DeltaV™ Historian Options

This white paper helps select the best continuous historian option for use with DeltaV Distributed Control Systems (DCS).

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1 Welcome

Welcome to the the DeltaV DCS Historian selection white paper. This manual helps in the selection of the DeltaV Historian that best meets the customer's needs. Emerson offers several different historian solutions to solve a wide range of customer needs. Consequently, at first, the choice of historian can seem daunting; however, after reading through this white paper the best historian choice will become clear.

1.1 Terminology

In this white paper, the following terms are used.

Legacy Historian: A continuous historian based on embedded OSIsoft technology, which was available on every DeltaV workstation from DeltaV v3.3 through v7.3. Continued use of the Legacy Historian on a DeltaV Application Station was available on upgrades to DeltaV v7.4 through DeltaV v11.3.1. This is also referred to as the "Legacy PI Historian."

DeltaV Continuous Historian: A continuous historian developed by Emerson as a replacement for the Legacy Historian, available in DeltaV v7.4 and later versions on every DeltaV workstation. The DeltaV Continuous Historian is available for new DeltaV systems and for DeltaV system upgrades.

Enterprise Historian: An OSIsoft PI Server integrated into DeltaV engineering and operations environments, as an alternative to the DeltaV Continuous Historian. The term "embedded enterprise historian" refers to an enterprise historian available in DeltaV v10.3 and later versions where the PI Server is installed on an Application Station. The term "integrated enterprise historian" refers to the enterprise historian option available in DeltaV v12.3 and later versions where the PI Server is installed on a non-DeltaV PC, typically on the plant/process local area network (LAN). The enterprise historian is available for new DeltaV systems and DeltaV system upgrades.

Advanced Continuous Historian: A continuous historian based on the latest embedded OSIsoft technology, which is available on the DeltaV Application Station as an alternative to the DeltaV Continuous Historian. The Advanced Continuous Historian is available in DeltaV v12.3.1 and later versions for new DeltaV systems and DeltaV system upgrades.

Site PI Server: An OSIsoft PI Server developed and supported by OSIsoft. Emerson's historian solutions frequently send data to Site PI Servers for data aggregation purposes.

1.2 A History of Historians

The data historian is crucial to Emerson's DeltaV users and has undergone many phases of development and enhancement throughout its lifespan. To meet the evolving needs of DeltaV users and address changing business needs, Emerson has introduced and retired historian products over the years. The following graph shows a timeline of supported historian solutions over the course of DeltaV releases.
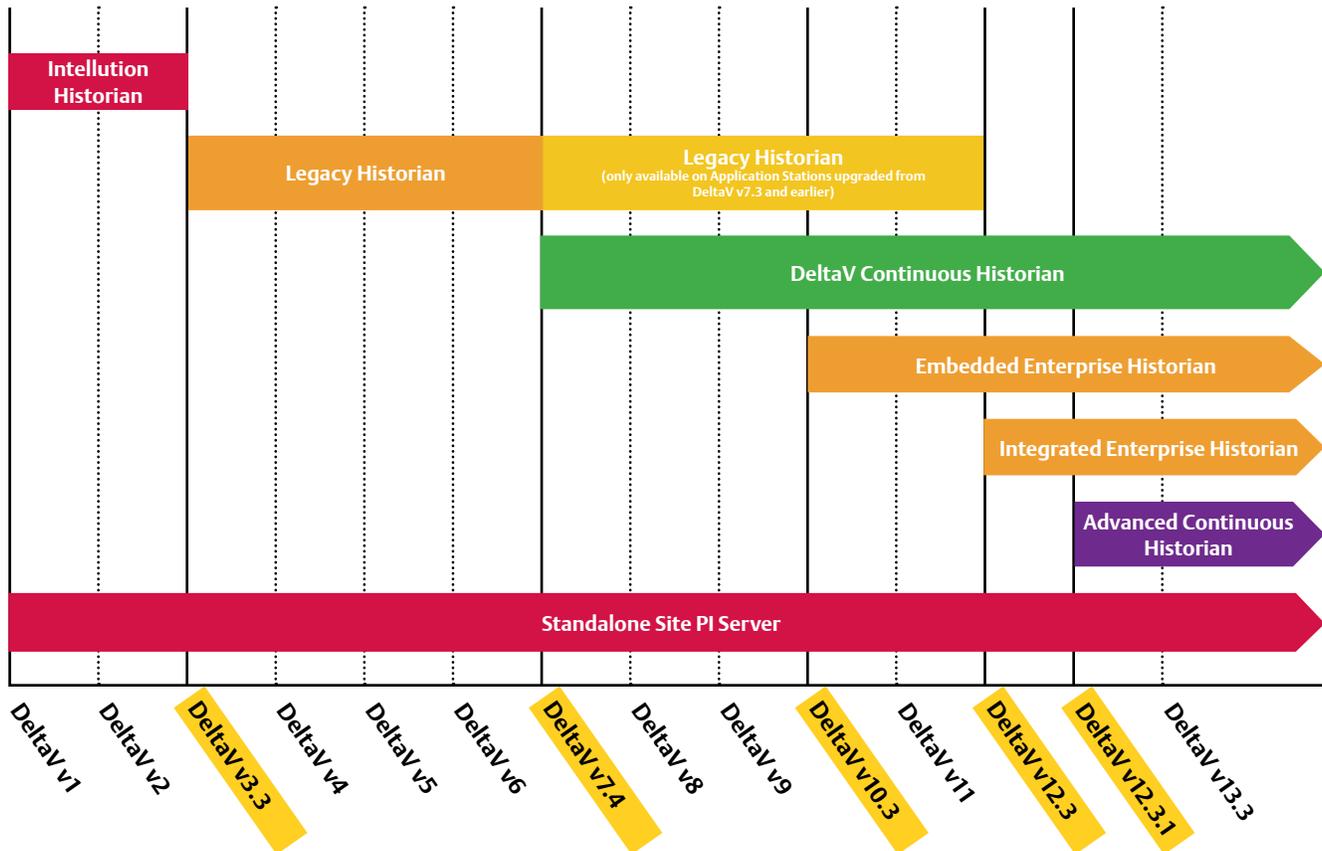

Figure 1 — *Historian Timeline.*

When DeltaV was first released, a small Intellution historian was included as part of the DeltaV Operate HMI package. Beginning in DeltaV v3, Emerson partnered with OSIsoft to deliver a historian on an Application Station. For the purposes of this document, this historian will be referred to as the Legacy PI Historian.

