Honeywell

Experion APP Specification

EP03-340-430
Release 430
October 2014, Version 0.1

Table of Contents

Revision History

Revision	Date	Description
1.0	October 2014	Release publication

1. Product Introduction

1.1. Experion System

The Experion Process Knowledge System (PKS) is Honeywell's unified control system for process, business, and asset management that helps industrial manufacturers increase their profitability and productivity. Experion takes customers well beyond distributed control system (DCS) functionality with an advanced automation platform solution and innovative application integration to improve business performance and peace of mind. This document specifies the features and technical details of Honeywell's Experion Application Processing Platform or E-APP

1.2. Architecture Overview

The Experion platform comprises many different integrated hardware and software solutions depending upon the needs of the application. The Experion architecture is highly scalable and provides a single automation system

1.3. Experion APP Overview

The E-APP is the advanced applications platform that combines the security necessary for advanced process control and optimization with the power to run complex applications from Honeywell, customers, and third party suppliers in an Experion LCN architecture. The E-APP provides system integration of data, alarms, and events between the Experion platform and an LCN. APP integrates process and business data, using industry-standard technologies such as Microsoft's Windows operating system and communication interfaces DCOM[1], OLE[2], and OPC[3]. You can execute existing Application Module (AM) functions on the E-APP and can expand them to interoperate with new Microsoft Windows-based applications. The E-APP node provides three coexisting functions:

- Existing LCN based Application Module (AM)
- Open data server
- Open application host

These functions can all occur simultaneously. Different performance characteristics can be expected based on the loading of each type of function.

E-APP is compatible with all other Experion LCN node types and personalities. E-APP is successor to the TPS APP supported with GUS and other TPS nodes which are not part of an Experion system. All Honeywell applications supported on TPS APP can be migrated to E-APP where a compatible release is available. While it is a control node E-APP does not host Experion Process Points. For LCN connected applications requiring Experion Process Points the correct node type is an ACE-T.

---

1 Distributed Component Object Model from Microsoft Corporation
2 Object Linking and Embedding from Microsoft Corporation
3 OLE for Process Control from the OPC Foundation

2. E-APP Specifications

2.1. System Sizing

Functional Area	Capacity Description	R4310 Capacity
LCN Capacity	Number of E-APP's per LCN	The E-APP, ACE-T and ESVT use the same LCN personality type. There is a limit of 20 instances of this personality per LCN. The sum of the number of these nodes is therefore limited to 20 per LCN.
Experion System Capacity	Number of E-APP's per Experion System	There is no configuration limit for the number of E-APP's in one Experion system. Other configuration limits must be observed.

2.2. E-APP Software Summary

Model #	Package/Component	Required/Optional
EP-ABV000	E-APP Base Software	Required
	License for Honeywell applications to communicate with the LCN	Included with base package
	File Transfer	Included with base package, optionally utilized
	Private TPN Server	Included with base package, optionally utilized
	System Management Runtime	Included with base system, Optionally implemented
	System Management Display	Included with base system, Optionally implemented
EP-ASP000	E-APP Solution Package	Purchasable Option
EP-CLS000	CL Server	Purchasable Option
EP-BRSE04	Experion Backup & Restore	Purchasable Option
TP-RDM000	Redirection Manager	Purchasable Option

Each E-APP package and the number of license packages per LCN is shown on the Experion TPN node license certificate. Note that neither the Experion license certificate nor the Experion license display includes E-APP information.

2.3. E-APP Base Software

The E-APP Base license is required for each E-APP node. E-APP Base provides the base for the other E-APP software options, and prepares the platform for use with Windows applications. E-APP Base includes File Transfer, a private TPN Server for use with Honeywell Advanced Applications, and a license for Honeywell applications to communicate with the LCN. It is sold on a per node basis. The APP Base license must be purchased with the computer platform. The Windows Server OS must be included with the computer platform purchase.

The E-APP Base Software package is usable within a domain or outside a domain. Honeywell highly recommends a Domain Controller when more than one node using the private TPN Server exists. The Domain Controller allows the creation of a Experion Domain, which provides a method to conveniently manage the Windows operating system (OS) network, an Experion security model, and a common open communication interface.

