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Server and Client Planning Guide

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Honeywell holds technical training classes on Experion. These classes are taught by experts in the field of process control systems. For more information about these classes, contact your Honeywell representative, or see `http://www.automationcollege.com`.

Related documentation

For a complete list of publications and documents for Experion, see the *Experion Overview.*

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Glossary

Introduction

1

This guide contains high-level planning and design topics for Experion servers and clients, as well as for controllers other than Process Controllers.

Knowledge Builder

Because this guide only includes high-level information, it includes numerous cross references to detailed topics within *Knowledge Builder*. (Knowledge Builder is the online library that contains the complete Experion documentation set.)

Consequently, if you have not already done so, you should install Knowledge Builder on a suitable computer.

If you are using a printed document set rather than Knowledge Builder, note that the references generally correspond to printed documents. For example, a reference to the "*Configuration Guide* section in Knowledge Builder" corresponds to the printed *Configuration Guide*. (However, some sections—such as the *Quick Builder Guide*—are not available in print.)

Related documents

The following documents complement this guide. You should read them before you start detailed planning and design tasks.

Document	Description
Network and Security Planning Guide	Contains networking, security, and systems integration information applicable to Experion.
Control Hardware Planning Guide	Contains planning and design topics applicable to Process Controllers.
Overview	Provides a comprehensive overview of Experion, including basic concepts and terminology.

Document	Description
Software Change Notice (SCN)	Contains last-minute information that was not able to be included in the standard documents. It may include important details that could affect your planning or design decisions.

Servers

2

This chapter describes how to determine your server requirements.

Issue	Comments
Redundancy	Decide whether you need server redundancy. See “Server redundancy” on page 15.
Distributed system	Decide whether you need a distributed system. See “Distributed System Architecture” on page 16.
eServer	Decide whether you want an *eServer*, which gives casual users read-only access to displays and reports. See “eServer” on page 23.
PHD	Decide whether you want an integrated PHD server, and whether you want PHD to store long-term history. See “PHD” on page 25.
Remote Engineering and Station Server	Decide whether you want a Remote Engineering and Station Server, which enables remote devices to access Station and Experion configuration tools. See “Remote Engineering and Station Server” on page 27.
Server scripts	Decide whether you can use *server scripts* to perform specialized tasks. See “Server scripts” on page 28.
Server names	Define the server name(s). See “Computer naming rules” on page 29.
Servers and the Enterprise Model Database (EMDB)	Decide which server will be used to store your system’s EMDB. See “Servers and the Enterprise Model Database” on page 30.

Issue	Comments
Defining and maintaining installation and network settings for your server(s)	When you have decided on the kind of servers you need, you can use the Experion Node Definition Tool to gather and deploy computer and network configuration information for those servers. The data collected by the tool can be used to perform installation and pre-configuration tasks such as automating the software installation process or maintenance tasks such as changing DNS settings. See the *Experion Node Definition Guide*.

Server redundancy

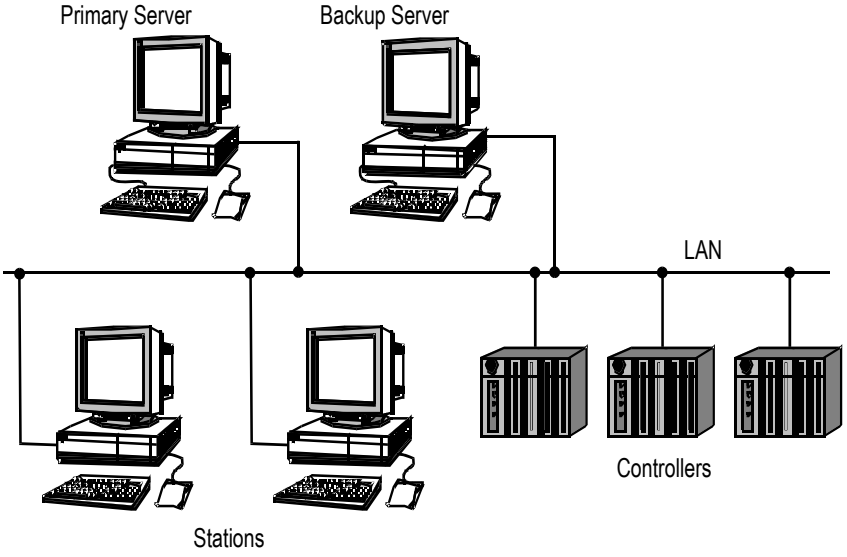
You can improve system availability with server redundancy.

In a redundant server system, Experion is installed on both servers, which are identically configured and connected through a LAN.

Database synchronization, which is achieved through the LAN, requires a significant bandwidth. Consequently, you should isolate the servers from heavily-loaded parts of the LAN and protect them from unusual loads.

Experion uses *software arbitration* to determine which server acts as primary. (With software arbitration, each server polls the other through the LAN to determine whether the other server has failed.)

Figure 1 Typical redundant server system



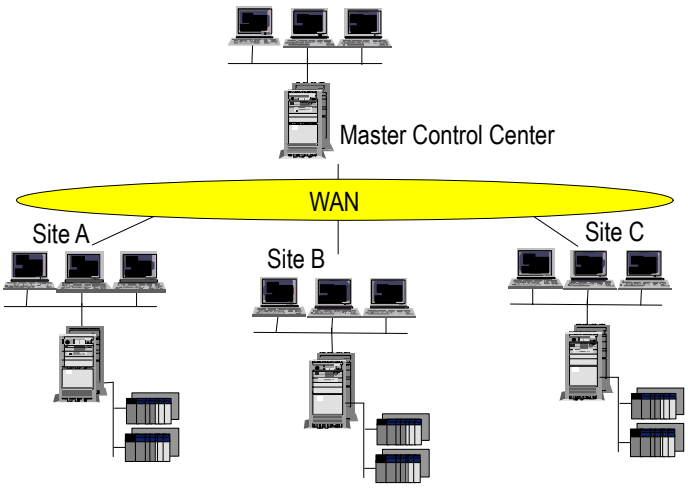
Distributed System Architecture

Distributed System Architecture (DSA) is an option that enables multiple Experion server systems to share data, alarms, alerts, messages, and history without the need for duplicate configuration on any server. With DSA you can integrate up to 10 servers into a single operational system.

DSA is appropriate for:

- Large-scale plant-wide systems in which the servers are connected through a high-speed LAN
- Geographically-distributed systems in which the servers are connected through a WAN (DSA has been designed to minimize network traffic, and supports WANs with speeds as low as 64 Kbps.)

Figure 2 Typical geographically distributed system



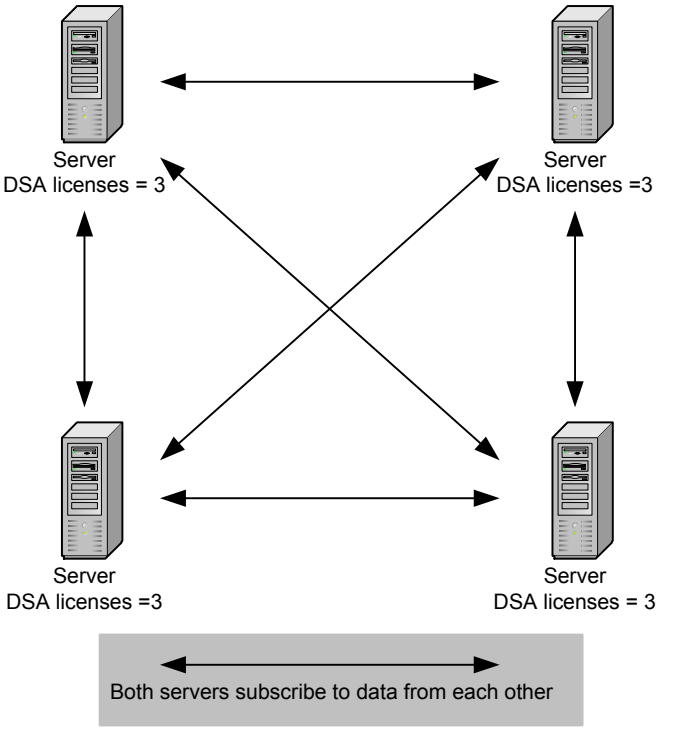
For more information about DSA, see the topic “Configuring Distributed System Architecture” in the *Server and Client Configuration Guide* in Knowledge Builder.

Inter-release support

DSA interoperability works between the current release and previous releases of Experion. So, for example, you can have a DSA system in which some servers are running Release X while others are running Release X-1. Please consult the SCN for specific details about which releases are supported.

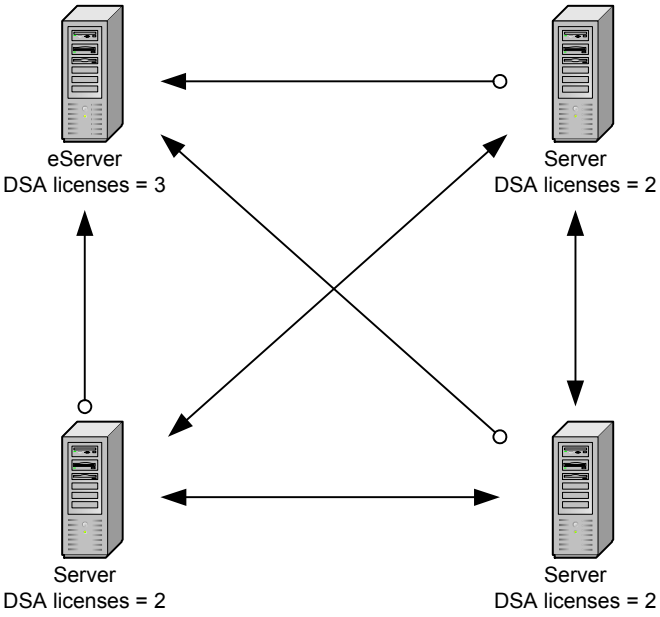
DSA licensing

With DSA, servers need a DSA license for each server that they subscribe to. The following diagram shows an example DSA configuration, comprising four Experion servers, each subscribing from every other server in the system. In this scenario, each server needs three DSA licenses.



If, on the other hand, one of the servers in this scenario were a “non-publishing” server, for example, an eServer, the total number of DSA licenses required for the system is reduced as follows:

- The non-publishing server requires three DSA licenses as it subscribes to data from all three of the other servers
- The other three servers only require two DSA licenses each as they only subscribe to two other servers.


eServer
DSA licenses = 3
Server
DSA licenses = 2
Server
DSA licenses = 2
Server
DSA licenses = 2
Both servers subscribe to data from each other
The server on the right does not subscribe to data from the server on the left

DSA and firewalls

If there is a firewall in your DSA system other than the default Windows Server 2003 SP1 and Windows XP SP2 firewalls, you will need to ensure that the necessary ports are opened in the firewall to enable DSA communications between the DSA client and server nodes.

For information on DSA communication through a firewall, see the topic "Firewall configuration" in the chapter on "Network security" in the *Network and Security Planning Guide*.

For information on DSA and the Windows firewall, see the topic "Windows XP SP2 and Windows Server 2003 SP1 security enhancements" in the chapter on "Securing access to the Windows operating system" in the *Network and Security Planning Guide*.

About point data in a DSA system

DSA provides global access to point parameter data on all servers in the system. Each server provides automatic dynamic caching of remote data for all of its clients, so that clients access their local server for all data. Clients do not access remote servers directly.

DSA data access works as follows:

1. When one of its clients requests data for a point that is not already in the local server's database, the local server asks the servers in the system for the data owner of the point.
2. When the data owner is determined, the local server subscribes to the remote server from which it obtained the data and automatically creates a cache reference (known as a "local cache point") in the local database.
3. While the subscription is in effect the data owner uses "report by exception", only sending data to the caching server when there is a change. When the data is no longer referenced by any of its client Stations or applications, the subscribing server cancels the subscription to the data owner. This subscription mechanism ensures maximum efficiency both on the servers and over the network.

DSA-specific rules and restrictions

The following rules apply where you have DSA-connected servers:

- Every point that will be accessed from more than one server must be assigned to an asset (see "Assets and asset models" on page 89).
- When creating a new point, it can have the same tag name (point ID) as a point on another server, but it cannot have the same tag name as a point on the same server, or the same tag name as any existing asset or alarm group within your Enterprise Model.

  When creating a new asset or alarm group, it cannot have the same tag name as any existing asset or alarm group within the same system connected via DSA, or the same tag name as any existing points on any of the servers connected via DSA.

  So, for example, you can have the tag name `FIC123` on `ServerNorth` as well as on `ServerSouth` because Experion will identify the first as `ExperionServerNorth:FIC123` and the other as `ExperionServerSouth:FIC123`, thus making each tag name unique within the system. You cannot, however, have an asset or alarm group called `FIC123` because assets and alarm groups are downloaded to every server in the system, and dowloading an asset with the tag name `FIC123` would conflict with the existing `FIC123` points on `ServerNorth` and `ServerSouth`.

- System tables (such as the message, acronym, and reason tables) that reference an item by number must be identical on every server.

Note

Cache points do not count against the licensed point count on a server but the total number of points on each server cannot exceed 65,000 points, which includes both local points and remote points (that is, those cached by the local server).

eServer

An eServer is a special Experion server that gives casual users read-only access to displays and reports using a browser such as Microsoft Internet Explorer.

An eServer also simplifies administration because it consolidates the management, security and licensing of casual user accounts.

An eServer provides two levels of access:

- Premium.

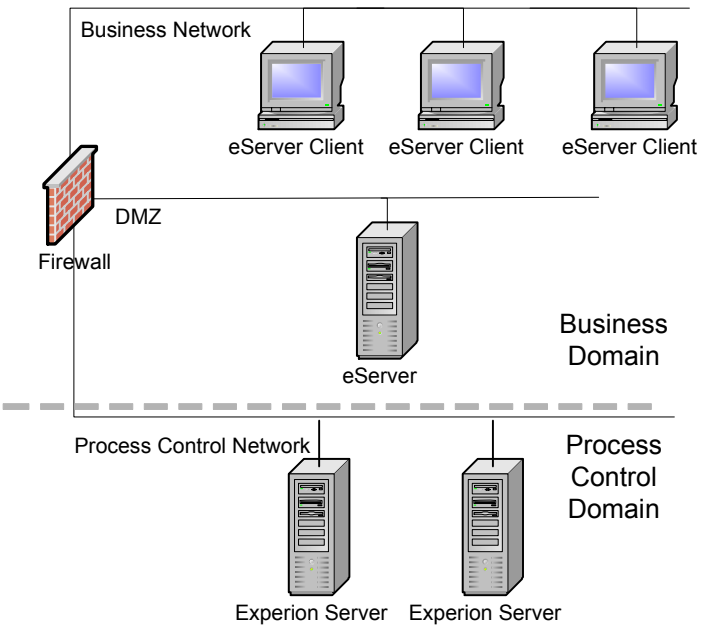
  Provides access to displays that are updated in the normal manner.

- Standard.

  Provides “snapshots” of displays that are not updated. (To check for changes to data, the user must request a new snapshot by using the browser's refresh function.)

An eServer license allows an unlimited number of standard access connections. Premium access connections are purchased separately.

The eServer software must be loaded on a separate computer, not on one of the Experion servers in your process control network.



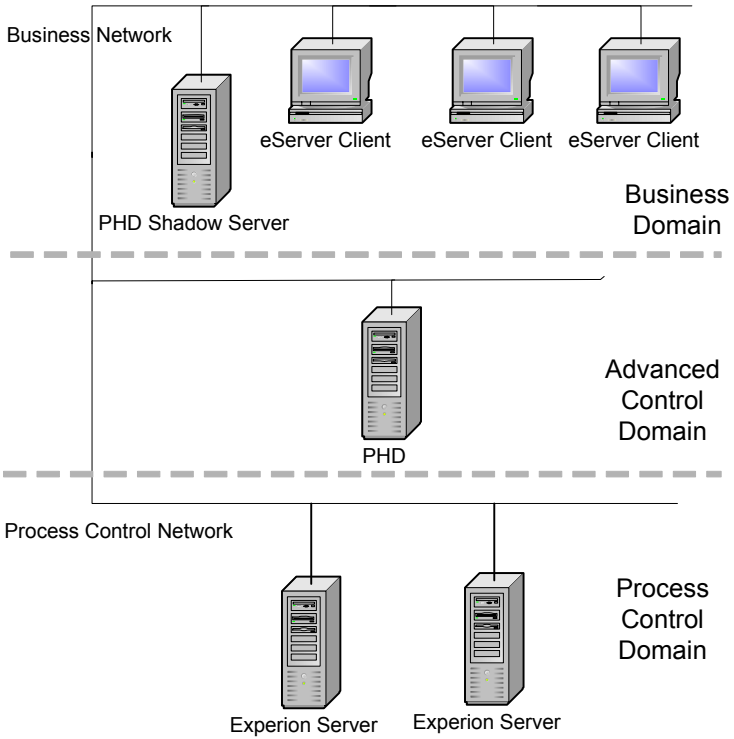
From a networking point of view, an eServer is a separate server in a DSA system, and requires a DSA license for each server that it subscribes to. For more information about DSA licensing requirements, see “DSA licensing” on page 18.

For more information about eServers, see “Configuring eServer” in the *Server and Client Configuration Guide* in Knowledge Builder.

For information about the security aspects of eServer, see the topic “eServer” in the section on “Firewall configuration” in the chapter “Network Security” in the *Network and Security Planning Guide*.

PHD

Process Historian Database (PHD) collects, stores, and replays continuous and other historical plant data. While PHD resides on a separate node from Experion servers, they can interact, enabling PHD to store long-term history data. PHD provides a more compact storage mechanism.



Short term history collection

When PHD is used, Experion should be configured to store around ten to thirty days of history—depending on your business requirements. History beyond this time window can be stored using PHD.

Long term history collection

When long-term history collection is migrated to PHD, your analytical applications must draw their data from PHD rather than Experion. Ensure that all

key applications can effectively use PHD history data sources prior to discarding the history in Experion.

Remote Engineering and Station Server

A Remote Engineering and Station Server is a computer that supports remote or mobile access to Station and to the Experion configuration tool, Configuration Studio.

You can set up a Remote Engineering and Station Server to enable remote access to either eServer Premium displays (Mobile Access for eServer Premium) or to full Station functionality (Mobile Access for Station).

Planning considerations

In planning for the number of Remote Engineering and Station Server nodes that you might need for your site, you should bear in mind the following:

- A Remote Engineering and Station Server can be configured to support either Mobile Access for eServer Premium or Mobile Access for Station (but not both). That is, you need to set up separate Remote Engineering and Station Servers for each type of access.

  A Remote Engineering and Station Server that provides Mobile Access for Station can, however, also be used to provide remote access to Configuration Studio.

- The maximum number of concurrent remote access sessions that a Remote Engineering and Station Server supports is 5.

Attention

- Within this maximum number of 5 concurrent sessions you can have a maximum of 5 concurrent connections to Station or 4 concurrent connections to Configuration Studio (or a mix of both types of connections provided that you do not exceed the individual limits for each type of connection). Note, however, that you cannot run both Station and Configuration Studio within the one session.
- Although you can run 4 concurrent connections to Configuration Studio, only one of those connections can run the Quick Builder component of Configuration Studio at any one time.
- Because access to Station is provided within Configuration Studio as one of the configuration tools, a remote device connecting to Configuration Studio does not need a separate connection to Station.

For information on installing and configuring a Remote Engineering and Station Server, see “Installing Remote Engineering and Station Server” in the *Supplementary Installation Tasks Guide* and “Configuring Remote Engineering and Station Server” in the *Server and Client Configuration Guide*).

For more information about Mobile Access for eServer Premium and Mobile Access for Station, see “Mobile Station” on page 53.

Server scripts

You can add extra functionality to your system with *server scripts*. A server script runs when its associated event occurs—for example, when:

- A point changes state
- An operator acknowledges an alarm
- The server starts
- A report is generated

Server scripts can also include:

- *Periodic* scripts, which run at specified intervals while the server is running
- *Library* scripts, which perform specialized functions when called by other server scripts

Server scripts don't block point processing, and don't impact other server functions because they run at a low priority.

Note that server scripting has been optimized for relatively short scripts (less than 30 lines), and is not designed for implementing control strategies (which should be done in the controller). If a task is computationally intensive, or requires extensive file handling, you should write a custom application in Visual C/C++ or Visual Basic.

For more information about server scripts, see the *Server Scripting Reference* section in Knowledge Builder.

Computer naming rules

All Experion server and client computers must have a unique name and IP address.

Basic naming restrictions

The basic restrictions when naming server and client computers are:

- The computer name must be 13 characters, or less, in length.
- The computer name must begin with an alphabetic character, such as a to z, or A to Z.
- The computer name cannot contain spaces or other non-standard characters.
- The last letter of the computer name is restricted and varies based on the Experion system topology. These restrictions are described in the following sections.
- When naming any client computer and a non-redundant standalone server, you must not use the letter A or B as the last letter in the name. The letters A or B can only be used as the last letter in the name of redundant servers only.
- In a redundant server system (see “Server redundancy” on page 15), server computer names have a common base name, which must follow the basic naming restrictions. The primary server computer name is the base name with the letter A appended, and the backup server computer name is the base name with the letter B appended.

  For example, if the base name is HSSERV:

  - The primary Experion server computer name would be HSSERVA.
  - The backup Experion server computer name would be HSSERVB.

Servers and the Enterprise Model Database

The Experion Enterprise Model Database (EMDB) comprises the engineering definitions of your system components, assets, and alarm groups.

EMDBs are created as part of an Experion installation procedure, which requires that you identify the node(s) on which you want to install the EMDB. You therefore need to consider the following before installing Experion:

- Which server (or redundant server pair) that the EMDB should reside on
- Whether you require more than one EMDB per system.

Attention

- If you choose to install the EMDB on a redundant server pair, you must install the EMDB on both server A and server B.
- Although it is possible to have multiple EMDBs, it is recommended that you only have one EMDB in an Experion system.

