODBUS, KNX, and M-Bus integrations. Regardless of the protocols used, the data is available for display in the Metasys user interface, for archiving in application servers, and for transmission to other devices on the IP network.

The Metasys system also supports:

- HTTPS with TLS 1.2 as the secure communication protocol between network engines, Application and Data Servers (ADS), Open Application Servers (OAS), and web browsers
- Simple Network Management Protocol (SNMP) for alarm traps and object queries in the Management Information Base (MIB)
- Simple Network Time Protocol (SNTP) for network time synchronization
- Simple Mail Transfer Protocol (SMTP) for email message transfer
- Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) for device naming and dynamic network addressing
- Simple Object Access Protocol (SOAP) and XML, which transfer data between components of the system and make the data available to enterprise applications through the use of published web services
- Wireless communication standards, including Wi-Fi (used in network communication) and ZigBee® (for field controller and sensor mesh)
- The Microsoft® Active Directory® service, which provides a standard IT integration of the Metasys system into a customer's existing Active Directory service infrastructure for Site Management Portal (SMP) UI and Metasys UI login authentication purposes. Starting at Release 11.0, Active Directory includes Microsoft Active Directory Federation Services (ADFS) in addition to Active Directory LDAP authentication, with the ability to enforce two-factor authentication (2FA) when the ADFS Server is configured for 2FA.

  ⓘ **Note:** The Metasys UI is not available on sites with network engine Site Directors.

- The SQL database format, used by the Metasys server to store historical data, which facilitates the use of Microsoft SQL Server® software
- A growing suite of REST-compliant Application Programming Interfaces (APIs), including an API that enables reading, writing, and commanding of one or more Metasys objects/ properties to provide a secure way to bi-directionally integrate with third-party applications.

Secure

The Metasys system uses industry-standard system security and encoding protocols to help protect against unauthorized access to data and control systems.

The Metasys system includes the following security features:

- Support for local, Active Directory LDAP, Active Directory Federated System, and Microsoft® Office 365 authentication.
- Obscures user names and passwords.
- Enforces strong passwords and password phrases.
- Provides an optional capability of sending its configured audit log entries and alarm (event) notifications to an external, industry-standard Syslog server, conforming to Internet published RFC 3164.
- Provides dormant account settings for users and reports. Dormant user account reports are available in the Site Management Portal (SMP). These reports can be scheduled on a daily basis. Dormant user account events are also included in the Audit Viewer and the Event Viewer.

- HTTPS with TLS 1.2 between Metasys components, including the Metasys Server, Metasys UI, System Configuration Tool (SCT), and network engines. This enhancement ensures the highest level of security to protect your building automation system from unauthorized users and computer hackers.
- Self-signed certificates are installed on supported products, with the option of configuring trusted certificates.
- One of three security shield icons are displayed in the SMP and SCT UIs to indicate the current level of a connection: trusted, self-signed, or untrusted.
- SCT 13.0 and later releases offer improved security by forcing users to change default passwords as part of the workflow when interacting with NxEs.
- Updated software licensing technology ensures only licensed, authorized, and released software is running on customer's networks.
- Users have to log on to SCT with a Metasys local or Active Directory user account.

System components

A typical Metasys system architecture comprises three tiers of components:
- Equipment Controllers
- Network Engines
- Metasys Server

Equipment Controllers

Metasys equipment controllers directly monitor and operate the HVAC and other building system equipment using onboard inputs and outputs and locally processed control logic.

Metasys equipment controllers include multiple families of controllers:
- FAC/FEC/VMA series equipment controllers, which were first introduced at MSEA Release 2.1 and have since been expanded and enhanced over several releases
- CG/CV series equipment controllers, which were first introduced at Release 10.0 and are intended to succeed the FAC/FEC/VMA series (Figure 3)
- TEC Thermostat Controller family (Figure 5)
- LN Series LonWorks® Controller family (LN Series LonWorks Controllers)

Equipment Controller families

The CG/CV series and FAC/FEC/VMA series equipment controller families share several similarities. Both families consist of fully programmable, high performance devices designed specifically for controlling a wide range of mechanical and electrical equipment found in commercial buildings. The CG/CV series controllers are modernized successors to the FAC/FEC/VMA series and include improvements intended to ease selection, configuration, commissioning, and servicing.
- CG/CV Equipment Controller Family:
    - General Purpose Application Controllers (CGMs and CGEs)
    - VAV Box Equipment Controllers (CVMs and CVEs)
    - Input/Output (I/O) Expansion Modules (XPMs)
- FEC Field Equipment Controller Family:
    - Advanced Application Field Equipment Controllers (FACs)
    - Field Equipment Controllers (FECs)

- Variable Air Volume Modular Assemblies (VMAs)
- Input/Output Modules (IOMs)

See CG series and CV series Equipment Controller families for more information about CGMs, CGEs, CVMs, CVEs, and XPMs.

See Table 4 for a comparison of the FEC family controllers.

For further details about CGMs, CGEs, CVMs, CVEs, and XPMs, refer to the *Metasys CG, CV Equipment Controllers and XPM Expansion Modules Product Bulletin (LIT-12013105)*. For further details about FACs, FECs, VMAs, and IOMs, refer to the *Metasys System Field Equipment Controllers and Related Products Bulletin (LIT-12011042)*.

Onboard inputs and outputs

Equipment controllers feature onboard inputs to receive information such as temperature, pressure, humidity, CO_2, energy consumption, occupancy detection, and equipment status. Equipment controllers feature onboard outputs to control valve and damper actuators, sequence staged equipment, and turn equipment and lights on and off.

Equipment controller models are available with different I/O mixes, letting you select the most appropriate controller and I/O for the target equipment. Equipment controllers also offer universal inputs and configurable outputs, providing greater flexibility.

Onboard control logic

The control logic in the equipment controllers is fully programmable, making these controllers well-suited for controlling a wide variety of equipment. The equipment controllers feature advanced logic capabilities including:

- **State-Based Control Logic:** ensures the execution of only the specific control logic for any given state. State-based logic prevents energy-wasting control situations such as simultaneous heating and cooling.

- **Continuous Adaptive Control Algorithms:** provide better control over time by automatically adjusting tuning parameters in response to seasonal and other load changes.

Controller Configuration Tool (CCT)

The Controller Configuration Tool (CCT) is the interface to the equipment controllers' control logic, and provides visually intuitive screens for programming, simulating, and commissioning. CCT is well-suited for programmers of any skill level and provides multiple programming interfaces, including:

- **System Selection Wizard:** programmers can choose from a list of application programs and select their specific control options by using a check-the-box interface.

- **Sideloop Wizard:** programmers can easily add additional custom control logic to the main control application by using a check-the-box interface.

- **Logic Interface:** programmers can create unique, custom programs by selecting and connecting functional logic blocks. The Logic interface also allows programmers to add or modify the control logic of applications created by the System Selection and Sideloop Wizards and also to view the logic and data flow for troubleshooting.

Mobile Access Portal (MAP) Gateway

The MAP Gateway is targeted for use by electricians, commissioning contractors, and field technicians to help them quickly and efficiently perform commissioning and wiring validation functions for Metasys equipment controllers. It is a pocket-sized web server that provides a wireless mobile user interface to Metasys equipment controllers, TEC3000 Series Thermostats, and Smart Equipment Rooftop Units (RTUs). The mobile user interface can be displayed in the browser of a phone, tablet, or laptop computer. The MAP Gateway enables users to access, view, edit, and override key information from all devices connected on a common BACnet MS/TP field bus.

Field Controller (FC) Bus

The CG/CV and FEC family equipment controllers feature a Field Controller (FC) Bus to share information peer-to-peer and with other components of the Metasys system. The FC Bus also allows network engines to supervise the equipment controllers. The networking protocol options supported by the CG/CV and FEC equipment controller families include:

- **BACnet MS/TP:** Applies to installations where a high-speed, industry-standard, open communication protocol is preferred.

- **BACnet/IP:** Applies to installations where Ethernet cabling with a high-speed, industry-standard open communication protocol is preferred. This communication protocol is available with the Metasys CVE, CGE, FAC4911, and VMA1930 controllers. Metasys supports the following IP networking topologies, each with their own cost and network resiliency characteristics:
    - Star
    - Daisy chain
    - Ring, using Media Redundancy Protocol (MRP) and selected Cisco® IE switches

- **Wireless ZFR:** Applies to installations where a less invasive, more flexible networking alternative to hard wiring is preferred or is more affordable.

- **N2:** Applies to legacy Metasys system installations that have equipment controllers added, where they can share the same N2 bus as legacy Metasys controllers, such as UNTs, VMA14xx, and DX-9100s.

Sensor/Actuator (SA) Bus

In addition to their onboard I/O interfaces, the CG, CV, and FEC family equipment controllers feature a Sensor/Actuator (SA) Bus to gain additional input and output interfaces and to connect to networked end devices. SA Bus devices include:

- **Input/Output Expansion Modules (XPMs and IOMs):** add additional input and output interfaces to an equipment controller to aid in operating large or complex equipment (such as central plants or large air handlers).

- **Network Sensors:** measure temperature, humidity, CO_2, and occupancy, and transmit this information to the equipment controller. Various mounting options are available, including wall-mountable and duct-mountable sensors.

- **Variable Speed Drives (VSDs):** control fan and pump speed, and can be controlled directly by the equipment controller over the SA Bus.

CG series and CV series Equipment Controller families

The CG series and CV series equipment controller families were introduced at Metasys 10.0. At Release 11.0, we are expanding this next-generation equipment controller family to include three additional general purpose application equipment controller models, two VAV Box Controller models with position feedback, and three new I/O expansion modules. This next generation of equipment controllers features modernized packaging and styling, removable screw terminal blocks, three rotary dial switches for setting the MS/TP address, background file transfer, and more.

The newly added CGE and CVE models communicate using BACnet/IP, which provides further flexibility in choosing the devices for a site's network.

