Honeywell

Experion

Control Hardware Notifications

Theory

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Notices and Trademarks

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About This Document

Provides information about how control hardware related alarm and event conditions are monitored in the Experion system.

Release Information

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References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title

Contacts

World Wide Web

The following Honeywell web sites may be of interest to Process Solutions customers.

Honeywell Organization	WWW Address (URL)
Corporate	*http://www.honeywell.com*
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Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	**ATTENTION:** Identifies information that requires special consideration.
	**TIP:** Identifies advice or hints for the user, often in terms of performing a task.
	**REFERENCE -EXTERNAL:** Identifies an additional source of information outside of the bookset.
	**REFERENCE - INTERNAL:** Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING**: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.

Symbol	Definition
	**WARNING, Risk of electrical shock**: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	**ESD HAZARD:** Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	**Protective Earth (PE) terminal**: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	**Functional earth terminal**: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	**Earth Ground**: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	**Chassis Ground**: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

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Notification System

Design Basics and Component Identification

Overall Scheme

The Experion sytem generates notifications when it detects certain changes in the process or the control system. For reference purposes, Experion notifications fall into one of these general notification classes.

Notification Class	Description
Message	Operator message defined as part of user-configured MESSAGE function block within Control Builder.
Operator Change	A journal entry triggered by an operator change in value for a function block parameter. Changes made through Station displays and Monitoring mode in Control Builder are journalized.
Process Alarm	A condition defined as part of a user-configured control strategy within the Control Builder application.
System Diagnostic	A condition determined by system diagnostic software.
System Information	A condition based on the execution of a system service and it may not be an explicit user configuration.
System State	A condition determined by the change of state in the process control equipment or a major component of the equipment.
Third-Party Alarms	Similar to process alarms, but the points for these alarms are not linked to Control Module function blocks. These alarms are defined as part of user-configured Status, Analog, and/or Accumulator points through the Quick Builder application.

Figure 1 shows the overall scheme that the Experion system uses for notification generation. While the Experion Server knows of all the "points" in the system, the alarm detection and annunciation determination occurs in the Control Processor. Note that the term event is used interchangeably with notification.

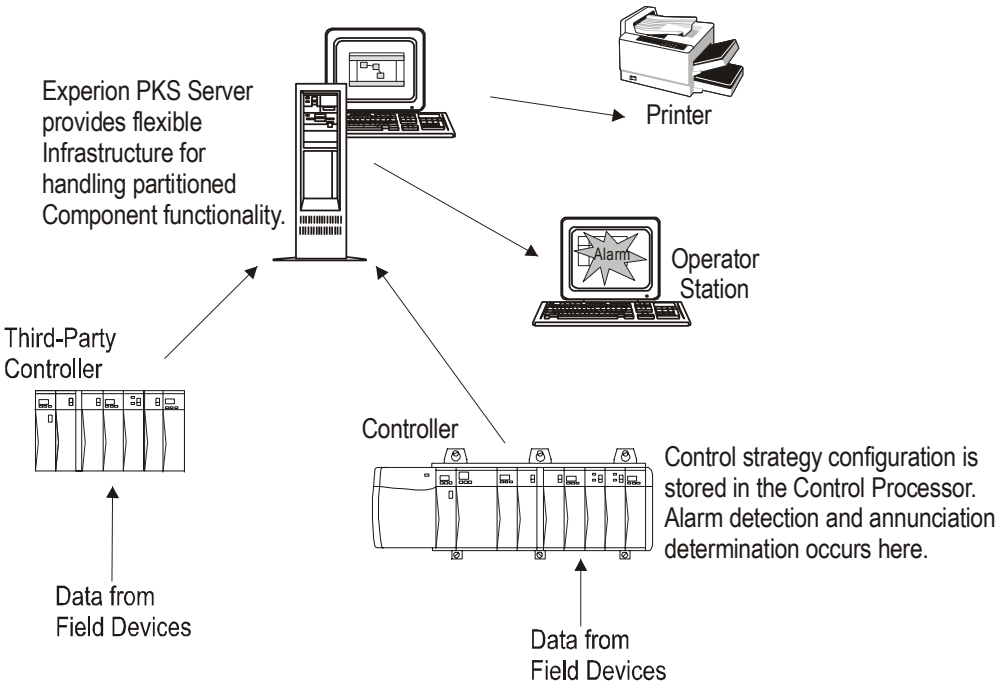

Figure 1 Experion scheme for notification generation.

Communications model

Figure 2 shows how the communications hierarchy for the Experion system compares with the International Standards Organization (ISO) - Open Systems Interconnection (OSI) model. The Control Data Access (CDA) is the communications application layer for the Experion system. CDA provides these two major communication services:

- Named Access, and
- Notifications.

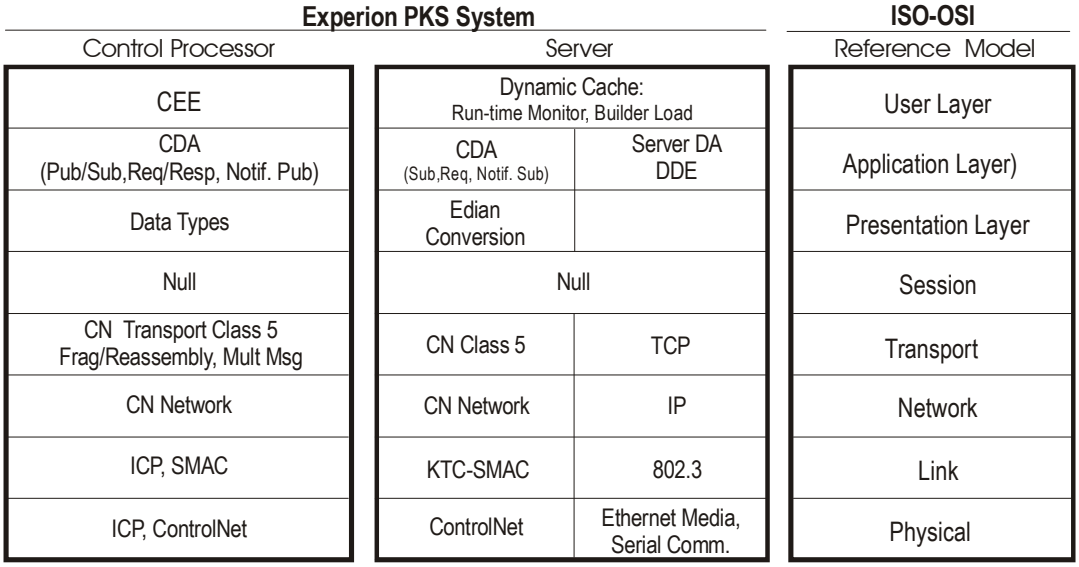

Figure 2 Experion communications hierarchy comparison.

Distribution model

Figure 3 is a graphic representation of the flow of notification data in Experion sytem. The emphasis is on CDA communication services and its relationship with the notification classes previously listed in this document. Particular emphasis is given to the process alarm class, which is defined as part of the Control Module configuration through the Control Builder application. The pertinent control data is identified as Experion points. These points are stored in the server's Real Time Database (RTDB) whenever the configured Control Module is loaded into the Control Processor (in the Hybrid Controller). Server subsystems can handle the processing of notification data for operator displays, printouts, reports, and logs.

Figure 3 includes a third-party controller to show that alarm and events generated by another controller can be integrated with Experion data. You configure third-party controller data as Analog, Status, and/or Accumulator points through the Quick Builder application. These points are also stored in the server's RTDB and processed by server subsystems. This means that third-party controller notification data is seamlessly integrated with Experion notifications.