Beginning with the release of DeltaV v7.4, Emerson began offering the DeltaV Continuous Historian. The DeltaV Continuous Historian was developed from the ground up by Emerson, providing similar functionality as compared to the Legacy PI Historian. Since there were many customers who had already deployed the Legacy PI Historian, an arrangement was made with OSIsoft to allow customers to migrate their existing Legacy PI Historians when they upgraded their DeltaV systems to v7.4 and beyond. New systems installed at v7.4 and greater were only allowed to deploy the DeltaV Continuous Historian.

By the release of DeltaV v12, the code base for the Legacy PI Historian was becoming more than 10 years old. Supporting the Legacy Historian was becoming increasingly more difficult, and as a result, the Legacy PI Historian could no longer be migrated into a DeltaV v12 system.

With the release of v12.3, Emerson began offering the Integrated Enterprise Historian. This option allowed customers to take advantage of their existing Enterprise PI Historian while still configuring the history requirements within DeltaV. An application acts as a gateway, using the DeltaV Smart Connector to send the history requirements of DeltaV DCS to the Enterprise PI Historian.

Finally, with the release of v12.3.1, Emerson began offering the Advanced Continuous Historian, which brings the power of OSIsoft technology to DeltaV history within an Application Station.

Since the early days of DeltaV systems, an OPC DA server provided another option for customers with enterprise level historians to access data. This method is generally used in conjunction with a local, DeltaV historian (either the DeltaV Continuous Historian or the Advanced Continuous Historian).

1.3 DeltaV Historian Options

Today, there are three continuous historian platforms available in the DeltaV system; the DeltaV Continuous Historian, the Advanced Continuous Historian, and the Enterprise Historian. The Legacy PI Historian and Standalone Site PI Server are not included in this document. This document focuses only on the products currently sold by Emerson.

In terms of support after purchase, the DeltaV Continuous Historian and the Advanced Continuous Historian are directly supported by Emerson. The Enterprise Historian support is divided between OSIsoft and Emerson. The Enterprise Historian's PI server and clients are supported by OSIsoft. There is a configuration interface called the Enterprise Historian Configuration Interface that is supported by Emerson.

1.3.1 DeltaV Continuous Historian

The DeltaV Continuous Historian is the standard DeltaV system historian and is available on every DeltaV workstation. It offers the base functionality that meets the needs of a majority of users and is Emerson's best-cost option. Other highlights of this product are:

- Fully integrated with DeltaV history clients

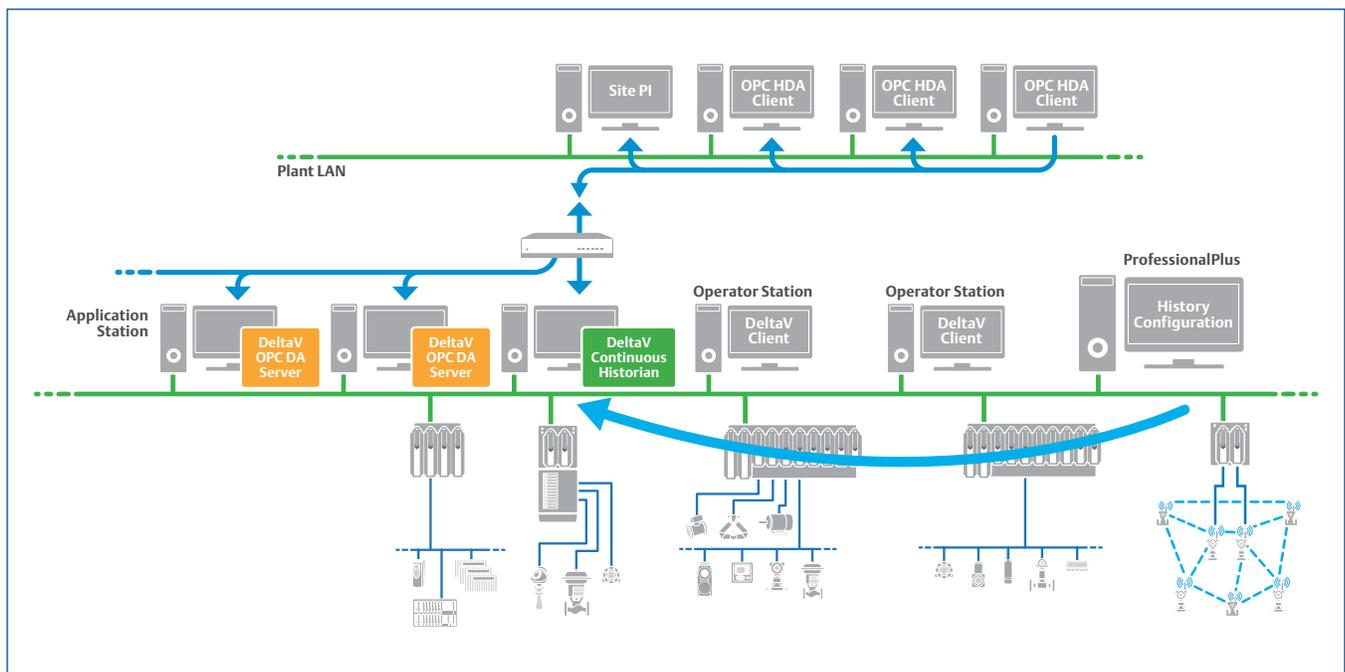- Ideal for use with DeltaV Advanced Control applications

- Best-cost option

Figure 2 — *Architecture of the DeltaV Continuous Historian.*

1.3.2 Advanced Continuous Historian

The Advanced Continuous Historian is based on OSIsoft technology. It provides an alternative to the DeltaV Continuous Historian for customers that want to tightly integrate with an OSIsoft PI Server and/or use OSIsoft history clients for data visualization. Other highlights of this product are:

- Supports redundancy and automatic data back-fill

- Connects to a limited set of both DeltaV and OSIsoft history clients

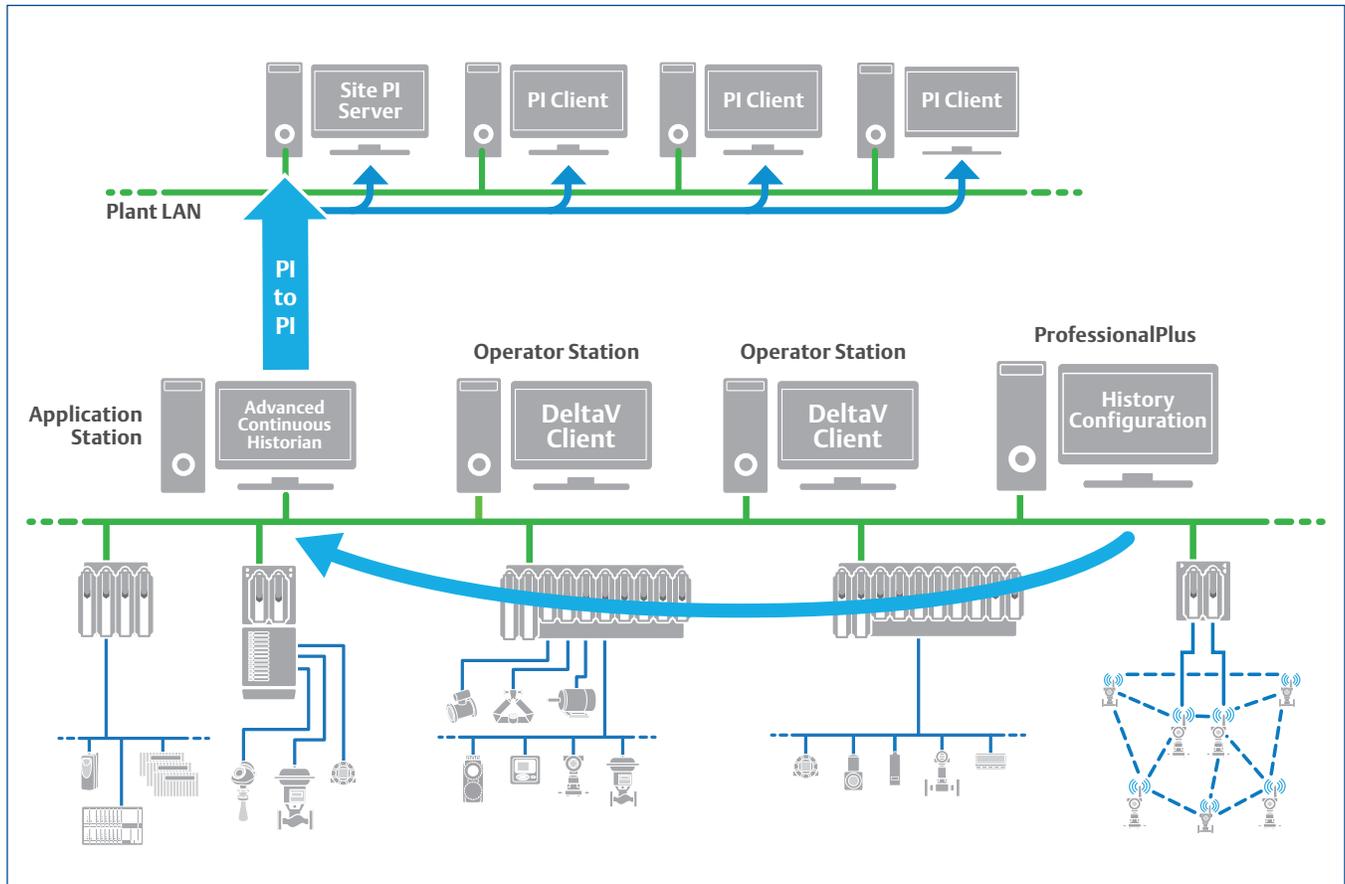- Ideal for integrating with an OSIsoft PI Server

Figure 3 — *Architecture of the DeltaV Advanced Continuous Historian.*

1.3.3 Enterprise Historian

An Enterprise Historian is an OSIsoft PI Server fully integrated with the DeltaV DCS. There are two flavors of the Enterprise Historian - the embedded Enterprise Historian is a PI Server installed on an Application Station local to the DeltaV control network and the Integrated Enterprise Historian is a PI Server installed on a non-DeltaV PC, typically on the plant/process LAN. An Enterprise Historian provides an alternative to the DeltaV Continuous Historian and Advanced Continuous Historian for customers who need a fully-featured historian that spans multiple control networks and can utilize the full suite of OSIsoft clients for data visualization. It is integrated with the DeltaV system with the purchase of the "Enterprise Historian Configuration Interface." Other highlights of this product are:

- Used to collect data from multiple control systems

- Connects to all OSIsoft history clients
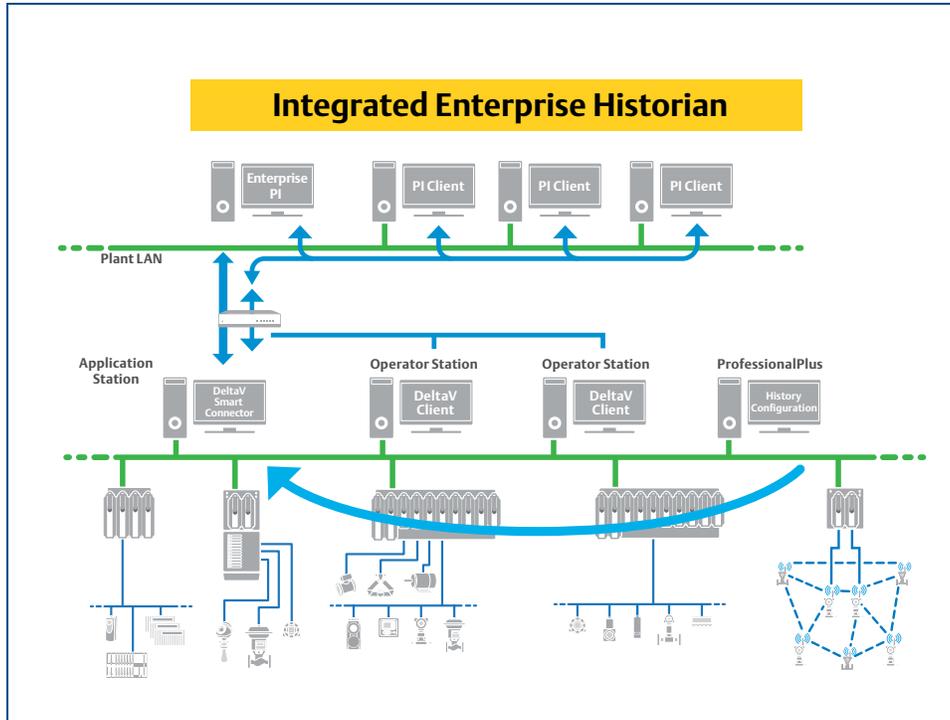
- Supports all third-party history clients