Additionally, new features introduced at Release 11.0 include factory-loaded, field-selectable applications in CV series controllers offering an alternative streamlined configuration workflow; a generic SA Bus object to enable a more nimble integration of approved BACnet MS/TP end devices on the SA Bus; SA Bus provisioning to streamline upgrade workflows; and support for BACnet Protocol Revision 18 for interoperability with third-party BACnet devices.

For more information about the features and benefits of the CG series and CV series equipment controller families, refer to *Metasys CG Series, CV Series Equipment Controllers and XPM Expansion Modules Product Bulletin (LIT-12013105)*.

Figure 3: General Purpose Application Controllers (CG series) and VAV Box Controllers (CV series)

Table 2: CG series and CV series controllers details

	M4-CGM04060-0	M4-CGE04060-0	M4-CGM09090-0	M4-CGE09090-0	M4-CVM03050-0	M4-CVM03050-0P	M4-CVE03050-0P
Description	General Purpose Application MS/TP Controller	General Purpose Application Ethernet Controller	General Purpose Application MS/TP Controller	General Purpose Application Ethernet Controller	VAV Box MS/TP Controller	VAV Box MS/TP Controller with position feedback	VAV Box Ethernet Controller with position feedback
Inputs and Outputs	10 total: • 3 Universal Inputs (UIs) • 1 Binary Input (BI) • 4 Configurable Outputs (COs) • 2 Binary Outputs (BO)		18 total: • 7 UIs • 2 BIs • 4 COs • 3 BOs • 2 Analog Outputs (AOs)		8 total: • 3 UIs • 2 COs • 3 BOs • Integral actuator • Integral DPT	8 total: • 3 UIs • 2 COs • 3 BOs • Integral actuator • Integral DPT • Integral potentiometer to sense actual VAV box damper position	
Communication Protocols	• FC Bus (BACnet MS/TP) • N2 (software switchable) • Zigbee for ZFR Pro Wireless Field Bus (add on modules)	BACnet/IP	• FC Bus (BACnet MS/TP) • N2 (software switchable) • Zigbee for ZFR Pro Wireless Field Bus (add on modules)	BACnet/IP	• FC Bus (BACnet MS/TP) • N2 (software switchable) • Zigbee for ZFR Pro Wireless Field Bus (add on modules)	• FC Bus (BACnet MS/TP) • N2 (software switchable) • Zigbee for ZFR Pro Wireless Field Bus (add on modules)	BACnet/IP

Table 2: CG series and CV series controllers details

	M4-CGM04060-0	M4-CGE04060-0	M4-CGM09090-0	M4-CGE09090-0	M4-CVM03050-0	M4-CVM03050-0P	M4-CVE03050-0P
Expandable through SA Bus	Yes						
Onboard Real Time Clock	Yes						

Figure 4: Expansion I/O modules

Table 3: New expansion I/O modules

Model number	M4-XPM04060-0	M4-XPM09090-0	M4-XPM18000-0
Description	Expansion I/O module		
Inputs and Outputs	10 total: • 3 UIs • 1 BI • 4 COs • 2 BOs	18 total: • 7 UIs • 2 BIs • 4 COs • 3 BOs • 2 AOs	18 BIs
Field Bus Networking	• FC Bus (BACnet MS/TP) • SA Bus		

FEC comparison

Table 4: Field Equipment Controller family comparison

	Advanced Application Field Equipment Controllers (FACs)	Field Equipment Controllers (FECs)	Variable Air Volume Modular Assemblies (VMAs)
Typical Applications	Controlling: • Equipment that requires local scheduling, alarming, and trending • Air Handling Equipment • Central Plant Equipment	Controlling: • Rooftop Units • Heat Pumps • Unit Ventilators • Air Handling Equipment • Central Plant Equipment • Exhaust Fans • Supplemental Heating Equipment	Controlling: • Pressure independent VAV boxes • Pressure dependent VAV boxes • Zone Dampers
Onboard Real Time Clock	Yes	No	Yes - on VMA1930 model only
Communication Protocols	• BACnet MS/TP (B-AAC) or N2 (field switchable) • BACnet/IP (B-AAC) (model FAC4911 only) • ZigBee Wireless (with an add-on module)	• BACnet MS/TP (B-ASC) or N2 (field switchable) • ZigBee Wireless (with an add-on module)	• BACnet MS/TP (B-ASC) or N2 (field switchable) • BACnet/IP (B-AAC): (model VMA1930 only) • ZigBee Wireless (with an add-on module)
Expandable through SA Bus	Yes		

TEC3x00 Networked Thermostat Controllers

TEC3x00 Networked Thermostat Controllers are specifically designed for controlling common commercial heating and cooling equipment. TEC3x00s are packaged in enclosures that are designed for mounting on a wall in the controlled space.

Figure 5: TEC3x00 Networked Thermostat Controller

The TEC3x00 Series Networked Thermostat Controllers provide on/off, floating, and proportional control of:

• local hydronic reheat valves

• pressure-dependent VAV equipment with or without local reheat

• two- or four-pipe fan coils

• cabinet unit heaters

• other zoning equipment using an on/off, floating, or 0 to 10 VDC proportional control input

Models also provide single- or two-stage control of unitary rooftop units (RTUs) with or without economizers and heat pumps. TEC3600 models feature field-selectable BACnet MS/TP or N2 communication capabilities for integration into the Metasys system. New TEC3000 models are available that feature embedded wireless field bus capabilities for wireless network integration into the Metasys system. All models include a USB port that allows simple backup and restore features, which enables rapid cloning of configuration between like units.

Some models have occupancy sensing capability built into the device. These thermostat controllers helps yield up to 30% energy savings in high-energy usage commercial buildings, such as schools and hotels, during occupied times by using additional standby setpoints.

All models feature an intuitive UI with backlit display that makes setup and operation quick and easy. Multiple fan configurations are supported for fan coil equipment types:

- single-speed
- multi-speed (two or three discrete speeds)
- variable-speed/EC motors (0 to 10 VDC control)

Some models support dehumidification on two-pipe fan coil units with reheat, and four-pipe fan coil units with or without reheat. When no heating is required, the thermostat controller monitors space humidity and activates dehumidification control as necessary. Heat and reheat are used as required to maintain the space temperature. For optimal dehumidification performance, use a fan coil unit that has a multi-speed or variable-speed fan (VSF).

For more information on TEC3x00s, refer to the *TEC3000 Series Stand-Alone and Field Selectable BACnet MS/TP or N2 Networked Thermostat Controllers Product Bulletin (LIT-12011954)*.

LN Series LonWorks Controllers

The Metasys system LN Series controllers use the LonWorks communication protocol and can be programmed using any compliant software, such as LN Builder. The plug-in for these devices features a graphical control logic interface that is custom-made to suit various control requirements.

LN Series controllers are fully programmable to monitor, control, and integrate a wide variety of HVAC and other building equipment, such as rooftop units, fan coils, heat pumps, unit ventilators, VAV boxes, multistage air handling units, chillers, boilers, and refrigeration systems.

Network Engines

Metasys network engines provide network management and system-wide control coordination over one or more networks of equipment controllers, including the following:

- Metasys CG series, CV series, FAC, FEC, VMA, TEC, and LN series equipment controllers
- Metasys CGE, CVE, FAC, and VMA IP equipment controllers using several different topologies
- Legacy Metasys controllers, such as UNTs, VMA14xx, and DX-9100s
- Third-party devices

Metasys network engines may also be networked together for scaling up on large projects, and they may be networked with a Metasys Server for additional functionality and site unification.

The Metasys system includes the following types of network engines:

- NxE series network engines, which were first introduced at MSEA Release 1.0 and have since been expanded and enhanced over several releases.
- SNx series network engines, which were first introduced at Release 10.1 and are intended to succeed the NxE series.

Refer to the *SNE/SNC Product Bulletin (LIT-12013296)* and the *Network Engines Product Bulletin (LIT-12012138)* for more information.

SNE Series Network Engines

At Release 11.0, we are introducing updated SNE series network engine models, which feature an updated main circuit board with improved design configured for future capabilities.

Also starting at Release 11.0, SNE models are FIPS 140-2 Level 1 certified. FIPS 140-2 is a U.S. government cyber security standard used to approve cryptographic modules and algorithms used for encryption. FIPS 140-2 is included by default in SNEs that have Release 11.0 software.

Figure 6: SNE series network engines

The following table outlines the SNE models in more detail.

Table 5: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
Succeeds	NAE55 Series	NAE45 Series	NAE35 Series	NAE45-Lite
Communication interfaces	• 1 Ethernet port • 2 RS-485 ports • 2 USB ports[2]	• 1 Ethernet port • 1 RS-485 port • 2 USB ports[2]		
Maximum allowed devices across all integrations. For example, MS/TP +IP. Includes VND integrations and devices brought in through routers.	600	150	60	110
BACnet/IP maximum trunks	1	1	1	1
BACnet/IP maximum devices per trunk	200	100	50	10
BACnet MS/TP maximum trunks	2	1	1	1

Table 5: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
BACnet MS/TP maximum devices per trunk (Johnson Controls devices only) ⓘ **Note:** A repeater is required if more than 50 Johnson Controls devices are on the same trunk.	100	100	50	100
BACnet MS/TP maximum devices per trunk (with 3rd party) ⓘ **Note:** A repeater is required if more than 32 devices are on the same trunk and some are 3rd party.	64	64	50	64
N2 maximum trunks	2	1	1	N/A
Mapped N2 devices per trunk ⓘ **Note:** A repeater is required if more than 50 devices are on the same trunk.	100	100	50	N/A
LonWorks maximum trunks	1	1	1	0
LonWorks maximum devices	255	127	60	0
Remote Field Bus maximum trunks	6	3	3	N/A
Remote Field Bus maximum Johnson Controls Devices per bus	32	32	32	N/A
Remote Field Bus maximum devices per bus (with 3rd party devices)	16	16	16	N/A
Maximum objects in device[3]	5000	2500	2500	2500