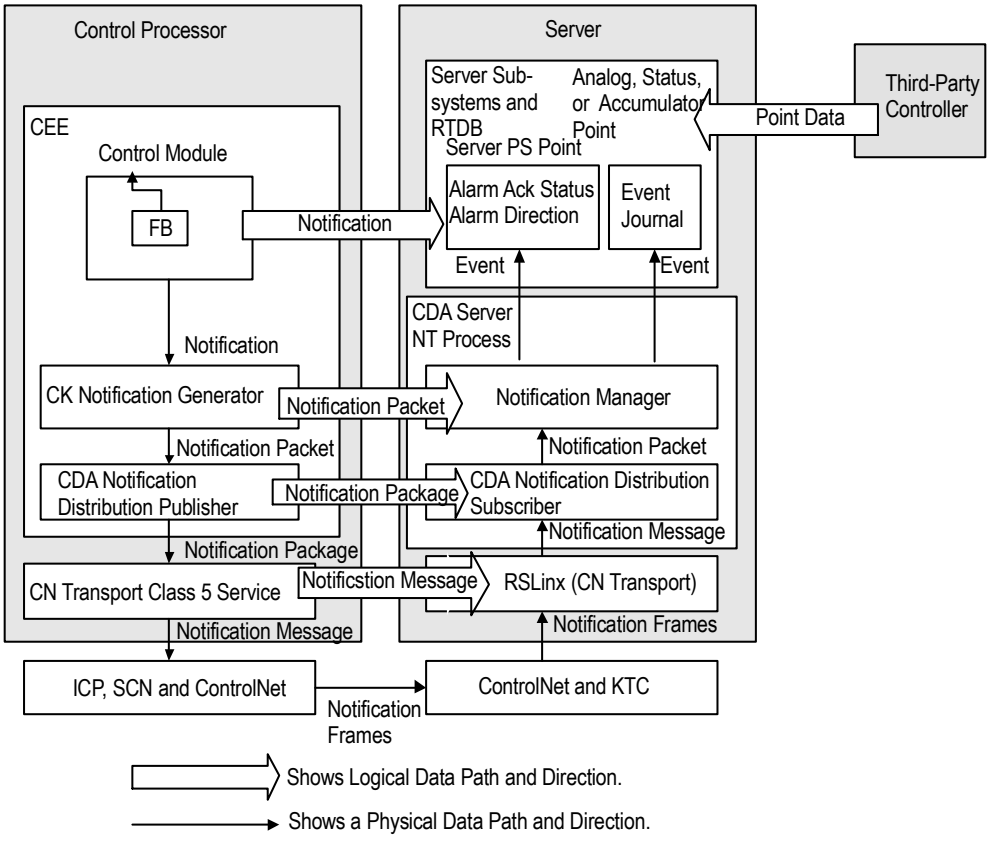

Figure 3 Notifications data flow diagram.

Control functions summary

We refer to the following elements, relative to the flow diagram in Figure 3, as control functions. These functions deal primarily with transforming detected notifications into notification packets, and passing those packets to the notification distribution system.

- Control Execution Environment (CEE)
- Control Module (CM) and Sequential Control Module (SCM) - not shown
- Function Block (FB)
- Control Kernel (CK)

Three additional elements, not included in the list above, that get involved with generating notifications are:

- Notification Manager (NM),
- Network Diagnostic Manager (NDM), and
- Station Display subsystem.

The NM detects and generates system diagnostic events and state changes. The NDM complements the NM by periodically checking the status of all the devices that are physically part of the system, but they are not explicitly configured as part of the user's control strategy. The NDM detects and generates system alarms or events depending on the severity of the conditions reported by the physical devices. The following table lists the devices checked by the NDM for reference. (Note that NDM is active on both the Primary and Secondary Server in systems with redundant Servers; however on the Secondary Server, NDM only monitors the PCIC device.)

Display Abbreviation	Description
CL	Control Logic 5550 Controller
CNETDRVR	RSLinx ControlNet Driver
CNI	ControlNet Interface Module
ENET	Ethernet Module
ENETDRVR	RSLinx Ethernet Driver
GW	ControlNet Gateway for either Series A or Series H Rail I/O.
KTC	CNI ISA PC to ControlNet Interface Card
LD	Fieldbus Linking Device
PCIC	PCI PC to ControlNet Interface Card
PLC	Family of Programmable Logic Controllers
RM	Redundancy Module
FTEB	Fault Tolerant Ethernet Bridge module

The Station Display generates operator change events for those changes made to CM parameters from a Station display. The Station application can be included on the Experion Server as well as a remote Operator Station.

The roles that these control functions play in the notification operation are summarized below.

Control Function	Notification Role
CEE	Serves as notification generator for all notifications that are detected by blocks within the Control Processor, these would include the Control Processor, CEE, IOM, CM SCM, and function blocks (FB). However, if the Control Processor is in a not OK state (which does not support CEE execution), then the Control Processor does not support notification generation.
Control Kernel	Executes blocks in an automatic and synchronous fashion, according to specified period and execution order. Supports the transport of variable values between blocks, by letting the client blocks do a call-get or a call-store of supplier blocks. Manages mapping of external block identifiers to internal database. Serves as a main interface between CDA and function block database. Manages notification distribution from each CM and SCM to the CDA notification publisher. Processes event recovery requests by commanding the same from each assigned CM.
Control Module and Sequential Control Module	Provide tag name for alarms sent by the function blocks. Provide alarm enable/disable function, so users can initiate or suppress notification traffic. Provide point active/inactive function, so users can access given function block parameters.
Function Block (FB)	Detects notification condition for configured alarms and events. Supports disable and enable alarms, and recreate event methods. It passes disabled alarms to the CM. Invokes the recreate event method, when the alarm enable is set (disabled cleared) to restore current alarm and event information. Note that CM invokes recreate event for notification regeneration, due to recovery.

CDA functions summary

We refer to the following elements, relative to the flow diagram in Figure 3, as CDA functions. These functions deal primarily with the communication services that send notification packets from a publisher (server) to a subscriber (client). This includes both the distribution of notifications on the ControlNet from the Control Processor to the Experion Server as well as distribution from the server to event clients.

- CDA Notification Distribution Publisher
- Notification Manager
- Event Journal
- Alarm Journal
- CDA Notification Distribution Subscriber
- Network Diagnostic Manager
- Notification Client

The roles that these CDA functions play in the notification operation are summarized below.

CDA Function	Notification Role
Alarm Journal	Serves as Server log for all alarms passed to the Station Alarm Summary display and other displays as well as reports.
CDA Notification Distribution Publisher	Takes notifications from one (or more) notification generator and distributes them on ControlNet to a CDA Notification Distribution Subscriber. If the CK-CDA event queue is full, CK stops putting events into the queue, and it puts backpressure on its event producers. There is no “queue full” event sent by CDA to the server. CK is not allowed to overwrite existing events in the queue.
CDA Notification Distribution Subscriber	Initiates and maintains the connection to all ControlNet based Notification Distribution Publishers and passes the notifications it receives on this channel to the Notification Manager.
Event Journal	Serves as Server log for all events passed to the Station Event Summary display and/or reports.
Network Diagnostic Manager	Reports its events and alarms to the Notification Manager (NM) for final reporting to the registered client. It periodically polls network status.
Notification Client	Receives events from the Notification Manager.

CDA Function	Notification Role
Notification Manager	Receives all notifications from all notification generators. It formats all events for the server (Unicode to MCBS, enumeration conversion, CDA handle conversion) and passes the events to the registered client.

About Transport services

The CDA Notification Distribution makes use of the CNET Transport System for:

- large (greater than 500 byte) published messages through fragmentation/reassembly,
- transport layer acknowledgment per frame,
- CNET Network priority “High” (highest priority unscheduled service on ControlNet), and
- queued interface between interchange and CDA Notification Distribution Subscriber.

System summary

The Experion Notification System uses dynamic communication services to provide comprehensive generation, distribution , management and recovery of all notifications from process alarms through operator change classifications.

The Notification System in no way impacts the controller’s ability to execute its primary control functions including interaction with I/O devices and peer control with other control devices.

Alarm and Event Processing

Related Operation Documentation

Please refer to the *Operators Guide* in Knowledge Builder for more information about all Station displays including Alarm Summary and Event Summary displays. The following information is provided for convenient reference only. If you should find a contradiction between the information, the information in the Operators Guide takes prescedence.

Alarm indication

The Station application provides an Alarm Summary display that lets you view all the current and unacknowledged alarms in the system or just those alarms with configured priority level of high and/or urgent, or just those assigned to a given area.

While the Alarm Summary display shown in Figure 4 is the focal point for viewing alarms, individual alarms can appear on any display including Detail, Group, Trend, and user built schematics. Alarms that are configured for a priority of journal are not displayed but can be included in a report or logged in a printed journal.

Alarm indications are displayed in this general format on the Summary display:

- <Date&Time><Area><Source><Condition><Priority>< Description> <Trip Value><Live Value><Units>

The following table provides a more detailed description for each of the display fields.