Networks

3

This chapter provides high-level information on networking issues.

Network planning issues for an Experion process control network are also described in the following documents:

- *Experion Overview* describes the basic concepts and terminology as well as the capabilities of an Experion process control network.
- *Control Hardware Planning Guide* provides detailed planning information for all aspects of Experion process control network planning. It also describes ControlNet, Ethernet, and FTE networks as well as PLC connections.
- *Fault Tolerant Ethernet Overview and Implementation Guide* includes information about configuring a system that conforms to Honeywell's High Security Network architecture. It contains information about network equipment specifications, configuration, IP addressing, and network topologies.

Network planning considerations

In planning your Experion network, your considerations should include the following issues.

Issue	Comments
Domain and network topologies	Select the most appropriate domain and network topology. See “Domain and network topologies” on page 33.
Network security	Determine your network security requirements. See the *Network and Security Planning Guide*.
Experion security features	Determine your Experion security requirements and decide what type of security you need to implement. See the chapter “Experion security features” in the *Network and Security Planning Guide*.
Network redundancy	Decide whether you need redundant networks. See “Network redundancy” on page 36.
Process Controllers	Determine the networking requirements of your Process Controllers. See “Process Controllers” on page 37.
Controllers other than Process Controllers	If you have controllers other than Process Controllers, determine how you are going to connect them to the network. See “Connection options” on page 66.
TPS	If you have a TPS system, decide whether you want to integrate it with Experion. See “Integrated TPS system” on page 34.

Domain and network topologies

The choice of domain and network topology depends on several factors, such as the size of your system, your security needs and the geographic layout of your system.

Domains versus workgroups

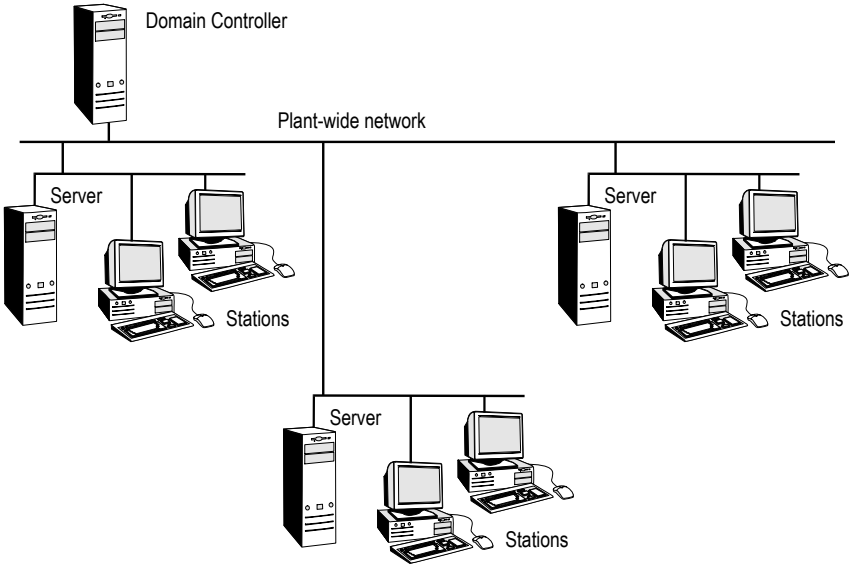
Domains are recommended for all but the smallest systems. A domain enables a group of PC nodes to be consistently managed, so that the same policies will be applied to all nodes in the domain. You should use domains if you need to integrate Windows and Station security. See "Integrated accounts" in the chapter "Experion security features" in the *Network and Security Planning Guide*.

A workgroup is more suitable for a small system which is not part of a corporate network—for example, a single server with two or three Stations.

Domain topology

The following figure shows a typical domain topology for a plant-wide system. Note that the domain controller must be on a separate computer: that is, not on the Experion server.

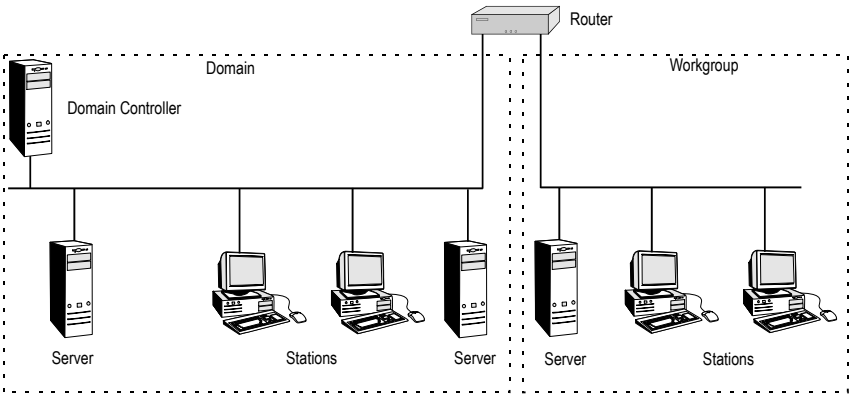
Figure 3 Typical domain topology for a plant-wide system



Mixed domain and workgroup topology

If you have a geographically dispersed DSA system, you can use a mixture of domains and workgroups. The following figure shows how you could use a domain for the centralized servers, and a workgroup for the remote server and its Stations.

Figure 4 Typical mixed topology

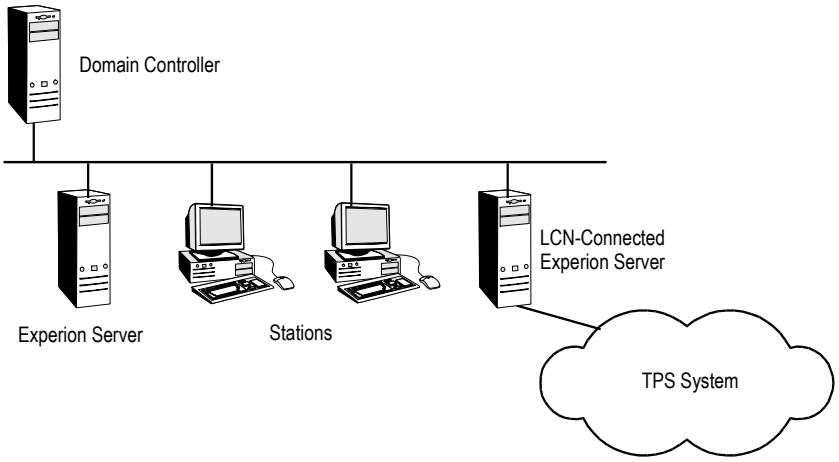


Integrated TPS system

If you want to integrate a TPS system, the Experion server and the LCN-connected Experion server (which forms the interface between the two systems) must be part of the same domain, as shown in the following figure. However, if you have a DSA system, the other Experion servers do not have to be part of that domain.

For more information about integrating TPS systems, see also “Integrating TPS systems” on page 161, and the *LCN-connected Station, Server and ACE Implementation Guide* in Knowledge Builder.

Figure 5 Typical integrated system



Connecting to the business network

You should not use the same network for your Experion system and your business system. If your business system needs access to Experion for reporting purposes you should use a firewall between the two networks. For more information about isolating the process control network from the business network, see the chapter "Network Security" in the *Network and Security Planning Guide*.

Network redundancy

You can improve system availability with network redundancy.

Network redundancy is appropriate where increased availability of the network is desired. (Ideally, the redundant links should be physically separated.)

Fault Tolerant Ethernet (FTE)

Honeywell's Fault Tolerant Ethernet (FTE) provides redundancy and a highly available networking scheme using commercial network interface cards (NIC) and standard Ethernet hardware (switches).

Attention

If you have a domain controller, it must be configured as a "single-connected" node on either of the FTE segments. (If you have redundant domain controllers, you must connect the backup controller to the other FTE segment.)

For more information about FTE, see the *Fault Tolerant Ethernet Overview and Implementation Guide* in Knowledge Builder.

Process Controllers

Experion supports supervisory level communications over Honeywell's Fault Tolerant Ethernet (FTE) network using the Fault Tolerant Ethernet Bridge module. It also supports supervisory level communications over a ControlNet network or Ethernet network using a ControlNet Interface (CNI) module or Ethernet module, respectively.

Attention

You cannot mix the supervisory network types on an Experion server or Station. For example, if your server is currently using a ControlNet supervisory network, you cannot add a Fault Tolerant Ethernet supervisory network to the server for simultaneous communication with different controllers.

You can connect Process Controllers to the server using Ethernet or ControlNet, using single or redundant links. For more information about the networking options for Process Controllers, see the *Control Hardware Planning Guide* section in Knowledge Builder.

Time synchronization

4

This section describes time synchronization requirements.

Experion time requirements

Reliable and coordinated time is an important element in an Experion system. It is used in many aspects of the system design, from control functions, to redundancy options, to intersystem communications of supervisory systems. This topic covers the time requirements at Level 1 and Level 2 of an Experion system.

At Level 1, the C300 Controller and Series C FIM4 require high-quality time served from a Network Time Protocol (NTP) or Simple Network Time Protocol (SNTP) Server. The quality of time determines how tightly events from different devices can be correlated, especially with regard to digital Sequence of Events.

The most stringent requirement for time at Level 1 comes from controllers doing high-resolution, digital sequence of events. An example of this requirement is in the electric utilities where thousands of digital input points are monitored. Each state change is time stamped to a minimum of 1 msec resolution. These state changes are logged. After certain faults, such as a generator going offline, the log is frozen for later analysis to see which condition led up to the fault. Examples are turbine imbalance, drop in frequency of the grid, circuit breaker trips, and so on. The critical physical and electrical events happen over just a few milliseconds. The log identifies which event happened first and caused the rest. Typically the cause is used to back-charge the responsible party.

At Level 2, time is a gating factor used in many supervisory functions such as:

- Redundancy
- Event processing
- System monitoring

At Level 2, time is measured in seconds. In order to provide consistent data, each node needs to maintain time within a deviation of 2 seconds or less.

Both levels provide important and critical functions to an overall system that is being used to control a plant's processes. System events can be generated from either the hardware side (Level 1) or from the supervisory side (Level 2.) Therefore, time synchronization between the two network levels also needs to be coordinated, ideally, using the same source. This mitigates messages and events being mishandled, regardless of where they were sourced from.

Time protocols

Simple Network Time Protocol (SNTP) is a proper subset of Network Time Protocol (NTP), which uses the same packet format. As a subset, SNTP does not run complex filtering and control algorithms to extract the best time from multiple sources and precisely set the local clock increment rate. SNTP only measures round-trip-delay and sets the local clock when it drifts beyond internal limits.

C300 and FIM use SNTP to attain the time, but include their own proprietary ability to adjust the clock increment rate to that of the time source so that fewer actual adjustments (bumps) are necessary (similar to the functionality of NTP).

The Windows 2000 based Operating system uses SNTP, while Windows 2003 and Windows XP use NTP.

NTP and SNTP protocols can interoperate, for example, an SNTP client can get time from a NTP server. An NTP client can get time from an SNTP server.

Windows 2003 Servers and Windows XP Professional use NTP. Both can be set up as NTP clients, NTP servers, or both an NTP client and server.

Although functional, due to the role that the operating system plays in an Experion system, it is not recommended to use a Windows XP as an NTP server.

Windows 2000/2003 based Active Directory/domain can be used as a time source for a Windows 2003/XP control system environment. If the control system is integrated with a Windows 2000/2003 based domain, it is recommended that you use the domain controller as your time source.

Each domain controller in a Windows 2000 domain, by default is an SNTP server. Each domain controller in a Windows 2003 domain, by default is an NTP server. The Active Directory provides a hierarchical time infrastructure.

Each system added into the Active Directory/domain synchronizes time with a time source in the domains hierarchy.

The default Windows NTP implementation is not set up for the tolerances needed for control systems. The Honeywell NTPSetup tool corrects the tolerance deficiencies and converts the Active Directory default settings to be compatible with control system requirements. To overcome the tolerances, parameters are updated to maintain more stringent time synchronization.

Failover capabilities, which are needed for reliable control system operation in the event of a failover, can be affected if the domain that you are integrating with is not running in native mode.

Planning your time hierarchy

Implementing a time strategy that is appropriate for a process control system involves using a time hierarchy where the root of the hierarchy is the most reliable time source.

Windows 2000 and 2003 based domains, by default, implement a hierarchy of time distribution across the domain. The domain controller that owns the Active Directory schema is the node that synchronizes with a reliable external source.

Ideally, all the control systems nodes are linked together in a hierarchy of time critical usage. In most cases, it may be better to set up one or two secondary network time protocol (NTP) servers that service all the control systems NTP clients on the local network. This provides mitigation against requirements on the network being available to keep the time consistent and attain accurate time.

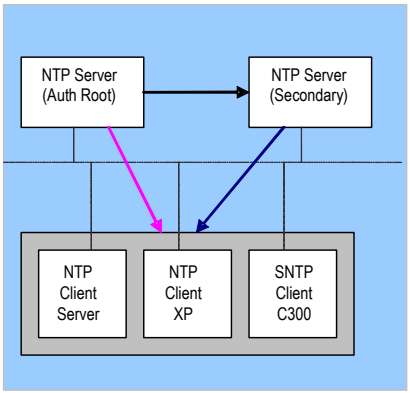
Your organization may already have a time hierarchy in place that can be utilized as a source from which you can then branch off for the control system. Regardless of the source of time, all topologies should include local NTP servers that serve time in the control system.

The following topics describe domain and workgroup topologies, with and without an external time source.

Workgroup topology with no external source

In the following diagram, redundant Experion servers are set up as redundant NTP servers. All time clients, such as Flex Stations, Console Stations, and C300 controllers, receive time from the primary Experion server. If this server fails over, time is served by the backup Experion server.

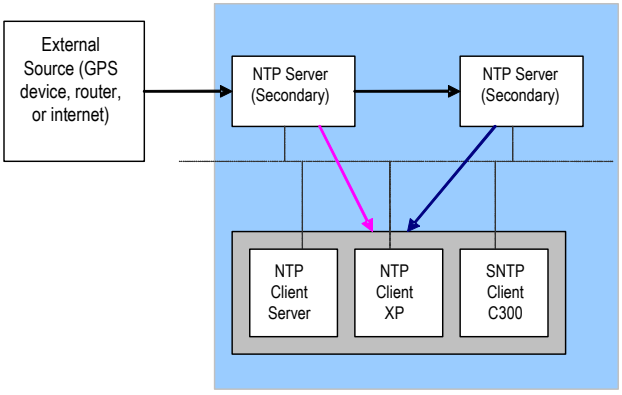
This topology uses the internal CMOS clock of the authoritative server as the time source. This time source is not as accurate and will create deviations in time seen throughout the hierarchy. Systems with strict requirements on sequence of events should not implement this topology.



Workgroup topology with external source

In the following diagram, the primary Experion server receives time from an external source. The redundant Experion servers are set up as NTP servers which serve time to all time clients, such as Flex Stations, Console Stations, and C300 controllers. If the primary Experion server fails over, time is server by the backup Experion server.

This topology creates a dependency on the network infrastructure between the control system and the external source. The reliability of this network should be taken into consideration when planning this time hierarchy.

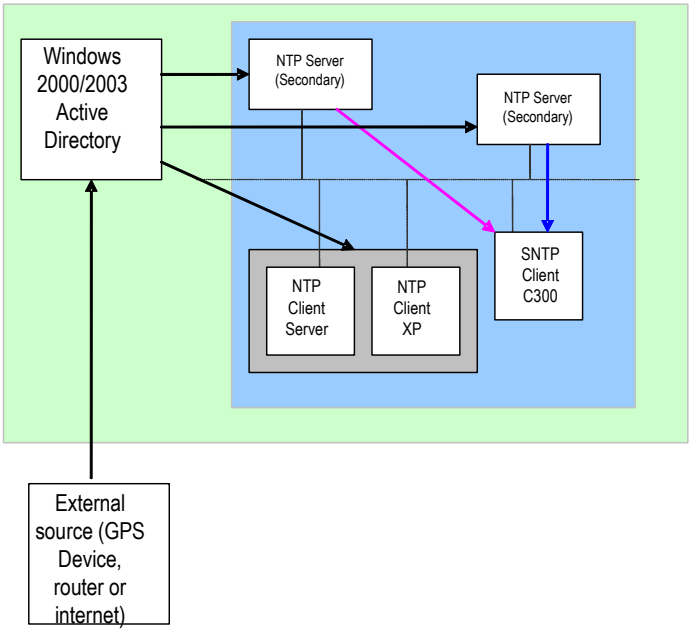


Domain topology

In the following diagram, the domain controller receives time from an external source. The domain controller serves time to the redundant Experion servers, Flex

Stations, and Console Stations. The Experion servers serve time to the C300 controller.

You should verify that the Active Directory/domain you link to uses a reliable external time source. If an external source is not used, the internal CMOS of the domain controller (schema owner) is used as the time source. This time source is not as accurate and will create deviations in time seen throughout the hierarchy. Systems with strict requirements on sequence of events should not implement this topology.



Stations

5

This chapter describes how to determine your Station requirements. (Station is Experion's user interface.)

For an example of how to determine your Station requirements, see "Determining your Station requirements (an example)" on page 59.

Issue	Comments
User types	Identify the user types and assess their respective needs. See "Identifying user types and assessing their needs" on page 47.
Read-only access by casual users	Determine whether an eServer, which provides read-only access to displays and reports, would satisfy the needs of users such as managers and production controllers. See "eServer" on page 23.
Flex Stations	Flex Station is the standard type of Station. It typically runs on a standard computer, and is suitable for most users and most tasks. Determine how you want to connect each Flex Station to the server. See "Connection options for Flex Stations" on page 48.
Console Stations	If you have Process Controllers and don't want to suffer loss of view if the server fails, you need Console Stations. See "Console Stations and Consoles" on page 49.
Mobile Stations	If users want access to data as they move around the plant, then you should consider Mobile Station. See "Mobile Station" on page 53.

Issue	Comments
Defining and maintaining installation and network settings for Stations	When you have decided on the kind of Stations you need, you can use the Experion Node Definition Tool to gather and deploy computer and network configuration information for those Stations. The data collected by the tool can be used to perform installation and pre-configuration tasks such as automating the software installation process or maintenance tasks such as changing DNS settings. See the *Experion Node Definition Guide*.
Simultaneous view of several displays	Determine whether users (especially operators) need to simultaneously see several displays. See "Multiple-window Station configurations" on page 54.
Loss of view during operator changeover	Decide whether you need to use the Signon Manager option so that Station keeps running when, for example, operators change shift. See "Signon Manager" on page 56.
Specialized hardware	Determine whether any users (especially operators) need specialized hardware, such as multi-monitor consoles, membrane keyboards and touch-screen displays. See "Specialized Station hardware" on page 57.
Security requirements	Based on user types, work practices and site layout, determine the most appropriate security setups for Stations and Windows. See the chapter "Experion security features" in the *Network and Security Planning Guide*.
Display update rates	Determine the rate at which you want displays to be updated. See "Station update rates" on page 55.
Displays	Determine your display requirements. See "Displays" on page 123.

Identifying user types and assessing their needs

Before you can determine your Station requirements, you must first identify each user type, and then assess their respective needs.

Typical user types include: operators, maintenance engineers, managers and production controllers.

Operators generally need dedicated Stations, whereas maintenance engineers may only need access to a Station for a few minutes, two or three times a day. Other users, such managers and production controllers, may only need read-only access to trend-related displays and reports.

Connection options for Flex Stations

There are two ways of connecting a Flex Station to the server:

- **Static**. A permanent, dedicated connection. This is the recommended connection type for Flex Stations used by operators.
- **Rotary**. An “as required” connection. This is the recommended connection type for users who do not need full-time access to the server, or who need remote access (typically through a modem).

  Rotary connections are advantageous from a licensing viewpoint because the license specifies the maximum number of simultaneous Station connections.

Console Stations and Consoles

Console Stations and Consoles are advisable in an environment where continuity of view is paramount and where it is important to minimize the impact of a server being unavailable.

About Console Stations

Console Stations provide direct access to process data as well as alarms and messages from CDA sources such as Process Controllers, FIM, IOLIM, and ACE nodes. This direct access provides a continuous view of your process, even if the Experion server is unavailable (for example, during a server failover). Consequently, there is no loss of view of critical data and alarms when the server fails, and so an operator can still control and monitor the process.

A Console Station is also connected to an Experion server. After you configure the connection to the Experion server, the server database files are replicated to the Console Station. This means that configuration of items such as process points is only done once.

Although a Console Station provides direct access to data, alarms and messages, some functions, such as reporting, history and events collection, are still provided by the Experion server. Therefore, if the Experion server is unavailable these functions are not available on the Console Station. For details, see the topics "Functions available on the Console Station" and "What happens when the Experion server is unavailable" in the chapter "Configuring Console Stations and consoles" in the *Server and Client Configuration Guide* in Knowledge Builder.

About Console Extension Stations

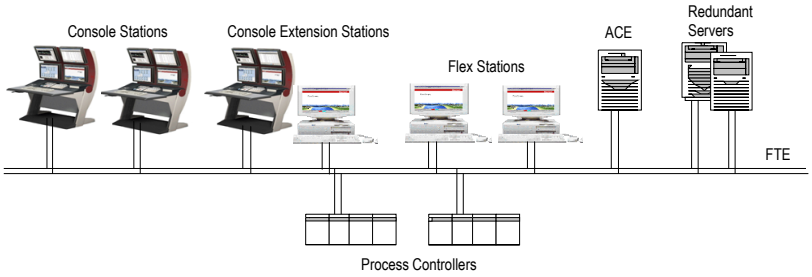
A Console Station can also have clients connected to it. These clients are called Console Extension Stations. A Console Extension Station connects to a Console Station in the same way that a Flex Station connects to an Experion server. A Console Extension Station has the same functionality as a Console Station.

For each Console Station, you can connect up to three *Console Extension Stations*. Console Extension Stations connect to a Console Station in the same way that a Flex Station connects to an Experion server.