Table 5: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
Supported type of parent server	• ADS • ADX • OAS	• ADS • ADX • ADS-Lite-E • OAS	• ADS • ADX • ADS-Lite-E • OAS	ADS-Lite-A only

Supported integrations	• BACnet/IP
	  - Simplex® Fire Alarm Control Unit (FACU)
	  - Cree® SmartCast® Lighting Control
	  - Molex® Lighting Control
	• BACnet MS/TP Field Controller (FC) Bus
	• N2 Bus
	  ⓘ **Note:** The M4-SNE110Lx-0 model does not support the N2 Bus.
	• LonWorks® (requires USB to LON adapter)
	  ⓘ **Note:** The M4-SNE110Lx-0 model does not support the LonWorks network interface.
	• Modbus: Modbus TCP/IP on Ethernet and Modbus Remote Terminal Unit on RS-485
	• KNX IP
	• M-Bus
	• Tyco® C•CURE® 9000 and victor® Video Management
	• Zettler® Fire Panel
	• OPC Unified Architecture (OPCUA/UA)			

Operating System	Wind River® Linux LTS 17 (LTS=long-term support)			
Microprocessor	NXP i.MX6 DualLite processor			
Memory	Flash 2GB of DDR3 RAM and 16 GB of eMMC Flash			
User Interface	Site Management Portal (SMP)			

1   These models are intended for use with the ADS-Lite-A servers (only) in Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, Thailand, Vietnam, and select branches within regions of Africa and the Middle East.
2   Only the supported USB integration adapters function with the SNE. Other integration adapters that are not supported cannot function with the SNE.
3   Suggested object limit for performance considerations.

The SNE models introduced at Release 11.0 are direct replacements of the models launched at Release 10.1. The following table outlines this in more detail.

Table 6: New SNE models

Model number	Maximum number of supervised MS/TP devices	Succeeds	Directly replaces
M4-SNE10501-0	50	MS-NAE3510-2 MS-NAE3514-2 MS-NAE3520-2[1] MS-NIE3910-2[2] MS-NIE3920-2[1,2]	M4-SNE10500-0
M4-SNE11001-0	100	MS-NAE4510-2 MS-NAE4520-2[1] MS-NIE4910-2[2] MS-NIE4920-2[1,2]	M4-SNE11000-0
M4-SNE110L1-0[3]	100	MS-NAE451L-2[3]	M4-SNE110L0-0
M4-SNE22001-0	200	MS-NAE5510-3 MS-NAE5520-3[1] MS-NIE5960-3[2] MS-NIE5920-2[1,2]	M4-SNE22000-0

1   Also requires USB-to-LON Adapter (ACC-USBLON-0).
2   May require USB to RS-232 adapter (ACC-USBRS232-0).
3   SNE110L and NAE451L are restricted to select global regions.

NAE85 Network Engine

The NAE85 is a software-only series of Metasys network engine that performs a key role in the Metasys system architecture. The NAE85 provides network management and system-wide control and coordination over one or more networks of Metasys equipment controllers, including the following:

- CG series General Purpose Application Equipment Controllers
- CV series VAV Box Controllers
- FAC and FEC series Field Equipment Controllers
- VMA series VAV Box Controllers
- TEC series Terminal Equipment Controllers
- Third-party equipment controllers

The NAE85 runs on a Windows Server and provides most of the same functions and capabilities as the hardware network engine models, but with much higher point capacities. If customers need to integrate large numbers of IP devices into their Metasys network, they select the NAE85, which supports up to 1,000 devices. The NAE85 can be networked with an Application and Data Server (ADS), an Extended Application and Data Server (ADX), or an Open Application Server (OAS) for additional functionality and site unification. If the NAE85 is configured as a Site Director, it can support up to four other NAEs.

Figure 7: Site Management Portal UI on NAE85

For more information about the NAE85 network engine refer to the *NAE85 Catalog Page (LIT-1901148)*.

SNC Series Network Control Engines

The Metasys SNC series network control engine is a hybrid offering that provides both supervisory and equipment control in a unified offering. They provide network management and system-wide control coordination over one or more networks of equipment controllers, including the following Metasys equipment controllers:

- CG series General Purpose Application Equipment Controllers
- CV series VAV Box Controllers
- FAC and FEC series Field Equipment Controllers
- VMA series VAV Box Controllers
- TEC series Terminal Equipment Controllers
- LN series Equipment Controllers
- Third-party equipment controllers

In addition to providing supervisory control capabilities, the SNC series network control engines also feature onboard input and output interfaces (I/O) and programmable logic to provide direct control over HVAC and other building system equipment.

Figure 8: SNC series network control engines

At Release 11.0, we are introducing new models of the SNC series network control engines, which feature an onboard display and keypad. The 2.4 in. display with 320 x 240 resolution provides local user interface capabilities. This provides end customers with the ability to quickly and clearly monitor equipment status, view alarms, see trends, issue overrides, and change setpoints and parameters.

Also starting at Release 11.0, SNC models are FIPS 140-2 Level 1 certified. FIPS 140-2 is a U.S. government cyber security standard used to approve cryptographic modules and algorithms used for encryption. FIPS 140-2 is included by default in SNCs that have Release 11.0 software.

The following table outlines the SNC models in more detail.

Table 7: SNC series Network Control Engines details

Features	SNC2515x-0 SNC2515x-0H	SNC2515x-04 SNC2515x-04H	SNC1612x-0 SNC1612x-0H	SNC1612x-04 SNC1612x-04H
Succeeds	NCE25 Series	NCE25 Series	NCE25 Series	NCE25 Series
Onboard inputs and outputs	• 40 total onboard I/O: 14 UI, 11 BI, 4 CO, 4 AO, 7 BO • Supports SA Bus expansion		• 28 total onboard I/O: 10 UI, 6 BI, 4 CO, 4 AO, 4 BO • Supports SA Bus expansion	
Communication interfaces	• **1 Ethernet port**: SNC25150-0, SNC25150-04, SNC16120-0, SNC16120-04, SNC25152-0, SNC25152-04, SNC25152-0H, SNC25152-04H, SNC16122-0, SNC16122-04, SNC16122-0H, and SNC16122-04H • **2 Ethernet ports**: SNC25151-0, SNC25151-0H, SNC25151-04, SNC25151-04H, SNC16121-0, SNC16121-0H, SNC16121-04, SNC16121-04H • 1 RS-485 port • 2 USB ports for connecting external integration adapters[1]			
Maximum allowed devices across all integrations. For example, MS/TP +IP. Includes VND integrations and devices brought in through routers.	96	4	60	4
BACnet/IP maximum trunks	1	1	1	1
BACnet/IP maximum devices per trunk	55	4	55	4
BACnet MS/TP maximum trunks	1	1	1	1

Table 7: SNC series Network Control Engines details

Features	SNC2515x-0 SNC2515x-0H	SNC2515x-04 SNC2515x-04H	SNC1612x-0 SNC1612x-0H	SNC1612x-04 SNC1612x-04H
BACnet MS/TP maximum devices per trunk (Johnson Controls devices only)	55	4	55	4
BACnet MS/TP maximum devices per trunk (with 3rd party)	50	4	50	4
N2 maximum trunks	1	1	1	1
Mapped N2 devices per trunk	50	4	50	4
LON maximum devices per trunk	64	4	60	4
LON maximum trunks	1	1	1	1
Remote Field Bus maximum trunks[2]	3	3	3	3
Remote Field Bus maximum Johnson Controls Devices per bus	32	32	32	32
Remote Field Bus maximum devices per bus (with 3rd party devices)	16	16	16	16
Maximum objects in device[3]	2500	2500	2500	2500
Supported type of parent server	• ADS • ADX • ADS-Lite-E • OAS			

Table 7: SNC series Network Control Engines details

Features	SNC2515x-0 SNC2515x-0H	SNC2515x-04 SNC2515x-04H	SNC1612x-0 SNC1612x-0H	SNC1612x-04 SNC1612x-04H

Supported integration drivers	• BACnet/IP
	   - Simplex® Fire Alarm Control Unit (FACU)
	   - Cree® SmartCast® Lighting Control
	   - Molex® Lighting Control
	• BACnet MS/TP
	• N2 Bus
	• LonWorks® (requires USB to LON adapter)
	• Modbus: Modbus TCP/IP on Ethernet and Modbus Remote Terminal Unit on RS-485
	• KNX IP
	• M-Bus
	• Tyco® C•CURE® 9000 and victor® Video Management
	• Zettler® Fire Panel
	• OPC UA			

Operating System	Wind River® Linux LTS 17 (LTS=long-term support)			
Microprocessor	NXP i.MX6 DualLite processor			
Memory	2 GB of DDR3 RAM and 16 GB of eMMC Flash			
User Interface	Site Management Portal (SMP)			

1   Only the supported USB integration adapters function with the SNC. Other integration adapters that are not supported cannot function with the SNC.
2   The SNC requires Release 11.0 or higher to support the Remote Field Bus integration.
3   Suggested object limit for performance considerations.

ⓘ   **Note:** Servers must be equal to or at a higher Metasys Release than their child engines, including the SNCs.

Network Engine features and integrations

Field equipment network management and integration

Metasys network engines provide network management over one or more networks of equipment controllers and other field devices. Metasys network engines feature several optional communication port and protocol selections for integrating not only Metasys equipment controllers, but also hundreds of types of non-Metasys devices and third-party devices typically found in commercial buildings.

•   **BACnet/IP:** for managing networks of Metasys IP-based devices, such as CGEs, CVEs, FEC family controllers (models FAC4911 and VMA1930), and third-party BACnet/IP devices.

•   **BACnet MS/TP:** for managing networks of Metasys CGM, CVM, XPM, FAC, FEC, VMA, IOM, and TEC equipment controllers, non-Metasys BACnet MS/TP controllers, and third-party BACnet MS/TP devices.

•   **Remote Field Bus:** for connecting remote BACnet MS/TP devices such as CGMs, CVMs, XPMs, FACs, FECs, VMA16s, IOMs, TEC3600 series thermostats, and other BACnet MS/TP field devices using a BACnet/IP to MS/TP router.