E-APP Base Software supports AM functionality. With this package, customers can migrate existing AM databases and applications without any re-engineering. The migration effort consists of simply loading the necessary LCN release checkpoint into the E-APP. While this configuration can be used to run any desktop applications, no TPN data is served to the Microsoft Windows applications. It is highly recommended that the APP with APP Base Software only be used for process control using the AM capabilities and that access to the Microsoft operating system side limited to supervisors, engineers, and administrators.

This offering is not redundant and does not provide any capability to integrate AM/CL applications with Microsoft Windows applications.

E-APP Base Software is the only software required to support hosting Honeywell Advanced Solutions applications such as PHD, Profit Suite and TotalPlant Batch. Third-party applications that communicate with the TPN through the E-APP node require the purchase of *APP Solution Package*. Both third-party and Honeywell advanced applications may also require the *CL Server package*.

2.3.1. AM Personality

The E-APP with Base Software uses the AM personality, which is part of the standard LCN Network software. The AM personality includes the standard AM alarming, CL (background and foreground), Custom Data Segment (CDS) data structures, messaging, regulatory control algorithms, and other point-processing capabilities (input/output connections).

2.3.2. APP Personality

The E-APP personality is part of the standard LCN Network media shipped with every E-APP, to be used with Microsoft Windows interoperability or optional software packages. The E-APP personality provides the mechanism for transfer of point.parameter information between the Microsoft Windows side of the E-APP and the TPN.

2.3.3. Network Installation of LCN Node Software

E-APP Base Software provides a server-based administration solution to allow LCN software upgrades to be pushed to LCN nodes. Through the use of this tool, LCN software can be pushed from the domain controllers to the target EST and APP nodes.

2.3.4. Automatic Backup/Restore

This function provides the ability to schedule periodic backups of LCN data bases to files in the Windows file system of the E-APP node. A utility program supports the scheduling and management of backup jobs, on-demand backups and selective restores of the data. This package relies on File Transfer.

2.3.5. System Management

This feature of the E-APP node helps to ease certain tasks required due to the networked environment of the LCN system. The following functions are provided for the user:

- Mechanism to retrieve, view, or be notified of system problems in a consistent manner

- System Management Configuration utility used for viewing and/or modifying configuration information, such as application defaults.

- Node administrator component that starts up and shuts down HCI servers

- System Management Client display for viewing of system components and HCI servers from all LCN nodes on the network

- System Repository, which is a consolidated file structure on the Domain Controller that maintains all the information about the Experion Domain

2.4. E-APP Optional Software

The following software is installed and configured on an E-APP after shipment from the factory. In addition, a Domain Controller must be present and operational.

2.4.1. EP-ASP000 APP Solution Package

The APP Solution Package is sold on a per node basis. It provides the open TPN Server (an HCI/OPC Server) and necessary components to implement a fully functional open platform on an open network. APP Solution Package provides the following:

- Enables clients to read and write data to all the nodes on the LCN via HCI/OPC
- Runs in parallel with the AM functionality delivered in the required APP Base Software
- Serves real-time TPN data to any network-connected OPC or HCI client application

2.4.2. EP-CLS000 CL Server

CL Server is licensed on a per node basis. CL Server – Requires EP-ASP000 for use with non-Honeywell Advanced Applications. CL Server enables TPN-based advanced control solutions to integrate with LCN (Windows) applications by providing the following:

- Initiate Microsoft Windows resident applications from AM/CL
- View status of and terminate the initiated Microsoft Windows applications from the Honeywell System Management Display
- Notifies the TPN in the event of a Microsoft Windows application failure

2.4.3. EP-RDM000 Redirection Manager (RDM)

RDM is licensed on a per client PC node basis. It manages OPC Clients and OPC Servers so that OPC Client calls will automatically be redirected to another OPC Server if the Primary Server fails. This transparent failover approach prevents loss of information (Data, Alarms, and Events). The OPC Client and Server management approach allows for the designation of an OPC Server pair for clients to use.

The following are benefits obtained through the use of RDM:

- Increased availability of OPC servers (including OPC DA access with PHD)
- Minimized interruption of client to server access
- Both the Primary and Secondary servers are active servers instead of having a Primary with a standby-only server.
- The RDM software seeks out and starts the OPC Server if a managed OPC node is available but does not have the server application running yet.
  NOTE: This does not apply to managed components like the TPN Server. Instead of "AutoStart" being managed by the RDM, the TPN Server can be configured to "AutoStart" at PC boot time.
- Redirection Manager allows both the primary and secondary servers to serve data to other clients that are not part of a redundancy scheme.