A Console Station and Console Extension Station can operate in the following environments:

- Distributed system architecture
- Icon Series Console environment
- Multi-window environment

The following figure shows an example architecture including Console Stations.



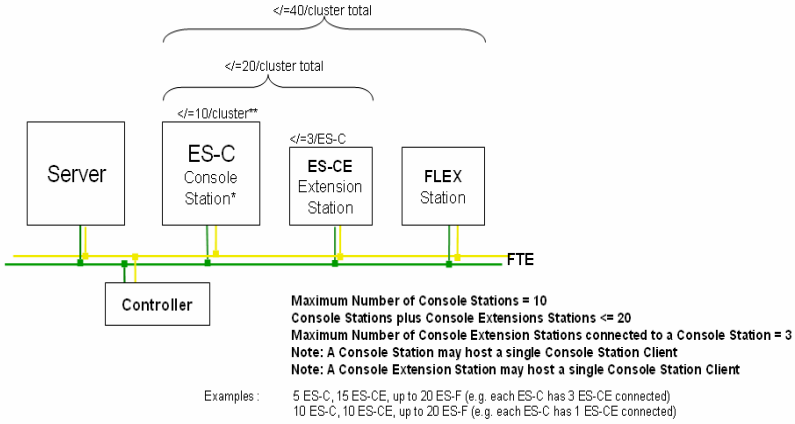
Licensing

You can obtain a license for as many as 10 Console Stations per server and a total maximum of 20 Console Stations and Console Extension Stations per server. So, if you need a licence for 10 Console Stations, the maximum number of Console Extension Stations you can be licensed for is 10. Alternatively, if you want more Console Extension Stations, you could obtain a license for 5 Console Stations and 15 Console Extension Stations to make up your total maximum of 20.

Note, however, that this total maximum of 20 is included in the total maximum number of 40 Stations per server, so that if you are licensed for 40 Stations and you want 10 Console Stations and 10 Console Extension Stations, the number of Flex Station licences will be capped at 20.

Figure 6 Experion cluster limits

Experion Cluster limits: Experion Server/Station-Console



Consoles

A *Console* is a logical grouping of Console Stations and Console Extension Stations constituting a single workspace for an operator.

In general, the Console Stations and their Console Extension Stations that make up a Console are not just a logical grouping but are grouped together in the same physical location. The Stations that make up a Console may well be mounted in a single piece of control room furniture, which provides a workspace for a single operator.

A Console is associated with a single Experion server, and can include the following combinations:

- A Console Station with a Console Extension Station
- Multiple Console Stations
- Multiple Console Stations with Console Extension Stations

Sample scenarios

A typical Console might consist of the following equipment in a single control room:

- 2 Console Stations
- 1 Console Extension Station (connected to Console Station 2)
- An operator entry panel connected to each Station
- Six screens (individual CRTs)
- Multi-window configuration with SafeView (see “Multiple-window Station configurations” on page 54).

This configuration provides redundancy and thus has the advantage of increasing Console capacity and robustness because the Console will continue to operate in the event of a single Console Station failing. Having additional Stations in the Console also meets the need for a large number of concurrent displays.

If necessary, you can also configure Consoles to cover the need for a remote Station. For example, you can set up a Console that includes a Station (either Console Station or Console Extension Station) in a remote location (outside the control room). This provides a degree of safety and enables plant operations to continue in the event that the control room can not be used. Within the control room the Console equipment can consist of a mix of Console Station and Console Extension Stations as described in the previous scenario.

Alarm and message acknowledgement in Consoles

In general when an alarm is acknowledged or silenced on one Station (whether it is a Console Station or a Flex Station), the alarm is acknowledged or silenced on all Stations in that system. By contrast, the default setting for a system with a Console is for alarms to have to be acknowledged on every Console in the system. You can, however, change this default setting within a server system so that when an alarm is acknowledged on one Station (whether Console or Flex) it is acknowledged on all Stations, including Console Stations within a Console.

For more information, see the topic “About consoles” in the chapter “Configuring Console Stations and consoles” in the *Server and Client Configuration Guide* in Knowledge Builder.

Mobile Station

Mobile Station enables users with remote devices (such as handheld computers) to access displays through a local wireless network.

Mobile Station provides the following levels of access and control:

- **Mobile Access for Station**. Provides users with the same level of access and control as a Flex Station.

  The Remote Engineering and Station Server that enables remote access to Station can also be used to enable remote access to Configuration Studio, the Experion configuration tool. For more information about Remote Engineering and Station Servers, see “Remote Engineering and Station Server” on page 27.
- **Mobile Access for eServer Premium**. Provides “live” displays, in which the data is regularly updated. This option does not provide any process control functions.
- **Mobile Access for eServer Standard**. Provides “snapshots” of displays, in which the data is valid at the time of the snapshot. This option does not provide any process control functions.

For more information, see:

- “Installing Remote Engineering and Station Server” in the *Software Installation and Upgrade Guide*.
- “Configuring Mobile Station” in the *Server and Client Configuration Guide.*
- “Configuring Remote Engineering and Station Server” in the *Server and Client Configuration Guide*.

Multiple-window Station configurations

There are two Station configurations that provide a multiple-window setup:

- **Multi-window Station**. A Flex or Console Station that uses SafeView to manage several windows (typically two or four), each of which can contain a separate display.

  Multi-window Station enables you to control the placement of displays in the various windows. For example, you may want the Alarm Summary in the top-left window, trends in the top-right window and point detail displays in the bottom-right window.

- **Multiple static Station**. A computer that has up to four instances of Flex Station running simultaneously. Note that each instance requires its own static connection to the server.

In practice, both setups require specialized hardware, such as the Icon Console.

For more information about these two configurations, see the topics “About multi-window Station” and “About multiple static Station in the Server and Client” in the *Server and Client Configuration Guide* in Knowledge Builder.

Station update rates

You can specify the rate at which each Station updates displays (the default is 1 second for static Stations and 10 seconds for rotary Stations). As a guideline, the faster values change, the shorter the required update rate.

In order to reduce the load on the server, you should specify the longest practical update rate. This is an important consideration if a Station uses a remote or low-bandwidth connection.

You can also specify an update rate for each custom display (which must be slower than Station's update rate). This is something you should consider if a display is particularly complex.

Signon Manager

If you use Windows-based security, and want to keep Station running during user changeovers - for example, when operators change shift - you need to use the Signon Manager option. (Without Signon Manager, the outgoing user must close Station and log off Windows; and the incoming must log on and restart Station.)

Signon Manager is also recommended if you have a multiple static Station (see “Multiple-window Station configurations” on page 54) because it enables users to simultaneously log on/off each instance of Station.

Note that Signon Manager requires Integrated Security. See the topic “Integrated accounts” in the chapter “Experion security features” in the *Network and Security Planning Guide*.

For more information about Signon Manager, see the topic “Signon Manager” in the *Server and Client Configuration Guide* in Knowledge Builder.

Specialized Station hardware

In general, Station runs on a standard computer, with a standard keyboard, monitor and mouse. However, Station supports most Windows-compliant peripherals such as trackballs and touch-screens, as well as two specialized keyboards:

- **Operator Entry Panel (OEP).** This is a membrane-style keyboard with dedicated function keys. It is suited for use by operators in harsh environments.
- **Integrated Keyboard (IKB).** This consists of a standard keyboard combined with dedicated function keys and built-in trackball. It is suited for use by operators who need a large number of function keys in addition to a standard keyboard.

Attention

The IKB and the OEP keyboard are not compatible with Experion Electronic Signatures. You cannot use either of these keyboards with Experion Electronic Signatures.

Icon Console

For demanding tasks, you can use Honeywell's Icon Console, which includes up to four flat-panel monitors and an OEP.

Either of Station's multiple-window configurations is suitable for use with an Icon Console. See "Multiple-window Station configurations" on page 54.

Figure 7 An Icon Console

Determining your Station requirements (an example)

The following example shows how to determine your Station requirements.

Your configuration and Station requirements are as follows:

- The site has a control room, staffed with two operators. It is essential that both operators can always see the Alarm Summary and some critical trend displays.
- Maintenance engineers need access to Stations on the production line, and have suggested five suitable locations.
- The two production controllers need one Station in their office. After hours, one of them is always on call—consequently, they both need Station at home.

The following Stations meet the requirements:

- Two Console Stations in the control room (Each is fitted with four monitors, and uses Multi-window Station and SafeView to ensure that the critical displays are always visible.)
- Five rotary Stations on the production line
- One static Station in the production controllers' office
- Two modem-connected rotary Stations at the homes of the production controllers

Because of the anticipated usage levels of the rotary Stations, you decide you only need a license for six Stations: three static (includes the two Console Stations) and three rotary.

Printers

6

This chapter describes how to determine your printer requirements.

Issue	Comments
Alarm printing	Alarm printers are typically located near Stations used by operators—for example, in the control room. Alarm printing requires a 132-column dot matrix printer that has been qualified for use with Experion.
Reports	Reports can be printed on any suitable printer. Typically, each report is directed to the most convenient printer on the network. For example, an alarm report might be printed on the printer in engineering office. See “Reports” on page 133.
Display captures	If you need to capture display contents, such as trends, you should consider a color printer.

Controllers

7

Experion supports a wide range of controllers in addition to Process Controllers. This chapter describes issues you need to consider in order to integrate these controllers with your Experion system. (The *Control Hardware Planning Guide* section of Knowledge Builder contains planning information for Process Controllers.)

Issue	Comments
Experion-specific documentation	Read the interface reference for each type of controller you want to integrate with Experion. See “Interface references” on page 64.
Monitoring and control strategies	Configure the controllers so that they do not impose excessive communications or processing loads on the server. See “Monitoring and control strategies” on page 65.
Connection options	Determine how you are going to connect the controllers to the server. See “Connection options” on page 66.
Scanning strategies	Determine the server’s data update requirements, and then design a scanning strategy that minimizes the communications load. See “Scanning strategy” on page 83.

Interface references

There is a separate interface reference for each type of controller supported by Experion. These references include integration details, such as connection and configuration options, that may affect your design and planning decisions.

The references are in the *Interface References* section in Knowledge Builder. (If Quick Builder is used to configure a controller, its reference is also included in Quick Builder's help.)

Monitoring and control strategies

Attention

Do not include the server in any control loops because potential delays, caused by communications traffic or heavy server loads, may seriously affect your plant's operation.

You should configure controllers so that they do not impose excessive communications or processing loads on the server. It is important to remember that the server's primary tasks are to:

- Monitor system activity
- Start/stop processes
- Generate reports
- Provide data to other systems

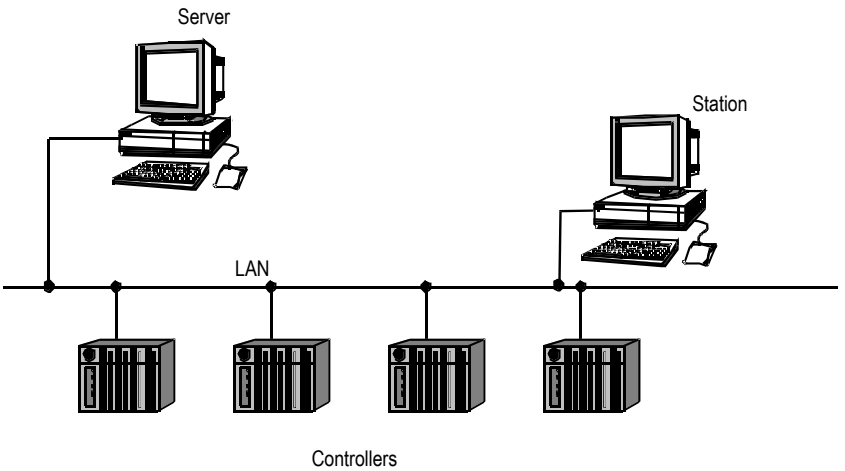
Connection options

The way in which you connect a controller to the server depends on several factors, including your plant's layout and the controller's communication port(s). (Note, however, that your choice may depend on restrictions specified in the interface references.)

Network connections

If a controller has a network port, you can connect it directly to the network.

Figure 8 Controllers connected directly to the network



Experion also supports a number of proprietary networks, such Fault Tolerant Ethernet (FTE) and ControlNet (see "Network redundancy" on page 465 and the "Network planning" topic in the "Experion security features" chapter of the *Network and Security Planning Guide*). For a list of supported proprietary networks, see the *Overview Guide* section in Knowledge Builder.

Redundant connections

If you have network redundancy, you may be able to connect some controllers using redundant connections. To check whether your controllers support redundant connections, see the manufacturers' documentation and the *Interface References* section in Knowledge Builder.

Direct serial connections

If you have a small system, you can connect controllers to the server's serial ports.

Note that you can add more serial ports to the server with a *serial adapter*. An advantage of serial adapters is that they provide a choice of interfaces, such as RS-422 and RS-485, which are suitable for medium-distance links.

For a list of qualified serial adapters, contact your local Honeywell representative.

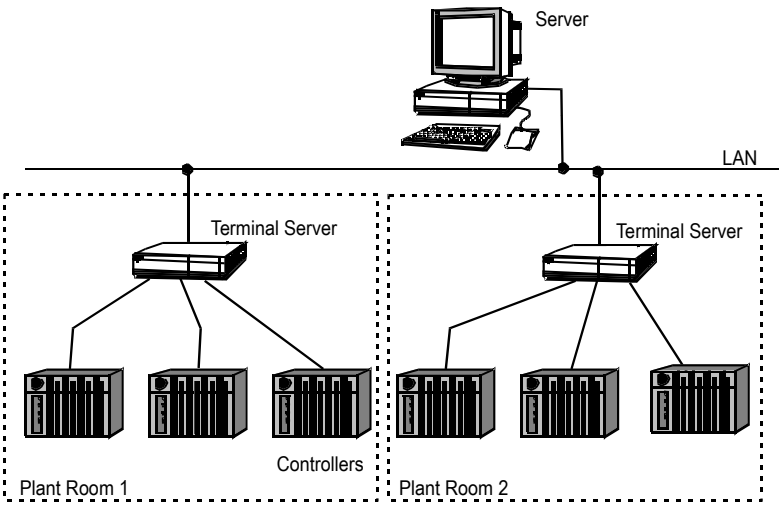
Indirect serial (terminal server) connections

You can connect controllers to the network through a *terminal server*. (A terminal server allows you to connect several controllers to the network even though they only have serial or parallel ports.) Most terminal servers also provide a range of serial connection options, such as RS-232, RS-422 and RS-485.

Terminal servers are particularly useful if you have a:

- Plant-wide LAN, and you want to connect controllers to the LAN—as shown in the following figure
- Geographically-dispersed controllers on a WAN

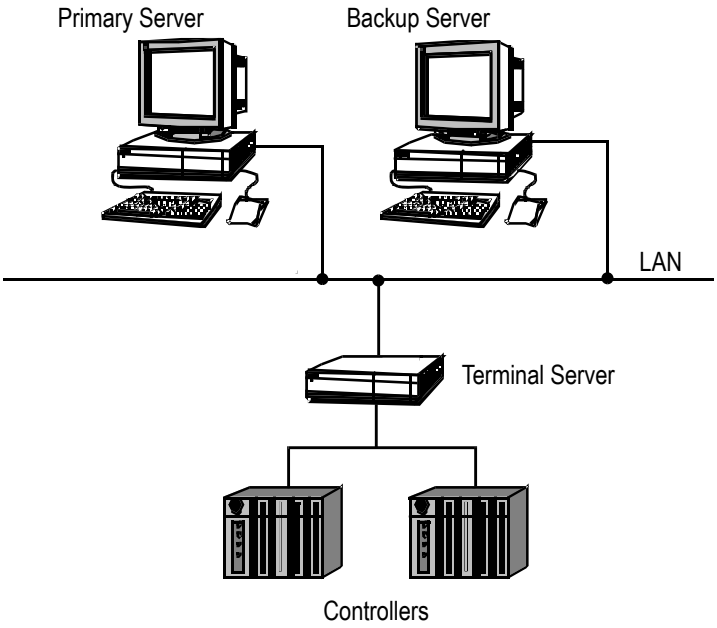
Figure 9 Typical system with terminal servers



Terminal servers and server redundancy

If you have redundant servers, you must use terminal servers to connect controllers that only have serial ports. (Unlike the controllers, terminal servers can automatically switch communications to whichever server is running as primary.)

Figure 10 A terminal server in a redundant server system



Modems

You can use modems to connect controllers located at remote sites, such as reservoirs.

If you only require infrequent scanning—as in the case of a reservoir—you could use a dial-up modem. If you require more frequent scanning, you could use a modem in conjunction with a leased line.

Note that you can also use modems to connect remote Flex Stations—for example to give engineers after-hours access from home.

Specialized links

If modem connections are not suitable, you can also use radio, satellite or other specialized links. In such cases, discuss your requirements with your local Honeywell representative.

Points

8

This chapter describes how to determine your point requirements.

Issue	Comments
Point names	Develop a consistent naming strategy for your points. See “Point naming conventions” on page 73.
Point types	If you have controllers other than Process Controllers, you need to understand the purpose and capabilities of Experion’s inbuilt point types (called *standard* points). See “Standard point types” on page 75.
System interfaces and point servers	Experion includes a number of high-level interfaces—called *system interfaces* or *point servers*—that allow it to exchange data with other applications or subsystems without the need for separately defining points. See “System interfaces and point servers” on page 77.
Algorithms	Determine whether you need to use any algorithms. See “Algorithms” on page 78.
Scripts	Determine whether you can use *server scripts* to perform specialized tasks on points. See “Server scripts” on page 28.
History collection	Determine your history collection requirements. See “History collection” on page 79.
Groups	Determine which points need to be grouped and displayed together. See “Groups” on page 81.
Trends	Determine which point parameters need to be displayed in a graphical manner. See “Trends” on page 82.

Issue	Comments
Scanning strategy	Develop an appropriate *scanning* strategy. (Scanning is the process by which the server reads from/writes to memory locations in controllers other than Process Controllers. See “Scanning strategy” on page 83.
Number of points	Estimate the number of points you require—the number determines your licensing requirements. See “Estimating the number of points required” on page 87.
Multiple servers	If you have multiple servers, see “About point data in a DSA system” on page 21.

Point naming conventions

When a point is created, it is given a unique name, for example, POINT01, POINT02. This identifier, known as the *point ID* or *tag name*, is used in Experion whenever it is necessary to refer to a point in the server (for example, on a custom display or in a report).

A point is also given an item name, for use in the context of the asset model. An item name is an intuitive name given to a point which can be used as an alternative to the tag name.

You need to develop a naming convention for points, and in doing so, comply with a number of rules relating to the length of names, the use of special characters, and other requirements. For example:

- Names must not be longer than 40 characters.
- Tag names must contain at least one alpha character.
- The first character must not be any of the following:
  - Dollar sign ($)
  - At sign (@)
  - Space

For a full list of naming rules and restrictions, see the section on “Point Names” in the chapter “Configuring points” in the *Server and Client Configuration Guide*.

It is also important for both engineers and operators that points are named in a consistent and “user-friendly” manner. You might, for example, consider:

- Basing the names on existing documentation, such as schematics and wiring diagrams, so that users can easily switch between documents and displays.
- Using the same prefix for related points, so that users can easily find related points.
- Starting each part of a name with a capital, to improve readability. For example: `Boiler1Temp`.

Examples

- **Using a device name prefix**. All points associated with `Boiler 3`:
  ```
  Boiler3Temp
  Boiler3InValve
  Boiler3OutValve
  ```
- **Using recipes**. A recipe is used to control a *unit* called `B5`. (A unit is typically something like a chemical cracker). The recipe includes the following

ingredients (each ingredient contains a value that is downloaded to the unit): WATER, ACID and START.

You need to create the following points for unit B5:

B5WATER
B5ACID
B5START

Point IDs and Distributed System Architecture (DSA)

With DSA (see "Distributed System Architecture" on page 16), you can have more than one point with the same point ID (or tag name) provided that the name is unique to a given server and that the points do not belong to the same asset.

If points with duplicate IDs (tag names) are created, then they can be distinguished by prepending the tag name with the server alias. If, for instance, there are two points with the duplicate tag name FIC123 on servers NorthPlantSrv and SouthPlantSrv, then the prepended tag names of each point would be NorthPlantSrv:FIC123 and SouthPlantSrv:FIC123. The prepended tag name can be used wherever normal tag names are used (for example, in an HMIWeb display).

Two important restrictions for points with duplicate tag names are:

- They must not belong to the same asset.
- Their prepended tag name (for example, NorthPlantSrv:FIC123) must not exceed 40 characters.

Standard point types

Experion provides the following types of *standard* (inbuilt) point that are used to exchange data with controllers other than Process Controllers.

Standard point type	Use
Analog	Continuous values, such as temperature or pressure
Status	Digital values (on and off)
Accumulator	Totalizer values
Container	A user-defined point type that allows you to treat a group of related points as if they were one point. See "Container points" on page 76.

Standard points have a composite data structure that can represent several field values. For example, you only need one analog point for a control loop that maintains the temperature of an oven, because the point's data structure includes the following *parameters* (data items):

- Process variable (PV) to record the current oven temperature
- Output variable (OP) to change the temperature of the oven
- Setpoint (SP) to specify the correct oven temperature
- Mode (MD) to change the loop from manual to automatic control

User-defined parameters

You can increase the functionality of a standard point by defining your own parameters to store custom data. For example, you may want to store a value generated by a script, or record the serial number of the device associated with the point.

For more information about standard points, see the topics "Understanding and configuring points" in the *Server and Client Configuration Guide* and "Point properties" in the *Quick Builder Guide* in Knowledge Builder.

Container points

A *container point* ties together a set of related points so that they can be managed as if they were one point. Container points not only speed up configuration tasks, they also make it easier for operators to manage your system.