- **SIMPLEX® Fire System:** The SIMPLEX Fire System provides a BACnet/IP integration with the Metasys system to automate building conditions when triggered by a fire event.

- **Lighting systems integrations:** LED lighting and sensor networks from preferred partners – Cree® and Molex® – are tightly integrated with the Metasys system for coordinated lighting behavior to alert occupants to critical building scenarios like fire, intruder alert, lockdown and code blue events.

- **ZETTLER® Fire Panels:** Integrates data sourced from Zettler Fire Detection System into Metasys. This integration enables Metasys to serve as a secondary fire notification system that can alert more occupants in the event of a fire.

- **C·CURE 9000 Access Control and victor Video Management Systems:** Vendor (VND) integration drivers are added to the Metasys system to provide data from C·CURE 9000 Access Control and victor Video Management Systems from Tyco Security Products.

- **ZFR and ZFR Pro Wireless Field Bus:** for wirelessly managing networks of Metasys CGM, CVM, FEC family and TEC3000 equipment controllers.

- **N2:** for managing networks of legacy Metasys equipment controllers, such as UNTs, VMA14xx, and DX-9100s and third-party N2 Open devices.

- **LonWorks:** for managing networks of Metasys LN LonWorks controllers, legacy LonWorks equipment controllers, such as DX-9200s and TCUs, and third-party LonWorks devices.

- **Modbus:** for managing networks of third-party Modbus devices, such as energy meters and process controllers.

- **KNX (formerly EIB):** for managing networks of KNX devices, such as window blinds and shading controls, lights, and meters.

- **M-Bus (EN 13757-3):** for managing networks of M-Bus devices, such as heat meters.

The Metasys network engine software normalizes data retrieved from these networked field devices into BACnet objects, so a common set of control processes and services can be applied to all devices in a unified manner.

Wireless Field Bus system

The Wireless Field Bus system provides a wireless platform across multiple levels of a Metasys building automation system (BAS), from network engines to equipment controllers and room sensors. Network engines require a Wireless Network Coordinator to interface to the wireless equipment controllers. Equipment controllers require only simple, add-on hardware to function wirelessly, and new models of TEC3000 network thermostats come with embedded wireless networking capabilities.

Wireless-enabled devices can coexist with hard-wired devices on the same Metasys network engine, providing a high degree of flexibility in installation design.

The Wireless Field Bus System provides a wireless alternative to hard-wired counterparts and facilitates easy initial location and relocation with minimal disruption to building occupants. The Wireless Field Bus System cost-effectively extends Metasys systems to applications where building aesthetics (such as solid walls or ceilings, temporary walls, or decorative surfaces) normally hinder hardwiring.

For more information, refer to the *WRG1830/ZFR183x Pro Series Wireless Technical Bulletin (LIT-12013553)* .

Automated system-wide control and coordination

Metasys network engines provide automated system-wide control and coordination over multiple field devices under one or more field device networks. Some examples of the system-wide control coordination capabilities include:

- **Scheduling:** enables network engines to automatically command any equipment or system integrated with Metasys to a preferred operational state (such as On/Off, Occupied/Unoccupied, Economy/Comfort, or Heating/Cooling/Economizer/Auto) based on a user-defined schedule. Operating parameters can be set according to time of day, days of the week, holidays, or calendar dates.

- **Alarm and Event Management:** enables the network engines to generate alarms based on user-defined criteria; to send alarm and event messages to web browsers, email servers, Network Management Systems, and serial printers; and to store and view alarm and event logs on the network engine and transfer the data to a Metasys Server.

- **Network-Wide System Interlocking:** enables network engines to collect data from field devices, make logical comparisons between the data, and issue relevant commands to other field equipment or systems, anywhere on the network.

- **Transaction Recording:** audits and logs all user actions performed through the network engine. Operators can review these logs to understand what changes have been made to the system, who made them, and when.

- **Historical Data:** can be collected and stored by network engines for any monitored data point value based on user-defined intervals or on a change of value. Network engines can transfer the data logs to the Application and Data Server at defined intervals or when the network engine logs are full.

- **Totalization:** allows network engines to calculate rolling sums of any monitored data point value stream. Operators can use this information to monitor runtime information useful for service, maintenance, and early identification of building system problems.

- **Optimal Start:** enables network engines to automatically determine the best time to start heating and cooling systems to ensure that the facility is conditioned for occupancy. It adjusts to seasonal variations and reduces energy use.

- **Demand Limiting Load Rolling (DLLR):** enables network engines to monitor energy (electricity, gas, steam, or water) meters and automatically shed equipment loads according to user-defined levels. Demand Limiting helps manage utility demand charges, and Load Rolling controls equipment operating levels to reduce total energy consumption. Comfort overrides prioritize equipment shedding.

Scalable

Different network engine models are available, each with different field device capacities, so you can select the model that best meets the size, complexity, and scope of your specific project.

For projects that exceed the capacity of a single engine, Metasys network engines may be networked together, and they may be networked with a Metasys Server for additional functionality and site unification. Also, a network engine, connected to a small number of other network engines, can act as a Metasys Site Director without the need for a Metasys Server.

Metasys Server

The Application and Data Server is an optional component that can be added to the Metasys system. The Server manages the collection and presentation of large amounts of trend data, event messages, operator transactions, and system configuration data, and provides one or more of the following:

- Site unification

- Long-term, large-scale storage of historical data
- Advanced reporting
- Metasys user interface, an intuitive user interface
- Site Management Portal (SMP) user interface, which provides advanced operation and system navigation tree to show a hierarchical network view of the entire system for all connected devices

At Release 10.1, a new server offering was introduced. The Open Application Server (OAS) combines many of the functions of a Network Engine with a Metasys Server into a single piece of software with optional add-on features that can be hosted on a virtual machine with required specifications or can be purchased as a turnkey offering, where Johnson Controls provides hardware with software already installed on it.

As Site Director, the OAS supports up to two supervisory devices, 200 field devices, and 20,000 objects. The OAS provides database software options for archiving licensed historical data using the Microsoft® SQL Server software database, and it enables secure communication to a range of Network Engines, including the NAEs, NCEs, SNEs, and SNCs. OAS is compatible with both Metasys UI and Site Management Portal (SMP), and can be configured through the System Configuration Tool (SCT).

Starting at Release 11.0, there is a new OAS variant. The OAS Minimum (M4-OASMIN-0) is a variant of the OAS offering whose capabilities are license-limited. The OAS Minimum cannot supervise child network engines unless a migration license is purchased. This new variant is offered at a lower price point than the OAS standard (M4-OASSTD-0). This provides an affordable Server option for smaller or less complex projects.

Also starting at Release 11.0, additional integrations are supported on the OAS. This enables more integration opportunities and openness in Metasys. The additional integrations include Modbus, M-Bus, KNX, Tyco C-Cure-victor, OPC Unified Architecture (UA).

Figure 9: OAS system diagram
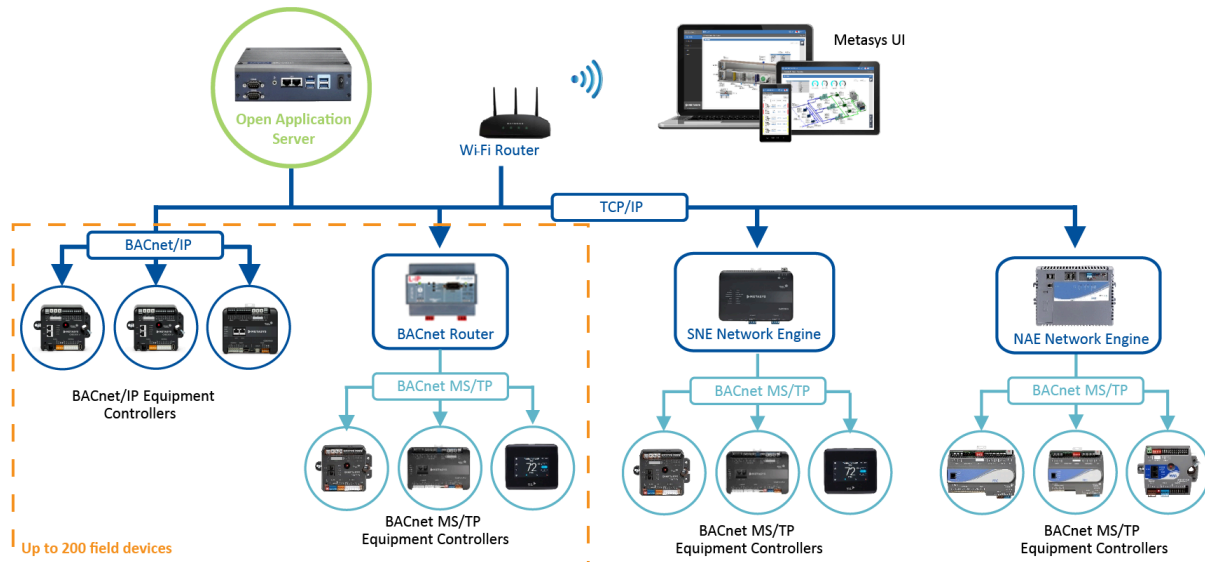
See Server comparison for a comparison of Metasys servers.

Server comparison

The Metasys Server software family includes variants with different feature sets to meet a variety of different applications.