2.4.4. EP-BRST04 Experion Backup & Restore (EBR)

Experion Backup & Restore (EBR) is licensed on a per node basis. EBR provides online real-time continuous backup for Experion servers, workstations and other nodes while allowing simultaneous and complete use of the system by operations. EBR is completely transparent, with minimal impact to the performance of the target server or workstation.

2.5. Application Integration

Application and system component communication in the E-APP are based on industry standard technologies. OLE for Process Control (OPC™) provides a mechanism to serve data from a data source to client applications using Microsoft

technologies. Honeywell utilizes these technologies within HCI to support interoperability among Experion clients and servers.

2.6. Honeywell Communication Interface (HCI)

HCI is the foundation that provides common intercommunication and management for Experion LCN system components and applications. HCI includes OPC interfaces as well as additional Honeywell value-added interfaces and functions. These additional HCI interfaces and functions provide value to both client and server. The additional capabilities are optional, but provide added security, integration, and ease-of-use to OPC.

2.7. TPN Server

The TPN Server is a real-time data server for the E-APP. It serves both OPC and HCI applications. The TPN Server is a managed component of the Experion system, which means that it has all the functions described for the Generic OPC server. Access to the server is enhanced through HCI. Clients use OPC interfaces to read and write data, but must use HCI interfaces to take advantage of the functions described below that are specific to the TPN Server.

2.7.1. Check Point

The TPN Server checkpoint file located on the E-APP node allows for up to 100,000 point.parameters references to be stored within it. The checkpoint file contains the references of point.parameters that have been requested against the TPN Server.

2.7.2. OPC Interfaces

The TPN Server interface supports all OPC DA interfaces (OPC 1.0A Automation Interfaces and OPC 2.0 Automation Objects) except public group and Ipersistfile interfaces.

TPN Server Performance Characteristics

Current throughput rates for demand reads and/or writes of the TPN Server are shown in the *TPN Server Performance Characteristics* table. All results shown below were done with a group of 1000 items. Smaller items/group will give lower throughput values. In addition, combinations of device and cache data access occurring together will decrease the throughput rate observed for both types of data access.

The performance testing was done with the following benchmarks:

Benchmark I:

A single application accessing values from the TPN, running on the E-APP. Total parameters read or written was 1000. Cache portion of the server was inactive during the device read/write test.

Benchmark II:

A single application accessing values from the TPN, running on a remote client PC on the PCN. Total parameters read or written was 1000. Cache portion of the server was inactive during the device read/write test.

Benchmark III:

Ten concurrently executed applications accessing values from the TPN, running on the E-APP. Total parameters read or written was 1000. Cache portion of the server was inactive during the device read/write test.

Benchmark IV:

Ten concurrently executed applications accessing values from the TPN, running on a remote client PC on the PCN. Total parameters read or written was 1000. Cache portion of the server was inactive during the device read/write test.

Table 1 — TPN Server Performance Characteristics

	DEVICE READ param/sec	DEVICE WRITE param/sec	% APP CPU Utilization (device read/write)	CACHE READ param/sec	% APP CPU Utilization (cache read)
Benchmark I	663	647	4-7%	40407	4-7%
Benchmark II	619	599	3-5%	3117	3-5%
Benchmark III	1757	1708	13-35%	46974	50-85%
Benchmark IV	1771	1725	8-40%	4997	10-30%

Function	Performance
Number of TPN Server Clients tested at once, including both local and remote data access clients.	30
Define an OPC Group and add 300 data items (no external to internal name conversion) by a local client.	100 ms
Read an OPC Group with 300 data items from the value cache by a local client.	50 ms
Read an OPC Group with 300 data items from the TPN by a local client (assuming sufficient LCN bandwidth available).	500 ms
Maximum sustainable parameter throughput to/from the local LCN through the TPN Server assuming there is sufficient available LCN bandwidth to support this throughput. pps = parameters per second	1600 pps

2.8. TPN Server Specifications

The TPN Server has the following features that are specific to it, based on the underlying TPN:

- Channels
- Access Levels
- Priority Levels
- Data Types
- Security

2.8.1. Channels

TPN Channels are the resource for accessing data from the TPN, as well as triggering Microsoft Windows applications from AM/CL applications. A maximum number of these channels can be allocated on any given LCN node connected to the TPN. The maximum channels must not be exceeded on any given node.