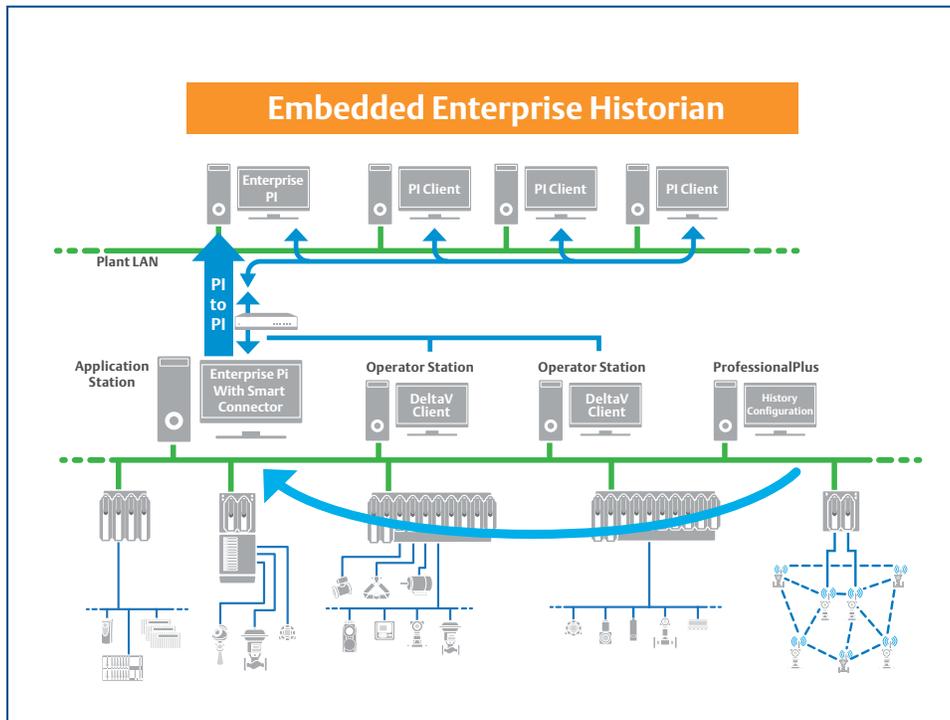**Figure 4** — *Architecture of the Integrated Enterprise Historian.*

Figure 5 — *Architecture of the Embedded Enterprise Historian.*

2 Selection Factors

This section outlines the main selection criteria for the DeltaV historian. The main points to consider are:

- Data Consumers: What clients are used to analyze data?

- Integration: Is this historian integrated with your customer's business system's historian?

- History Recovery: How are data gaps filled after a machine or network outage?

- Size: How many parameters can be stored on the historian?

- Price: What is the price of the historian?

The recommended approach to choose a historian based upon each individual factor is discussed in the subsections below. In the ideal case, each decision tree will point to the same historian selection. However, this will sometimes not be the case. If there are conflicts and one factor points to a different historian than another, the most important factor to the end user should be given more weight in the decision process. If the decision tree lands at "NEXT FACTOR" it essentially means "DON'T CARE" and it can be removed from the decision making process. At the very least, the historian selection process will be simplified and given more clarity as the end user examines each factor.

2.1 Data Consumers

What applications need access to the historicized data is an important decision factor for users who will be analyzing historical data on the screen. As such, careful consideration must be given as to what clients will be used to view the data because this directly impacts the choice of historian. The following table lists the supported client connections to the historian types.

	DeltaV Continuous Historian	Advanced Continuous Historian[1]	Enterprise Historian[1]
	v7.4 - Present	v12.3.1 – Present	v10.3 - Present
DeltaV Clients			
Batch Analytics	Yes	Yes[2]	Yes[2]
DeltaV Executive Portal	Yes	Yes[2]	Yes[2]
DeltaV History Web Service	Yes	No	No[3]
DeltaV Web Server	Yes	No	No
DeltaV Operate embedded trend objects	Yes	Yes[4]	Yes[4]
DeltaV Reporter	Yes	No[5]	No[5]
History Analysis	Yes	Yes[4]	Yes[4]
Adapt	Yes	Yes	Yes
InSight Basic	Yes	Yes	Yes
InSight Reporter	Yes	No[6]	No[6]
MPC Operate	Yes	Yes	Yes
Neural	Yes	Yes	Yes
Predict, PredictPro, PredictPlus	Yes	Yes	Yes
Process History View	Yes	Yes	Yes
DeltaV OPC History Server7	Yes	No	No
OSIsoft Clients			
PI Batch	No	No	Yes
PI DataLink	No	Yes	Yes
PI Manual Logger	No	Yes	Yes
PI ProcessBook	No	Yes[8]	Yes
PI to PI Interface	No	Yes	Yes
PI OPC Server	No	Yes[8]	Yes
Other PI clients & applications	No	No	Yes
Other Clients			
Informetric Systems InfoBatch	Yes[9]	Yes[2]	Yes[2]
SyTech XLReporter	Yes[9]	Yes[2]	Yes[2]

[1] *DeltaV parameter status needs separate history collection; status is automatically collected in the DeltaV Continuous Historian*
[2] *Requires the OSIsoft PI OPC Server*
[3] *OSIsoft offers PI Web Services Interface as an alternative to DeltaV History Web Service*
[4] *Supported in DeltaV v13.3 and higher*
[5] *OSIsoft offers PI DataLink and PI Manual Logger as an alternative to DeltaV Reporter*
[6] *Since DeltaV Reporter is not compatible, DeltaV InSight Reports will not work.*
[7] *Programmatic non-DeltaV data entry is supported in DeltaV v13.3 and higher with DCH Write Interface*
[8] *Purchased separately from OSIsoft*
[9] *Requires the DeltaV OPC History Server*

Table 1 — *Supported Historian Client Connections. Yes = supported; No= not supported*