Display Field	Description
Date&Time	Shows the date and time the Experion Server received the alarm.
Area	Shows the area assignment for the point or device.
Source	The name of the alarm source. For Experion, this is the tag name or the NDM coded identification tag. If the name is too long to be fully displayed in the alarm summary, it is truncated. To see the full name, move the cursor over the partial point ID to display the full name.
Condition	The alarm condition being indicated.
Priority	Shows the priority assignment of the alarm: **U** for urgent, **H** for high, and **L** for low. Can also show the severity assignment of the alarm, if applicable. Severity can be a number between 0 to 15.
Description	A description of the alarm. For Experion, this is the configurable Basic Function Block description. If the description is too long to be fully displayed in the alarm summary, it is truncated. To see the full description, move the cursor over the partial description to display the full description.
Trip Value	The value that triggered the alarm. Not applicable for all points.
Live Value	The current value. Not applicable for all points.
Units	The unit that the value represents. For example, ml/s. Not appplicable for all points.

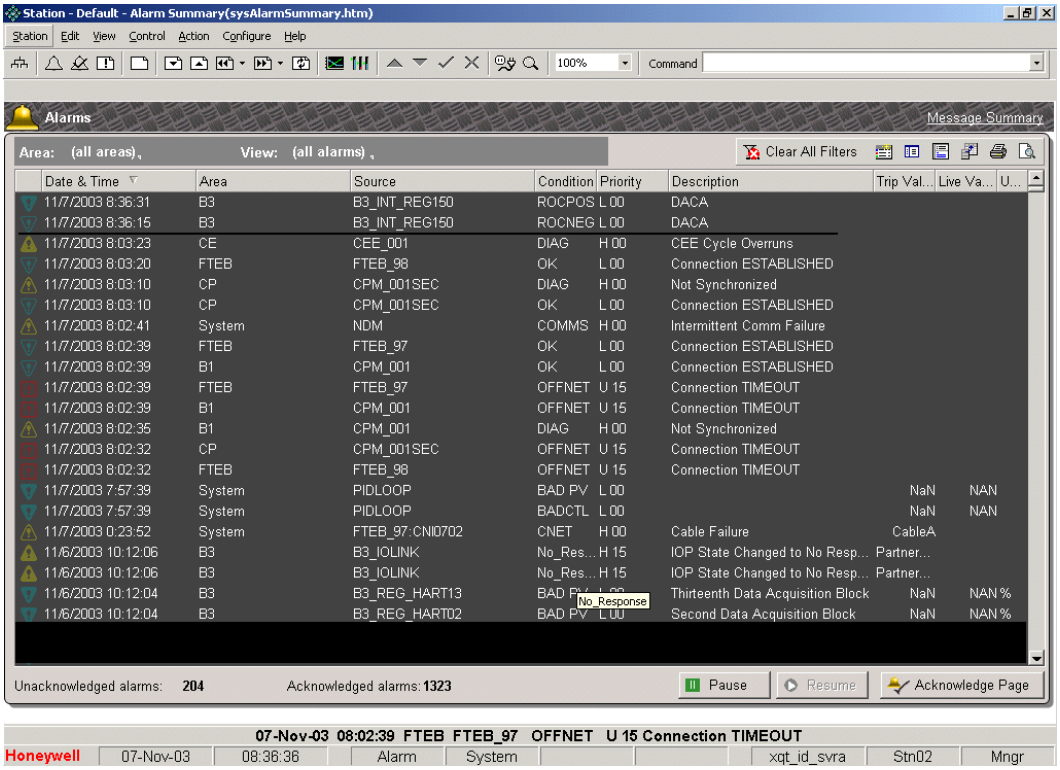

Figure 4 Alarm Summary Display Example.

As shown in the following figure, symbols and color are used to signify the relative importance of an alarm indication. Refer to the *Changing What is Shown in the Alarm Summary* section in the *Operators Guide* for more information.

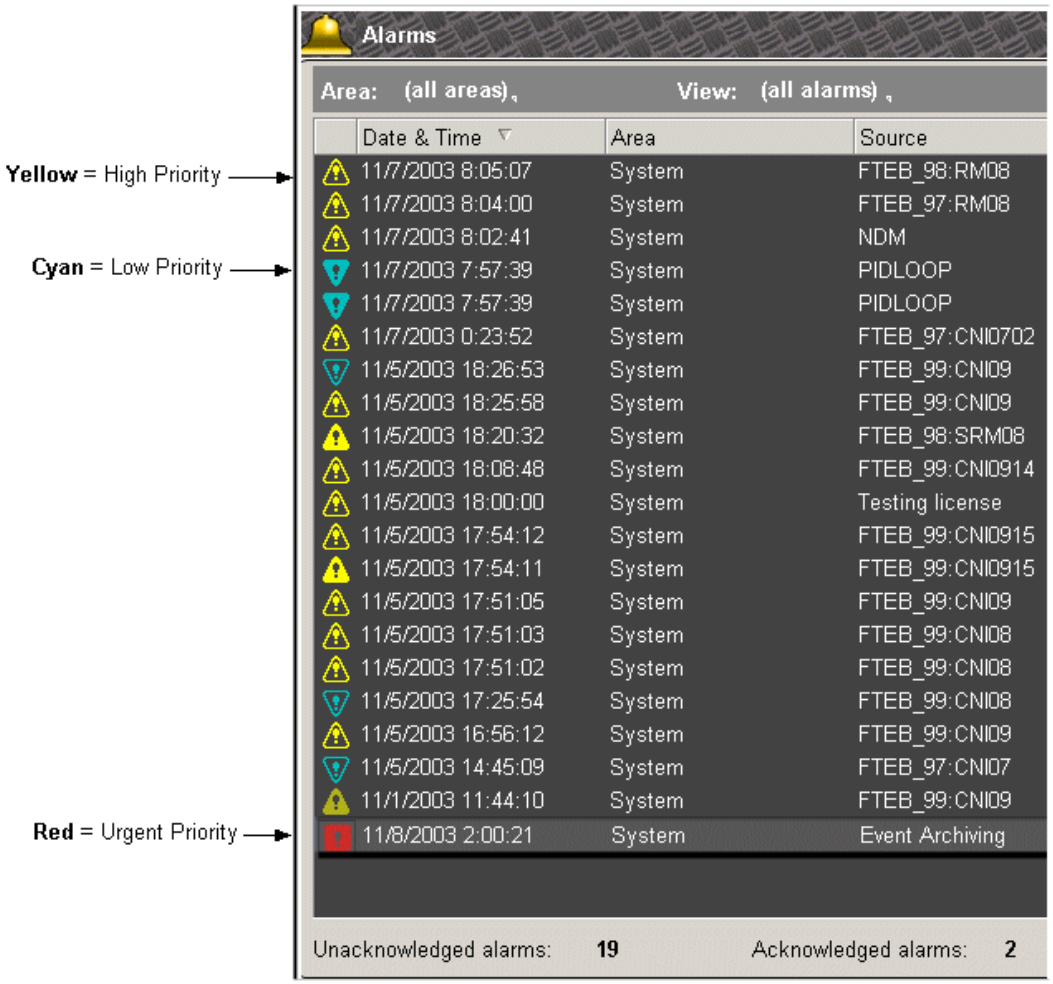

Figure 5 Example of alarm indicator field on alarm summary display.

Alarm types

The alarm types associated with function blocks in a Control Module or Sequential Control Module are listed below.