Table 8: Metasys Server Family Comparison

Feature	Application and Data Server (ADS)	Extended Application and Data Server (ADX)	Open Application Server (OAS)
Host Platform	Desktop computer platform: • Microsoft Windows® operating system • Microsoft SQL Server Express database • Open Database Connectivity (ODBC) compliant database package	Server platform: • Microsoft® Windows Server® operating system • Microsoft SQL Server database	Turnkey and virtual desktop platform (virtual machine (VM)): • Microsoft Windows® operating system • Microsoft SQL Server Express database • Open Database Connectivity (ODBC) compliant database package Virtual server platform (VM): • Microsoft® Windows Server® operating system • Microsoft SQL Server database
Supported Simultaneous Users	Up to 5 users	Up to 10, 25, 50, or 100 users (license specific)	Up to 5 users
Network Engine Management	Up to 14 engines	Up to 1,000 engines ⓘ **Note:** support for engines varies depending on size of server hardware	OASMIN: 0 engines OASSTD: up to 2 engines
Archival of Historical Data	Manual, scheduled, or automatic	Manual, scheduled, or automatic	Manual, scheduled, or automatic ⓘ **Note:** This feature requires the **Metasys Historical Data Add-on** license, which needs to be purchased separately.
User Interface	Metasys UI SMP	Metasys UI SMP	Metasys UI SMP
Supports Export Utility	Yes	Yes	No
Supports Metasys Advanced Reporting	No	Yes	No
Supports Energy Essentials	No	Yes	No
Support for Split Configuration	No	Yes	No
Supports Metasys for Validated Environments (MVE)	No	Yes	No
Five Years of Historical Data in Metasys UI	Yes	Yes	Yes ⓘ **Note:** This feature requires the **Metasys Historical Data Add-on** license, which needs to be purchased separately.

Table 8: Metasys Server Family Comparison

Feature	Application and Data Server (ADS)	Extended Application and Data Server (ADX)	Open Application Server (OAS)
Metasys Database Manager	Yes	Yes	Yes
Support for Fault Detection and Fault Triage features	Yes	Yes	Yes ⓘ **Note:** At a minimum, you require 8GB of RAM and four virtual cores to support the Fault Detection and Fault Triage features on an OAS.

For more information, refer to the *Application and Data Server (ADS) and Extended Application and Data Server (ADX) Product Bulletin (LIT-1201525)* and to *Open Application Server (OAS) Product Bulletin (LIT-12013309)*.

Server features

FIPS 140-2 Level 1 compliance

FIPS 140-2 is a U.S. government cyber security standard that is used to approve cryptographic modules and algorithms used for encryption. At Release 11.0, we are introducing FIPS 140-2 as licensed add-on feature to the Metasys Server software products, including ADS, ADX, and OAS. This addition assures end customers that Metasys uses strong cyber security techniques to prevent unauthorized access to systems and data.

The following table provides more information about mixed site communication behaviors.

Table 9: FIPS 140-2 impact on mixed site communication behaviors

Communication behavior	Server Site Director and FIPS 140-2 status	
	Metasys Server at Release 11.0, and FIPS 140-2 is added.	**Metasys Server at Release 11.0, but FIPS 140-2 is not added.**
Can communicate with child network engines at Release 10.1 or earlier (FIPS 140-2 not available)	No	Yes
Can communicate with child network engines at Release 11.0 (FIPS 140-2 is default)	Yes	Yes

Metasys Application Programming Interface (API)

Additional enhancements to the Metasys Server software at Release 11.0 include an enhanced REST-compliant **Metasys Monitoring and Commanding Application Programming Interface (API)**. This API enables reading, writing, and commanding of one or more Metasys objects or properties to provide a secure way to bi-directionally integrate with third-party applications. At Release 11.0, this API is enhanced to optimize its integration with Johnson Controls Enterprise Management (JEM). This ensures a robust and cyber-secure integration between Metasys and JEM.

Site unification

Metasys network engines can network together for scaling up on large projects. When the number of Network Engines becomes larger than a single network engine can efficiently handle as the Site Director, you can add a Metasys Server as the Site Director to unify the system.

The Metasys Server connects to the network engines over the Ethernet IP network and coordinates access to the system for all users. You can use a VPN over a WAN for communication to devices in

other buildings or on remote sites; access remote sites over the Internet and an ISP, or by leased line or dial-up service using Remote Access Service (RAS) or the Point-to-Point Protocol (PPP).

Historical data storage and management

A Metasys Server can be added to the Metasys system when the long-term historical data storage needs exceed the capacity of a network engine. The Metasys Server connects to the network engines over the Ethernet IP network and offers manual, scheduled, and automatic archiving of historical data, including trend data, event messages, operator transactions, and system configuration data. See Server comparison to understand the archiving capabilities of each Metasys Server type.

Metasys operators can view up to five years' worth of data within Metasys UI. This feature helps operators identify opportunities for system performance improvements and energy savings by providing year-over-year energy reporting.

ⓘ   **Note:** This feature requires the **Metasys Historical Data Add-on** license for an OAS, which needs to be purchased separately.

Software licensing and software updates

Starting at Release 10.0, updated licensing technology and software delivery are available. Updates include software downloads, comprehensive licensing and entitlement management, and 24-hour, self-service licensing over the Internet. These enhancements help streamline software management for field technicians and customers, and protect customers' buildings and networks from cyber security threats by preventing unlicensed, unauthorized use of Metasys software products.

Starting at Release 11.0, Metasys UI administrator users receive notifications directly in the UI when licenses are expired, or when licenses are due to expire. Metasys UI administrator users also receive a software update notification when software updates are available. The software update notification feature identifies the latest software update for the Metasys server products, based on which one is installed with Metasys UI. For example, if your Metasys UI is installed with a Metasys OAS, you will see OAS update notifications only. Software Manager data is thereby displayed directly in the Metasys UI.

Metasys Export Utility

The Metasys Export Utility extracts historical trend, alarm, and audit data from the Network Engine or ADS/ADX. This data is then provided in several file formats, such as Microsoft Excel® spreadsheet (.xls) and Access® database (.mdb). You can instantly extract the selected data or schedule an extraction at a convenient time or interval.

ⓘ   **Note:** Metasys Export Utility is not supported for the Open Application Server (OAS).

Advanced Reporting

The Metasys Advanced Reporting System is an optional feature of the ADX that provides historical and configuration data reporting capabilities separate from those available in the Site Management Portal.

Metasys Advanced Reporting System allows authorized users to run reports to review the configuration and performance of the Metasys system. Users can easily view these reports in a web browser.

The following reports are available for the points included in the reporting system user views:

- Configuration Setup Review
- System Behavior
- Trend Report—statistical calculations and Mean Kinetic Temperature (MKT)
- Trend Detail Report—summary data

You can export a report and save it in a variety of formats, such as Microsoft Excel or PDF, for later use.

For information about the reporting capabilities offered by the Metasys UI, see Advanced Search and Reporting.

Energy Essentials

Energy Essentials is an add-on to the Metasys Advanced Reporting System and provides reports that transform stored energy data into meaningful information within the Metasys system. Energy Essentials offers the following seven reports:

- **Big Picture Energy:** a single high-level report that includes normalized source energy use.
- **Consumption:** similar to Big Picture Energy, a report that offers another level of detail on energy use in the default units of each energy type.
- **Electrical Energy:** a report focused on electrical energy information, including usage, peak demand, reactive power, and power factor.
- **Production:** a report focused on the energy that your site produces, including efficiency. For example, this report lets you see the true efficiency of your natural gas generator.
- **Simple Energy Cost:** a cost-based report, offering an easy-to-configure, high-level view of energy costs.
- **Load Profile:** a report focused on the daily demand profile, containing key information for developing strategies to minimize and defer peaks.
- **Equipment Runtime:** a report dedicated to the hours of runtime for equipment that typically represents a large percentage of overall usage. This report also includes the number of equipment starts for the reporting period.

Metasys Database Management

The Metasys Database Manager interacts with and monitors the trend, alarm (event), audit, and annotation databases on your Metasys Server. It provides both managing and monitoring database functions, handled in two separate windows:

- **Managing**: includes summarized information on methods for restoring Metasys system Metasys Server trend, alarm (event), audit, annotation, and reporting databases.
- **Monitoring**: continually reads database information and alerts you, using the taskbar icon, email, or both, based on user-configurable warning and alarm levels.

User Interface

Metasys UI

The Metasys UI is an HTML5-compliant web interface that provides device-agnostic access to Metasys from smartphones, tablets, and computers. The Metasys UI is an intuitive interface that reduces learning time, maximizes productivity of operators, and provides a seamless user experience no matter what type of client device is used to access the system. The client device does not require any additional software installation—no Java™, Microsoft Silverlight®, or Adobe® Flash® or other software from an online app store. The Metasys UI is included with any Metasys server: ADS, ADX (unified and split), OAS, and ADS-Lite.

ⓘ   **Note:** The server software must be licensed in order to log in to the Metasys UI.

Figure 10: Metasys UI

Dashboards and widgets

A dashboard organizes data in the Metasys UI to help operators see a complete picture of what is happening in a space, with a piece of equipment, or in a system such as a central plant. Within each dashboard, widgets provide specific operator interaction features. Operators can customize dashboards to suit specific needs, by allowing the selection of viewable widgets, widget order, and widget appearance, as well as being assigned by client device type.

The **Space Dashboard** provides a cohesive summary of the selected space, including the equipment that serves the space and potential problem areas in the space. The widgets shown in the Space Dashboard include the following:

- **Graphics** provide a visual representation of the selected space, enabling operators to quickly check the status of that space, uncover unusual system conditions, make relational comparisons between nearby spaces at-a-glance, and issue commands to improve performance or restore order. The Graphics widget displays digital representations of equipment or systems, with graphical symbols and animations created using the Graphics Manager.

- **Equipment Serving Space** identifies the equipment serving the selected space and then provides details about that equipment, including other equipment or systems that may be affecting that piece of equipment.

- **Potential Problem Areas** provides a single display showing all items in alarm, warning, overridden, out of service, and offline statuses in a space. This display lets you filter and view data that is important to you. Starting at Release 11.0, you can also use this widget to investigate and manage faults that occur on your site, if fault detection is licensed. The Potential Problem Areas widget can be used as a daily punch list to manage buildings more efficiently.

  ⓘ **Note:** For an OAS, you require the **Metasys Potential Problem Areas** license to access Potential Problem Areas Points. You require the **Metasys Fault Detection** and the **Metasys Fault Triage** licenses to access both Fault Detection and Fault Triage. You can use Fault Detection without a Fault Triage license, but you require both licenses for Fault Detection and Fault Triage to use Fault Triage.