If the historian is going to be used to view historical data reports on a system with DeltaV Advanced Control applications, specifically DeltaV InSight Reporter, the DeltaV Continuous Historian should be selected. If the historian needs to utilize a combination of DeltaV and OSIsoft clients, the Advanced Continuous Historian should be selected. If the historian needs the full suite of OSIsoft clients, an Enterprise Historian should be selected. This decision process is depicted in the Figure below.
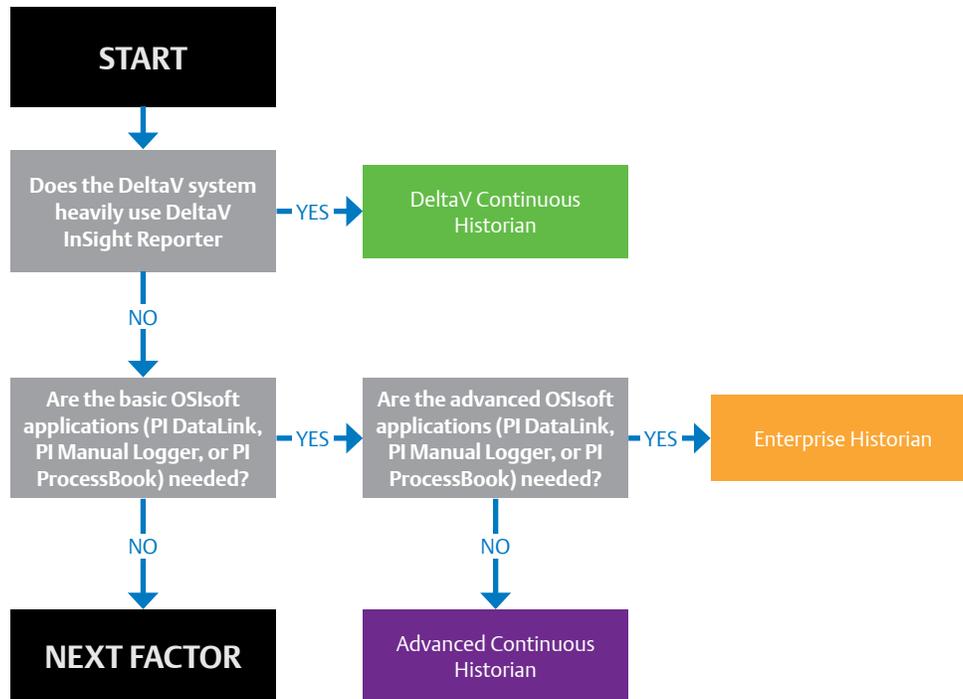
Figure 6 — *Data Consumers Decision Tree.*

2.2 Integration

Integration to another data store that aggregates historian data, such as a business-level historian, is a key factor in the historian decision. The following assumptions are made in this section:

Assumptions

1. The focus of data integration will assume that the higher-level/business historian is an OSIsoft PI server. If the DeltaV historian is connecting to another third-party historian (e.g. AspenTech InfoPlus.21), the recommendation is to use the DeltaV Continuous Historian since the data connection will go through a standard OPC HDA interface or a separate OPC DA (real time) server on an Application Station. The OPC HDA interface to DeltaV can be used for back-filling the third-party historian and ensures that the timestamps are the same in both the control system and business-level historian. The OPC DA option does not allow for back-filling of data to the business-level historian. In this scenario there is no benefit to using the OSIsoft embedded technology from an integration standpoint.

2. It is assumed that a historian is required on the control network. If all historical data is going to be collected at the higher-level/ business historian, then DeltaV can simply pass the data using the OSIsoft PI OPC DA interface that is connected to the DeltaV OPC server. In other words, depending on the nature of the data, if it is not critical, no historian may be required. The risk is that if the OPC DA interface is interrupted, the historical data is lost because there is no local historian collecting data on the control network.

There are advantages/disadvantages for each historian and data interface. The following table lists the historian, data interface, benefits, and disadvantages of each historian/interface combination.

Historian	Interface to Site PI Server	Interface to DeltaV	Advantages	Disadvantages
DeltaV Continuous Historian	OSIsoft PI OPC DA interface ➡️ DeltaV OPC Server (DA)	Native DeltaV runtime	1. Easy installation; included as part of DeltaV install. 2. Can provide multiple data paths by configuring two interfaces connected to two OPC servers, reducing the risk of data loss.	1. Double configuration effort: points must be configured on DeltaV and PI Server. 2. Timestamps of the parameters at DeltaV Continuous Historian will be different than at the Site PI Server. 3. Requires additional OPC server(s) and associated licensing. 4. Firewall ports must be open to allow OPC DA (DCOM) so it is less secure or an OPC Tunneler must be used to send data to Site PI Server. The Emerson Smart Firewall, with dynamic port mapping, solves this problem.
DeltaV Continuous Historian	OSIsoft PI OPC Historical Data Access (HDA) interface ➡️ DeltaV OPC History Data Access Server (HDA)	Native DeltaV runtime	1. Easy installation; included as part of DeltaV installation. 2. Timestamps are the same in the DeltaV Continuous Historian as the Site PI Server. 3. Can provide multiple data paths by configuring two interfaces connected to two OPC servers, reducing the risk of data loss.	1. Double configuration effort: points must be configured on DeltaV and PI Server. 2. Performance of HDA interface is relatively slow (7,000 parameters/second). 3. Firewall ports must be open to allow OPC HDA (DCOM) so it is less secure or an OPC Tunneler must be used to send data to Site PI Server. The Emerson Smart Firewall, with dynamic port mapping, solves this problem.

Historian	Interface to Site PI Server	Interface to DeltaV	Advantages	Disadvantages
Advanced Continuous Historian	OSIsoft PI to PI	Native DeltaV runtime	1. Reduced configuration effort: points managed in one place in the DeltaV DCS. 2. Automatic data buffering to Site PI if connection is lost. 3. Easy installation; included as part of DeltaV installation. 4. Timestamps are the same in the Advanced Continuous Historian as the Site PI Server. 5. Supports data back-filling with two historians connected with two PI to PI interfaces.	None
Integrated enterprise historian	OSIsoft PI to PI	OSIsoft DeltaV Smart Connector (OPC)	1. Reduced configuration effort: points managed in one place in DeltaV DCS. 2. Automatic data buffering to Site PI if connection is lost. 3. Timestamps are the same in the enterprise historian as the Site PI Server.	1. No data collection at the control network so if there is a network interruption, data is lost. 2. History clients on the control network must connect to the higher-level network of the integrated enterprise historian. 3. Requires additional DeltaV OPC server(s) and associated licensing. 4. Firewall ports must be open to allow OPC DA (DCOM) so it is less secure or an OPC Tunneler must be used to get data from DeltaV DCS. The Emerson Smart Firewall, with dynamic port mapping, solves this problem.