Alarm Definition	Alarm Type Text	Function Block
Control Module Alarms		
No alarm exists	blank	All
Deviation from Advisory Setpoint	ADVDEV	PID
High Deviation from Setpoint	DEVHI	PID
Low Deviation from Setpoint	DEVLO	PID
PV Rate of Change Exceeded configured rate in negative (descending) direction	PVROCN	DATAACQ
PV Rate of Change Exceeded configured rate in positive (ascending) direction	PVROCP	DATAACQ
PV is Off Normal	OFFNRM	DEVCTL
PV High Trip Point Exceeded	PVHIGH	DATAACQ
PV Low Trip Point Exceeded	PVLOW	DATAACQ
PV High High Trip Point Exceeded	PVHIHI	DATAACQ
PV Low Low Trip Point Exceeded	PVLOLO	DATAACQ
Bad Control	BADCTL	PID
PV is BAD	BADPV	DATAACQ, DEVCTL

Alarm Definition	Alarm Type Text	Function Block
SCM Alarms		
No alarm exists	blank	All
Abnormal Execution Failure	FAIL	SCM Container
Step Timeout Alarm	STEPTO	SCM Container
STATE Alarm - Hold	HOLD	SCM Container
STATE Alarm - Stop	STOP	SCM Container
STATE Alarm - Abort	ABORT	SCM Container

NDM Overview

The Network Diagnostic Manager (NDM) monitors the devices physically present that are not explicitly configured as part of the user's control strategy. NDM perodically updates the scan list to add and remove device of interest and monitors the devices on the scan list. It searches the Supervisory network for devices of interest, including all slots within supervisory chassis, all downlinks, and all slots within remote chassis. It monitors the devices on the scan list and generates notifications for noteworthy events. For example, the status of a connecting cable and the fault status of a device.

NDM detects various Critical Communication Failures and stops the Control Data Access (CDA) Server service to allow for redundant server failover. Prior to stopping the CDA Server service, an indication of the specific communication fault detected is both appended to the Error Log and posted as a diagnostic alarm. Refer to the *Control Hardware Troubleshooting and Maintenance Guide* for details on critical communication failure notifications detected by the NDM.

NDM tag-coding scheme

The NDM uses an automatic tag-coding scheme to identify physical devices that are resident in the Experion system architecture. The NDM scans all devices present in the system even if the associated Control Processor module (CPM) is not configured. In most cases, the tag name is sufficient to identify a device.

For communication related devices, an automatic tag coding scheme that is based on a combination of the tag name and the display abbreviation for a given device, as noted previously, appended with appropriate numeric code data. As shown in the following illustration, the basic format for the appended code is device slot number (ss) and MAC address for connected CNI in remote chassis (mm) with a Fault Tolerant Ethernet or Ethernet supervisory network.

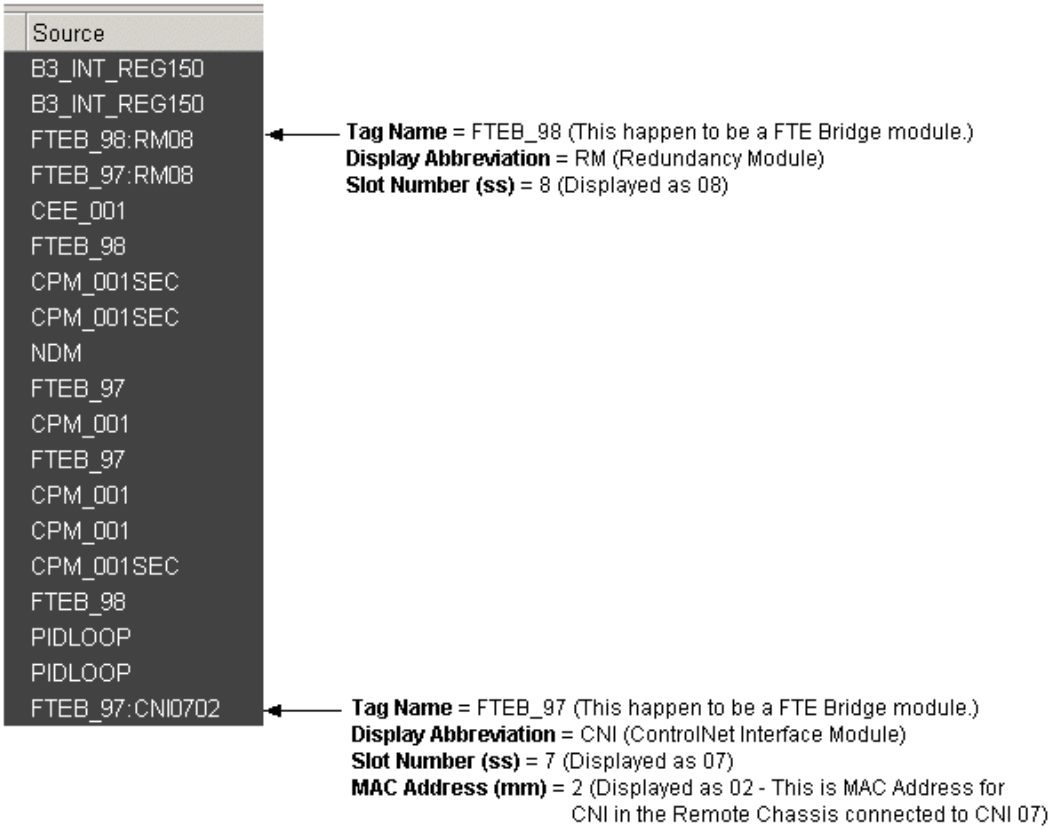

Figure 6 Typical NDM Coding Scheme for Device Identification

Depending on the complexity of your control architecture, the appended numeric codes may vary as noted in the following table. The numeric codes are listed as lower case letter pairs that represent a value from 00 to 99.

If the displayed tag format is . . .	Then, it means the notification is for the . . .
ss	The chassis slot (ss). It identifies a device residing in the same chassis connected to the Supervisory network. For example, if FTEB_98:RM08 is the NDM generated tag, the Redundancy Module is located in slot 8 of the supervisory chassis that contains the FTE Bridge module with tag name FTEB_98.
ssmm	The chassis slot (ss) and MAC ID (mm). It identifies a device residing on a ControlNet subnet with a path through a chassis attached to the Supervisory network. For example, if FTEB_97:CNI0702 is the NDM generated tag, the CNI with MAC address of 02 is located in a remote chassis and connected to the CNI in slot 7 of the supervisory chassis that contains the FTE Bridge module with tag name FTEB_97.
mm	The MAC ID (mm). It identifies a device residing on the supervisory ControlNet segment. For example, If AB_PCIC-1:PCIC24 is the NDM generated tag, the PCIC card with an address of 24 in this Supervisory ControlNet segment is installed in the computer with RSLinX driver named AB_PCIC-1.
mmss	The MAC ID (mm) and chassis slot (ss). It identifies a device residing in the same chassis as the supervisory CNI. For example , If AB_PCIC-1:CNI0103is the NDM generated tag, the CNI in slot 3 is located in the supervisory chassis with CNI with MAC address of 01 that is connected to the computer with RSLinX driver name AB_PCIC-1.

If the displayed tag format is . . .	Then, it means the notification is for the . . .
mmsscc	The MAC ID (mm), chassis slot (ss), and ControlNet subnet MAC ID (cc). It identifies a device residing on a ControlNet subnet with a path through a chassis connected to the supervisory ControlNet. For example, If AB_PCIC-1:CNI010303 is the NDM tag, the CNI with MAC address of 3 is located in a remote chassis connected to the CNI in slot 3 of the supervisory chassis with CNI with MAC address of 01 that is connected to the computer with RSLinX driver name AB_PCIC-1.

Figure 7 shows an example of NDM generated notification tags in the Event Summary display for reference.