- **Equipment Summary** is a table view listing all similar equipment that directly serves the selected space, and any downstream spaces. The Equipment Summary shows the most important information for each equipment and provides links to the equipment for even more detailed information.

- **Schedule** widget lists all schedules affecting the selected space, and displays if the schedules are enabled or disabled. Operators can then select, view, and edit specific schedules associated with a space. The Schedule widget summarizes how a space is affected by a scheduling strategy so that operators can understand the complete picture. The Schedule widget also provides a way to view effective schedule information for a specific date in the future, so that you can ensure it is set up correctly. Furthermore, the bulk scheduling feature allows operators to add exceptions to several schedules at once and to assign weekly schedules in bulk.

- Starting at Release 11.0, the Space Dashboard also supports the **Trend** widget. For details about the Trend widget see the section below.

The **Equipment Dashboard** provides a cohesive summary of a selected piece of equipment. The widgets shown in the Equipment Dashboard include the following:

- **Graphics** provide a visual representation of the selected space, enabling operators to quickly check the status of that space, uncover unusual system conditions, make relational comparisons between nearby spaces at-a-glance, and issue commands to improve performance or restore order. The Graphics widget displays digital representations of equipment or systems, with graphical symbols and animations created using the Graphics Manager.

- **Trend** widget is a chart showing up to ten points of historical data for a single piece of equipment at the same time. This widget enables operators to view historical equipment data, compare performance changes over time, and easily create PDF or CSV reports. Operators can identify patterns in equipment operation, including performance outliers using an intuitive candlestick chart that displays min, max, and averages. Starting at Release 11.0, operators can also select an un-trended point, and begin seeing its real-time present value plotted on a Trend chart. This feature is called Live trending. In addition, the Trend feature is enhanced at Release 11.0 to include the ability to choose to view raw or aggregated data, regardless of duration. Furthermore, the sample limit is increased to 50,000 samples and the individual trend sample limit was removed. This provides Metasys operators with more visibility into historical data.

- **Equipment Activity** enables operators to view alarm activity, network controller offline events, user changes, and annotations made in a date range of up to one year in the last five years for the selected piece of equipment. This widget enables operators to easily see and understand the correlation between disparate activities occurring in the system.

- **Equipment Relationships** identifies all relationships a piece of equipment has with other equipment, spaces, and network field controllers.

- **Equipment Data** lists all points and their real-time values for the selected piece of equipment, providing operators with detailed information about the operational status of the equipment.

- **Schedule** widget lists all schedules affecting the selected equipment, and displays if the schedules are enabled or disabled. Operators can then select, view, and edit specific schedules associated with a piece of equipment. The Schedule widget summarizes how a scheduling strategy affects the equipment so that operators can understand the complete picture. The Schedule widget also provides a way to view effective schedule information for a specific date in the future, so that you can ensure it is set up correctly. Furthermore, the bulk scheduling feature allows operators to add exceptions to several schedules at once and to assign weekly schedules in bulk.

The **Cyber Health Dashboard** provides a Metasys administrator with a centralized view of potential security-related issues or system issues which are detectable by a Metasys Server, but which may not surface as part of general system alarms. The administrator can also see out-of-date software at one glance. The widgets shown in the Cyber Health Dashboard include the following:

- **Security Analysis** provides you with a detailed breakdown of security issues and risks. The widget consists of a Summary tab, Critical Issues tab, Potential Risks tab, and Informational tab. The **Summary** tab shows a summary of critical issues and potential risks. The **Critical Issues** tab shows critical issues related to either the user accounts or server. The **Potential Risks** tab shows potential risks related to either the user accounts or server. The **Informational** tab shows informational items that are neither critical issues nor potential risks. For example, you can see how many total user accounts exist, or how many network engines have Metasys software at Release 8.1 or later. You can filter account-related and/or server-related issues. You can edit user details for account-related issues, and you can read policy recommendations pertaining to the issues.

- **System Status** shows an account overview in the form of a bar chart and an engine overview in the form of a doughnut chart. The **Engine Details** tab lists the name, IP address, certification expiration, firmware version, and status of the engines.

- **User Activity** shows all successful user login occurrences during a specified period of time, all unsuccessful user login occurrences during a specified period of time, and all account lock-out occurrences during a specified period of time.

At Release 11.0, you can export a Cyber Health Dashboard report in `.pdf` format. This enables Metasys operators to provide documented evidence of cyber security status and improves the sharing of cyber security information with other audiences, such as IT personnel.

Additional Metasys UI features are available that are not specifically located in the Space or Equipment Dashboard, including:

- **Alarm Manager** enables operators to view and take action on Metasys system alarms. The Alarm Manager rolls up occurrences of alarms to help operators prioritize the most important alarms and manage all occurrences of alarms in one operation. The Alarm Manager also displays an Alarm Summary that indicates how well the alarms are being managed. The Alarm Manager is accessible through the Metasys UI and full screen view, with a separate URL, well-suited for 24/7 operations centers. Spaces and equipment do not need to be configured for users to take advantage of the Alarm Manager. Users can navigate directly from the Alarm Manager to the Building Network through a link, without having to manually search the network tree after finding the root cause of an alarm. Starting at Release 11.0, operators have the ability to filter on Building Network items and they can also bulk annotate.

- **Alarm Monitor** provides a similar view as the Alarm Manager, but does not require the user to log into the Metasys system. The Alarm Monitor is well-suited for the types of users who do not require or do not have authorization for full Metasys access, but who are responsible for viewing alarms from multiple integrated building systems. Spaces and equipment do not need to be configured for users to take advantage of the Alarm Monitor.

- **Custom Trend Viewer** is a chart showing up to ten points of historical data from multiple pieces of equipment at the same time. This widget enables operators to see and compare performance changes over time. Operators can identify patterns in equipment operation, including performance outliers using an intuitive candlestick chart that displays min, max, and averages.

- Introduced at Release 11.0, **System Activity** is a system-level audit log that provides a time-line view of all audits that have occurred across an enterprise. Metasys operators can filter by user, for example, to get insight into who is taking what actions on their Metasys system. System Activity provides transparency to Metasys operators to understand what actions have been taken on their system and by whom.

- Starting at Release 11.0, operators can save trend studies (the specific points that are displayed on the trend graph, the trend graph type, and the trends' date and time range) and then reuse these Trend Studies at a later time. The **Trend Study Manager** is the single point of entry for creating and editing Metasys UI trend studies. With this feature, operators can easily access custom trends configured in a previous Metasys UI session, and they can also view and manage space and equipment associations with all supported trend studies.

Certain widgets are connected with Advanced Search and Reporting, which enables users to quickly create even more powerful reports by leveraging the power of the dashboard with the Advanced Search feature. The widgets connected with Advanced Search include the Equipment Summary widget, Equipment Serving Space widget, Equipment Data widget, Graphics widget, and the Summary View widget. See also Advanced Search and Reporting.

Building Network

Metasys users with appropriate access can visualize the configuration of the Metasys network using the All Items tree in the Building Network feature. Global status indicators enable users to visually identify network and operational issues for any item in the Metasys network. Spaces and equipment do not need to be configured for users to take advantage of the Building Network feature in Metasys UI.

Starting at Release 11.0, users can add, delete, and configure objects directly from the Building Network tree in Metasys UI. Users can add, delete, and configure the following objects: integrations, devices and point objects, trends, alarms, schedules, and scheduled items. This reduces the need for Metasys operators to use a different UI to perform these configuration tasks.

Each item integrated into the Metasys system has a dashboard, where users can diagnose issues with the building network by viewing and editing detailed item information, and by viewing historical trend data. The widgets shown in the Building Network dashboard include the following:

- **Detail** shows the user the current value and status of the item being viewed and allows the user to issue commands. The Detail widget contains the focus, diagnostic, and network views that allow the user to view and edit detailed information for each item integrated into Metasys.

- **Summary** widget allows the user to quickly identify operational issues with the network item by displaying a tabular rollup of data under the current network item. For instance, a listing of data points' present value and status under a network field controller.

- **Relationships** allows the user to identify which space or equipment the network item serves.

- **Trend** widget is a chart showing up to ten points of historical data being collected on the Metasys network item at the same time. This widget enables users to view historical data, compare changes over time, and easily create PDF or CSV reports. Users can identify patterns including outliers, using the intuitive candlestick chart that displays min, max, and averages.

- **Involvement** identifies what is currently attempting to control an object. The widget provides a visual depiction of what is involved with the object including what is serving it and what it is serving. The widget includes real-time values at every connection point in the involvement. The widget also distinguishes between operator commands and references (logic connections). Involvement helps operators identify the root cause of system issues more quickly.

Some network dashboards, such as Schedules and Graphics, display the associated schedule summary or graphic widget, in addition to other widgets available in the Building Network dashboard.

Intuitive navigation

The Metasys UI provides the following methods for operators to easily and quickly find information about their system:

- **Spaces Tree** is a set of links to each Space Dashboard. These links are intuitively organized by the site's physical hierarchy.
- **Building Network Tree** provides access to objects using an alternative navigation tree to the Spaces tree. The Building Network tree organizes objects according to the Metasys object hierarchy, similar to the All Items tree in the Site Management Portal.
- **Bookmarking** provides a way for operators to quickly access favorite or most-frequently visited dashboards simply by bookmarking each location in the browser.
- **Search Bar** enables operators to quickly access specific dashboards by entering the first few letters of the name of the space or equipment.

Fault Detection and Fault Triage

Fault Detection

- Fault Detection is a licensed add-on feature to the Metasys Server software products, including ADS, ADX, and OAS.

  ⓘ **Note:** At a minimum, you require 8GB of RAM and four virtual cores to support the Fault Detection and Fault Triage features on an OAS.

- This feature identifies building system-related faults and lists them in order of severity, whereby it leverages Johnson Controls-defined rules and a semantic data model to ease configuration.
- Fault Detection helps operators identify issues of building systems that are not operating correctly, prevent energy waste, and avoid comfort complaints. The feature is delivered in a way that minimizes configuration workflows.