Table 2 — *Historian Data Integration Comparison.*

Generally speaking, if the historian is going to be integrated with a Site PI Server, the Advanced Continuous Historian should be selected. The DeltaV Continuous Historian should be selected if the requirements for network robustness and data transfer performance to the Site PI Server are low. This decision process is depicted in the figure below.
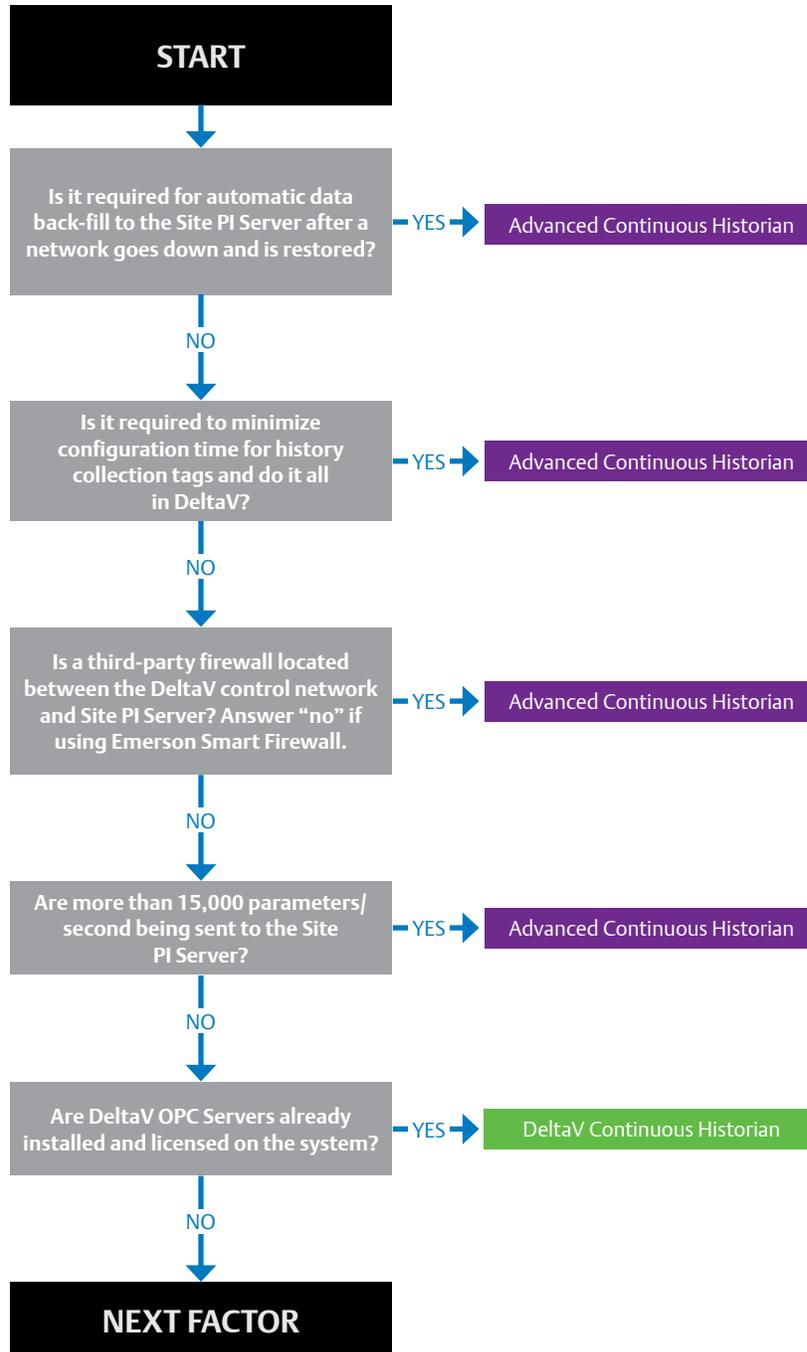
START

Is it required for automatic data back-fill to the Site PI Server after a network goes down and is restored? — YES → Advanced Continuous Historian

NO

Is it required to minimize configuration time for history collection tags and do it all in DeltaV? — YES → Advanced Continuous Historian

NO

Is a third-party firewall located between the DeltaV control network and Site PI Server? Answer "no" if using Emerson Smart Firewall. — YES → Advanced Continuous Historian

NO

Are more than 15,000 parameters/second being sent to the Site PI Server? — YES → Advanced Continuous Historian

NO

Are DeltaV OPC Servers already installed and licensed on the system? — YES → DeltaV Continuous Historian

NO

NEXT FACTOR

Figure 7 — *Integration Decision Tree.*

2.3 History Recovery

History recovery in this context refers to how data is populated within a historian after a machine or network outage. History recovery will affect the data available to client applications. For example, if a historian goes offline for a period of time, when a client connects, it will see a data gap. Refer to the figure below.
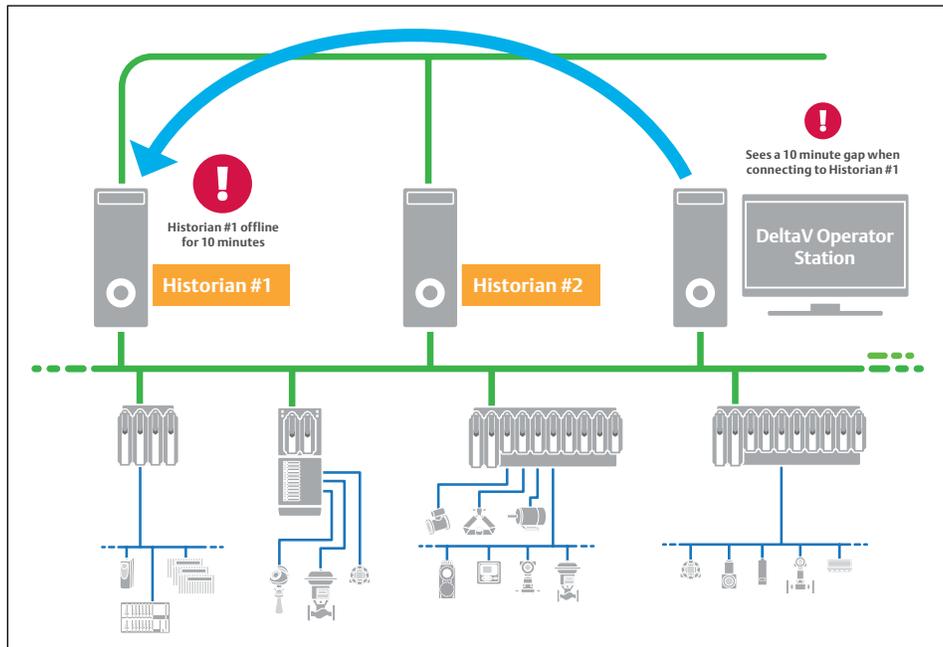

