CMS Connectors Overview

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Contents

Chapter 1. Introduction

Purpose

The purpose of this document is to provide an overview of the Call Management System (CMS) connectors. This document contains general information on CMS connectors.

This document's intended audience:

- Avaya & Partner sales resources
- Avaya, Partner, and Customer technical resources
- Users familiar with Avaya Call Management System (CMS)

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Overview

Real-time and historical CMS data are readily available to end users via native CMS reporting tools. When other systems or applications need that same data, Avaya offers access to the data by way of CMS connectors and interfaces.

By providing CMS data, CMS connectors & interfaces become essential to contact center operations. The CMS data is consumed by Avaya solutions, customer-created applications, and third-party systems for a wide variety of purposes, including workforce management, agent adherence, scheduling, forecasting, reporting, analytics, payroll, digital signage (e.g. wallboards), desktop displays or dashboards, and pre-routing.

Chapter 2. Real-time Connectors

Real-time connectors provide near real-time or “snapshots” of CMS data by utilizing CMS’s native terminal emulator-only reporting tool, called Screen Painter. Resulting data is sent to the receiving system or application via a network socket, encrypted or un-encrypted.

The real-time connector will attempt to connect to the listener every few seconds for an indefinite period, as frequently as every 3 seconds. Once a connection is established the real-time interface leaves the connection up indefinitely. If the connection is broken the real-time interface has auto-recovery functionality that will attempt to re-establish the connection.

A CMS Main Menu Addition is provided with each interface for manually starting/stopping the connector. The connectors start up automatically at system startup. If the CMS application is turned off (with the OS still running) the interface must be manually restarted (via the connector menu), after the CMS application has been turned on.

CMS caveats and limitations apply to real-time connectors, i.e. these interfaces cannot exceed or circumvent CMS limitations. For example, CMS real-time reports (custom or standard) cannot support a refresh rate faster than 3 seconds; therefore, real-time connectors cannot support a faster refresh rate. Another example is that CMS terminal emulator (Screen Painter) reports have a column/width limit of 132 characters or spaces across the report; therefore, real-time reports used for CMS real-time connectors cannot exceed 132 characters across, including spaces and delimiters. A workaround for this is to have data on multiple lines, with a unique roq identifier, if needed.

Real-time adherence (RTA) connectors

Real-time adherence (RTA) connectors are a subset of real-time connectors designed to send agent state data to receiving applications that are primarily used for agent scheduling, adherence, or pre-routing. This subset includes connectors created solely and exclusively for specific Avaya and third-party applications, with specifications defined & agreed upon by both Avaya and those receiving parties.

Examples of RTA connectors include, but are not limited to, WFO RTA (for sending real-time data to Avaya WFO), IEX RTA (for sending real-time data to NICE IEX WFM), TCS RTA (for sending real-time data to Aspect TCS/eWFM), and Geotel RTA (for sending real-time data to Cisco ICM).

Generic RTA, despite its name, is also designed to send real-time data to several other applications like Avaya Agent Map, Teleopti, and Monet. For a complete list of CMS connectors and their uses, see *CMS Connectors Matrix (Appendix A).*

Inherent in its design for use by so many third-party vendors, Generic RTA is more configurable than other RTA connectors and allows for options like additional information in startup markers, timestamps data stream headers, or delimiter choices.

At startup, RTA connectors send one record for each monitored & logged in agent. After startup, a record is sent only if the agent has a change of state. This design drastically reduces the bandwidth demands on the customer's network and processing requirements for the receiving server/application.

Extensive state change detection logic processing is done to the data on CMS. Only raw data items are transmitted in the data stream (no calculations are performed).

Each RTA connector refresh of data is terminated with the string, "==EOD==" (end of data). The EOD marker is sent at every RTA refresh regardless of whether there are any updates to the agent records. Thus, the EOD marker serves to provide a de facto heartbeat function to keep the connection from dropping due to a lack of data.

RT_Socket Connector

Another subset of real-time connectors is a single connector called RT Socket. RT Socket is a tool kit or API-style interface that enables the customer or third party to develop a real-time data feed from their CMS (client) to another computer (server).

As with RTA connectors, a TCP listener must be provided by the customer or third-party vendor. Source code for sample socket listeners is freely available on the Internet.

RT Socket is highly configurable. It allows for options like appending or prepending a string to each row of data, appending a string of choice to mark the end of data or refresh, or replacing nulls with zeros.

Although RT Socket can utilize a variety of CMS real-time Screen Painter reports to send snapshots of CMS data to third-party vendor applications, it is more commonly used to send skill, VDN, and trunk group data.