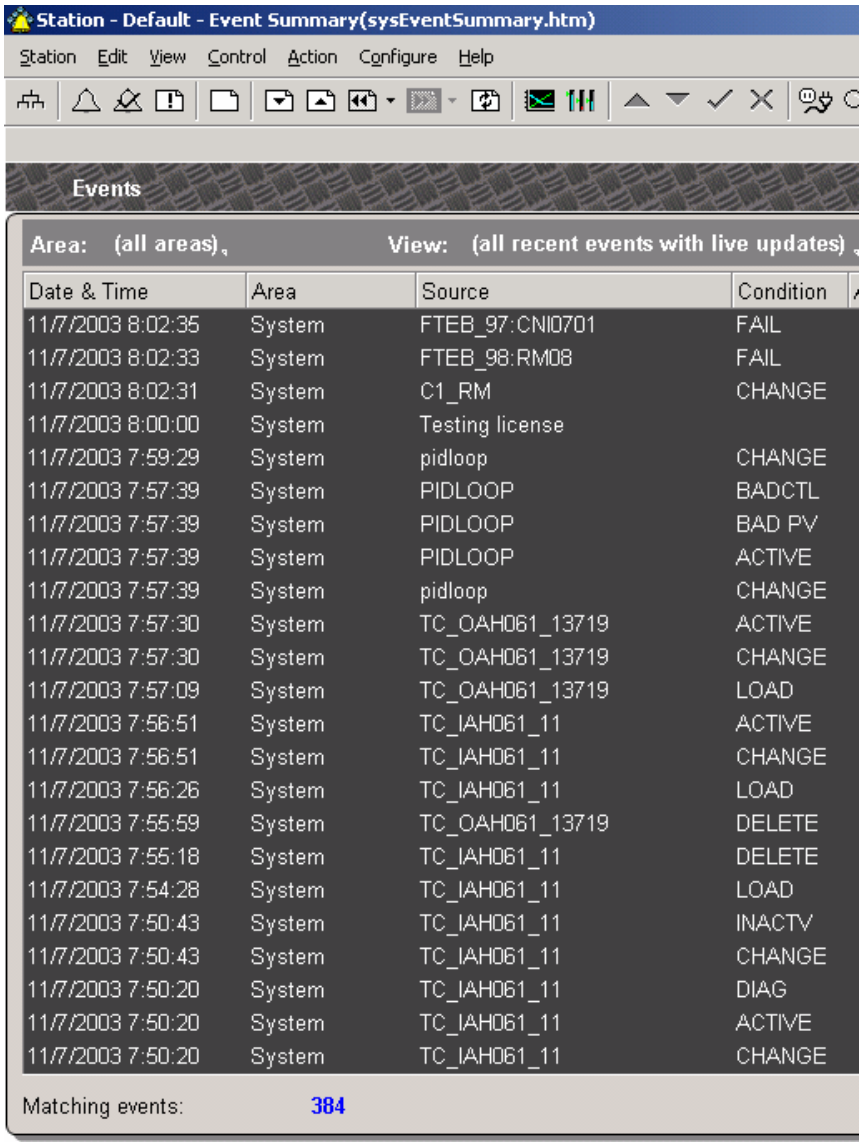

Figure 7 Example of NDM generated tags in the Event Summary display.

REFERENCE - INTERNAL

Refer to the *Control Hardware Troubleshooting and Maintenance Guide* for a detailed description of all the NDM generated notifications.

Example of NDM tag decoding

Figure 8 illustrates the CNI tag codes that would be generated to report a notification against the given partial network topology. Since this topology has a ControlNet Supervisory network, only one RSLinx driver is configured. This diagram contains a Redundant Chassis Pair (RCP): the chassis on the left is currently operating as the Primary and the chassis on the right is the Secondary. If an error is detected in the downlink CNI in the Primary chassis, the notification is reported for tag CNI0303. This identifies the CNI as being located in the number 3 slot in the Controller chassis that has a CNI with a MAC address of 03 for the Supervisory ControlNet. For example purposes, the RSLinx driver name is AB_PCIC-1.

ATTENTION

In a system with an RCP, a redundant Controller switchover can result in a changed tag code reference for a Bad CNI.

For example, if the downlink CNI in the Primary chassis in Figure 8 is Bad before switchover, it is displayed as a notification with a tag reference CNI0303. After switchover occurs, the network path to the Bad downlink CNI changes to go through the Secondary chassis and its notification tag reference changes to CNI0403. It is the same downlink CNI but the network path reflects the switch between the Primary and Secondary chassis including the logical change in the MAC address assignments.

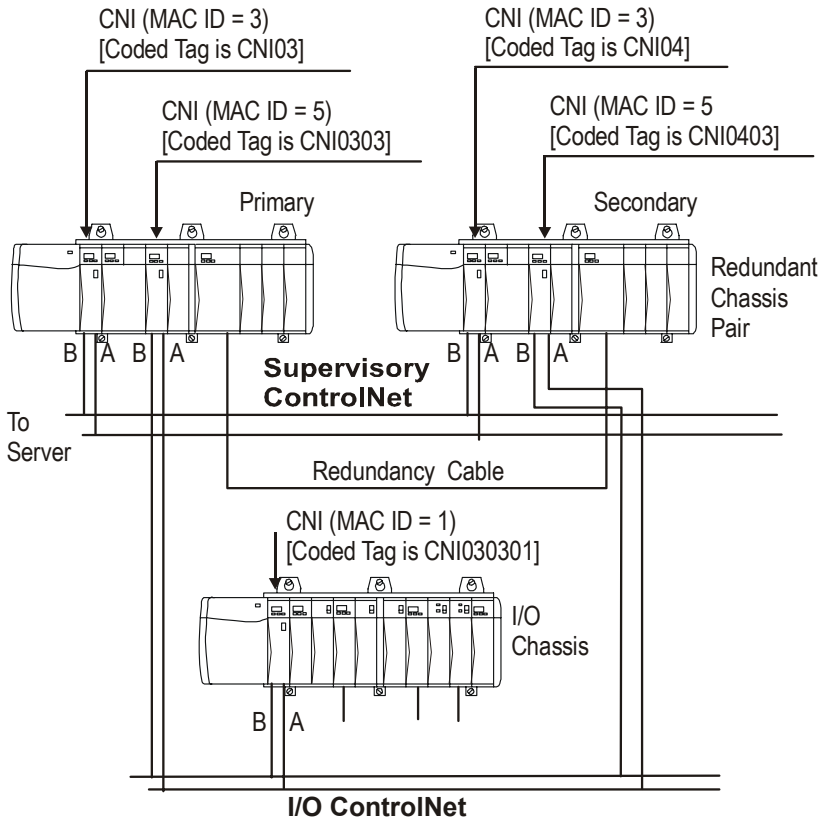

Figure 8 Typical NDM coded tag references for CNIs.

Multiple displays

The Station application provides several standard operator displays as well as the ability to view user built schematics. These displays allow an operator to quickly access more information about a point in alarm with just a keystroke or a command field entry. An operator can also invoke the Control Builder application to monitor the loaded Control Module, if limited access to configurable function block parameters is required. .

Figure 9 is a general graphic representation of how an operator may interact with the given Station displays to progressively reveal more data about a given point in alarm, including the invoking of the Control Builder application.

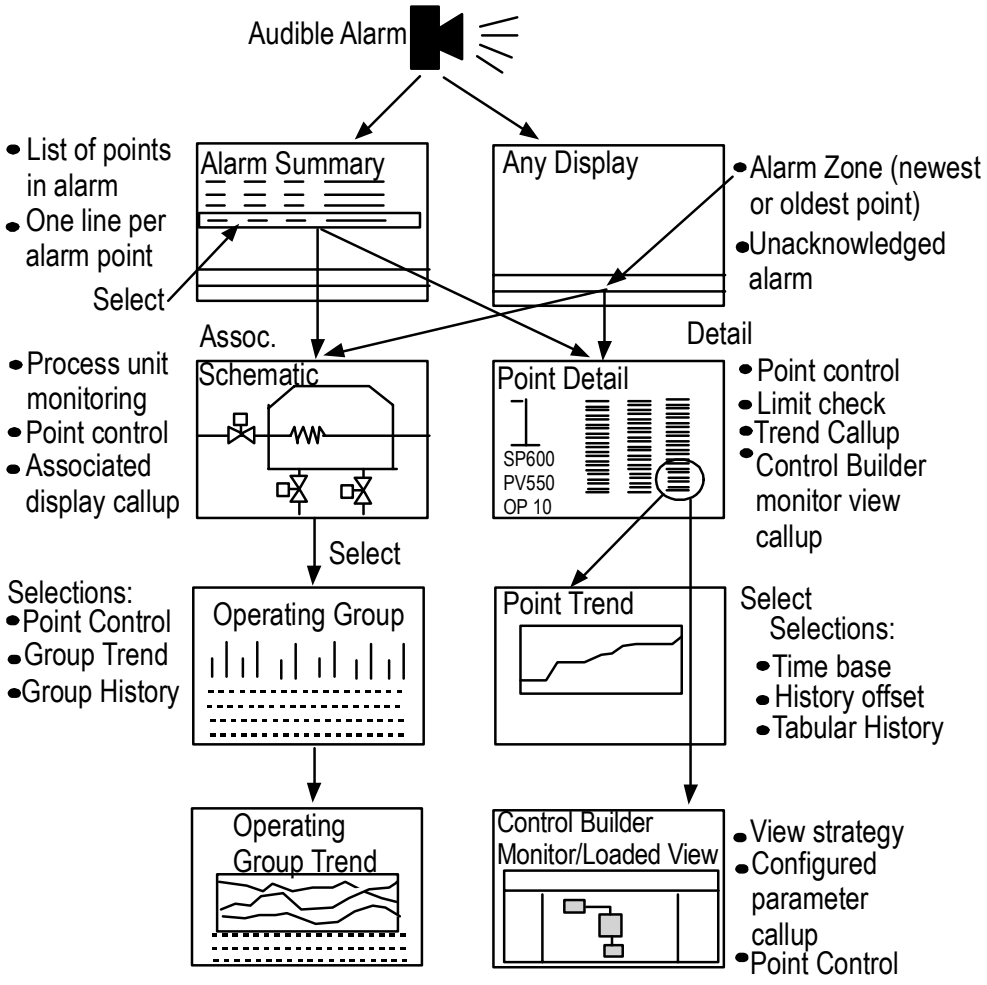

Figure 9 Station display interaction for data disclosure.