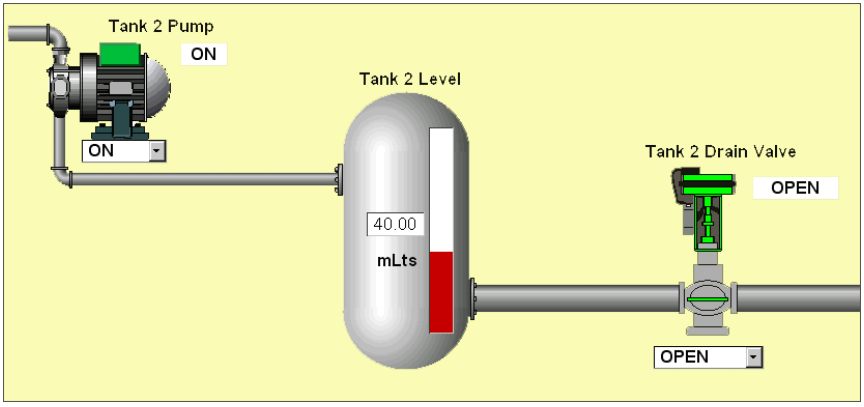
A container point is, in effect, a user-defined point type that matches your data requirements for a particular type of device or process. For example, if you have fifty identical compressors, you could create a new type of container point called “compressor”, and then create one compressor point for each compressor.

For each type of container point, you must:

- Define its structure in Quick Builder
- Create a *point detail display* in Station (A point detail display shows run-time values and configuration settings for a particular type of point, and is functionally equivalent to the point detail displays supplied with Experion.)

  You may also want to create a matching *faceplate*. (A faceplate is a specialized popup that shows a subset of the details shown on the point detail display—typically the point’s run-time values and control settings. A faceplate appears when an operator clicks an object that is linked to a point.)

Figure 11 Typical point detail display



For more information about container points, see the *Quick Builder* section in Knowledge Builder.

System interfaces and point servers

Experion includes a number of high-level interfaces—called *system interfaces* or *point servers*—that allow it to exchange data with other applications or subsystems without the need for separately defining points.

The database structure of system interface/point server points—called *flexible points*—is determined by the application/subsystem, rather than by Experion.

The documentation for each system interface/point server contains Experion-specific information, such as integration issues and connection options, that may affect your design and planning decisions. For details about:

- The OPC Advanced Client, see the topic "Configuring the Experion OPC Advanced Client" in the *Server and Client Configuration Guide* in Knowledge Builder.
- TPS Integration, see the *LCN-connected Station, Server and ACE Implementation Guide* in Knowledge Builder.

Algorithms

An algorithm extends a point's functionality by performing additional processing, or initiating an action. Experion provides two types of algorithms:

- **PV**. Gathers/manipulates data, the result of which is usually stored in the point's PV.
- **Action**. Initiates an action—such as requesting a report—when the point's PV changes value.

Note that you should use algorithms carefully, because attaching them to numerous points may adversely affect the server's performance.

For a description of each algorithm, see the *Quick Builder* section in Knowledge Builder. (Also included in Quick Builder's help.)

History collection

You can collect the following types of history for point parameter values. (Note that the standard and extended history intervals are the default intervals. If they are not suitable, they can be changed with assistance from Honeywell.)

History type	Description
Standard	Stores the following snapshots and averages: • 1-minute snapshots • 6-minute averages of the 1-minute snapshots • 1-hour averages of the 1-minute snapshots • 8-hour averages of the 1-minute snapshots • 24-hour averages of the 1-minute snapshots
Fast	Stores snapshots at regular intervals—called the *fast history interval*. (This interval, which is set when installing Experion, can be between 1 and 30 seconds.)
Extended	Stores the following snapshots: • 1-hour snapshots • 8-hour snapshots • 24-hour snapshots

The maximum number of point parameters for which you can collect history are as follows.

History type	Maximum number of point parameters
Standard	50,000
Fast	1,000
Extended	5,000

Attention

Care should be taken to ensure that the communications capacity of the controller subsystem is not exceeded. Depending upon this capacity it may not be possible to configure the maximum number of standard history parameters available.

Storage requirements for history samples

Experion stores each type of sample in a separate history file. For example, there are five history files for standard history, one each for: 1-minute snapshot, 6-minute average, and so on.

Use the following formula to determine your total storage requirements (in bytes):

*(N1+N2+N3+N4+N5+2)*PS*4+(N6+2)*PF*4+(N7+N8+N9+2)*PE*4*

Part	Description
PS	Number of point parameters with standard history.
PF	Number of point parameters with fast history.
PE	Number of point parameters with extended history.
N1 to *N5*	Number of samples retained by each of the standard history files. *N1* = 1-minute snapshots, *N2* = 6-minute averages, and so on.
N6	Number of samples retained by the fast history file.
N7 to *N9*	Number of samples retained by each of the extended history files. *N7* = 1-hour snapshots, *N8* = 8-hour snapshots, and *N9* = 24-hour snapshots.

Archiving history samples

You can configure each history file to hold up to 100,000 samples for each parameter. Note, however, that there is a limit to the size of each history file and that the number of samples stored decreases as the number of parameters increases.

For optimum performance, especially in a redundant server system, it is recommended that you configure an individual history file to be no greater than 500Mb in size.

Note also, in the case of fast history, that the history file fills up very quickly—for example, if you set the fast history interval to 1 second, 100,000 samples represents just over one day.

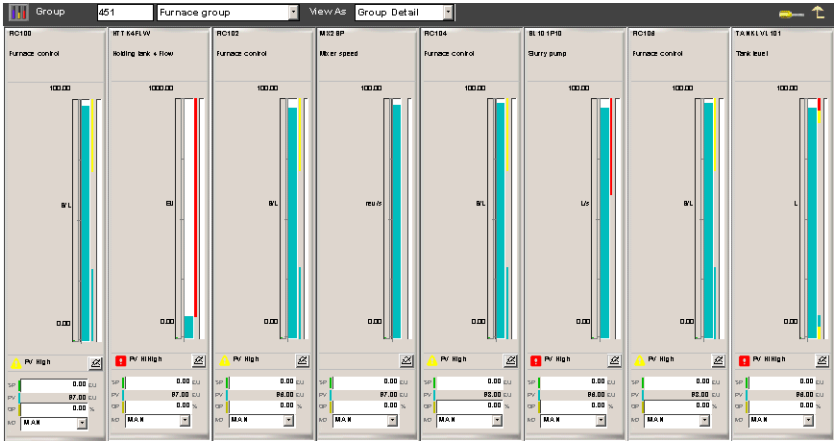
If you need to keep more than 100,000 samples, you must configure the History Archive Manager to archive the history files at appropriate intervals. Typically, history files are archived to another disk on the server, a file server or to recordable CD (CD-R).

Groups

You can make it easier for operators to interpret system activity by grouping related points.

Each group can contain up to eight points, and each point in the group has its own faceplate that shows the values of the major parameters.

Figure 12 Typical group



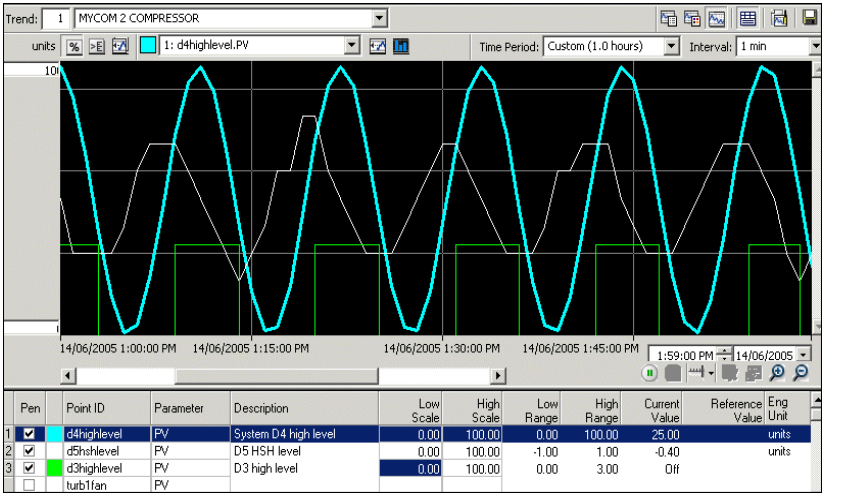
Trends

Trends display historical process values in a graphical manner. In many instances, trends provide operators with the best means of understanding system activity.

Depending on your database size, you can define up to 1,000 trends.

In order to make a trend meaningful, you need to select the appropriate type of history collection for each point parameter. For example, you need fast history for a rapidly changing parameters, but extended history for slowly changing ones. See “History collection” on page 79.

Figure 13 Typical trend



A standard trend displays historical data for up to 32 points as line graphs. In addition to the line graph, you can choose to display numeric history for the points in the trend as well as events associated with the points in your trend.

You can configure your trend so that the data is displays as:

- A bar graph for up to three points
- An X-Y plot for two analog points, with one point’s values plotted against the other.

Scanning strategy

Scanning is the process by which the server reads from/writes to memory locations in controllers other than Process Controllers.

Each item of controller data to which the server needs read/write access is defined in the server as a point parameter. For example, the temperature of a boiler would typically be represented in the server as the PV (process variable) of an analog point. (For information about points and their parameters, see “Points” on page 71.)

An efficient scanning strategy provides the required level of monitoring and control, while keeping system load to a minimum.

Issue	Comments
Basic principles	Ensure that your strategy conforms to the basic principles. See “Basic principles of scanning” on page 84.
Scanning techniques	Use scanning techniques that are appropriate to your needs. See “Scanning techniques” on page 85.
Scan optimization	Optimize your scanning strategy, so that you minimize the load on the server. See “Scan optimization” on page 86.

Basic principles of scanning

Keep these two basic scanning principles in mind when designing your scanning strategy:

- **Limit control to starting/stopping processes**

  The Experion server is not designed to be included in control loops—potential communication delays and heavy server loads may result in unreliable system activity. (The Experion server is primarily designed to collect data, and to present it in a meaningful way to users.)

- **Limit data extraction to useful information**

  You should only extract data from controllers that is useful to operators, or is required for a specific purpose (trending, auditing and so on).

Scanning techniques

Experion supports the following *scanning* techniques. (Scanning is the process by which the server requests point parameter values from controllers.) You can use several scanning techniques on the same controller, providing they are supported by that controller.

Scanning technique	Comments
Periodic	The server scans a point parameter at the specified interval. For example, if a parameter's scan period is 15 seconds, the server scans the associated controller every 15 seconds for the parameter's value. You can choose from a range of standard scan periods, ranging from seconds to minutes, and you can assign a different scan period to each parameter. Periodic scanning: • Is supported by most controllers • Is simple to implement • Places a predictable, but potentially heavy, load on the server
Demand	The server only scans a point parameter when requested by an operator, a report, or an application.
Exception	The server polls the controller for any change-of-state data. Exception scanning is thus triggered by events, not time. Exception scanning is: • Not supported by all controllers • More difficult to implement than periodic scanning because it usually requires additional logic in the controller, additional configuration in Experion, or both

Unsolicited messaging

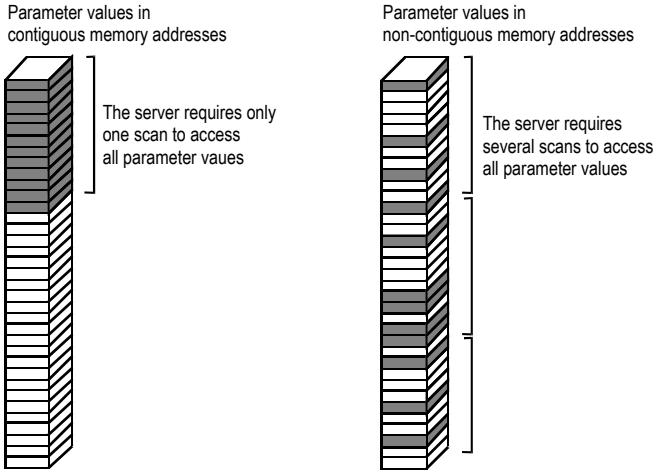
Some controllers support *unsolicited messaging*, where the controller, rather than the server, initiates a communications session. Unsolicited messaging can substantially reduce communications traffic, especially if the values do not change frequently.

Check the manufacturer's documentation to determine whether a controller supports unsolicited messaging.

Scan optimization

To optimize scanning:

- Use unsolicited messaging if the controller supports this feature, and values change infrequently.
- Use periodic scanning if values change frequently.
- Choose a scanning period appropriate to the values being scanned. For example, you do not need to scan a temperature every 5 seconds if it changes only slightly over an hour.
- Minimize the number of scan packets as follows:
  - Specify the minimum number of scan periods for a given controller because the server requires a separate scan for each scan period. For example, you might only need two scan periods for a particular controller: a short one for a few critical values, and a long one for all other values.
  - For each scan period you use, specify the longest period that is acceptable to your needs.
  - Arrange parameter value addresses so that they occupy contiguous addresses in the controller's memory, as shown in the following figure. If parameters occupy contiguous addresses, the server can access many parameters in a single scan—the exact number is controller-specific.



Estimating the number of points required

Based on your analysis of your system and the role that you want Experion to perform, estimate the number of points you need to define. Use this figure, with an appropriate safety margin, to determine your licensing requirements.

Remember that composite nature of Experion points means that you do not need one point per I/O value. See “Standard point types” on page 75.

Assets and asset models

9

The chapter introduces the concept of assets and asset models in Experion, and provides an overview of the steps involved in planning and implementing an asset model.

About Experion assets

An Experion *asset* is a database entity that represents a particular physical item in your enterprise, for example, fixed plant equipment, facilities and buildings.

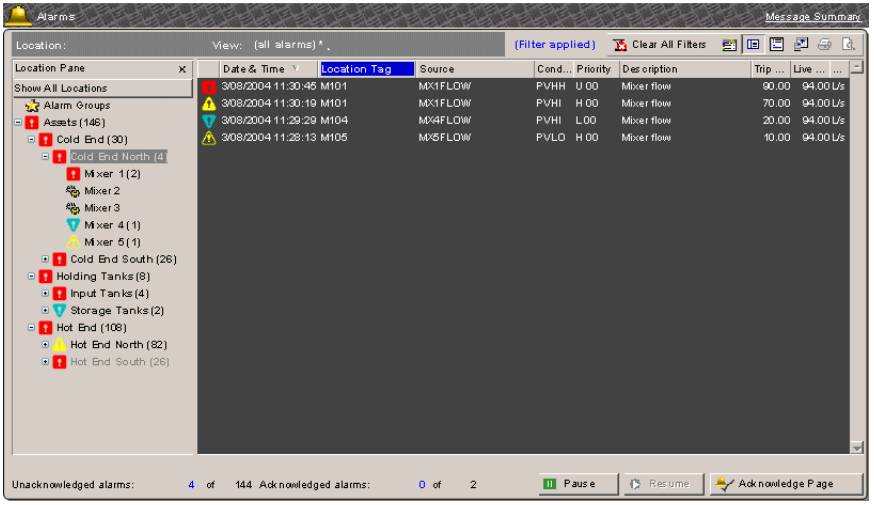
The benefits of a hierarchical asset-based structure in your Experion database include:

- A simple and intuitive means of implementing *scope of responsibility* (SOR), that is, of allowing or restricting access to parts of the plant, process, or equipment.

  Instead of having to nominate each and every item for which a given Station or operator has scope of responsibility, you can often assign the scope of responsibility with a single click, depending on how you have defined your asset structure. By assigning a given asset to a Station or operator, you assign that Station or operator the ability to control all the points that belong to that asset (and any of its subsidiary or "child" assets) and to view the alarms and custom displays for that asset.
- A structure that can be used to logically replicate your physical assets and to engineer your Experion system around your key entities.
- A user-friendly asset-naming system that helps operators and other users to more easily navigate through displays and identify particular parts of the plant or specific pieces of equipment without having to remember obscure tag names.
- A ready-made form of alarm aggregation. Once you have defined your assets and the points that belong to those assets, alarms for those points are automatically aggregated under each asset (see Figure 14 on page 91).

  Note that you can also aggregate alarms across a range of assets by configuring alarm groups (see "Alarm group model" on page 92).

Figure 14 An Alarm Summary display showing alarm aggregation by asset



About assets and the Experion Enterprise Model

Assets and the asset model form the core of the Experion *Enterprise Model*, a framework that can be used by engineers, operators, and applications to model and view their plant or process. The Enterprise Model replaces the flat, area-based structure that was used prior to Release 210.

You use the new Experion tool, Configuration Studio, to build your Enterprise Model on an engineering Station and then download it to the servers in your Experion system.

An Enterprise Model comprises:

- A system model
- An asset model
- An alarm group model

System model

The system model represents the boundaries of your system. It comprises information about:

- The servers that are part of your Experion system.
- The Stations, channels, controllers, system interfaces, and printers that are associated with those servers.

In building your system model, you can also define those servers that are connected to, but not part of your Experion system (for example, servers on your business network).

After you have built your system model with Configuration Studio and downloaded it to your Experion servers, the engineering data you downloaded with your system model is supplemented by additional detail about the individual components of your system, which can be viewed from the System Status display in Station.

Asset model

The asset model, which forms the core of your Enterprise Model, is used to:

- Define scope of responsibility
- Navigate your Experion system
- Resolve data references
- Manage alarms
- Organize points, displays and reports.

Alarm group model

The alarm group model is used to:

- Define alarm groups
- View aggregated alarms for those alarm groups

For more information about alarm groups and aggregated alarms, see "Configuring aggregate alarming" in the *Server and Client Configuration Guide* in Knowledge Builder and the *Enterprise Model Builder User Guide*.

Configuring and implementing an asset model

To implement your asset model you need to go through the following steps.

Task	Go to	Done
Familiarize yourself with the concepts and terminology associated with an asset model.	"About Experion assets" on page 90	
Plan your asset model, that is, work out the structure and names you will use for your assets.	"Planning your asset model" on page 98	
Use Configuration Studio to define the servers and assets in your system.	"Configuration Studio" on page 170 and the *Enterprise Model Builder User Guide*	

Task	Go to	Done
If you are upgrading from a previous release of Experion: migrate your data to your newly created Enterprise Model database.	"Migrating from an area-based system to an asset-based system" on page 96	
Download your asset model to all the Experion servers in your system.	The *Enterprise Model Builder User Guide*	
Use Quick Builder or Control Builder to build your points and specify the parent asset for each point.	The *Quick Builder Guide* and the *Control Building Guide*	
Optionally, build alarm groups and associate assets with alarm groups.	The *Enterprise Model Builder User Guide*	
Assign assets to Stations, if you are using Station-based security	The topic "Assigning scope of responsibility to Flex Stations" in the *Server and Client Configuration Guide* in Knowledge Builder	
Assign assets to operators, if you are using operator-based security	The topic "Assigning scope of responsibility to operators or Windows group accounts" in the *Server and Client Configuration Guide* in Knowledge Builder	
Assign assets to reports	The topic "Configuring reports" in the *Server and Client Configuration Guide* in Knowledge Builder	
Assign assets to custom displays	The *HMI Web Display Building Guide*	

Terminology

You need to be aware of the following terminology when planning and configuring your asset model.

Term	Description
Asset	An entity representing fixed plant equipment, facilities, or buildings. All assets have a tag name, an item name, and a full item name.
Assignable asset	An asset that can be assigned to an operator or Station for the purposes of scope of responsibility, that is, for the purposes of controlling what an operator or Station can view or control in your Experion system.
Associated asset	If you configure an alarm group to aggregate alarms across a range of assets, you need to associate that alarm group with an asset to assign scope of responsibility.
Tag name	A unique identifier given to an asset or point. For example, the tag name for the agitator in Figure 15 on page 102 might be `AG001`, and the tag name for `Precipitator1`, its parent asset, might be `PR001`.
Item name	An intuitive name given to an asset or point which can be used as an alternative reference to the tag name, for example, when calling up a Point Detail Display. Unlike the tag name and the full item name (see below), the item name does not have to be unique. For example, Figure 15 on page 102 shows an asset model that contains two assets with the item name of `Train1`, two assets called `Train2`, and two called `Precipitator1`.
Full item name	The full item name consists of the item name of the entity combined with the item name of its parent, and so forth, up to a top level node. For example the full item name of the agitator in the asset model shown in Figure 15 on page 102 is: `/Assets/Precipitation/Train1/Precipitator1/Agitator` A full item name must be no longer than 200 characters and, like a tag name, must be unique within the system.
Unassigned item	Unassigned items are items that do not belong to (or are not associated with) an asset. For example, if you build a point but do not assign the point to an asset, the point is downloaded as an unassigned item. Likewise, if you delete an asset but retain the points that belongs to that asset, those points become unassigned items.

Term	Description
Enterprise Model	An Enterprise Model is a framework that can be used to model and view a plant and its processes (as well as the various system components of an Experion system). An Enterprise Model comprises: • A system model (see “System model” on page 91) • An asset model (see “Asset model” on page 92) • An alarm group model (see “Alarm group model” on page 92)
Enterprise Model Database (EMDB)	You use Configuration Studio to define the various components of your Enterprise Model. In doing so, you build an Enterprise Model Database (EMDB), which comprises the engineering definitions of your system components, assets, and alarm groups. After building your EMDB on an engineering Station, you download it to the servers in your Experion system.

Migrating from an area-based system to an asset-based system

Prior to Release 210, Experion used an area-based structure. Migrating a pre-R210 server to Experion R210 or later automatically converts areas to assets.

The migration process converts areas to top-level assets, that is, assets that are displayed at the top of your asset hierarchy. (See Figure 14 on page 91 for an example of an asset model with three top-level assets: `Cold End`, `Holding Tanks`, and `Hot End`). The item name and tag for newly converted top-level assets are derived from the area name. Thus, for example, if you had areas called A1, A2, and A3 in your pre-Release 210 system, the migration process will convert these areas into top-level assets whose tag name and item name are A1, A2, and A3 respectively.