It comes with many sample reports designed specifically for various third-party vendors. RT Socket can also use Screen Painter reports designed by customers or third-party vendors (within CMS reporting limitations). Customers also have the option of opening an engagement with Avaya Professional Services for the creation of custom reports.

Specific options, guidelines & recommendations for RT Socket can be found in the installation instructions that are included in the PLDS download bundle.

RT Socket vs. Generic RTA

Below is an abbreviated comparison RT Socket and Generic RTA functionality. Note that some third-party vendors require both connectors (e.g. Aceyus). For a complete list of connectors and their uses, see *CMS Connectors Matrix* (Appendix A).

Functionality Highlights	**RT Socket**	**Generic RTA**
Data fields are customizable	Y	N
Multiple records per staffed agent are sent at every refresh	Y	N
After startup, an agent record is sent only if the agent state has changed	N	Y
Agent logout records (UNSTAFF) are sent	N	Y
Lower processing load required of CMS	Y	N

Chapter 3: Historical Connectors

CMS historical connectors retrieve historical agent, skill, VDN, admin, login/logout, and other data from the CMS historical database and transport that data to a receiving system, often a third-party vendor's application. The data sent is typically in the form of an ASCII text delimited file.

The historical connectors are scheduled to run after each CMS interval (typically every 30 minutes), or once a day / month, depending on the specific connector and receiving application.

User menus, added to the CMS main menu, are provided for the purposes of resending older data and checking logs.

CMS caveats and limitations apply to historical connectors. For example, historical connectors cannot retrieve data that does not exist on CMS.

WFM Connectors

One major category of historical connectors is workforce management. The data sent is typically agent, skill, VDN, and login-logout data. This subset of historical connectors includes interfaces created solely and exclusively for specific Avaya and third-party applications with specifications defined & agreed upon by both Avaya and those receiving parties.

In other words, these historical connectors are designed specifically for WFM applications (e.g. Avaya WFO, NICE IEX WFM, Aspect TCS/eWFM, Verint WFM, Calabrio WFM, Centerbridge, and Inova). For a complete list of connectors and their uses, see *CMS Connectors Matrix* (Appendix A).

Unload Interface

Another subset of historical connectors, the Unload interface provides a means to unload CMS table data once a day, once a month, or once an interval into delimited ASCII text files and transmit that data from the CMS to a receiving server.

All table data items are unloaded. In effect, the interface is doing the equivalent of an SQL "select *" for each configured table. The interface is commonly used to replace ODBC access for systems where performance is a concern or to provide a rudimentary replication of CMS tables on an external server.

The interface uses the concept of configurations by session. Each session can be configured uniquely from other sessions. For example, session 1 can be configured to send daily tables once a day and session 2 can be configured to send interval data at the end of each interval.

Multiple tables can be configured per session and each session can send data for one ACD or all ACD's.

Instead of unloading all rows of data from specified tables, Unload allows the option to filter or send data based on certain criteria, e.g. location ID, tenant ID, or skill group. For a list of all tables available for unload, as well as filter settings, see the installation instructions included with the PLDS download bundle.

Payroll

The Payroll connector provides a means to transmit agent login/logout punches from the Avaya CMS to a receiving payroll application. The connector is scheduled to run once a day and each ACD-session combination requires a separate data feed.

In addition to login/logout punches, dictionary agent names are optional. If installed/configured, dictionary agent descriptions can be an additional field.

AUXlogging data (not part of the CMS historical database) is another optional field. By taking advantage of a co-installed AUXlogging interface, the Payroll connector offers the ability to create one file that has both login/logout and auxin/auxout information merged.

Chapter 4: Other Connectors

In addition to real-time and historical connectors, other connectors are also available. These provide specific functionality that enhances CMS's native capabilities.

Admin-Sync (HA CMS)

HA CMS is not truly a CMS feature. HA CMS is an ACD feature. Purchasing HA CMS means that the multiple CMS data feeds feature will be authorized and activated within the ACD. The activation of the multiple CMS feature within the ACD enables the ACD to transmit the same data stream simultaneously to two CMS's. Thus, **HA CMS is simply two redundant CMS servers connected to the same ACD.**

The two simultaneous data streams being sent from the ACD to the two HA CMS's provide the synchronization of ACD call data between the two HA CMS's.

If the Admin-Sync package is not purchased, there are no special changes done on the CMS for HA. Each of the two CMS's is an independent, stand-alone system that is unaware of the existence of the other CMS.