Figure 8 — *History Data Gap Example.*

History recovery fills in the data gaps with data from the active or "good" historian. Refer to the figure below.
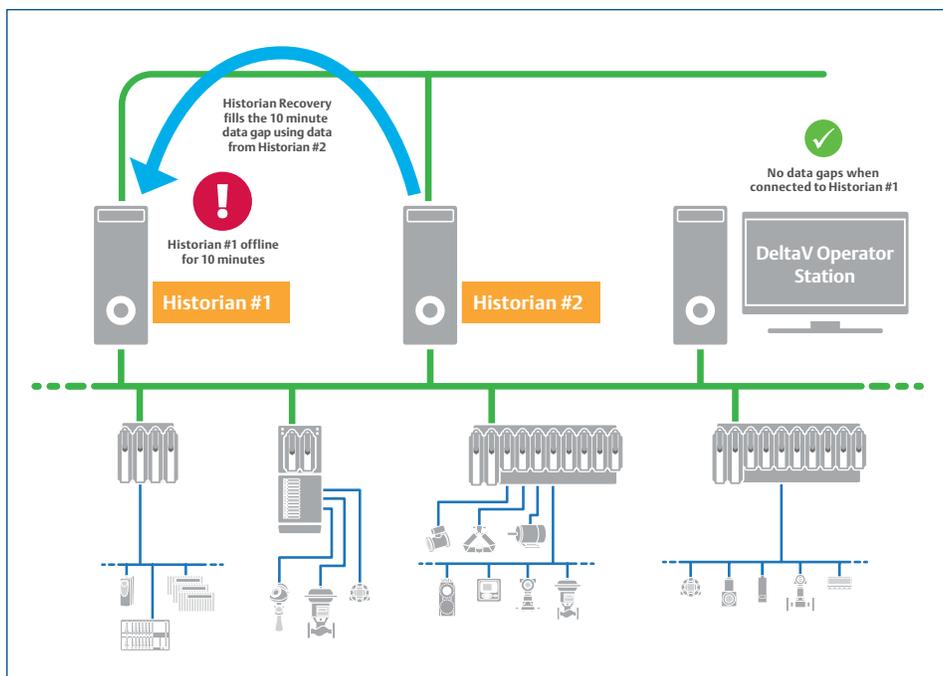

Figure 9 — *History Recovery Example.*

If history recovery is required, the Advanced Continuous Historian should be selected as it uses OSIsoft's PI to PI application to do this. The DeltaV Continuous Historian does not have history recovery capability – the clients must reconcile the data gaps manually. This decision process is depicted in the figure below.
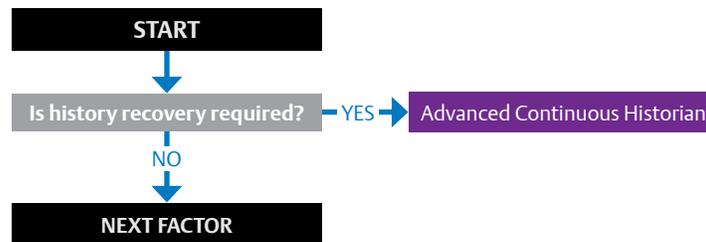
Figure 10 — *History Recovery Decision Tree.*

2.4 Size

Size refers to the number of parameters that can fit into a single historian, also referred to as "capacity." The following maximum sizes/capacities are supported for each historian option.

- DeltaV Continuous Historian: 30,000 parameters
- Advanced Continuous Historian:
  - 30,000 parameters in DeltaV v12.3.1
  - 60,000 parameters in later releases
- Enterprise Historian (integrated): 500,000 parameters
- Enterprise Historian (embedded): 30,000 parameters

The embedded enterprise historian is dedicated to an Application Station using the DeltaV Smart Connector and DeltaV OPC DA server. Consequently, the size of the system is limited to 30,000 – the maximum allowed number of OPC parameters on a single Application Station. The Integrated Enterprise Historian can connect to multiple Application Stations using the DeltaV Smart Connectors and DeltaV OPC DA servers and can hold up to 500,000 parameters. The Integrated Enterprise Historian can also connect to multiple DeltaV systems. For all enterprise historian architectures, each Application Station supplying data to the historian will require licenses for the DeltaV Smart Connector, DeltaV OPC DA server, and Enterprise Historian Configuration Interface.

All the historians are scalable and additional historians can be added to the system. However, there are circumstances where the number of parameters that can fit into a single historian influence the final decision (e.g. minimizing hardware and machine nodes). The parameter limits and decision process, is depicted in the figure below.
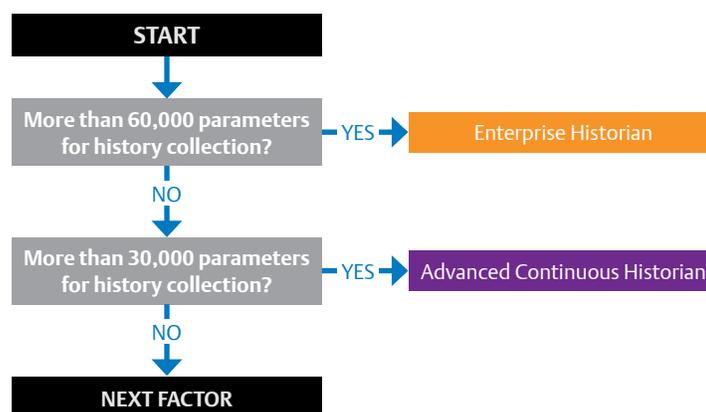
Figure 11 — *Size Decision Tree.*

2.5 Performance

Performance refers to the number of parameters that can be written to the historian per second. These are parameters read from the control network devices. It is often referred to as writes per second, or scan rate. There are circumstances where the performance of the historian can influence the final decision (e.g. a large amount of parameters require a scan rate of 1 second). The following scan rates are supported for each historian option.

- DeltaV Continuous Historian: 3,000 parameters/second
- Advanced Continuous Historian:
  - 5,000 parameters/second in DeltaV v12.3.1
  - 10,000 parameters/second in later releases
- Enterprise Historian: 5,000 parameters/second

These performance numbers should not be confused with the transfer rates between historians, e.g. transferring values from the Advanced Continuous Historian to a Site PI server. Those performance numbers are bigger because there is a low risk of data loss.

Note the availability of data depends on the performance of the controllers on the network, since they are serving the data. The limit of data availability from the controllers may be the bottleneck; not the historian. Although the historians have been tested to support the parameter writes per second as shown above, the control network may not – depending on its configuration and bandwidth. Keep this in mind as performance limits and decision making questions are evaluated in the figure below.
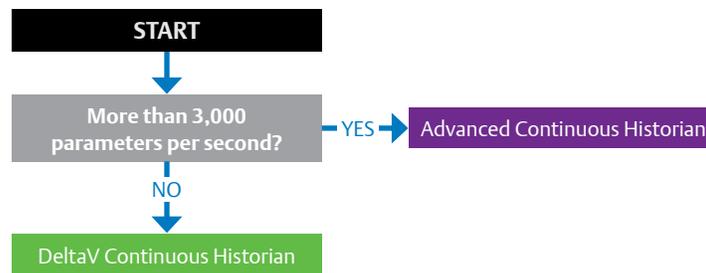

Figure 12 *— Performance Decision Tree.*

2.6 Price

Price is an important decision factor for customers. Please contact your local Emerson Sales Office or Local Business Partner for current pricing information. Price can be also affected by many factors such as system architecture and process requirements.