Alarm suppression

You can suppress the display of alarm information on an individual Control Module (CM) and Sequential Control Module (SCM), area wide, or system wide basis through the respective Enable/Disable function. The general actions associated with a given enable or disable function are summarized below.

If you enable or disable alarms on. . .	Then, enable action is. . .	Or disable action is. . .
Per CM or SCM basis (This means you must enable/disable each contained CM and/or SCM individually.)	CM/SCM recreates all outstanding alarms. Server forwards any alarms for that point to the alarm summary and the alarm zone. Server journals the alarms.	CM/SCM generates a “disable” event to cover all alarms for contained function blocks. Server treats current alarms reported against the CM/SCM as “disabled”, so once they are acknowledged, they are removed from the alarm summary. CM/SCM stops reporting any alarms against the CM/SCM. Server does not report new alarms from the disabled point to the alarm summary. Server does not receive alarms from disabled CMs/SCMs. Alarms are disabled at the source. Server does not journal alarms for a disabled point.

If you enable or disable alarms on. . .	Then, enable action is. . .	Or disable action is. . .
Area Wide basis	Server forwards any alarms for that area to the alarm summary, event journal, and alarm zone. Recreates alarms for all points still in alarm for the affected area on the alarm summary, event journal, and alarm zone.	Server treats alarms for CMs /SCMs assigned to the disabled area as “disabled”, so once they are acknowledged, they are removed from the alarm summary. Server does not report new alarms from the disabled area to the alarm summary. Server does not journal alarms for a disabled area.
System Wide basis	Server forwards any alarms to the alarm summary and alarm zone. Recreates alarms for all points still in alarm on the alarm summary, event journal, and alarm zone.	Server treats alarms for CMs as “disabled”, so once they are acknowledged, they are removed from the alarm summary. Server does not report new alarms to the alarm summary. Server does not journal alarms.

Display of alarms is also impacted by state changes in the Control Module and Control Processor as well as the alarm itself, as noted below.

If. . .	Then,. . .
Alarm priority is changed to NONE or JOURNAL	The alarm is removed from the Alarm Summary. (Note that a change in priority to NONE is recorded as an event in the Event Summary.)
Alarm returns to normal	Alarm is shown as “returned to normal” and is removed from the Alarm Summary when acknowledged.
Control Processor (CPM) transitions from Run to Idle	All alarms for all CMs/SCMs in the associated CEE are shown as “disabled”, so once they are acknowledged, they are removed from the alarm summary.
CPM fails	All alarms for all CMs/SCMs in the associated CEE are frozen at their last state until the CEE recovers.
CPM transitions from Idle to Run (warm start)	The points recreate any currently outstanding alarm. For warm start transition, the points reexecute the alarm algorithms to create alarms as new.
User deletes CM	All CM points are deleted from the Experion Server, which also deletes any associated alarms from the Alarm Summary.
User inactivates CM	All the alarms for this CM are shown as “disabled”, so once they are acknowledged, they are removed from the Alarm Summary.
User reactivates CM	Server reports any alarms detected during the first execution of each function block the same as steady-state detection of block alarm condition.

Event indication

The Station application provides an Event Summary display that lets you view a journal of events that have occurred over time listed in reverse chronological order.

Event indications are displayed in this general format on the Summary display:

- <Date&Time><Area><Source><Condition><Action><Priority><Description> <Value><Units>

Where:

Display Field	Description
Date & Time	Shows the date and time the event was journalized.
Area	Shows the area assignment for the point or device.
Source	The name of the event source. For Experion, this is the tag name or the NDM coded identification tag.
Condition	The event being indicated.
Action	Status indication, if applicable. For example, OK.
Priority	Shows the priority level assignment of the event. U for urgent, H for high, L for low and J for journal. Or, the User Name entered for Control Builder login for Control Builder journal events.
Description	The description associated with the event.
Value	For Experion, additional descriptor data. Up to 14 characters. Or, the new value, for Control Builder journal events.
Units	Not Used

Figure 10 shows an example of an Event Summary display. Its format is similar to the Alarm Summary display.

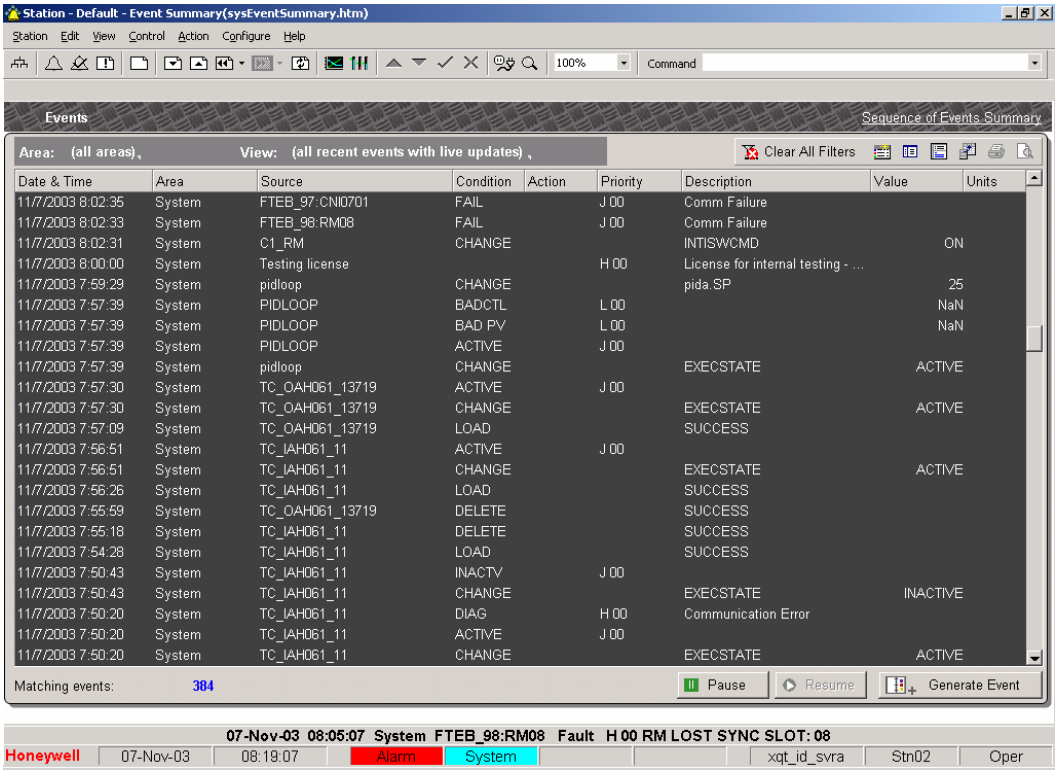

Figure 10 Event summary display example.

Event types

Events can be broadly identified as either a system or an operator change type. If a MESSAGE function block client executes its message, the sent message is also logged as an event. The acknowledgement and confirmation of a Confirmation type message are also logged as events. A system type event can represent one of these three system notification classes previously described in this document.

- System State
- System Diagnostic
- System Information

ATTENTION

SCM status events are reported as alarm exceptions related to the execution of the STEP and TRANSITION function blocks as listed under the Alarm Types heading.

Basic system state changes that can trigger an event are summarized below.