Similarly, any references to areas that were configured in Experion releases prior to R210 are converted to references to those newly created top-level assets and added to your asset database.

Attention

When you use Configuration Studio to add a migrated server to your system, you are given the option of importing the assets from this server into your Enterprise Model Database (EMDB). It is strongly recommended that you perform this import. Otherwise the migrated assets on that server will be overwritten when the EMDB is downloaded to that server.

Overview of procedures for migrating asset data

When migrating from a pre-R210 server to Experion post-R210, you should:

1. Back up each pre-R210 Experion server.
2. Migrate these servers to the latest release of Experion (currently R300) as per the procedures in the *Software Installation and Upgrade Guide*.
3. Use Configuration Studio to add each migrated server to your system. (See “Configuration Studio” on page 170 and the *Enterprise Model Builder User Guide* in Knowledge Builder.).

   When prompted, choose the option of importing the assets from that server into your EMDB.
4. Once all the servers have been added to your system in Configuration Studio, and their assets imported, you can perform any required modifications to the asset model before downloading the asset model to all the servers in your system.

Prior to Release 210, Experion used an area-based structure. When you upgrade to Release If you will be migrating your system to from

When you migrate from a previous release of Experion to Release 300 and you add a new server to the system, you are given the option of migrating the data from that server to your Enterprise Model database.

Because the asset model replaces the area-based structure used in Release 201 (and earlier releases), the data migration process involves the conversion of areas to assets. Accordingly, if you opt to migrate your previous configuration data to Experion R300, any areas that were configured for your system in previous releases of Experion are converted to assets and added to your asset model.

Moreover, the migration process converts areas to top-level assets, that is, assets displayed at the top of your asset hierarchy. (Figure 14 on page 91 shows an asset model with three top-level assets: `Cold End`, `Holding Tanks`, and `Hot End`). The item name and tag for these newly converted top-level assets are derived from the area name. Thus, for example, if you had areas called A1, A2, and A3 in your pre-Release 210 system, the migration process will convert these areas into top-level assets whose tag name and item name are A1, A2, and A3 respectively.

Similarly, any references to areas that were configured in previous releases of Experion are converted to references to those newly created top-level assets and added to your asset database.

Attention

Before you download the Enterprise Model Database (EMDB) to any server, you must ensure that your EMDB is complete. That is, if there is any data on the server that needs to be migrated from a previous release of Experion to your Release 300 EMDB, make sure that this is done before you download the EMDB to that server.

If you download an incomplete model, there is a risk that the assets will be deleted because they will be overwritten by the EMDB as it is downloaded.

Planning your asset model

When planning or configuring your asset model there are a number of things that you might consider.

First and foremost, your asset model should reflect the logical and physical design or structure of your plant. For example, if your site consists of two distinct plants, say, Plant North and Plant South, each with their own control room, then it would probably be advisable to define Plant North and Plant South as top-level assets.

You should also think about which parts of your plant need alarms disabled and enabled, and the level of detail required. For example, when you need to undertake maintenance on a filtration tank, you will want to be able to temporarily disable the alarms for all the points associated with that particular tank. By defining each filtration tank as an assignable asset, you can disable (and subsequently re-enable) all the alarms for that tank with a single click (via the Alarm Enable/Disable display).

In planning your asset model, you also need to bear in mind the following recommendations, guidelines and restrictions:

- The maximum number of assets you can enter into your EMDB is 4,000.
- The maximum number of assignable items in the system, including assignable assets, is 1000. Note that the maximum number of assets will come out of the number of available points in a system, but will not be counted against your licensed point count.
- Although you can have as many as 10 levels, from a practical point of view you should use no more than 5 levels, otherwise your system may become too difficult to navigate.

  The deeper and more complicated your model, the more cumbersome and therefore less useful your structure will be. For example, adding levels to your model adds to the length and complexity of the full item name for assets. Remember too that the full item name must be no longer than 200 characters.
- As a general principle keep your asset model simple and small. Do not define assets down to the lowest level, for example, down to the level of nuts and bolts. You should, however, define as assets any items that you would like to be able to use for filtering or navigating purposes. For example, you should define as assets any items that you would like to have included “in the tree” of an Alarm Summary display to aid in navigating through (or filtering) alarms. Similarly, you should also define as assets any items that you want to use for navigating through (or filtering) report data.
- It is recommended that you make your top 2 levels of assets assignable.
- When you make an asset assignable, everything else above that level should also be marked as assignable.

- In naming your assets, you should also consider a standard naming convention for similar or identical items. This will enable you to take full advantage of the Experion generic displays, which allow you to reuse the same HMIWeb display for similar items. For example, if you would like to use the same display for points associated with the pumps on your filtration tanks then you should give all of these pumps the same item name, say, PUMP. For more information about generic displays, see "About generic displays" in the chapter "Assets and asset models" of the *Server and Client Configuration Guide* in Knowledge Builder.
- Make use of alarm aggregation by configuring alarm groups to collate data from disparate sources. For example, you may want to capture the data for all the valves in your system, which are not necessarily grouped under the one higher-level asset. Note, however, that alarm groups must be associated with an asset for the purposes of scope of responsibility. For details about configuring alarm groups, see "Configuring aggregate alarming" in the *Server and Client Configuration Guide* in Knowledge Builder.

For more detailed information about defining and configuring your asset model, see the *Enterprise Model Builder User Guide*.

Assets as an organizational structure for points

The primary relationship in an asset model is that of asset containment, where one asset contains another. The relationship between individual assets therefore forms a hierarchical structure (see Figure 15 on page 102).

This hierarchical structure plays a central role in organizing the information available on the Experion server system. In particular, it provides the primary means of organizing points, which are associated with assets in an asset model.

In your Experion asset model, points can be given names that are meaningful and readily understandable. For example, although the tag name for a point representing a flow controller in your system might be `FC123`, you can assign a more meaningful item name like `FlowController` to this point in your asset database. Moreover, you can have more than one point called `FlowController` as long as the full item name is unique.

Naming rules for assets

Assets have both a tag name and an item name. Although tag names must be unique within a system, item names can be duplicated within your system provided that the full item name is unique. Therefore, for example, you could have an asset called `FlowController` in `FiltrationRoomNorth` as well as in `FiltrationRoomSouth` because the full item name of one will be `/Assets/FiltrationRoomNorth/FlowController` and the other will be `/Assets/FiltrationRoomSouth/FlowController.`

When naming assets you need to bear in mind a number of restrictions. For example:

- A point's tag name must not match the item name of any other point belonging to the same asset.
- Tag names and item names must not be longer than 40 characters.
- The full item name (for example, `/Assets/Plant/Tank1/Filter`) must be no longer than 200 characters.
- The tag name or item name cannot start with the characters $ or @, or a space.
- Spaces can be used within a tag or item name but not as the first or last character.

Note that names are not case-sensitive: `Cooling Tower1` and `cooling tower1` represent the same asset.

For a full list of naming rules, see the section on "Naming rules for assets" in the chapter "Configuring your Enterprise Model" in the *Server and Client Configuration Guide*.

About assignable assets

Your asset model is not only a logical representation of your physical assets and how they relate to each other, but also provides a framework for determining which system, process, or individual item of equipment can be accessed by which operator (or Station) in your plant. Your asset model therefore forms the basis for defining an operator's (or Station's) scope of responsibility: an operator's (or Station's) access to the system is determined by the assets and other entities that have been assigned to them.

Assets that can be assigned to an operator (or Station) are called *assignable assets*. The scope of an assignable asset includes all asset "children" of the assignable asset including any points associated with those assets or any alarm groups that have been designated that asset for SOR purposes.

In planning your system you therefore need to consider which assets will need to be accessed by which operators (or Stations), and ensure that those assets have been defined as assignable in your asset model.

After planning and building your asset model, you can specify which assets that individual operators (or Stations) can access or control. By assigning assets to operators (or Stations) you can ensure that when operators call up the Alarm Summary display, they only see the alarms for those assets that have been assigned to them.

Attention

All top level assets in your asset model are automatically set to be assignable. Below this top level, you can specify which assets are to be assignable.

If lower level assets are not configured to be assignable, the lower level assets inherit the assignment of the assets above them in the hierarchy.

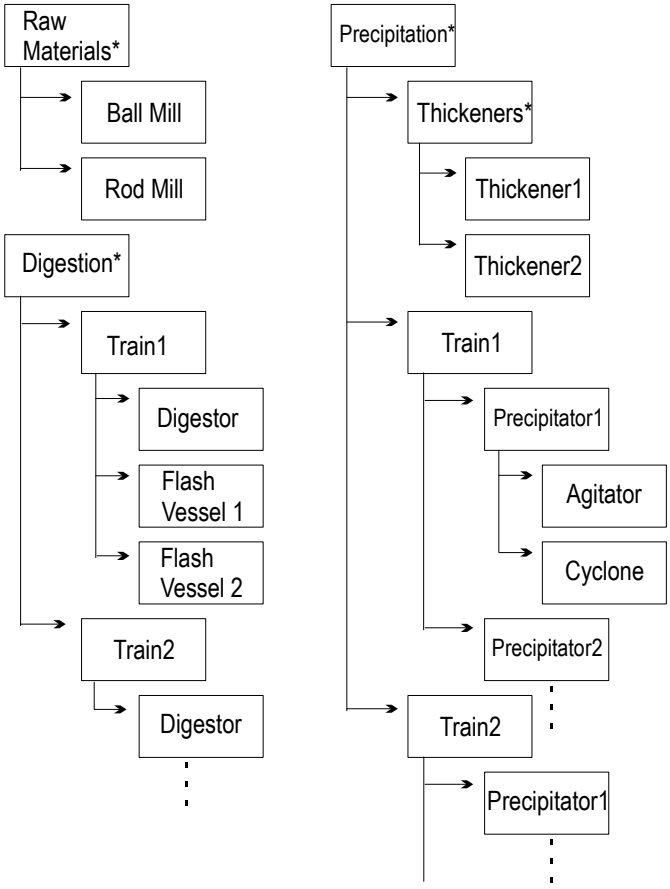
Example

In the following figure, an asterisk beside the asset name indicates that it is assignable. `Raw Materials`, `Digestion`, and `Precipitation` are all top level assets, which are by default assignable. Assigning a top-level asset to an operator gives them access to that asset and any asset below that asset, that is not separately assignable.

Thus, for example, if you assign the asset `Raw Materials` to an operator, you are automatically assigning access to the assets below it in the asset tree, namely `Ball Mill` and `Rod Mill`. Similarly, if you assign the asset `Precipitation` to an operator, you are assigning access to `Train1` and `Train2`, as well as the assets shown below them in the asset tree. However, because `Thickeners` is shown as a separately assignable asset, access to `Thickeners` is not automatically assigned. To give an operator access to `Thickeners` and its child assets `Thickener1` and `Thickener2`, you need to specifically assign `Thickeners` to that operator.

If, on the other hand, you want an operator to only have access to `Thickeners` (and its child assets), but not to `Train1` or `Train2` (and their child assets), then you would specifically assign `Thickeners`, but not its parent asset `Precipitation`, to that operator.

Figure 15 Example of an asset model



About profiles

Within an asset model Experion also uses profiles as a means of further refining the restriction of access. A profile consists of a list of assignable assets and a time period. If you are using operator-based security, you can set up profiles to provide:

- Additional security by assigning assets only for specified times
- A method of giving an operator additional access at specified times; for example, after-hours monitoring from a central location.
- A quick way of assigning assets to operators

For more information about profiles, see “Configuring profiles for scope of responsibility” in the chapter “Configuring security and access” in the *Server and Client Configuration Guide* in Knowledge Builder.

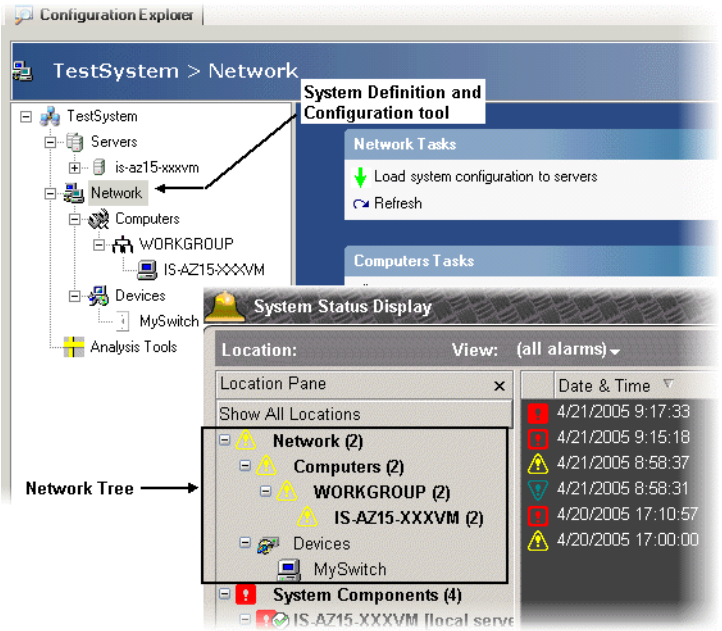
System Status Network tree

10

This section describes Network Tree planning considerations.

About the System Status Network tree

This section describes Network tree planning considerations so that you are able to view computers and network equipment and their events from the System Status display. You use specific tasks in Configuration Studio to define network equipment. After you download these definitions, the Network tree in the System Status display is built and visible to operators with the appropriate scope of responsibility assignment. In order to view event and performance data for the items appearing in the Network tree, you deploy the Experion System Event Server and System Performance Server.



About System Event Server and System Performance Server

The System Event Server (SES) is an Experion system component that issues Windows events as OPC alarms or events to a subscribing OPC client such as the System Status Display. The System Status display shows Windows system events through the use of the SES. The SES is integrated with the Experion Alarm and Event subsystem. The integration means, for example, that an operator can acknowledge a system alarm from the System Status display in the same manner that a process alarm is acknowledged on the Alarm Summary display.

The System Performance Server (SPS) is an OPC Data Access server that retrieves performance and configuration information and allows it to be integrated into operator displays and process applications in a manner consistent with process data access. This kind of information is vital for system monitoring and problem analysis. While third-party tools provide some trending and analysis of computer and network performance information, the SPS provides capabilities that integrate this information into the process control environment.

Identifying a network topology

Several topologies are shown in this section to illustrate System Status Network tree planning considerations. The topologies include:

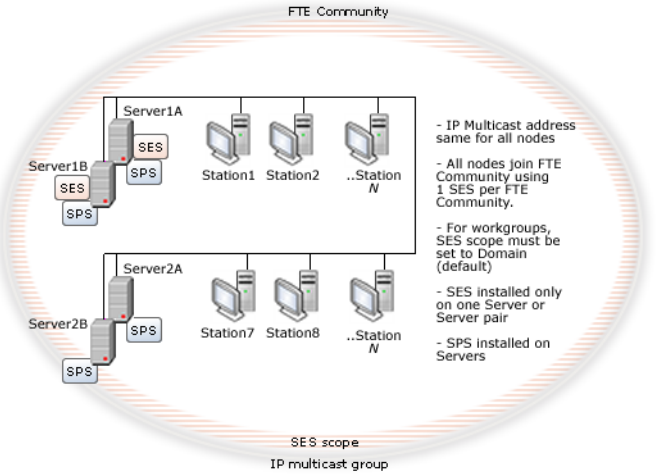
- Workgroup
- Domain with no Organizational Units (OUs)
- Domain with OUs
- Multiple domains

Attention

If you are planning to support a Network tree in a Windows domain environment, the following sections imply that you have Active Directory and Dynamic DNS already configured. The topologies are narrowly focused on planning considerations for the System Status display Network tree. For information regarding network and security best practices for Experion systems, refer to the *Network and Security Planning Guide*.

Workgroup topology

In the following figure, a workgroup topology is shown to illustrate planning considerations to support event notifications to the System Status display and its Network tree.

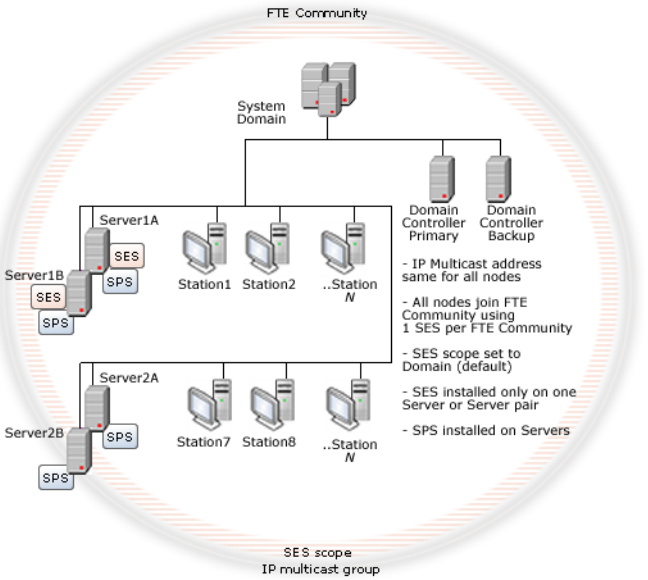


In this example, redundant Servers support several Stations. The first planning consideration for this example is that all nodes belong to the same IP Multicast

group using the same IP multicast address. Additionally, the nodes form an FTE Community as they share the same System Event Server as set from Configuration Studio. Note that the System Event Server is installed on only one of the redundant server pairs. The System Event Server scope of domain (its default setting) is appropriate for this workgroup topology. System Performance Server (SPS) should be installed on all Experion servers. When there are multiple Experion servers in an FTE community, the Distributed System Architecture (DSA) option should be enabled so that the servers can share SES event data. Each server in the FTE community subscribes to the server hosting the SES.

Domain with no OUs

In the following figure, a simple domain with no Organizational Units (OUs) topology is shown to illustrate planning considerations to support event notifications to the System Status display and its Network tree.

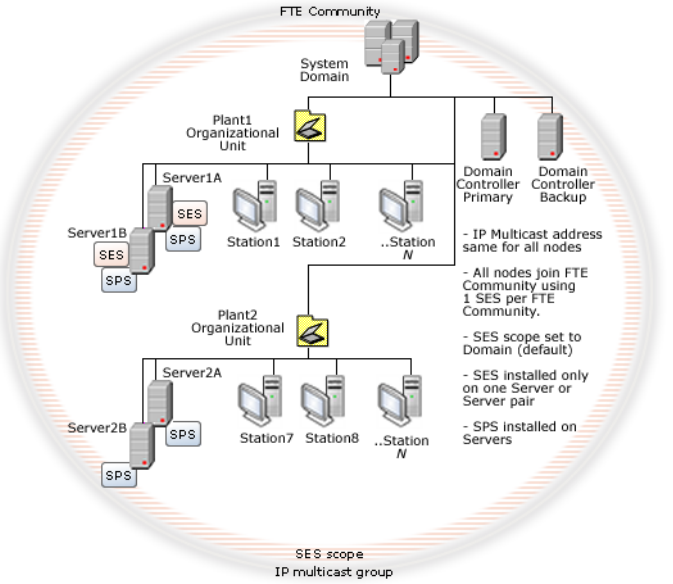


In the example, redundant servers support several Stations. The first planning consideration for this example to note is that all nodes belong to the same IP Multicast group using the same IP multicast address. In doing so, the nodes form an FTE Community. Additionally, the nodes access the same System Event Server (SES) as defined from the FTE Community Settings task in Configuration Studio. Note that the System Event Server is installed on only one of the redundant server pairs in an FTE Community. The System Event Server scope of domain (its default setting) is appropriate for this topology. The System

Performance Server (SPS) should be installed on all Experion servers. When there are multiple Experion servers in an FTE community, the Distributed System Architecture (DSA) option should be enabled so that the servers can share SES event data. Each server in the FTE community subscribes to the server hosting the SES.

Domain with OUs

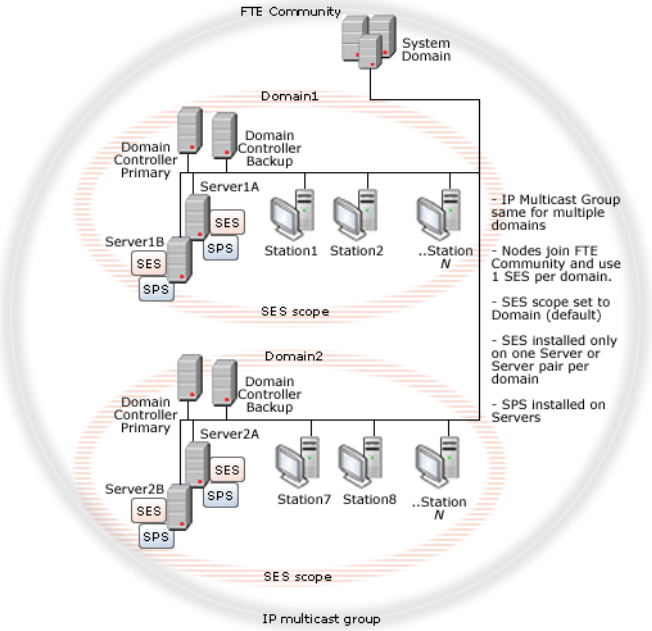
In the following figure, a domain topology using Organizational Units (OUs) is shown to illustrate planning considerations to support event notifications to the System Status display and its Network tree.



In the example, redundant servers support several Stations in OUs. The first planning consideration for this example is that all nodes belong to the same IP Multicast group using the same IP multicast address. Although the nodes form an FTE Community, they are also organized into OUs. The nodes use the System Event Server as set from Configuration Studio. The System Event Server scope defaults to the domain setting. The System Performance Server (SPS) should be installed on all Experion servers. When there are multiple Experion servers in an FTE community, the Distributed System Architecture (DSA) option should be enabled so that the servers can share SES event data. Each server in the FTE community subscribes to the server hosting the SES.

Multiple domains or multiple workgroups

In the following figure, a topology using multiple domains is shown to illustrate planning considerations to support event notifications to the System Status display and its Network tree. A topology of multiple workgroups within the same multicast group should follow these same planning considerations.