For the Integrated Enterprise Historian, there is no per-parameter license, however there is an Enterprise Historian Configuration Interface license.

3 Conclusion

On the following page is a combined view of the decision flowcharts shown above. If after reading this document, the choice of historian is still unclear, there may be more factors influencing the decision than are covered in this document. If this is the case, the recommendation is to select the DeltaV Continuous Historian because it covers most of the baseline functionality and is automatically installed on each DeltaV workstation. Also, Emerson makes it easy to migrate to a different historian. For example, the Advanced Continuous Historian is automatically installed on DeltaV Application Stations and can be enabled by simply adding a license and changing a property menu. If additional functionality is required, the enterprise historian can be installed and run as the historian. Emerson provides instructions to migrate data so there is no data loss if the historian is changed later.

Emerson is committed to the DeltaV Historian Options outlined in this white paper and will continue to provide feature enhancements and support going forward. There are currently no end-of-life plans for these historians, so future availability should not be a factor in the selection process.
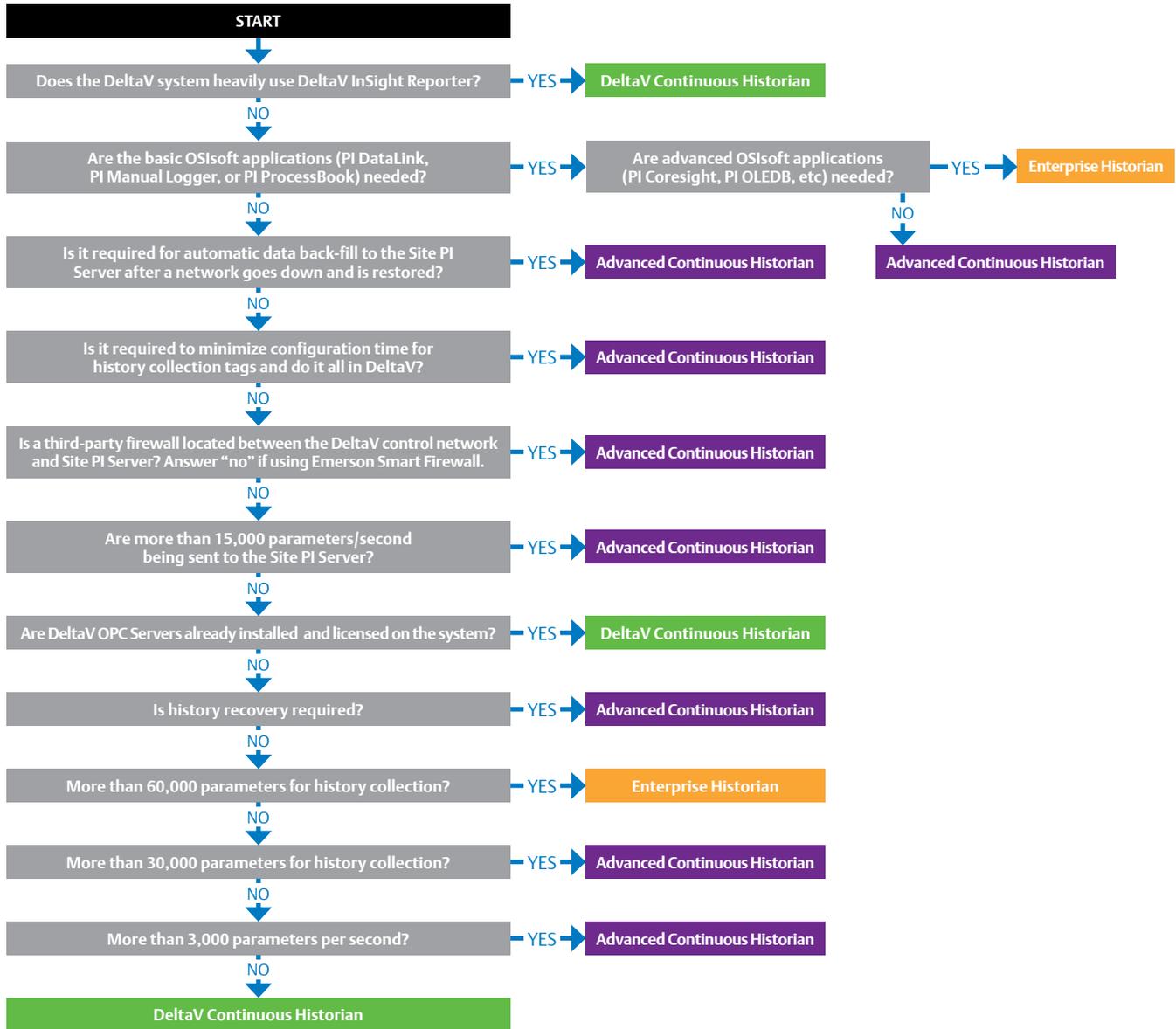
START

Does the DeltaV system heavily use DeltaV InSight Reporter? — YES → DeltaV Continuous Historian

NO

Are the basic OSIsoft applications (PI DataLink, PI Manual Logger, or PI ProcessBook) needed? — YES → Are advanced OSIsoft applications (PI Coresight, PI OLEDB, etc) needed? — YES → Enterprise Historian

NO → Advanced Continuous Historian

NO

Is it required for automatic data back-fill to the Site PI Server after a network goes down and is restored? — YES → Advanced Continuous Historian

NO

Is it required to minimize configuration time for history collection tags and do it all in DeltaV? — YES → Advanced Continuous Historian

NO

Is a third-party firewall located between the DeltaV control network and Site PI Server? Answer "no" if using Emerson Smart Firewall. — YES → Advanced Continuous Historian

NO

Are more than 15,000 parameters/second being sent to the Site PI Server? — YES → Advanced Continuous Historian

NO

Are DeltaV OPC Servers already installed and licensed on the system? — YES → DeltaV Continuous Historian

NO

Is history recovery required? — YES → Advanced Continuous Historian

NO

More than 60,000 parameters for history collection? — YES → Enterprise Historian

NO

More than 30,000 parameters for history collection? — YES → Advanced Continuous Historian

NO

More than 3,000 parameters per second? — YES → Advanced Continuous Historian

NO

DeltaV Continuous Historian

Figure 13 – *Historian Selection Decision Tree.*

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