Fault Triage

- Fault Triage is a licensed add-on feature to Fault Detection and the Metasys Server software products, including ADS, ADX, and OAS.

  ⓘ **Note:** At a minimum, you require 8GB of RAM and four virtual cores to support the Fault Detection and Fault Triage features on an OAS.

- Fault Triage improves the fault list order by adding fault duration and occurrence to the sorting logic, which improves driving the biggest problems to the top of the list.
- Fault Triage leverages the Johnson Controls Field Support Knowledge Database to suggest possible causes, their likelihood, and appropriate corrective actions.

- The feature captures corrective action activity including not tried, tried, and solved issues with the ability to add notes.

- In addition, Fault Triage offers automatically generated, multi-stacked charting of fault data for each fault occurrence.

- Fault Triage provides an assisted experience for less experienced HVAC controls technicians.

The functionalities of Fault Triage and Fault Detection are documented in detail in the *Potential Problem Areas widget* section of *Metasys UI Help (LIT-12011953)*.

Advanced Search and Reporting

The Advanced Search and Reporting feature brings powerful insights to all Metasys users by providing an intuitive and easy method to gather and analyze data. Users can quickly search for data across the Building Network tree or by spaces or equipment. Using a series of filters, including wildcards, you can refine your search results. For example, you can search for all zone temperature points in a specific space.

With the Advanced Search results, you can:

- Create reports showing historical activity, alarms, audits, and trend data based on a defined time range, or create reports showing the present values of selected objects. This provides Metasys administrators with real-time information without requiring a log in.

- Export report data to .csv or .pdf file formats on an ad hoc basis or by scheduling a report. You can send scheduled reports to an email address or a network location automatically.

- Issue bulk commands to selected points.

- Perform bulk modify of multiple objects or attributes on a single object.

Table 10: Advanced Search and Reporting features

Feature	Description
Scheduled Reports	Provides the ability to schedule the email delivery of reports to up to 10 specified recipients. Report templates can be saved and be executed "on-demand" in the future. ⓘ **Note:** OAS requires the **Metasys Scheduled Reports** license for this functionality.
Advanced Search filter by Equipment Definition short names	Enables the filtering down of an Advanced Search to only include specific Equipment Definition short names.
Time Picker	Enables the initiation of reporting and filtering for a specified time range, including for ranges less than one day.

Table 10: Advanced Search and Reporting features

Feature	Description
Bulk Modify	Enables the modification of multiple objects or multiple attributes on a single object.
Smart Filtering	Enables launching directly from certain widgets into a pre-filled Advanced Search. The filters are filled based on the equipment, space, and object information included in the widget. Users can launch Advanced Search from the following widgets: • Equipment Summary widget • Equipment Serving Space widget • Equipment Data widget • Graphics widget • Summary View widget

▶ **Important:** Spaces and equipment do not need to be configured for users to take advantage of the Advanced Search and Reporting feature. Advanced Search is available on computer and tablet platforms, but it is not available on phone platforms. Additionally, the Reporting, Bulk Commanding, and Bulk Modifying features of Advanced Search are not available on tablet or phone platforms.

User Management

The User Management feature facilitates the creation and management of users and their roles, category-based permissions, and privileges directly in Metasys UI Online, without the need to install software on client machines. Administrators can create and manage user details for Active Directory and Metasys local users. Starting at Release 11.0, Active Directory includes Microsoft® Active Directory Federation Services (ADFS), including two-factor authentication (2FA) when the ADFS Server is configured for 2FA. This single sign-on solution helps prevent unauthorized access to Metasys, which, if not prevented, could result in data, financial, and reputational loss, system disruption, and other negative consequences.

This feature is also available in the Metasys Site Management Portal (SMP), but over time it will be available in Metasys UI Online only.

Space Authorization

Users can assign user access permissions to specific spaces and the equipment serving those spaces with Space Authorization. This allows for segmented user access by physical space within the building or campus.

Remote Notifications

The Remote Notifications feature in the Metasys UI replaces the Server Destination Delivery Agents (DDAs) in the Site Management Portal (SMP). DDAs facilitate the routing of event and audit messages generated on the Metasys Server or engine.

With the Remote Notifications feature you can configure the routing and filtering of event and audit messages directly in the Metasys UI for each Metasys Server or engine, without the need to install software on client machines.

ⓘ **Note:** Starting at Metasys Release 10.1, SMP management of Server DDAs has been removed. Management of Server DDAs is available with the Remote Notifications feature in Metasys UI only. However, SMP management of Server DDAs is still available for MVE sites.

The main Remote Notification features are as follows

- **Space and Equipment filters**: Operators can specify space(s) and equipment for which to receive remote notifications, which improves the existing remote notification configuration workflow, as existing users are required to create numerous custom categories in order to achieve this level of functionality today.

- **Test email**: Operators can send out a test email to confirm that the remote notifications are configured correctly and that recipients are able to receive them. This prevents missed notifications due to misconfiguration.

- **Alarm Escalation**: If an alarm has not been acknowledged or discarded by recipients in a specified period of time, an additional set of recipients will be notified.[1] This provides Metasys administrators with a way to reduce the risk of operators missing critical alarms that could lead to compliance issues in critical spaces. This also ensures that alarm notifications are reaching the appropriate recipients, to prevent issues from becoming major breakdowns.

- **Send Announcement**: Starting at Release 11.0, the Send Announcement feature provides the ability to send announcements to selected users. The announcement can be delivered by email, on a login banner, and on a home page banner. This feature enables information sharing and collaboration between multiple Metasys operators on a single site.

Enhanced Commanding

The Metasys UI includes the following features that enhance the practice of commanding or changing values, enabling operators to restore order quickly and efficiently and avoid unplanned rework.

- Timed Operator Commands enable operators to easily set time limits on the manual commands, such as issuing an override or taking a point out of service, to ensure the system reverts to automatic control. This can help reduce energy costs and reduce comfort complaints caused by the system staying in manual control for too long.

- The Annotations on Commands feature provides a means for operators to add a note when issuing a command, such as issuing an override or taking a point out of service. The note appears in the Equipment Activity widget to help operators trace system behavior back to manual commands and why they were issued. Administrators can choose to apply a setting to force users to add Annotations. This prevents confusion and clarifies understanding of why a Metasys operator made a change in the system.

- The commanding dialog view with integrated Priority Array identifies the current command priorities. This helps operators troubleshoot issues faster by making it easier for them to determine what command priority is currently active on a point object.

- Users can navigate directly from the Commanding Dialog to the Building Network through a link, without having to manually search the network tree after finding the root cause of an alarm or other issue.

- Metasys UI supports all existing SMP commands. This enables Metasys operators to perform all SMP commands on objects that are supported in Metasys UI.

Metasys UI tools

Several tools are available to help you create the Metasys UI. The System Configuration Tool (SCT) allows you to quickly define the spaces hierarchy, equipment definitions, and serving relationships. The Rapid Archive Creation streamlines the generation of the entire Metasys database for new or retrofit Metasys installations.

Metasys UI comes with an embedded graphics package to enable system designers to create the Graphics widgets using photo-realistic graphical representations of equipment and spaces. No

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1   If the alarm clears before the specified period of time expires and without being acknowledged, the alarm escalation is still sent.

separate software or license is required to use the Graphics Manager and Editor. An extensive library of graphic templates, symbols, and controls is provided with the Metasys UI, simplifying the task of graphic creation. Customized graphics symbols can be created using the Custom Behaviors feature.

The Metasys UI also supports viewing of graphics that were created with earlier versions of Metasys graphics tools. Standard graphics created with the User Graphics Tool (UGT) and Graphics + graphics created with the Graphics+ Generation Tool (GGT) can be associated with spaces, equipment, and field controllers and be viewable in the Metasys UI without manual conversion.

The Metasys UI Offline offers the ability to view how the Metasys UI looks in order to validate the UI's configuration. You can view the spaces and equipment configuration and view the graphics associated with the space and equipment. The Metasys UI Offline leverages the SCT archives instead of the live site. The Metasys UI Offline is automatically installed along with the SCT.

Site Management Portal (SMP)

Network engines and Metasys Server configurations include an embedded user interface called the Site Management Portal (SMP), which operators can access for system navigation and operation.

The SMP does not require any special workstation software—only a web browser and a Johnson Controls specific Java® plug-in. Authorized users simply log in to the network engine or Metasys Server using a web browser to access the Site Management Portal. This embedded user interface is ideal for smaller networks and remote locations where a dedicated computer platform to support a user interface is not required, and also for sites where a Metasys network view and advanced operations are preferred.

ⓘ   **Note:** The Metasys server must be licensed in order to log in to the SMP UI.

Some of the key features of the SMP include the following:

Table 11: Key features of the SMP

Feature	Description
System Security	Enables network engines to recognize users with valid user names and passwords at the Site Management Portal user interface. User access data is encrypted in transmission and in the Network Engine database. To indicate the active security level, a shield icon appears on the SMP login and UI screens: green (encrypted and trusted), orange (encrypted), or red (untrusted). The system administrator manages user profiles, authorization levels, user names, passwords, and network engine data access privileges in each user account.
Standard System Navigation tree	Shows a hierarchical network view of the entire system for all connected devices.
Monitoring and control	Work with all the mechanical and electrical systems in a typical building by collecting data from field devices. The required commands are then coordinated and sent to the controlled equipment at the required priority.
Global Search	Enables Site Management Portal operators to search the Metasys system and manage lists of objects, which can be used by other features for commanding, trending, reporting, and object selection.
Global Command	Allows Site Management Portal operators to send a single command to multiple objects and view a log of the command results.

Table 11: Key features of the SMP

Feature	Description
Trend Studies	Show the historical data records of one or more data points in a single view for analyzing building system performance and quickly locating system problems.
Reports	Offer a snapshot view of the current exception situations and summary data in the entire site or in a selected area of the site, and enable you to locate points that need attention.