The first planning consideration for this example to note is that all nodes belong to the same IP Multicast group using the same IP multicast address. In doing so, the nodes form an FTE Community. Note that the System Event Server is installed on one of the redundant server pairs in each domain. The nodes access the System Event Server (SES) in their domain as defined from the FTE Community Settings task in Configuration Studio. The System Event Server scope of domain (its default setting) is appropriate for this topology. The System Performance Server (SPS) should be installed on all Experion servers. When there are multiple Experion servers in an FTE community, the Distributed System Architecture (DSA) option should be enabled so that the servers can share SES event data. Each server in the FTE community subscribes to the server hosting the SES.

If Server1 and Server2 are DSA connected, duplicate FTE event notifications occur. To eliminate these duplicate FTE event notifications, remove the FTE event filter file (`C:\HWIAC\Filters\FTEFilter.xml`) from all but one SES pair.

SES event notification behavior

Events are gathered by the System Event Provider (SEP), part of system management runtime. The events are synchronized on all nodes within the FTE Community and domain. The SES is used to convert these events to an OPC event usable by the Experion server.

If the SES fails, an event is generated by the Experion server indicating that it has lost the connection to the SES. System Events are not viewable until the SES is restarted, or the Experion server fails over to the redundant server. When SES is restarted, it reads all events from the SEP and makes them available to the server. No event loss occurs. If the SEP fails, the SES reports loss of connection with its data source (SEP), and no system events are available. When the SEP is restarted, it synchronizes with another node which has the full set of events. In addition, new events that occurred during the time that SEP was unavailable are read and added to the event list. No event loss occurs.

Network tree planning summary

Honeywell recommends that one of the above topologies be chosen when implementing Experion. Utilizing these topologies will allow for simplified configuration and cater to future system expansion. System expansion is simplified by simply configuring new nodes to use the same IP multicast address and the same SES already implemented. The planning considerations are summarized in the following sections.

Recommendations

For typical domain and workgroup environments, establishing all nodes to use the same multicast address and SES scope provides you with the most ease of use and flexibility for future growth.

Location of SES

Only one System Event Server (SES) must be installed per FTE Community, per domain. If the Experion servers are redundant, the SES is installed on both servers.

Scope of SES

The SES scope default setting of domain provides synchronization of system events across the domain as restricted by the multicast community.

Enabling event notification for SES

Events are enabled for capturing through the use of the event filter configuration tool. Event filter files are installed on the nodes where the events defined (in the filter file) are logged. For example, the TPN Server event filter file is installed on the node with the TPN Server. FTE filter files are installed with the SES. By default, all FTE events are collected based on the view of the SES node.

DSA

The Distributed System Architecture (DSA) option should be enabled so that multiple servers in an FTE community can share SES event data. Only one server (pair) in the DSA can have the SES component installed and active. The remaining servers need to subscribe to the server (pair) hosting SES to access all system events.

When you first define a server and download this server definition to other servers in the system, the default subscription for the server is disabled and it does not participate in the DSA. After you define a server, you must enable the DSA connection with other servers so that SES event data can be shared.

You need to consider these DSA connections when determining the number of DSA connections to license.

Location of SPS

SPS should be installed on all Experion servers.

Notifications from switches and routers

Any switches or routers from which notifications are to be received are configured to send those notifications to the server nodes on which the SNMP Monitor has been installed.

Auxiliary Status display

SES and SPS auxiliary displays are installed automatically on all Experion nodes as part of the system management software. The Auxiliary Status display should be installed on any other clients needing view of SES or SPS auxiliary status. Other managed component auxiliary displays need to be installed (for example, TPN Server, Redirection Manager) if used within the system.

Alarms and events

11

This chapter describes how to determine your alarming and event requirements.

Issue	Comments
Alarm prioritization	Formulate a set of rules and guidelines for prioritizing alarms. See “Alarm prioritization” on page 116.
Alarm count aggregation	Consider alarm groups as a way of aggregating alarm counts. See “Alarm count aggregation” on page 117.
Alerts	Consider using alerts for notifications whose urgency and priority are not high enough to be alarms. See “Alerts” on page 118.
Messages	When defining an alarm for certain types of standard point (status, analog and accumulator), you can assign an appropriate *message* that helps operators understand the significance of the alarm. (The Alarm Summary display only shows basic details—such as the point ID, date/time and priority—which may not be sufficient for operators.) See “Messages” on page 119.
Alarm annunciation	Consider your alarm annunciation needs, such as buzzers, horns and alarm paging. See “Alarm annunciation” on page 120.
Event storage and archiving	Consider your *event* storage and archiving needs. (Events include alarms, changes in point status and operator actions.) See “Event storage and archiving” on page 122.

Alarm prioritization

It is essential that alarms are correctly prioritized so that operators are able to respond to alarms in a systematic manner. You therefore need to formulate a set of guidelines so that commissioning engineers assign the correct priority to each alarm condition. You also need to take into account “cascading alarm” scenarios—for example, if a pump failure results in a pressure drop, the pump failure alarm requires a higher priority than the pressure alarm.

Experion prioritizes alarms at two levels:

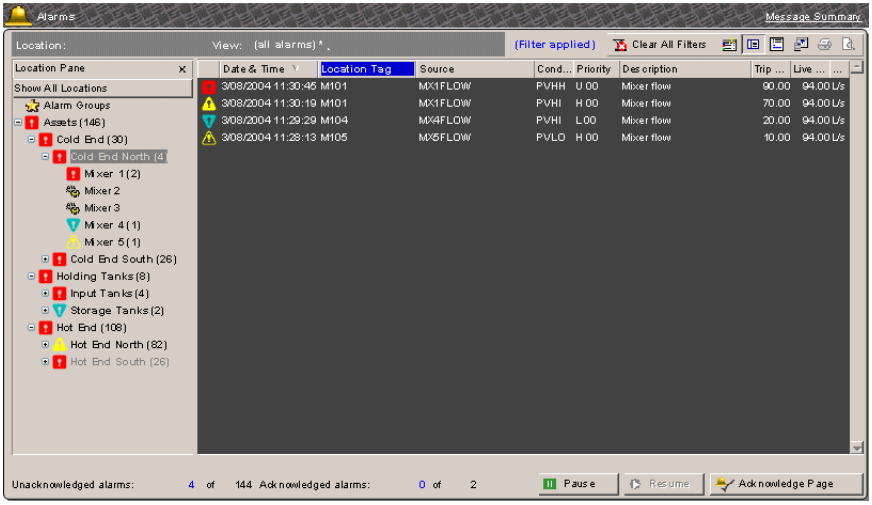
- **Priority**. The priorities are: `Urgent`, `High`, `Low` and `Journal` (the default)
- **Sub-priority**. These range from `15` (highest) to `0` (lowest)

All alarms, except `Journal`, appear in the Alarm Summary and are therefore responded to by operators. All alarms, including `Journal`, are written to the event journal.

Views

You can improve alarm management by creating appropriate *views* for operators. (A view shows a particular subset of alarms, and presents the details in a particular way.) The following figure, for example, only lists alarms for the asset `Cold End North` and shows detailed information about those alarms.

Figure 16 A typical Alarm Summary display



Alarm count aggregation

Custom operating displays are often organized hierarchically to provide an overview of the process being monitored and controlled. To enable operators to see alarms in particular parts of the plant at a glance, aggregated alarm counts can be added to custom displays.

One way in which you can generate aggregated alarm counts is to configure points into alarm groups (see “More about alarm groups” on page 117).

Operators can also view aggregated alarms counts via your asset model (see “Assets and asset models” on page 89): the asset tree in the location pane on the Alarm Summary contains aggregated alarm counts for each asset that contains a point that is in alarm. No configuration is required for alarm count aggregation by asset.

Note the alarm counts stored in the AASTBL database file are obsolescent. They are only valid in a flat asset model. Alarm counts should instead be accessed via the parameters available on an Asset point.

More about alarm groups

Alarm groups provide an alternative way of viewing assets and alarms associated with assets. By using alarm groups, you can create a group of assets and points that are otherwise unrelated to one another in the asset model. For example, you may be interested in all mechanically agitated tanks in the plant for the purposes of monitoring agitator-related alarms across the entire plant.

The benefits of using alarm groups are:

- Additional filtering capabilities on the Alarm Summary.
- Aggregated alarm counts for alarm groups. The alarm counts of all the points within the alarm group are aggregated.
- Aggregate alarming parameters which you can add to custom displays so you can see the number of alarms in each section of the plant at a glance.

You create alarm groups using Configuration Studio. For instructions on creating an alarm group, see the following topic in Knowledge Builder:
Experion R300 > Configuration > Enterprise Model Builder User’s Guide > Creating and configuring alarm groups.

For more information about alarm aggregation and custom displays, see “Configuring aggregate alarming” in the *Server and Client Configuration Guide* in Knowledge Builder.

Alerts

Alerts are notifications whose urgency and priority are not high enough to be alarms.

There are several types of alerts:

- Interactive Instruction alerts, which can be generated by C300 controller and ACE to indicate to operators that there are tasks that they must complete so that a sequential control module can continue executing. These types of alerts are configured when the sequential control module is configured. For more information on sequential control modules and alerts, see the *Sequential Control Module User's Guide*.
- User-generated alerts, which can be used for example as a reminder to an operator to schedule maintenance for a piece of equipment.
- System-generated alerts, which are notifications of an abnormal condition in the system that could cause problems if the condition is not is not fixed.

  For example, the gas pressure in Pipe A has been rising steadily over the last couple of days, most probably due a build-up of waste particles on the inner lining. This is leading to a degradation in process performance. An alert is raised to indicate that pipe cleaning must take place in the next week.

Alerts are incorporated into Experion from a third-party user alert application using a URT connection. For more information see "Configuring alerts" in the *Server and Client Configuration Guide* in Knowledge Builder.

Messages

Messages can be generated to provide additional information to an operator, for example when a point goes into alarm, a message can provide an explanatory note or a procedure.

There are four types of messages:

- Informational
- Confirmable (available if you have Process Controllers or a TPS system)
- Single signature (available if you have Process Controllers)
- Double signature (available if you have Process Controllers)

Informational messages are defined in:

- Configuration Studio if you have standard points.
- Control Builder if you have process points.
- TPS if you have a TPS system.

Confirmable messages are configured in Control Builder or TPS.

Single signature and double signature messages are configured in Control Builder.

For status, analog, and accumulator points you can specify a predefined message to be displayed in the Message Summary when the point goes into alarm.

Each Station displays the message text defined on its local server. If you have a DSA system, the message indexes and text should be the same on all servers to ensure that appropriate messages are displayed for remote points.

Alarm annunciation

Although alarms appear in Station, you need to consider your alarm annunciation needs. Experion provides three types of alarm annunciation:

- Station-based buzzer or speaker
- External horn or siren
- Alarm paging

Station-based buzzer or speaker

Audible alarm notification is appropriate for Stations used by operators; however, it may not be appropriate for Stations used by production controllers and managers.

You can specify the system-wide characteristics of alarm notification, such as the duration of the sound, and the frequency at which the sound repeats if an alarm is not acknowledged. You can also disable audible alarming on particular Stations, as appropriate.

External horn or siren

If there is a possibility that users may not hear a Station buzzer/speaker, you should consider installing one or more horns or sirens.

You can configure up to four *alarm notification* points—one each for `Urgent`, `High`, `Low` or `Any` alarm priority—to control horns or sirens. For example, you could use the `Urgent` point to control a horn, and use the `Any` point to control a buzzer.

Alarm paging

Alarm paging sends a paging message to one or more designated pagers whenever a specified alarm is raised.

You can use either of the following types of paging:

- **Point-based**. You configure the paging requirements for each point whose alarms you want paged.
- **Asset-based**. You configure the paging requirements for each asset.

Paged messages can contain a number of details, including the priority, point ID, point description and associated message (if one has been assigned).

Alarm Paging supports the following protocols:

- Paging Entry Terminal (PET) protocol
- Telocator Alphanumeric Protocol (TAP)
- Universal Computer Protocol (UCP)

Alarm Paging also supports sending messages as:

- Email
- SNMP messages

For more information about alarm paging, see “Configuring alarm paging” in the *Server and Client Configuration Guide* section in Knowledge Builder. Also, contact your local Honeywell representative for a list of suitable paging service providers in your region.

Event storage and archiving

Events are initially collected in a system database, and are periodically copied to a Microsoft SQL Server online event database for queries and reporting. The events are kept in database for a specified period, after which they are deleted.

If you want to retain events for more than a few weeks, you need to use Event Archiving to configure:

- How long events are kept online
- How often events are archived

Event Archiving allows you set up automatic archiving, or to configure an alarm which alerts the operator to archive events at appropriate intervals. Event Archiving enables you to archive events to a network file server or to tape. Archiving to tape uses the Windows Backup program. Events archived to a network file server can be copied to other media such as CD, or included in a system backup.

For more information about Event Archiving, see “Configuring Event Archiving” in the *Server and Client Configuration Guide* section in Knowledge Builder.

Displays

12

This chapter describes how to determine your display requirements.

Issue	Comments
System displays	Experion includes a comprehensive set of *system* displays, which display information in a standardized manner. Some system displays, such as groups and trends, require configuration. See “System displays” on page 124.
Custom displays	Decide whether you want to create your own (*custom*) displays. Well designed custom displays make it much easier for operators to interpret system activity and to run your plant in an efficient manner. See “Custom displays” on page 125.
Web pages and other documents	Station can display Web pages and ActiveX documents, such as Microsoft Word and Microsoft Excel documents. You can also embed Web pages and ActiveX documents in custom displays. See “Web pages and other documents” on page 131.
Update rates	You need to select an appropriate update rate for each Station. See “Station update rates” on page 55.

System displays

Experion uses most system displays in an automated manner—for example, when you create a new point, Experion uses the appropriate point detail display to show the point's details. However, the following types of system display require configuration.

Display type	Description
Group	Displays major parameter values for up to eight related points. See "Groups" on page 81.
Trend	Displays historical process values in a graphical manner. The data can be displayed in several ways—such as lines and barcharts—and can track several variables. If you use trends, you need to determine the data collection requirements for each point parameter displayed as a trend. See "Trends" on page 82 and "History collection" on page 79.

Custom displays

You can make it much easier for operators to interpret and control system activity if you create suitable *custom* displays.

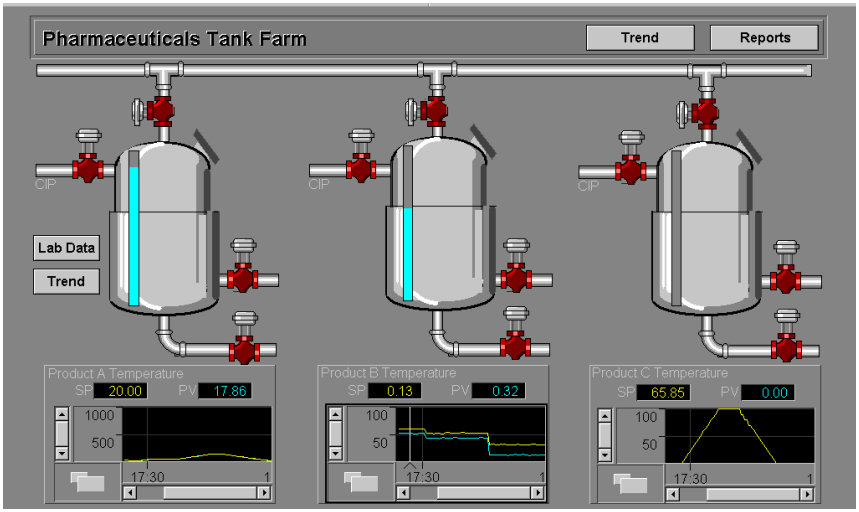
Custom displays are created using HMIWeb Display Builder, a specialized drawing tool which is supplied with several clip-art libraries that cover a range of industries. For example, the clip-art libraries include representations of pumps, valves and so on.

With custom displays you can insert your own graphics (for example, photographs and layout diagrams) using any of the following formats.

- GIF (*.gif)
- Windows Bitmap (*.bmp)
- JPEG (*.jpg)
- Metafile (*.wmf)
- Portable Network Graphic (*.png)

The following figure shows a typical custom display created using HMIWeb Display Builder.

Figure 17 Typical custom display



Custom display features and considerations

In planning your custom displays you might consider the following issues.

Issue	Comments
Display scripts	Decide whether you need to write *display scripts*. See “Display scripts” on page 127.
Embedded documents	Decide whether you want to include operational procedures or other information in your displays. See “Web pages and other documents” on page 131.
Acronyms	Determine whether you need to define any special acronyms. See “Acronyms” on page 128.
Layout and design	Specify the purpose of each display, and establish a set of design guidelines. See “Display design” on page 129.
Assets	You can use assignable assets to restrict access to custom displays to specific operators or Stations. See “Display page security” on page 130. (See also “About assignable assets” on page 100.)

Display scripts

You can add extra functionality to your displays with *display scripts*. For example, you could write a script that runs an animation when an object changes state.

For more information about display scripts, see the topic “Display scripting reference” in the *HMIWeb Display Building Guide* section in Knowledge Builder.

Acronyms

An *acronym* describes the meaning of a point parameter's state (or integer value). For example, the acronyms "Stopped" and "Running" are much more meaningful in displays than the raw parameter values "0" and "1".

Experion includes a comprehensive collection of acronyms that are suitable for most purposes (Open/Closed, Manual/Automatic, and so on). However, you can create your own acronyms if needed.

For more information about acronyms, see the topic "About acronyms" in the *Display Building Guide* section in Knowledge Builder.

Display design

When designing custom displays, you should determine:

- The purpose of each display from an operator's point-of-view
- How operators will navigate from one display to another (For example, you could have a "home" display, showing the entire plant, with a set of buttons to link to other displays that show specific assets or processes.)
- The security requirements of each display (You can use assignable assets to restrict access to a display to operators or Stations that have been assigned a specific asset. See "Display page security" on page 130.)

You should present information in an appropriate form, so that it is intuitive and easy to use. Also, consider using a presentation style similar to that used in the system displays, so that operators are not confronted with two presentation styles.

Display page security

The data that can be viewed with a display page is primarily controlled by assigning to operators (or Stations) the assets that contain the data. Values can be seen if the access level is View or higher. Values can be changed if the access is `Oper` or higher. However, additional constraints can be defined for an individual page.

- A page may be assigned to an asset, so that the operator has to have View access to that asset in order to call up the display page at all.
- An individual database link can have data entry permissions set. Data entry can be totally prevented, that is, the field is read only, or a security level may be applied, allowing an operator with lower level to see the data, but not modify it. (This technique is also used on many system pages to restrict data entry to Admin level only.)

Web pages and other documents

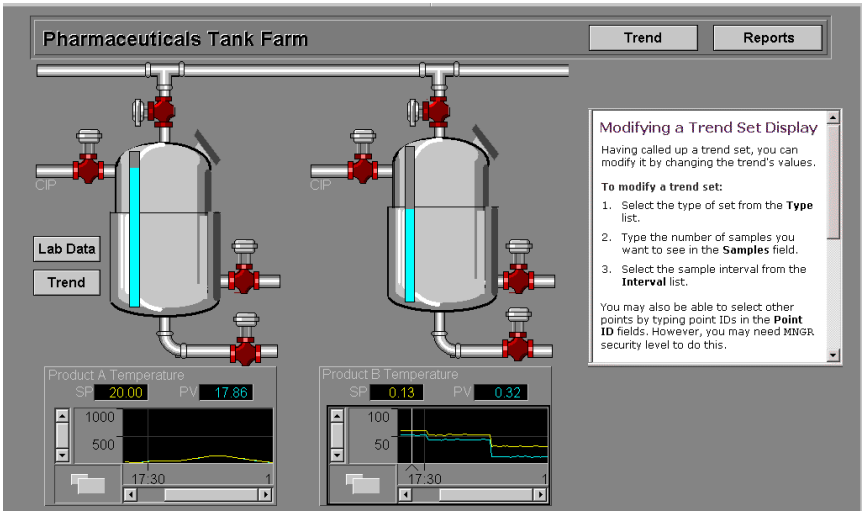
Station can display Web pages and ActiveX documents, such as Microsoft Word and Microsoft Excel. You should therefore consider making operating instructions and other useful information available to users.

Station ensures that users can still monitor alarms while viewing such documents, and provides security features that allow you to restrict access to specified documents and Web sites.

Displays with linked documents

You can also include links to Web pages and ActiveX documents in custom displays, as shown in the following example. If you subsequently update the document, the display is automatically updated because it only includes a link to the document.

Figure 18 Display with a linked document



Reports

13

Reports are typically used for:

- Analyzing alarms and events
- Analyzing system activity
- Performing routine tasks (Some of Experion's standard reports perform tasks.)
- Searching for points with specific attributes

Issue	Comments
Standard reports	Check the standard reports supplied with Experion to see whether they meet your needs. See "Standard reports" on page 134.
Integrated Microsoft Excel Reports	Enables you to create custom reports that present server data in a Microsoft Excel spreadsheet. See "Integrated Microsoft Excel reports" on page 135.
Free Format Reports	If you need to modify a standard report, or create your own standard reports, consider the Free Format Report Writer option. See "Free format reports" on page 136.
Output destination	Determine where you want to send your reports. For example, you may want to print some reports, but view others online. See "Output options" on page 137.
Scripts	Determine whether you can use *server scripts* to perform specialized tasks on your reports. See "Server scripts" on page 28.

Standard reports

The following reports are supplied with Experion. (Some are only available if you have licensed the associated option.)