The TPN Server can be configured for the number of channels allocated for use by the TPN Server and the number of allocated channels reserved for high priority requests. The TPN Server can be configured to use from one to the maximum number of channels available. Of these channels, assignment can be made for high or low priority requests. The user configures the number of channels assigned for high priority requests, from one to the maximum number of channels available. The channels for low priority requests are then calculated as the allocated channels minus the high priority channels. The TPN Server will assign defaults if the user does not configure any channels.

The range for the TPN Server is 1-31 channels. The recommended number of channels for both low and high priority requests is 10.

Table 2 — TPN Server Specifications

One TPN Server per E-APP
Maximum of 30 TPN Channels available to all Microsoft Windows applications
Single level of indirection
Clients need to remove and re-add data items that are defined on the TPN (that is, a point is deleted and then a point of the same name is reconfigured on the system) or the client must disconnect and then reconnect in order to access a point that has been redefined.
Can be configured for Auto-start or manual-start

2.8.2. Default Access Level and TPN Server Priority Level

Every HCI and OPC client has the option of explicitly setting the access level and the server priority level. This configuration sets those values for clients who do not explicitly set the attributes. The client must have the proper permission to set the requested server priority level and access level. The security proxy filenames used to validate client requests is user configurable. The client uses the *IHciValidateSecurity* interface to validate security configuration. Default access levels and priorities should be chosen carefully, since any client with access to the server is granted the default access level as a minimum default priority.

2.8.3. Access Level - *IHciAttributes* Interface

Eight TPN system access levels specify the privilege level required for data access operations performed on a configured object. Access levels only apply when a TPN parameter is being stored.

2.8.4. Priority Level - *IHciAttributes* Interface

Ten TPN Server priority levels specify the request priority level (TPN channel priority) and the TPN system data access priority level required for operations to be performed. Priority assignments allow a request to get serviced at the appropriate level of importance on the TPN while minimizing that request's impact on other requests on the TPN. The priority levels determine the following:

1. Whether to use a high-priority or low-priority TPN channel for communication with the LCN system.
2. The TPN system function level required to perform TPN system operations.

2.8.5. Supported Data Types

The following table shows the TPN data types that are supported, and how they are mapped into HCI/OPC data types.

Table 3 — Mapping of TPN Data Types to HCI/OPC Data Types

TPN Data Type Description	HCI/OPC Data Type
Real – 32-bit IEEE format	VT_R4
Standard and Self-Defining Enumeration - 14 bytes	External form VT_BSTR4 Internal form: VT_ARRAY (VT_VARIANT(VT_I4))
Boolean - 8 bits (0 or 1)	VT_BOOL
Time - 48 bits	VT_DATE
Entity ID - 64-bit unsigned	VT_ARRAY (VT_VARIANT(VT_I4)), 2 elements
String - 42 bytes	VT_BSTR
Integer - 16-bit signed	VT_I2
Array of Integers, 16-bit signed - 1023 items max	VT_ARRAY (VT_VARIANT(VT_I2))
Array of Reals, 32-bit IEEE - 1023 items max	VT_ARRAY (VT_VARIANT(VT_R4))
Array of Standard and Self-Defining Enumerations, 14 bytes - 1023 items max	External form: VT_ARRAY (VT_VARIANT (VT_BSTR) Internal form: VT_ARRAY (VT_VARIANT(VT_14))
Array of Booleans, 8 bit - 1023 items max	VT_ARRAY (VT_VARIANT (VT_BOOL))
Array of Times, 48 bits - 1023 items max	VT_ARRAY (VT_VARIANT (VT_DATE))
Array of Entity IDs, 64 bit – 1023 items max	VT_ARRAY (VT_VARIANT (VT_I4)), 2 elements per Entity ID
Blind Record - 1K words max.	VT_ARRAY (VT_VARIANT (VT_UI1))

Access of an "entire" array as a single item is supported. The TPN Server does not provide access to TPN alarm information or console state information.