The SMP also provides online system configuration to efficiently streamline the process of setting up or reconfiguring one or more network engines, including:

- automatic discovery of field devices on a network engine's BACnet, LonWorks, and N2 buses to accelerate the configuration process
- simple creation of customized user navigation trees and powerful tabular summaries
- custom graphics configuration
- setting of user access rights and permissions
- point naming and setting of operating parameters
- graphical Logic Connector Tool (LCT) for custom programming
- downloading, uploading, and archiving network engine databases
- support of the configuration and commissioning tools for controllers on the N2 bus, BACnet MS/TP bus, ZFR, and ZFR Pro wireless mesh networks
- demand limiting and load rolling configurations

ⓘ **Note:** SMP officially enters its end-of-support phase starting at Metasys Release 12.0.

System Configuration Tool (SCT)

The System Configuration Tool (SCT) provides an offline mechanism for a project design engineer to configure the network engines and Metasys Server along with the Space and Equipment relationships for the Metasys UI. The SCT can be integrated with the site to provide database loading and scheduled backups of the entire site. In addition to installing the SCT software, the SCT installer has been improved to install the required third-party software components, all with a single click of the mouse.

ⓘ **Note:** SCT must be licensed in order to log in.

With **SCT Pro**, users can quickly and easily provision new, out-of-the-box Network Engines. Users can complete any of the following tasks:

- Provision a new Network Engine
- Upload and download a site
- Perform a backup of a site
- Schedule automatic recurring backups
- Restore a site from a backup
- Upgrade a device
- Discover devices on the same subnet as the SCT Pro server

SCT Pro is installed during the installation of SCT Release 13.0 and later. Users can launch the new HTML user interface from SCT or from a URL on any client device type (workstation, tablet, or phone).

The following table provides an overview of the SCT, Metasys Server, and NAE Update Tool releases:

Table 12: Metasys Server, SCT, and NAE Update Tool releases

Release Date	Metasys Server	SCT	NAE Update Tool
October 2015	Release 7.0	Release 7.0	Release 7.0
September 2016	Release 8.0	Release 11.0	Release 11.0
February 2017	Release 8.1	Release 11.1	Release 11.1
August 2017	Release 9.0	Release 12.0	Release 12.0
December 2018	Release 10.0	Release 13.0	Release 13.0
October 2019	Release 10.1	Release 13.2	Release 13.2
October 2020	Release 11.0	Release 14.0[1]	The NAE Update Tool continues to be a component of the SCT install. However, we encourage you to use SCT Pro instead of the NAE Update Tool.
November 2020	Release 11.0	Release 14.1	
May 2021	Release 11.0	Release 13.3 and Release 14.2	

1   SCT 14.0 was discontinued when SCT 14.1 was released.

For a list of updated features and benefits available at the latest SCT Release, refer to the *System Configuration Tool Catalog Page (LIT-1900198)*.

System configurations for special applications

LonWorks Control Server (LCS)

The LCS85 is a high-capacity server that allows the integration of large LonWorks network systems. The LCS85 uses an open-architecture flat LonWorks system to monitor and supervise HVAC equipment, lighting, security, fire, and access control. The LCS85 supports a comprehensive set of supervisory features and functions for large facilities and technologically advanced buildings and complexes. When configured as the Site Director, the LCS85 can support up to four Metasys network engines.

A single LCS85 within a building provides monitoring and control, alarm and event management, data exchange, trending, energy management, scheduling, and data storage. For more information refer to *LonWorks Control Server (LCS) 85 Product Bulletin (LIT-12011549)*.

Metasys for Validated Environments (MVE)

Metasys for Validated Environments (MVE) is designed for facilities that require regulatory compliance for their environmental control systems. MVE controls environmental conditions and audits user management for critical environments, such as hospitals, research facilities, food production centers, and other production environments where tight control is crucial to product success.

MVE provides traceable electronic records, signatures, and time-stamped audit trails for facilities, helping customers comply with:

- Food and Drug Administration (FDA) Title 21, Code of Federal Regulations Part 11

- Annex 11 of the European Union Good Manufacturing Practice (EU GMP) regulations (European Medicines Agency [EMEA] 1998)
- Agency regulations around the world that deal with electronic records and electronic signature requirements

The MVE feature operates on an ADX and communicates to validated Network Engine models.

ⓘ **Note:** All validated engines have to be at the same release as the validated site director. For example, if the validated engines are at 11.0, the validated site director also needs to be at 11.0. However, you can have non-validated engines at a previous release (10.1 or earlier). Refer to *Metasys for Validated Environments, Extended Architecture Product Bulletin (LIT-12011326)* for further information about validated engines.

ⓘ **Note:** MVE sites support SMP, but not Metasys UI.

UL/864 Smoke Control Listed systems

The Metasys system at Release 8.1 can be configured to provide a UL/cUL 864 UUKL 10th Edition Smoke Control Listed system. The system integrates a fire alarm system, such as the Intelligent Fire Controller (IFC) fire alarm panel, the Firefighter's Smoke Control Station, and damper and fan control points throughout the facility using BACnet MS/TP and legacy N2 Bus devices.

The Metasys Smoke Control System includes a set of UL/cUL 864 UUKL 10th Edition Smoke Control hardware components Listed for indoor, dry environments. The smoke control applications are targeted to be run in specific models (designated with a -U suffix) within the network engine and Field Equipment Controller (FEC) families. SMP is the supported UI in the 10th Edition Listing.

The UL/cUL 864 UUKL 10th Edition Smoke Control Listing at Release 8.1 includes the listing for the US and Canada at 10th Edition. The listing title is Metasys System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System.

Summary

Today's Metasys system is our most advanced system ever. Johnson Controls continuously strives to find new ways to make Metasys work harder for you and help you work smarter. We are constantly innovating to make sure our software, user interface, monitoring, and analytics are the best available.

Related documentation

Refer to the following literature for technical specifications and information on operating and performance characteristics of the Metasys system.

Table 13: Related documentation

For information about	Refer to document
Metasys system overview	*Metasys System Configuration Guide (LIT-12011832)*
General Purpose Application Controllers (CGs), VAV Box Equipment Controllers (CVs), and I/O Expansion Modules (XPMs)	*Metasys CG, CV Equipment Controllers and XPM Expansion Modules Product Bulletin (LIT-12013105)*
Metasys system FEC family controllers and related products	*Metasys System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)*
Cisco® switch technology for Metasys network	*Cisco IE 2000 and IE 4010 Ethernet Switches for Metasys Networks Installation Instructions and Troubleshooting Guide (LIT-12013055)*

Table 13: Related documentation

For information about	Refer to document
Controller Configuration Tool (CCT)	*Controller Configuration Tool (CCT) Catalog Page (LIT-1900386)*
LonWorks®-based products for integration into Metasys system	*LN Series Controllers Overview Product Bulletin (LIT-1201979)*
SNE Series Network Engines and SNC Series Network Control Engines	*SNE/SNC Product Bulletin (LIT-12013296)*
SNE Series Network Engines commissioning	*SNE Commissioning Guide (LIT-12013352)*
SNC Series Network Control Engines commissioning	*SNC Commissioning Guide (LIT-12013295)*
Network Engines	*Network Engines Product Bulletin (LIT-12012138)*
Network Engine commissioning for KNX vendor integration	*Network Engine Commissioning for KNX Vendor Integration (LIT-12013148)*
Network Engine commissioning for M-Bus vendor integration	*Network Engine Commissioning for M-Bus Vendor Integration (LIT-12013149)*
Network Engine commissioning for Modbus vendor integration	*Network Engine Commissioning for Modbus Vendor Integration (LIT-12013150)*
Network Engine commissioning for C·CURE 9000 Access Control and victor Video Management integration	*Network Engine Commissioning for C·CURE 9000 Access Control and victor Video Management Integration (LIT-12013151)*
Network Engine commissioning for Cree® Digital Lighting Systems Integration	*Metasys System Commissioning for Cree Digital Lighting Systems Integration (LIT-12013152)*
Network Engine commissioning for Molex® Digital Lighting Systems Integration	*Metasys System Commissioning for Molex Digital Lighting Systems Integration (LIT-12013153)*
Network Engine commissioning for Simplex® Fire System integration	*Network Engine Commissioning for Simplex Fire System Integration Application Note (LIT-12013060)*
Network Engine commissioning for Zettler® Fire Panel integration	*Network Engine Commissioning for Zettler MX Speak 6.0 Vendor Integration (LIT-12013269)*
Application and Data Server and Extended Application and Data Server	*Application and Data Server (ADS) and Extended Application and Data Server (ADX) Product Bulletin (LIT-1201525)*
Open Application Server	*Open Application Server (OAS) Product Bulletin (LIT-12013309)*
Metasys UI Help and overview	*Metasys UI Help (LIT-12011953)*
Export Utility	*Metasys Export Utility Product Bulletin (LIT-1201800)*
System Configuration Tool (SCT)	*System Configuration Tool Catalog Page (LIT-1900198)*
System Configuration Tool (SCT) Pro	*Metasys SCT Pro Help (LIT-12013035)*
LonWorks® Control Server (LCS) 85	*LCS85 Product Bulletin (LIT-12011549)*
Metasys for Validated Environments (MVE)	*Metasys for Validated Environments, Extended Architecture Product Bulletin (LIT-12011326)*
Metasys Release 8.1 Smoke Control System	*Metasys System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System Catalog Page (LIT-1901048)*

Table 13: Related documentation

For information about	Refer to document
Commissioning a Metasys Release 8.1 Smoke Control System	*Metasys System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System Technical Bulletin (LIT-12012487)*
Software licensing	*Software Manager Help (LIT-12012389)*
Metasys API	Metasys API documentation: Includes a Quick Start Guide, REST API documentation, Frequently Asked Questions section, and Example Applications. *Metasys REST API Client for .NET and COM Developer Guide (LIT-12013522)*
ZFR Pro Wireless	*WRG1830/ZFR183x Pro Series Wireless Technical Bulletin (LIT-12013553)*

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

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