Report	Description
Alarm and Event	Alarm and event details from the event file. This report enables you to analyze alarms and events that occurred during a specified time span on specific points.
Alarm and Event DSA	Alarm and event details from other servers in the DSA. This report enables you to analyze alarms, alerts, and events that occurred during a specified time span on remote points on multiple servers.
Alarm Duration	The duration of alarms and events on nominated points during a nominated time span.
Batch	Batch reports are used to collect history for a set of points and events for an asset for the duration of a production run. A batch report can collect: • One type of history sample (such as 5-second samples or 1-hour averages) for up to 50 points • Events for one asset
Cross Reference	Where points are referenced in the server database. The report lists the following types of references for the nominated points: custom displays, trend displays, algorithms, reports, operating groups, history gates, source address for another point, application program point lists.
Point Attribute	Points that are in a specified state; for example, you can generate a report on all points that are off-scan, have alarms inhibited, have a bad PV, or are in manual mode.
Sequence of Events	Some types of controller can time-stamp events to millisecond resolution. When this capability is used, the server stores the high resolution event information in the server's "sequence of events" file. This report is based on data extracted from this file.

Integrated Microsoft Excel reports

You can design your own reports in Microsoft Excel and run them from a Station like a standard report.

These reports use either Microsoft Excel Data Exchange or Experion's ODBC driver to access data in the server database. When choosing between Microsoft Excel Data Exchange and ODBC driver, consider the following:

- Microsoft Excel Data Exchange can access all information in the server database, whereas the ODBC driver can only access point, history and event data.
- Microsoft Excel Data Exchange can write to the server database.
- Microsoft Excel Data Exchange has no security, whereas the ODBC driver follows the same security conventions as other reports.

For more information about Integrated Microsoft Excel Reports, see "Microsoft Excel reports" in the *Server and Client Configuration Guide* in Knowledge Builder.

Free format reports

The Free Format Report Writer allows you to modify standard reports, and to create your own reports and add them to the list of standard reports.

You can write reports that:

- Get values from point parameters
- Perform calculations on those values (for example, addition, subtraction, multiplication, division, and exponentiation)
- Retrieve historical data to determine summations, maximums, minimums, and standard deviations
- Generate an X-Y plot of the historical values for two points
- Store new values or calculations in the server database or in operating system files

You can also use free format reports to write information back to the server database, providing your needs are simple. (For more sophisticated requirements, see “Exchanging data with other applications” on page 145.)

For more information about the Free Format Report Writer, see “Configuring Free Format Reports” in the *Server and Client Configuration Guide* in Knowledge Builder.

Output options

When designing a report, you need to consider how it is to be output. For example, a report that only needs to be viewed online should have a very simple layout.

The output choices are:

- **Print**. Typically used for routine reports, such as weekly reports, that need to be kept or read by users without access to a Station.
- **Online**. Typically used to see a “snapshot” of a particular part of the system, and then discarded. For example, you may want to check the current status of a particular production line.
- **File**. Suited for further processing by another application. For example, you may want to import the report file into a spreadsheet.

Specialized features

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This chapter describes specialized Experion features that may be of use in your system.

Feature	Comments
Recipes	The Recipe Manager allows you to quickly reconfigure standard processes. See “Recipes” on page 140.
Point Control Schedules	Point Control Schedules enable you to control points on a periodic or one-off basis. See “Point control schedules” on page 142.
Honeywell Digital Video Manager	Honeywell Digital Video Manager is a Closed Circuit Television product that can be easily integrated with Experion. See “Honeywell Digital Video Manager” on page 143.

Recipes

The Recipe Manager allows an operator to quickly reconfigure a *unit*—such as a chemical cracker or production line. The Recipe Manager achieves this by downloading a set of predefined values to the unit.

If you have several identical units, operators can download the same recipe to any unit. If appropriate, they can also download scaled values—to control, for example, the size of a production batch.

A recipe can include up 30 *ingredients* (an ingredient specifies a value and the parameter to which it is downloaded). If more than 30 ingredients are required, you can chain recipes together to form a larger recipe. (If you require a more sophisticated batching system, ask your Honeywell representative for information about TotalPlant Batch.)

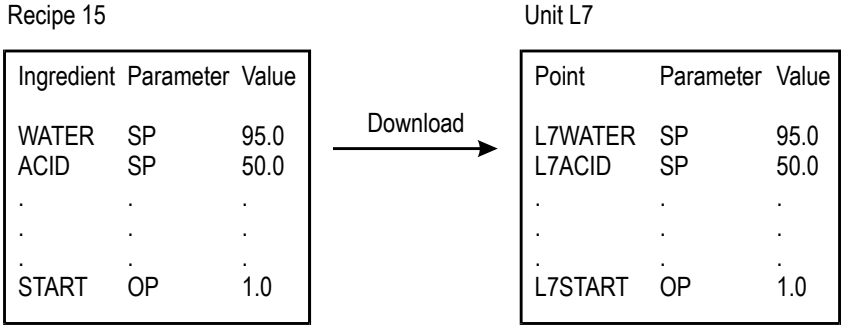
The total number of recipes that can be configured depends on the size of your Experion database.

Point requirements

The following naming rules apply to points used in recipes:

- The unit's two-character identifier is used as the prefix
- The ingredient's name is used as the suffix
- The names must follow the standard "Point naming conventions" on page 73

When downloading a recipe, Experion determines each point ID by combining the unit ID and the ingredient name. The following figure shows what happens when recipe `15` is downloaded to unit `L7`. In this example, the value of `WATER` is downloaded to the SP of point `L7WATER`.



If you want to download a recipe to several units, you need to define an appropriate set of points for each unit. Following from the above example, a unit called `L8` requires the following points:

```
L8WATER
L8ACID
.
.
.
L8START
```

Point control schedules

Point Control Schedules enable you control points on a periodic or one-off basis. It also includes the capability of defining holidays and shifts.

For example, you could schedule:

- A pump to switch on at 4 pm and off at 6 pm each work day
- A boiler to close down at midnight on a specific day

For more information about Point Control Schedules, see “Configuring Point Control Schedules” in the *Server and Client Configuration Guide* in Knowledge Builder.

Honeywell Digital Video Manager

Honeywell Digital Video Manager (Honeywell DVM) is a Closed Circuit Television (CCTV) product that combines the advantages of digital video with the latest Web and networking technologies.

You can easily integrate Honeywell DVM with Experion because it:

- Uses Station as its user interface, which means that operators can seamlessly switch between Experion and Honeywell DVM displays
- Can initiate recordings in response to Experion alarms and events

For more information about Honeywell DVM, contact your Honeywell representative.

Exchanging data with other applications

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Experion includes a number of data exchange options that extend its capability and functionality.

For example, you can export current point parameter values from the server database to a Microsoft Excel spreadsheet, and then perform sophisticated calculations.

Option	Description
Microsoft Excel Data Exchange*	Exports server data to Microsoft Excel spreadsheets. See "Microsoft Excel Data Exchange" on page 146.
ODBC Data Exchange	Used to exchange data between the Experion database and an ODBC-compliant database. See "ODBC Data Exchange" on page 147.
ODBC Driver*	Primarily intended for reporting, it enables an ODBC-compliant application to access data in the Experion database, such as history, event, and point parameter values. See "ODBC Driver" on page 148.
OPC	Experion provides a range of OPC server and client options, each of which has been optimized for a specific purpose. See "OPC" on page 149.
Network API*	Allows you to create applications that can exchange data between Experion and another application, which is either on the server or another computer. See "Network API" on page 160.

* Part of the Open Data Access (ODA) option.

Microsoft Excel Data Exchange

Microsoft Excel Data Exchange allows you to capture real-time point parameter and history information, and display the data in a Microsoft Excel spreadsheet.

You can capture server data using either the Microsoft Excel Data Exchange Wizard, or through cell formulas. The captured data can be static or dynamically updating, and can consist of either point parameter or historical data.

After capturing the data, you can create charts to display and analyze data with Microsoft Excel's toolset. You can also link the values into other OLE-enabled applications.

Microsoft Excel Data Exchange provides:

- Read/write access to point parameter values
- Read access to history data
- Read/write access to server database files (user files)

For more information about Microsoft Excel Data Exchange, see "Using the Microsoft Excel Data Exchange wizard" in the *Server and Client Configuration Guide* in Knowledge Builder.

ODBC Data Exchange

ODBC Data Exchange enables two-way exchange of data between the Experion database and an ODBC-compliant database (either local or remote). It is typically used to periodically transfer data such as production totals and values for billing customers. ODBC-compliant databases include Microsoft SQL Server, Oracle 7, Microsoft Access, and Sybase 10.

With ODBC Data Exchange, the Experion server acts as a *client* application. (Contrast this with the ODBC Driver, where the Experion server acts a *server* application.)

For more information about ODBC Data Exchange, see “Configuring Experion ODBC” in the *Server and Client Configuration Guide* in Knowledge Builder.

ODBC Driver

The ODBC Driver is part of the Open Data Access (ODA) option. It is primarily intended for reporting, and enables an ODBC-compliant application to access data in the Experion database, such as history, event and point parameter values. ODBC-compliant applications include Microsoft Access and Microsoft Excel.

With the ODBC Driver, the Experion server acts as a *server* application. (Contrast this with ODBC Data Exchange, where the Experion server acts a *client* application.)

For more information about the ODBC Driver, see “Configuring Experion ODBC” in the *Server and Client Configuration Guide* in Knowledge Builder.

OPC

Experion provides the following OPC interfaces, each of which has been optimized for a particular purpose:

- Experion OPC Client Interface
- Experion OPC Advanced Client
- Experion OPC Display Data Client
- Experion OPC Data Access Server
- Experion OPC Historical Data Access Server
- Experion OPC Alarm and Event Server
- Experion OPC Integrator

Experion OPC Client Interface

The Experion OPC Client Interface is primarily designed for integrating low-complexity subsystems, such as controllers. Configuration involves individually mapping OPC items to standard Experion points (analog, status and so on). If you require alarming for an item, you must configure the associated point's alarm properties.

There are two options for supporting redundant third-party OPC servers:

- The OPC Client interface native supports the concept of preferred and secondary servers.
- Redirection Manager can be used with redundant third-party OPC servers, which can give better performance during OPC server failover due to the fact that it builds OPC groups on both OPC servers.

For more information about the Experion OPC Client Interface, see the *OPC Client Interface Reference* section in Knowledge Builder.

Experion OPC Advanced Client

The Experion OPC Advanced Client includes a data client, and an alarm and event client for connection to third-party OPC servers.

Redirection Manager should be used when communicating to redundant third-party OPC servers. It is preferable for the third-party OPC servers to run in a dual active mode rather than an active-passive mode.

Experion OPC Advanced Data Client

The Experion OPC Advanced Data Client is primarily designed for integrating complex subsystems, and is compliant with the OPC 2.0 Data Access specification. Such systems typically have OPC items with multiple parameters, and are capable of generating their own, often broad range of, alarms.

It also performs dynamic communications optimization. Only those parameters (items) that are currently being accessed—in displays, reports and so on—are subscribed from the OPC server. The points are dynamically subscribed and unsubscribed as required to minimize load on the source system.

For more information about the Experion OPC Advanced Data Client, see "Experion OPC Advanced Client" in the *Server and Client Configuration Guide* section in Knowledge Builder.

Experion OPC Advanced Alarm and Event Client

The Experion OPC Advanced Alarm and Event Client enables Experion to receive alarms and events from third-party OPC alarm and event servers.

OPC alarms are displayed and acknowledged in the same way as Experion alarms, giving operators a uniform user interface. For example, when an OPC alarm is received, it appears in the Alarm Summary; and when an operator acknowledges the alarm, confirmation of the acknowledgement is sent to the OPC alarm and event server.

The Experion OPC Advanced Alarm and Event Client is based on the OPC Foundation Alarm and Events Specification (Version 1.0).

For more information about the Experion OPC Advanced Alarm and Event Client, see "Experion OPC Advanced Alarm and Event Client" in the *Server and Client Configuration Guide* section in Knowledge Builder.

Experion OPC Display Data Client

The Experion Display Data Client is designed to be used when you want to add OPC items to custom displays, but have no requirement for advanced features such as alarms, history or reporting.

Redirection Manager should be used when communicating to redundant third-party OPC servers. It is preferable for the third-party OPC servers to run in a dual active mode rather than an active-passive mode.

You can directly add OPC items to custom displays, without having to first define them as points in Quick Builder.

For more information about the Experion Display Data Client, see “Experion OPC Display Data Client” in the *Server and Client Configuration Guide* in Knowledge Builder.

Experion OPC Data Access Server

The Experion OPC Data Access Server gives an OPC client read/write access to Experion point parameters. It is compliant with the OPC 2.0 Data Access specification, and can accept connections from either OPC 1.0 or 2.0 clients.

The Experion OPC Data Access Server supports all mandatory OPC interfaces, including an automation interface for application development in Visual Basic, as well as the IOPCBrowseServerAddressSpace interface. For more information on the automation interface, see the *OLE for Process Control Standard Version 1.0a* or the *OLE for Process Control Standard Version 2.0*.

Note that if you have redundant Experion servers, you need Redirection Manager to provide continuous communication during failover.

For more information about the Experion OPC Advanced Data Access Server, see "Experion OPC Data Access Server" in the *Server and Client Configuration Guide* in Knowledge Builder.

Experion OPC Historical Data Access Server

The Experion OPC Historical Data Access Server gives an OPC client access to Experion point parameter history. It is compliant with the OPC Historical Data Access Specification Version 1.2.

If you have redundant Experion servers, you need Redirection Manager to provide continuous communication during failover.

For more information about the Experion OPC Historical Data Access Server, see "Configuring the Experion OPC Historical Data Access Server" in the *Server and Client Configuration Guide* in Knowledge Builder.

Experion OPC Alarm and Event Server

The Experion OPC Alarm and Event Server allows an OPC alarm and event client to receive alarm and event information from Experion. It is compliant with the OPC Foundation Alarm and Event Specification, Version 1.02.

If you have redundant Experion servers, you need Redirection Manager to provide continuous communication during failover.

For more information about the Experion OPC Alarm and Event Server, see "Experion OPC Alarm and Event Server" in the *Server and Client Configuration Guide* in Knowledge Builder.

Experion OPC Integrator

The Experion OPC Integrator is used to transfer data between different parts of the system using data that is accessible through OPC. OPC Integrator can be used in many different architectures that include process controllers, SCADA controllers, distributed control systems, local and remote Experion servers. This section describes common system topologies using OPC Integrator.

An important point to note in all topologies is that OPC Integrator is not designed to transfer safety or process critical data. To transfer critical data, you should use a direct peer to peer method of communication between controllers rather than through a server-based process.

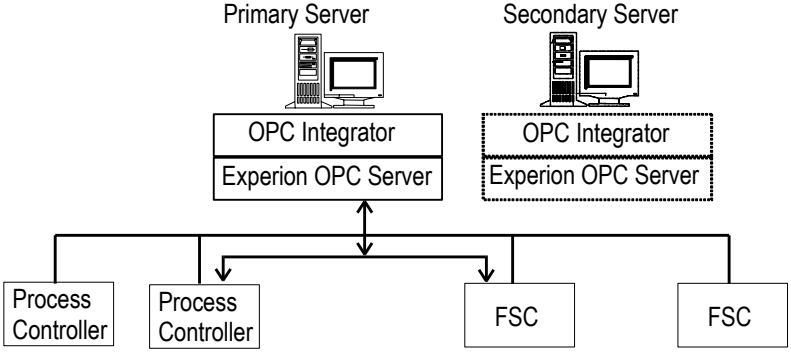
Transferring data between local points

In this topology, OPC Integrator and the Experion OPC server are installed on the same Experion server to achieve communication between controller. The controllers can be:

- Process controllers
- SCADA controllers
- SCADA controllers connected using the Experion OPC Client Interface

Previously the value transportation algorithm may have been used to achieve this type of communication.

This architecture supports Experion server redundancy.

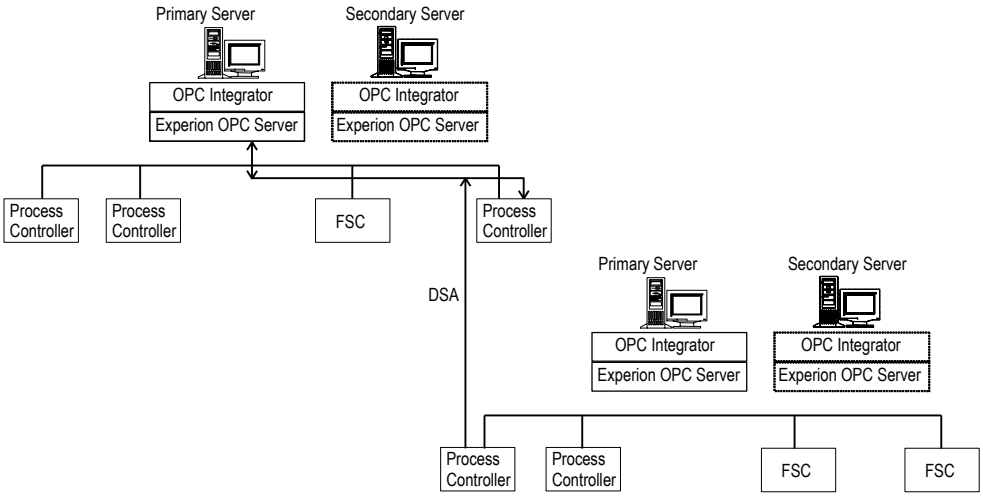


Transferring data between local and remote points

In this topology, OPC Integrator and Experion OPC server are installed on multiple Experion servers to achieve data transfers between controllers that are connected to different Experion servers. Although the OPC integrator groups are configured with localhost, the source and destination points could be part of a controller that is connected to a different Experion server. In this situation, data transfer is achieved using the DSA subsystem.

It is important to note that OPC Integrator groups must be configured so that controller writes are performed on the local server. That is, all destination items must be part of a controller that is connected to the local server.

This architecture supports Experion server redundancy.



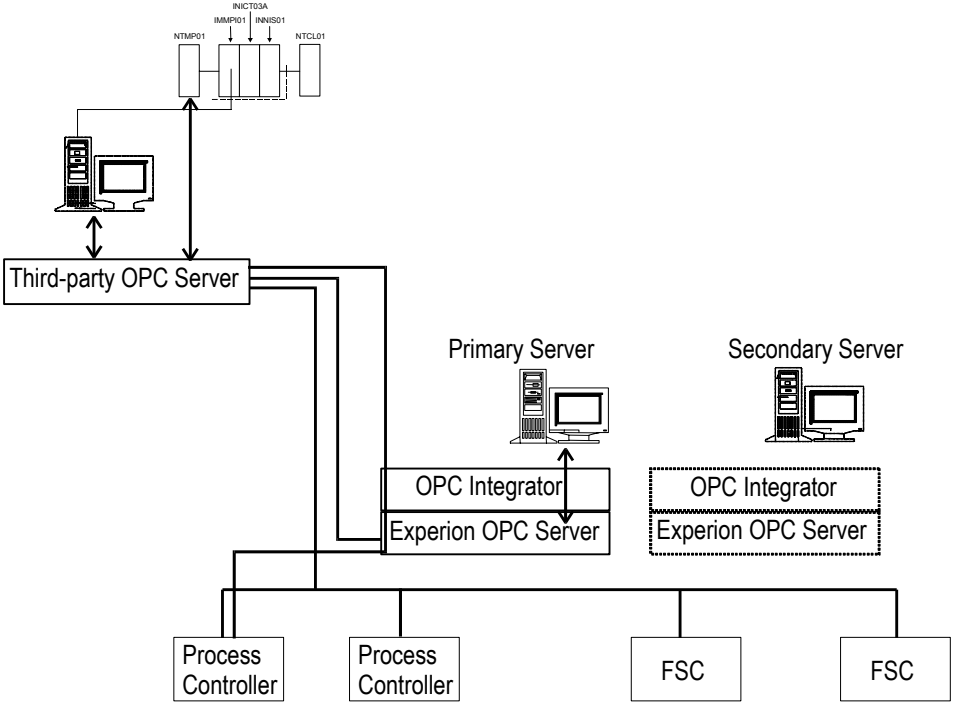
Transferring data between Experion and a third-party OPC server

In this topology, OPC Integrator interfaces with the local Experion OPC server and a remote third-party OPC server connected to another system to achieve data transfers between other OPC connected systems and Experion.

Operator changes and controller initiated changes performed on other systems can be transferred to Experion. Likewise, operator changes and controller initiated changes performed in Experion can be transferred to other systems. OPC Integrator can have bidirectional groups which are designed to transfer data in both directions, regardless of where the change occurred.

In this topology, one of the systems has the role of master to prevent transfers going in to a continuous loop.

This architecture supports Experion server redundancy and also supports redundancy for remote OPC servers. OPC Integrator can be used to manage the redundancy or Honeywell Redirection Manager can be used to manage redundancy.



For more information about the Experion OPC Integrator, see “Experion OPC Integrator” in the *Server and Client Configuration Guide* section in Knowledge Builder.

OPC Integrator licensing

OPC Integrator is licensed on a per connection basis. A connection is defined as an OPC data access server whose data is being subscribed to by OPC Integrator. The OPC data access server can be on the same computer as the Experion server or on a separate computer. If the same OPC data access server resides on two different computer and OPC Integrator subscribes to data on both computers, this is considered to be two connections. If multiple transfer groups are connecting to the same physical computer and OPC data access server, this is considered to be one connection.

If you have the Experion OPC data access server, a free OPC Integrator connection to the Experion OPC data access server on the local computer is provided. This connection appears on the license as OPC Integrator local transport enabler. This connection allows for transportation of data on the local Experion OPC data access server, that is, where the source and destination of an OPC Integrator transfer groups uses the Experion OPC data access server progID with an IP address of localhost. All other OPC Integrator connections are licensed.

This free connection is for OPC Integrator only. You still require a license for the OPC data access server.