2.8.6. Security

Access to the TPN Server is controlled using DCOM security that controls who can launch and connect to the TPN Server. Method level security can be configured.

---

4 The external form is the default. The internal form may be explicitly requested by appending an "internal" property indicator to the parameter name.

2.9. CL Server Specifications

The CL Server software package allows AM/CL applications to initiate Microsoft Windows resident applications. It is not a data server, and thus has no OPC interface capability. However, it is an HCI managed component that retains all the benefits of the generic OPC server. The HCI interfaces provide the COM interfaces necessary to achieve those benefits.

The CL Server software has three main functions:

1. Receives requests from the PCN and initiate Microsoft Windows applications.
2. Monitors the CL-initiated applications and notifies the PCN when they terminate.
3. Maintains the state of the security switch held in the AM Personality.

The CL Server has the following features based on the underlying TPN:

- Security
- Security Switch
- Supported AM/CL Subroutine Calls
- Startup and Shutdown
- Memory Requirements

2.9.1. Security

Access to the CL Server is controlled using DCOM security, as described in the HCI Server Applications section. DCOM security controls who can launch the CL Server and who can connect to it. Programmers using CL Server can configure Method level security.

2.9.2. Security Switch

The security switch is a three-position switch in the form of a LCN Network system parameter. The positions are:

- Read-Only
  (No Microsoft Windows side applications can write to the TPN.)
- Read-Write access only for CL-initiated applications
  (All other applications on the node will have read-only access.)
- Read-Write access for all applications

The security switch is limited when the TPN Server is used to allow Microsoft Windows applications to access TPN data. The TPN Server only supports Read-Only and Read-Write access for all applications. When "Read-Write access only for CL-initiated applications" is selected, the TPN Server defaults to Read-Only access. The default position of the switch is Read-Only if CL Server is configured on the node.

2.9.3. Supported AM/CL Subroutine Calls

Execute task with wait – Used to initiate an application on the Microsoft Windows side. The program uses one application initiation queue slot until it has completed.

Get Queue Info – Used to determine how many queue slots are available and how many are in use.

Get Queue Slot Info – Used to get status information from a queue slot about a CL-initiated Microsoft Windows side application.

Store X Access – Used to change the state of the security switch.

2.9.4. Startup and Shutdown

On startup, the CL Server checks for any applications left over from a failed CL Server. If any are found, it terminates them. On shutdown, the CL Server terminates all executing applications. It notifies CL blocks of application termination. No abnormal statuses are returned to the CL block.

2.9.5. Memory Requirements

The CL Server requires AM memory per the following *AM Memory Used by CL Server* table. This memory includes the software, data buffers, and extra space to equalize user available heap with standard AM personality.

Table 4 — AM Memory Used by CL Server (AMCL06 external load module)

TPN Network Release	Memory (K words)
R53x, 68x	2451

Table 5 — CL Server Requirements

Applications must run on the same APP as the CL Server.
Applications run under the CL Server's user ID.
Application hibernation is not available in this release.
Application installation can be controlled and limited to authorized individuals.
CL Server must run on a node containing an LCNP4, such as an APP.
There can be only one CL Server per APP.
CL Server can be configured for Auto-start or Manual-start
The range of TPN channels is 2, with a recommended setting of 2.

2.10. Component Services

The Component Administration Service and the HCI Name Service functions are automatically started up upon node power-up.

These Service functions provide the following:

- **Component Admin Service (CAS)**

  CAS Monitors the state of a managed HCI component and reports the state/status of the component to the Windows Management Instrumentation service which relays the state/status to connected System Management Displays. CAS also provides methods through Windows Management that allows the System Management Display to request the Start, Stop, and Shutdown of a managed HCI Server. Proxy file security controls the user access to these methods.

  CAS also supports the Redirection Manager. Redirection Manager requests the CAS that is resident with a Server to monitor the state of the Server. CAS can monitor the status of the following types of servers:

  - RDM managed servers
  - OPC servers
  - Managed HCI servers
  - Non-Managed HCI servers

- **HCI Name Service**

  HCI Name service is a Locator service for client applications using HCI APIs. The Name service can find HCI and OPC servers in a local Domain or across Domains that have been given an Alias Name though the HCI component configuration page. HCI Name service also provides local component replication.