State Change	Applies to Equipment	Comment
Fail to Idle	CPM	CPM must go from Fail to Idle state, and requires a database load prior to going to Run.
Fail to Run	IOM	Configured IOMs are either Failed (not okay) or Run (okay).
Fail, Idle, Run to Offnet	Hybrid Controller	Only the controller as a whole can be Offnet. Server has lost visibility of Hybrid controller.
Idle to Run	Hybrid Controller	
Idle, Run to Fail	CPM, IOM	Transition to failure is on a per card basis. For Control Processor, this is treated as “Offnet”.
Offnet to Idle, Run, Fail	Hybrid Controller	Offnet to Fail is the same as staying Offnet. No new notification is sent.
Run to Idle	Hybrid Controller	

State Change	Applies to Equipment	Comment
Switchover	Redundant Chassis Pair – Hybrid Controllers	Secondary chassis becomes Primary on switchover. Related events are posted between Recovery Begin (RCVBGN) and Recovery End (RECVEND) events.

System diagnostic and system information events are closely related and may also be thought of as equipment failure and Control Processor exception status reporting. Some basic diagnostic classifications are summarized below for general reference.

Diagnostic Class	Where Detected	Description
CPM Fail	NM	The Notifications Manager detects that the CPM is in the Failed State. This means the CPM can respond to CNET messages but not CDA messages.
CPM Not Responding	NM	The Notification Manager detects the CPM is not responding to CDA or CNET messages. This could be caused by CPM hard failure, such as watchdog timeout, or loss of communications on ControlNet.
Hardware Failure	CPM	Indicates a partial hardware failure detected by the diagnostic manager or some other diagnostic agent. The failure may or may not be recoverable without manual intervention. An example would be a RAM parity circuit failure.
IOM Failure	CPM	Control Processor's I/O Manager detects a failed IOM. Note that a state change event (IOM state changes to Fail) is generated in addition to the system diagnostic event.

Diagnostic Class	Where Detected	Description
IOM Partial Failure	IOM	For those IOMs that can self-detect faults, the IOM produces a status indication. The CPM generates the IOM diagnostic notification.
Network Diagnostic Notification	NDM	The Network Diagnostic Manager detects status of all CNIs in the Supervisory and I/O networks and reports status to the NM.
Poor Execution	CEE	The CEE detects that its execution of function blocks is degraded. An example would be execution cycle overruns.
System Diagnostic Notification	CPM	Indicates a system diagnostic failure where there is a detected problem, which is not related to the CPM or the Hybrid Controller, and the CPM remains in an “OK” state. An example would be CPU free too low. If the CDA server fails, Experion produces a “NOTCLI subscription failed” system diagnostic.

Operators can make changes to selected parameters through these displays.

- User built schematics in Station
- Station Group and Detail displays
- Run-time monitoring displays in Control Builder

Changes made through Station displays are recorded in the event journal along with the operator’s name.

Changes made through Control Builder are recorded in the event journal along with the User Name specified during Control Builder login. The following types of operator initiated actions through Control Builder trigger event journal entries.

- All ‘successful’ parameter writes to the Controller including activate/inactivate.

- All ‘attempts’ of Controller loads/deletes. A failed load or delete is also entered in the event log.
- Successful restoration of Controller from snapshot.

Figure 11 shows an example of Control Builder events recorded for a user named "mngr" in the Events Summary display.

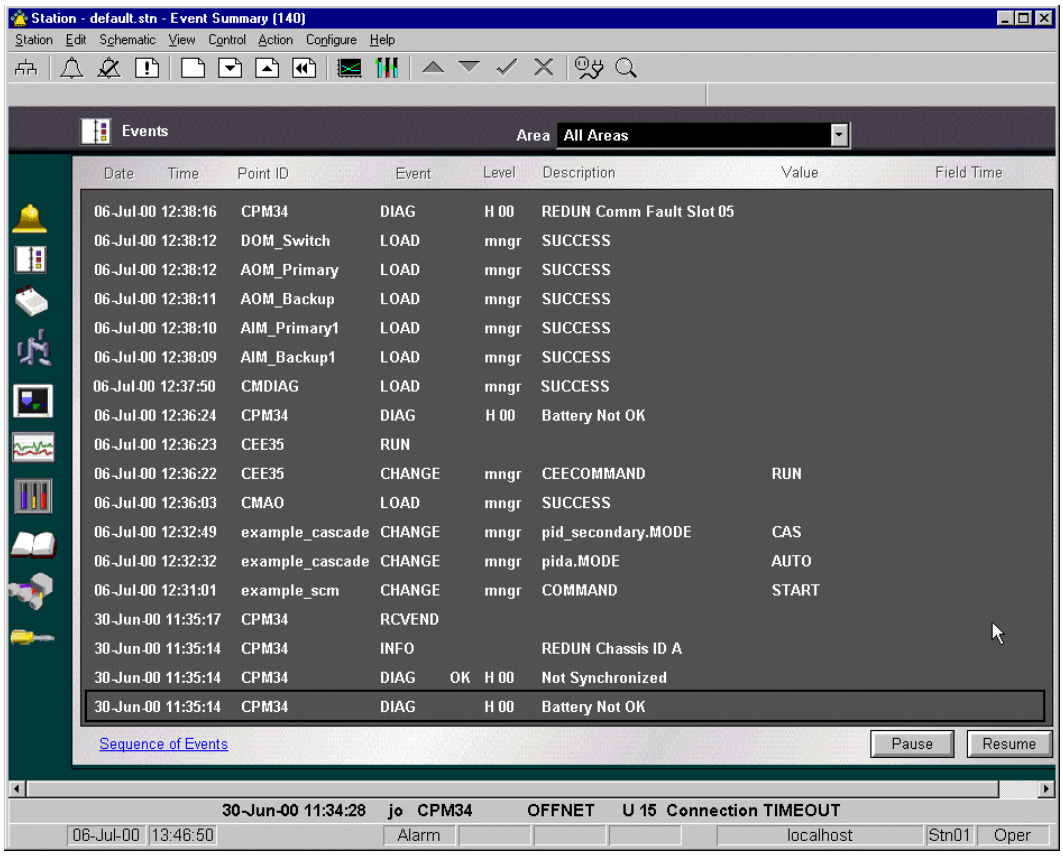

Figure 11 Control Builder event journal entries example

A word about errorhandling log

If for some reason a Control Builder event journal entry cannot be made in the event log, an error is recorded in an Errlog_n.txt file, where n equals a number, in this directory location *C:\Documents and Settings\All Users\Application Data\Honeywell\Experion\ErrLog_1.txt*.

An example of the entries in the Errlog_n.txt file is shown below for reference:

5/19/00 10:54:06 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_F32.PV[0] changed to 5555
5/19/00 10:55:21 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_N08.START.IN changed to OFF
5/19/00 10:55:23 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_N08.START.IN changed to ON
5/19/00 10:56:29 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_N04.EXECSTATE changed to ACTIVE
5/19/00 11:00:09 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_TEXT.STR[0] changed to mari
5/19/00 11:00:15 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_FLAG.PVFL[0] changed to OFF
5/19/00 11:00:24 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_INT.PV[0] changed to 0
5/19/00 11:00:55 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_INT.PV[0] changed to 0
5/19/00 11:01:12 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_F32.PV[0] changed to 0
5/19/00 11:02:32 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.IN_F32.PV[0] changed to 66.66
5/19/00 11:04:21 AM PS_E_WARNING (1LI .101.12394)	CB Journaling failed, CN2_Test2.Constant.PV changed to 5550

Message Processing

Message indication

The Station application provides a Message Summary display that lets you view all the current messages that have been sent. A message is displayed along with the time it was generated and the name of the Control Module that contains the MESSAGE function block associated with the message as shown in Figure 12.