In the following table, example scenario 1 does not require a licensed OPC Integrator connection if the Experion OPC data access server has been purchased. For example scenario 2, a total of three licensed connections would be required:

- VendorA running on Localhost
- VendorA running on 192.168.0.1
- VendorB running on 192.168.0.1

Transfer Group	Source ProgID	Source IP	Destination ProgID	Destination IP
Example Scenario 1				
GroupA	Experion	Localhost	Experion	Localhost
Example 2				
GroupA	VendorA	Localhost	VendorA	192.168.0.1
GroupB	VendorA	Localhost	VendorB	192.168.0.1

Network API

Network API is part of the Open Data Access (ODA) option. It allows you to create applications—in Visual C/C++ or Visual Basic—that exchange data with the Experion database. These applications can run on another computer or the Experion server.

Applications that use Network API can have:

- Read/write access to point parameter values
- Read access to history data
- Read/write access to server database files (user files)

ODA incudes libraries of functions, header files, and sample source programs to help programmers create network applications.

For more information about Network API, see the topic “Network API reference” in the *Application Development Guide* section in Knowledge Builder.

Integrating TPS systems

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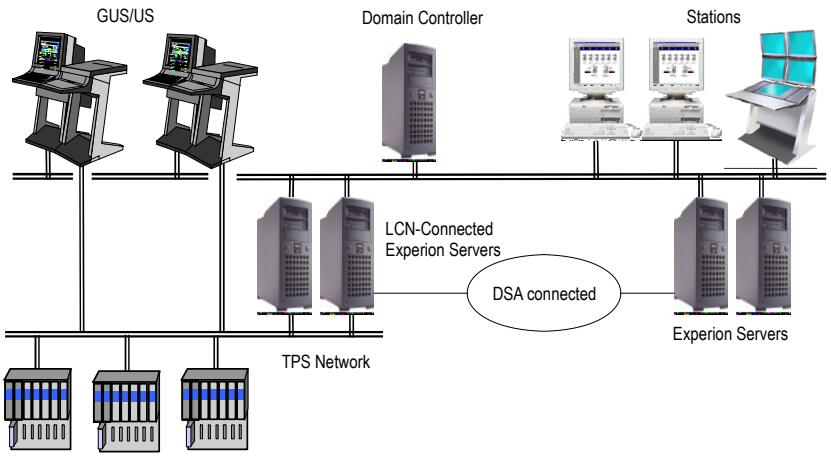
If you have a license for the TPS integration option, you can use an LCN-connected Experion server to connect an Experion cluster with a TPS cluster via DSA.

The following figure shows a typical integrated system. The LCN-connected Experion server is a specialized Experion server that includes some TPS components, and is fitted with an LCNP card so that it can communicate over the TPS network.

Figure 19 Typical integrated system



TPS data and notifications in Experion

When you integrate your TPS systems with Experion, TPS data is treated the same way as native Experion data. For example, you can include TPS data in displays and reports, and can access it through Experion's interfaces such as ODBC and Microsoft Excel Data Exchange.

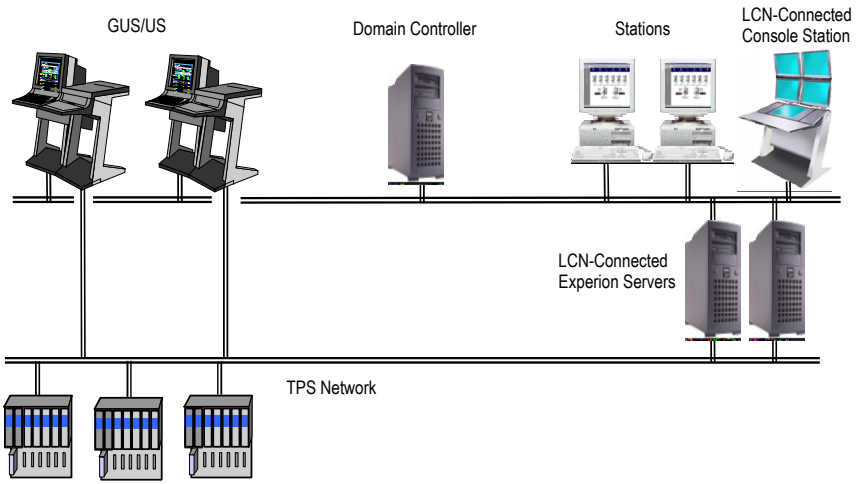
TPS notifications (alarms and events) are also treated in the same way as native Experion alarms and events. For example, they are automatically included in the Alarm, Event, and Message Summary displays.

For more information about using an LCN-connected Experion server to connect Experion and TPS clusters via DSA, see the *LCN-connected Station, Server and ACE Implementation Guide* in Knowledge Builder.

LCN-connected Experion Stations

Alternatively, you can replace Global User Station (GUS) and Universal Station (US) functionality through the use of LCN-connected Experion Stations and LCN-connected Experion servers, as shown in the following example scenario. For more information, see the *LCN-connected Station, Server and ACE Implementation Guide* in Knowledge Builder.

Figure 20 Small integrated system which uses an LCN-connected Experion server for both the Experion and TPS systems



Creating custom applications

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The Experion API allows you to create two types of custom application that run on the server: *tasks* and *utilities*.

Tasks are usually dormant, waiting for a request. For example, tasks can be activated:

- On a regular basis
- When a status point changes state
- While a standard point is on scan
- When an operator presses a function key
- When an operator selects a Station menu item
- When an operator clicks a button on a display

Utilities run interactively from the command line, and typically perform administrative functions. A utility can prompt the user for more information and can display information directly to the user through a Command Prompt window.

Custom applications can be written in Visual C/C++ or Visual Basic. The API Library incudes libraries of functions, header files, and sample source programs to help programmers create applications.

For more information about the API, see the *Application Development Guide* section in Knowledge Builder.

Installation and commissioning tasks

18

Issue	Comments
Installation and configuration	Perform installation and configuration tasks in a logical order, and assign appropriate resources. See “Installation and configuration tasks” on page 166.
Testing	Develop a comprehensive test plan that thoroughly tests each subsystem.
Training	Determine the training needs of operators, and maintenance engineers and production controllers.

Installation and configuration tasks

The following table lists typical installation and configuration tasks.

The table lists the tasks in approximate order. However, you can perform some tasks in parallel—for example, you can create custom displays and configure controllers at the same time.

For a more complete and detailed list of:

- Installation tasks, see the *Software Installation and Upgrade Guide*.
- Configuration tasks, see the *Server and Client Configuration Guide*.

Task:	For details, see:
Purchase required hardware and software for the server and client computers.	*Software Installation and Upgrade Guide*
Prepare the server and client computers, and install the Experion components.	*Software Installation and Upgrade Guide*
Configure your controllers.	For Process Controllers, see the *Control Hardware Planning Guide* and the *Control Hardware Installation Guide* in Knowledge Builder. For controllers other than Process Controllers, see: • The manufacturer's documentation • References section in Knowledge Builder
Build your system model and asset model.	• "Configuring your enterprise model" in the *Server and Client Configuration Guide* in Knowledge Builder. • *Enterprise Model Builder User's Guide* in Knowledge Builder.
Define Flex Stations and printers in Configuration Studio.	*Quick Builder Guide* in Knowledge Builder or Quick Builder's help.
Build your control strategy with Configuration Studio's Control Builder (for Process Controllers) or Quick Builder (for SCADA controllers).	For Process Controllers, see *Control Builder*'s help. For SCADA controllers, see: • *Quick Builder Guide* in Knowledge Builder or Quick Builder's help • References section in Knowledge Builder

Task:	For details, see:
Create custom displays.	*HMIWeb Display Building Guide* in Knowledge Builder or the associated help
If applicable, create custom applications.	*Application Development Guide* in Knowledge Builder
If applicable, write server scripts.	*Server Scripting Reference* in Knowledge Builder
If applicable, integrate your TPS system(s).	*LCN-connected Station, Server and ACE Implementation Guide* in Knowledge Builder
Fine-tune your configuration.	*Server and Client Configuration Guide* in Knowledge Builder

Experion includes a comprehensive set of tools to help you configure your system. See “Configuration tools” on page 169.

Configuration tools

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Experion provides a number of configuration tools and utilities:

- Configuration Studio (see page 170)
- Experion server utilities (see page 174)
- Station (see page 175)
- Special-purpose utilities (see page 176)

Configuration Studio

Configuration Studio provides a central location from which you can configure your Experion system. The individual tools required to configure various parts of your system are integrated with, and launched from, Configuration Studio.

In Configuration Studio, you are provided with a customized list of tasks that you are required to complete to configure your system. When you click a task, the appropriate tool is launched so that you can complete the task.

From Configuration Studio, you can launch the following configuration tools:

- Enterprise Model Builder
- Quick Builder
- Control Builder
- System displays
- HMIWeb Display Builder

Enterprise Model Builder

Enterprise Model Builder is a graphical tool that you use to define:

- The servers that constitute your system
- The assets that constitute your asset model

These definitions constitute the Enterprise Model Database (EMDB). For more information about assets and the Experion Enterprise Model, see “Assets and asset models” on page 89. The procedures for defining your assets are documented in the *Enterprise Model Builder User Guide* and in the topic “Configuring your Enterprise Model” in the *Server and Client Configuration Guide*.

Quick Builder

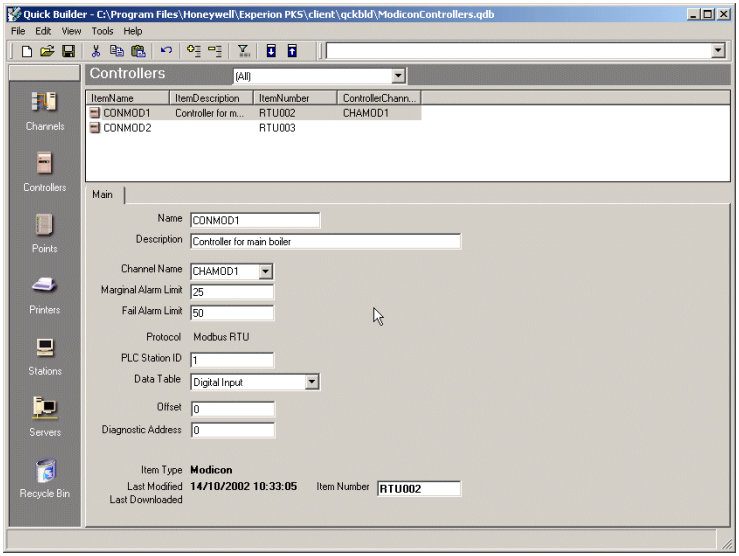
Quick Builder is a graphical tool for configuring Flex Stations, printers, controllers (other than Process Controllers) and standard points. (If you have Process Controllers, you configure them with Control Builder. For details, see the *Control Building Guide* section in Knowledge Builder.)

After building hardware and points with Quick Builder, you download these items to the server database.

When you download the data in Quick Builder —or part of it—to the server, it becomes part of the *configuration database*. (The configuration database defines how each component in your system is configured.) If necessary, you can update the data and repeat the download process. Alternatively, you can upload data from the configuration database into Quick Builder, edit it and then download it back to the server.

The procedures you use to build items with Quick Builder are documented in the *Quick Builder Guide*. For more information about Quick Builder, see the *Quick Builder* section in Knowledge Builder or Quick Builder's help.

Figure 21 Quick Builder



Control Builder

Control Builder is a graphical tool for building your control strategy for Process Controllers.

The procedures you use to build your control strategy are documented in the *Control Building Guide* section of Knowledge Builder.

System displays

The system displays that you can call up in Configuration Studio are used to configure items such as reports, group display, trends, Station settings, Console Stations, and so on.

The procedures for configuring these items are documented in the *Server and Client Configuration Guide* section of Knowledge Builder.

HMIWeb Display Builder

HMIWeb Display Builder is the specialized drawing tool you use to create your own (custom) displays.

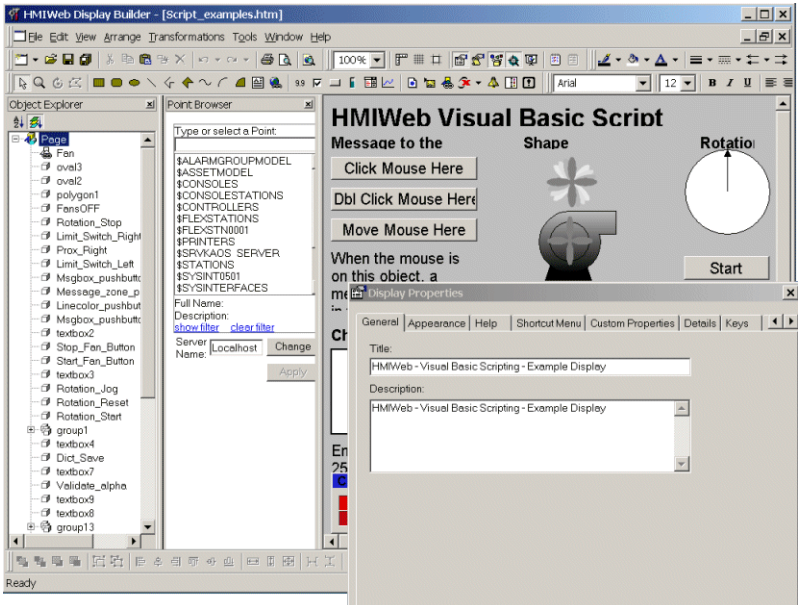
(Experion also includes Display Builder, which creates displays with a proprietary "DSP" format. This format was used exclusively in earlier versions of Experion and is still used for most system displays.

Each version is supplied with clip art libraries that cover a range of industries. You can also insert your own graphics, such as photographs and layout diagrams. Each version supports a number of graphic formats, including:

- GIF (*.gif)
- Windows Bitmap (*.bmp)
- JPEG (*.jpg)
- Metafile (*.wmf)
- Portable Network Graphic (*.png)

For more information, see the *HMIWeb Display Building Guide* or *Display Building Guide* section in Knowledge Builder, or the help supplied with each version.

Figure 22 Typical layout of HMIWeb Display Builder



Experion server utilities

Utilities that run on the server are available to assist you in configuration and administration tasks. Utilities that apply to specific controllers, such as communications testing utilities, are described in the controller references. General utilities are described in the topic “Command reference” in the *Server and Client Configuration Guide*.

Station

Apart from being the operator interface, Station is also used to “fine tune” the configuration database after you have downloaded your Quick Builder projects to the server.

Attention

If you use Station to modify the configuration database, it will no longer be in synch with your Quick Builder projects.

Honeywell strongly advises that you keep your Quick Builder projects in synch with the configuration database by uploading configuration data from the server at regular intervals.

Special-purpose utilities

Experion includes a comprehensive set of utilities to help you perform specialized tasks, such as diagnosis, communications testing and database initialization. For example, there is a communications test utility for each of the supported controllers.

For details about the controller-related utilities, see the *Interface References* section in Knowledge Builder. For details about the other utilities, see the topic "Command reference" in the *Server and Client Configuration Guide* in Knowledge Builder.

Glossary

acronym

A text string that represents a state or value of a point parameter in a display. From an operator's point of view, it much easier to understand the significance of an acronym such as "Stopped" than it is to interpret the meaning of an abstract value such as "0".

ActiveX document

An ActiveX-compliant document. (ActiveX is a set of technologies developed by Microsoft.) Examples include Microsoft Word documents and Microsoft Excel spreadsheets.

algorithm

An algorithm extends a point's functionality by performing additional processing, or initiating an action.

API

Application Programming Interface.

asset

In Experion an asset is a representative entity such as fixed plant equipment, materials, and buildings.

Asset Model

The Experion Asset Model provides an organizational structure to enable you to engineer your Experion system around your key entities. It provides a hierarchical structure that is intended to resemble your organization.

Because of this, the Asset Model can help operators more easily identify particular parts of the plant or specific pieces of equipment without having to remember obscure names. For example, you have a point that represents a flow controller; the unique identifier for the flow controller is `FC123`. The Asset Model enables you to give the point a more intuitive name such as `FlowController`.

The Asset Model also provides an intuitive way of allowing or restricting access to parts of the plant, process, or equipment with the use of assignable assets.

assignable assets

An asset that can be assigned to an operator or Station for the purposes of controlling what an operator or Station can view or control in the Experion system.

configuration database

The database that defines how system components—such as Stations, controllers and points—are configured.

Console

A logical grouping of Console Stations and Console Extension Stations.

Console Extension Station

A Flex Station that is connected to a Console Station rather than to the server.

Console Station

A Station that has direct access to Process Controllers in addition to the server. Consequently, there is no loss of view of critical process data if the server fails.

Compare with a Flex Station.

controller

Generic term for a device that is used to control and monitor one or more processes in field equipment. Controllers include Programmable Logic Controllers (PLCs), loop controllers, bar code readers, and scientific analyzers.

Display Builder

The Experion tool for creating custom displays with a proprietary DSP format. (Web-based displays are created using HMIWeb Display Builder.)

Distributed System Architecture (DSA)

An option that enables multiple Experion systems to share data, alarms and history.

container point

A container point ties together a set of related points so that they can be managed as if they were one point. A container point is, in effect, a user-defined point type that matches your data requirements for a particular type of device or process.

display

Station uses displays to present system information to operators in a manner that they can understand. The style and complexity of displays varies according to the type of information being presented.

electronic signature

A combination of a user ID and password which are used as the legally binding equivalent of a handwritten signature.

event

Any change in the system, including alarms, changes in point status and operator actions.

faceplate

A specialized popup that shows a subset of the details shown on the matching point detail (or template) display—typically the point's run-time values and control settings. A faceplate appears when an operator clicks an object that is linked to a point.

Flex Station

A Station that is generally installed on a computer other than the server computer, and which is connected to the server using either a static or rotary connection.

Compare with a Console Station.

flexible point

A point on a system interface or point server. The database structure of a flexible point is determined by the system interface/point server, rather than by Experion.

full item name

In the Experion Asset Model, the full item name consists of the item name of the entity combined with the item name of its parent, and so forth, up to a top level node. A full item name uniquely identifies an entity within the system. For example, `/Plant/Filtration/Tank/FlowMeter`.

group

A set of up to eight related points, whose main parameter values are shown on single group display.

HMIWeb Display Builder

The Experion tool for creating custom HMIWeb displays.

item name

In the Experion Asset Model, an item name is an intuitive name given to a point which can be used as an alternative to the tag name. The item name does not have to be unique.

Knowledge Builder

An online library that contains the complete Experion documentation set.

message

Supplementary information that helps operators understand the significance of the alarm. The alarm only provides basic details-such as the point ID, date/time and priority-which may not be sufficient for some operators.

Mobile Station

Mobile Station enables handheld devices to access Station displays using a wireless network.

multi-window Station

A Station that uses several windows—typically two or four—each of which can contain a separate display. A multi-window Station uses SafeView to manage the placement of its Windows.

multiple static Station

The term used when up to four instances of Station are running simultaneously on the same computer. Each instance has a separate, static connection to the server.

ODA

Open Data Access. The ODA option includes a number of options, such as ODBC Driver and OPC server and client, that enable other applications to exchange data with Experion.

OPC

OLE for Process Control. OPC is a set of standards to facilitate interoperability between applications within the process control industry. These include automation/control applications, field systems/devices or business/office applications.

Operator Entry Panel

A membrane-style keyboard with dedicated function keys. It is suited for use by operators in harsh environments.

point

A data structure that, in most cases, contains information about a field entity.

point parameter

A unit of information about a point, such as its current value, set point, description, and so on.

point detail display

A display that shows parameter values, configuration settings and other details about a specific point.

point server

A high-level interface that allows Experion to exchange data with another application or subsystem without the need for separately defining points in Experion. The database structure of a point on a point server (called a *flexible point*) is determined by the application/subsystem, rather than by Experion.

Process Controller

Experion's controller, which can handle all possible control requirements—whether for continuous processes, batch processes, discrete operations or machine control needs. The term is used to refer to all control hardware (chassis, power supply, Control Processor and ControlNet bridge) as a single entity.

Points on a Process Controller are called *process points*.

Quick Builder

The configuration tool used to create and maintain the system's configuration database.

recipe

A set of predefined values downloaded by the Recipe Manager to points that control a particular process. The individual values are, in effect, the "ingredients" for the recipe.

redundant server

In a redundant server system, the backup server that is actively linked to the primary (running) server, so that it can take control if the primary server fails or is shut down.

SafeView

SafeView is used to control the characteristics of and access to windows within the Microsoft Windows workspace. It is used in conjunction with Station to provide multi-window Station.

scanning

The technique used to read data from a controller (other than a Process Controller). Scanning is performed for point parameters with source addresses (for example, PV, SP and OP). Experion uses demand, exception, and periodic scanning techniques.

script

A mini program—typically written in VBScript—that increases the functionality of your system. For example, you could write a script that runs when a point changes state or when an operator acknowledges an alarm.

software arbitration

A software-only technique in which each server polls the other through the LAN to determine whether the other server has failed.

Station

Experion's operator interface.

system interface

A high-level interface that allows Experion to exchange data with another application or subsystem without the need for separately defining points in Experion. The database structure of a point on a system interface (called a *flexible point*) is determined by the application/subsystem, rather than by Experion.

tag name

A unique identifier given to a point or an asset.

task

A usually-dormant application that resides on the server, waiting for a request. Tasks can be activated in several ways, for example: on a regular basis, or when the status point changes state.

TPS

The abbreviation for TotalPlant® Solutions.

terminal server

A terminal server allows you to connect several controllers and Stations to a network even though they only have serial or parallel ports. Most terminal servers also provide a range of serial connection options, such as RS-232, RS-422 and RS-485.

trend

A display in which changes in value over time of one or more point parameters are presented in a graphical manner.

unassigned item

In the Experion Asset Model, an unassigned item is an item that has not been associated with an asset. For example, if you build a point but do not associate the point with an asset, when you download the point, the point is considered to be an unassigned item. Likewise, if you delete an asset but retain the points associated with the asset, those points become unassigned items.

unsolicited messaging

The process by which a controller initiates a communication session with the server when there is a change in a process variable. Contrast this with *scanning*.

Unsolicited messaging can substantially reduce communications traffic, especially if the values change infrequently.

utility

A server-based application that runs interactively from the command line. Utilities typically perform administrative functions.

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