- **Local Component Replication**

  Some components/Servers are accessed by local clients only; others are accessed by clients anywhere in the domain, thus, the name Local component. Redirection manager (RDM) is an example of a local component. The user configures an RDM on one node in their Domain and may build a ES-T display that accesses it. To run the same ES-T display on another node, the RDM would have to be installed and configured on that node. The configuration from the first node is automatically replicated to the new node when RDM is installed and registered with COM. The HCI Name Service also monitors the HCIComponent Key and records all changes as events to the Application Event log.

2.11. TPN Processor (LCNP4) and Time Synchronization Options

An LCNP4 board is required for APP software to access data from the LCN.

In the base system, the user manually synchronizes LCN time to the local time zone as necessary (e.g., for clock drift or Daylight Savings transition), just as one might manually adjust a watch or clock. The LCNP4 board provides 2 automatic time synchronization alternative options when a Honeywell LCN-connected computer node (an EST, an E-APP or ESVT) is used as an LCN Clock Source.

2.11.1. GPS time synchronization

This option provides the very high accuracy needed when an LCN's time must be tightly synchronized to the time of another system (e.g., another LCN). A GPS (Global Positioning Satellite) antenna is connected via a junction box and time link cable to the LCNP4 board. Using the UTC (Universal Time Coordinated) signal from the GPS satellite and the time entered by the user, the LCNP4 board every second calculates the local time zone bias, and synchronizes the LCN time to the local time zone with 300-microsecond accuracy.

GPS time synchronization is totally automatic; it works when the time link cable is plugged into the LCNP4 board. It does not recognize Daylight Savings, so DST transition adjustments are still manual. It does not affect the Windows time of the LCN-connected computer node.

2.11.2. TPN time synchronization

Windows OS contains functions to synchronize a computer's time to a network time server, with a typical accuracy of 1-2 seconds. Many sites use such a time server to time-synchronize the Windows side of Experion nodes, and may want to use it for the LCN as well.

TPN time synchronization is included in ES-T, APP, and Experion base software. When this option is selected, the LCNP4 every second pushes the "Windows time" of its computer to the LCN, applying any LCN time change gradually so that LCN sequential time functions and time stamps will function properly. When a Daylight Savings time transition occurs in the Windows side, the corresponding adjustment to LCN time can be configured to be automatic or manual.

3. Related Experion & TPN Documentation

The following table shows where related information can be found in the Experion PDF collection:

Information	Experion PDF Collection Document
Installation of E-APP software on server hardware	Software installation Users Guide
Integration of E-APP with Experion and other TPN nodes	Integrated Experion TPS Node Users Guide
Secure setup and configuration of an E-APP on a PCN	Network Planning Guide
	Domain Controller Planning Guide
	Network Security Planning Guide
Setup and service of E-APP hardware	Server Model Planning & Installation Guide
Setup and configuration of E-APP to TPN connection	Experion PKS Configuration Utility Users Guide
Configuration and maintenance of of CL Server	CL Server Users Guide
Configuration and maintenance of HCI/OPC Data Access	HCI/OPC Data Access Users Guide
Configuration and maintenance of TPN Server	TPN Server Users Guide
Off process hardware upgrade from an APP to E-APP	Server model APP to E-APP Upgrade Kit Instructions
Off process upgrade from E-APP to E-APP	Server model APP to APP Upgrade Kit Instructions

The following table shows where related information can be found in the TPN TPS PDF collection:

Information	TPN TPS PDF Collection Document
Migration of E-APP between releases of TPN	TPN Customer Release Guide
TPN configuration of an E-APP node	TPN Engineers Reference Manual

Experion^{TM} is a trademark of Honeywell International Inc..

All other products and brand names shown are trademarks of their respective owners.

Distributed by:

relevant.

888.858.3647 | relevantsolutions.com

For More Information

To learn more about Honeywell's products or solutions visit our website http://www.honeywellprocess.com or contact your Honeywell account manager.

Automation & Control Solutions

Honeywell Process Solutions

1860 W. Rose Garden Lane

Phoenix, AZ 85027

Tel: 800-822-7673

www.honeywellprocess.com

Honeywell