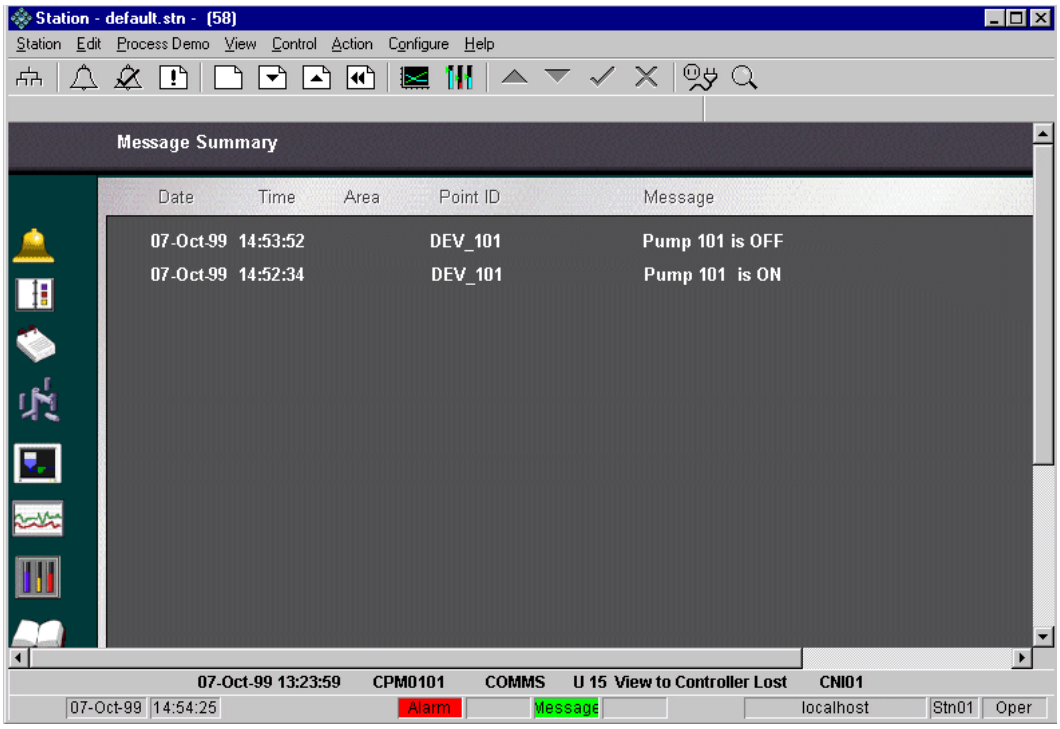

Figure 12 Station Message Summary display format.

Message types

A client-triggered message is configured to provide operation information or a request for operator action as part of the normal or abnormal execution of the control strategy configured within Control Builder. A message can be one of these two types.

Message Type	Description
Information	Requires no specific action from the operator. It is provided for information only.
Confirmation	Waits for operator to confirm. A client trigger pulses the corresponding SENDFLAG[n] to send the MESSAGE[n] to the Experion Server. The client of the MESSAGE block checks for the confirmed parameter (CONFIRMED[n]) to be set to True. The CONFIRMED[n] parameter indicates whether the MESSAGE block has received a confirmation. An operator must acknowledge a confirmation message twice to confirm it through the Message Summary display.

A typical confirmation message would have a STEP output client for the corresponding MESSAGE block SENDFL[n] parameter and a TRANSITION condition client for the corresponding MESSAGE block CONFIRMED[n] parameter. Where “n” is the number of the configured message (0 to 15). The following Figures 13 and 14 show sample configuration entries for STEP and TRANSITION blocks in an SCM that are used as clients for a MESSAGE block (MESSAGE5) in a Control Module (DEV_101). The number 2 message in the MESSAGE block is configured as a confirmation type.

#		Step Outputs
1	-	example_pid.pida.modeattr:=2
2	-	example_pid.pida.sp:=75.
3	-	example_pid.pida.sp:=example_scm.rectarget[1]
4	-	example_scm.histvalue[1]:=example_pid.pida.pv
5	-	DEV_101.MESSAGE2.SENDFL[2] := 2
6	-	DEV_101.MESSAGE2.SENDFL[3] := 3

Figure 13 Typical STEP output configuration for configured message in a MESSAGE block.

#	Transition Conditions	
1	example_scm.command=3	
2	example_pid.pida.pv>50.	
3	example_motor.DEVCTLA.gpv=4	
4	DEV_101.MESSAGE2.CONFIRMED[2] = 2	

Figure 14 Typical TRANSITION condition configuration for configured confirmation message in a MESSAGE block.

The configured message string is stored in the System Repository instead of the Controller. This means that you must configure the messages before loading the Control Module to the Controller. You can not change a message through the Monitoring tab after the Control Module is loaded to the Controller. To change a message, you must reconfigure it through the Project tab and reload the Control Module to the Controller.

Since the SENDFLAG[n] is a pulse trigger, it is automatically set to False during the next execution cycle. This means the MESSAGE block is ready to send the same message again in the next cycle. To avoid continuous messaging, you can use a FLAG block in conjunction with a PULSE block in the loop to the client trigger.

Notification Reporting and Acknowledgment

Reporting scheme

How the predetermined reporting structure correlates with the notification classes is summarized below. This directs a notification to the end-point client or clients that provide the appropriate user view of the notification.

Notification Class	Reporting Scheme
Operator Change (Station Displays only)	Sent to the operator change journal and the printer journal. Note that these events bypass the Notification Manager.
Process Alarm	Sent to the alarm journal, printer journal, and event journal.
System Diagnostic	Sent to the alarm journal, printer journal, and event journal.
System Information	Sent to the event journal and the printer journal.
System State	Sent to the event journal and the printer journal. System states themselves are accessible as parametric attributes of a block and are available on system status displays.
Third-Party Alarms	Sent to the alarm journal, printer journal, and event journal.

Acknowledgment scheme

Operators can acknowledge receipt of a notification related to one of these three notification classes through Station displays.

- Process Alarms with priority level other than journal
- System diagnostics with priority level other than none or journal
- Messages

Alarm and diagnostic acknowledge functions are managed entirely within the server and Station subsystems. The acknowledge status of a detected condition is stored on a per condition basis within the tagged point in the server RTDB. The tagged point maps to the CM tagged block of the same name. Operators can acknowledge alarms through the Station Alarm Summary display. In systems with multiple operator stations, you only have to acknowledge a condition through the alarm summary in one station to have the condition acknowledged in all alarm summaries on all stations.

The message acknowledge function is managed entirely within the server and Station subsystems. Operators can acknowledge both information and confirmation type messages through the Station Message Summary display. The information messages are removed upon acknowledgement. The confirmation messages are confirmed upon a second acknowledgement.

Notification Recovery

Recovery initiators

The Experion notification system automatically initiates a notification recovery routine in response to the following system conditions:

- Server Startup
- Control Processor Startup
- ControlNet Failure and Recovery (Dual Cable or CNETB)
- Area and System Wide Enable

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The server receives notifications that are assigned to a different area than one being recovered, but it discards these as duplicates of current information. Recovered notifications for a currently disabled area are also discarded.

Recovery routine

In general, a notification recovery routine consists of the Notification Manager commanding each CEE to recover all currently outstanding alarms and system diagnostics. It recreates data as required for these notification classes:

- Process Alarms for those conditions, which are in alarm at the time of recovery, are recreated.
- CPM and CEE System States are recreated as part of a full recovery.
- System Diagnostic conditions that are true at the time of recovery are recreated.
- Third-Party Alarms are handled the same as Process Alarms above.

Frequently Asked Questions About Experion Alarming

Question	Answer
How many alarms can the Experion System handle concurrently?	1000 active alarms.
Is this the size of the alarm page buffer?	Yes
What happens if there is an alarm overflow?	In general, newer alarms replace older alarms. The Experion Server can request full alarm regeneration, if needed, and the ultimate data owning alarm blocks hold alarm information, in case of a system alarm overflow.
If the alarm summary page is full, what happens with the alarms that follow?	Newer alarms replace older alarms on the alarm summary. An algorithm is applied to discard the least important alarm from the list according to this schema. • Discard any duplicate alarm; then, • Discard lower priority alarm; then, • Discard oldest alarm.
Are overflow alarms stored in the Event log file?	All alarms received are placed in the Event journal.

Question	Answer
What happens to alarms when the Experion Server is not running?	When the Server is restarted, all alarms generated by the Hybrid Controller are resent to the Server database. Alarms will be regenerated in response to any of the following events. • Server startup • Redundant Server failover • Re-enabling alarms system-wide, by area or by point • Control Processor startup • Redundant Controller switchover • ControlNet communications failure and recovery • Setting a CEE's state to RUN • Setting a CM's state to Active
When are alarms timestamped?	Alarms are timestamped when received at the Server database.
Can alarms be disabled during maintenance periods, plant commissioning or other circumstances?	Alarms can be disabled through several means, depending upon the extent of the silencing required. You can disable alarms on a point (CM or SCM), area, or system wide basis through Station.

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