The Admin-Sync add-on package automatically keeps select CMS administrative data in synchronization between the two HA CMS's via a nightly push (copy and replace) from the Primary to the Secondary via the customer's LAN/WAN.

Thus, all administration changes that are copied by Admin-Sync's nightly push must be performed on the Primary. Any administrative functions performed on the Secondary CMS will be overwritten when the nightly push runs.

Installing the Admin-Sync package does NOT turn the two CMS's into a clustered system. In a nutshell, the Admin-Sync package merely automates tasks that the customer would otherwise have to perform manually with backups/restores.

The physical requirements for the CMS systems are that the two CMS's be closely matched, (similar hardware) and they must have the same CMS base load release. Examples of the same CMS base load release are either both R18 or both R18.1, but not an R18 paired with an R19. The two CMS do not have to be the same maintenance release. Thus, an R19ab.a can be paired with an R19ab.d. This is so that historic call data can be transferred back and forth and administrative data can be copied (pushed) from the Primary to the Secondary.

ECH Handler

External Call History (ECH) is the external version of CMS's Call Records (aka Internal Call History) feature. Additional information on the CMS Call History feature is available on support.avaya.com.

ECH and internal CMS Call Records (ICH) are mutually exclusive. When the ECH feature is "installed" (activated) on the CMS the storage of internal Call Records (ICH) is deactivated.

The ECH Handler package converts the binary ECH data files into ASCII data files suitable for loading into a customer provided database. The ASCII ECH data files are then SFTP'ed to the receiving server.

ECH Handler supports up to 8 data feeds for sending data to:

Destination	Type of feed
Avaya Contact Analyzer (CA)	ASCII
Avaya Operational Analyst (OA)	Binary
Nice Analyzer (Explorer 2)	ASCII
Aspect Data Mart	Binary
Third-Party	ASCII
Customer's Internal System	ASCII

Upon request, Avaya Professional Services (APS) will provide a sample database schema file. The customer may use the sample schema file as a guide for creating their receiving dB table. It is the customer's responsibility to create the receiving tables in their database system. Purchasing additional consulting time from APS is recommended if the customer needs additional assistance in this area.

The ECH data format was unchanged from CMS R11 through R15 CMS when using the Standard data record format. The Extended call record format introduced in R12 CMS contains additional fields over the R3V11 call record format.

CMS Release	Call Record Format Fields
R18.1 ECD and R19	93
R18	89
R17	88
R16.3	85
R16 – R16.2	83

R12 – R15 Extended	77
R11 – R16 Standard	65

Each ASCII data record is terminated with a field delimiter and end-of-line marker. For some database import tools, this can cause an issue where it thinks there is an additional field at the end.

AUXlogging

CMS does not have native support for timestamps of when an agent enters and exits an AUX state. The AUXlogging interface closely approximates (within about 3 seconds) the time an agent enters and exits AUX states.

AUXlogging data is created by extrapolating data from a CMS custom real-time report. Thus, AUXlogging data will not and cannot be as precisely accurate as native CMS data. Therefore, AUXlogging data is provided on a “Best Effort” basis and will not be as accurate as native CMS data such as login/logout data.

The heart of the AUXlogging package is a daemon (pronounced ‘demon’) process that monitors agent state change events. When an agent’s state changes to AUX an auxstart record is written to an in-memory table. When the agent’s state changes from AUX to some other state a table lookup is done to find the corresponding auxstart record within the in-memory table. The data from the start record is then combined with the auxstop event data. The completed record is then written to a buffer file. A change in the associated auxreason code is considered a change to the AUX state and will trigger the writing of an aux event record to the buffer file.

The completed data records (in the buffer file) are written to a custom CMS (Informix) database table (c_auxlog) just after the end of each CMS Interval (default: 1 and 31 minutes past the hour). The completed AUX event data records will then be available to ODBC and SQL queries as well as to custom CMS reports. In other words, during normal operation only completed AUX event records (for example, those records with both a start and stop time) are written to the database. Incomplete records (for example, those with no stop time) are only written to the database in the event of an abnormal or error condition (for example, if the ACD data link is lost).

The ACD does not send an AUX event counterpart to an agent logout message. Therefore, there is no such thing as an ‘auxstop’ message from the ACD or switch. Therefore, the AUXlogging daemon utilizes a proprietary algorithm for establishing the auxstop event.

At 03:10 AM each day (configurable) all AUX event records over 31 days old (configurable) are purged from the c_auxlog table by the AUXlogging archiver. If the AUXlogging archiver cannot run (for example, the system is down for maintenance) then the older than 31 days records will simply be purged the following day at 03:10 AM.

When installed with a compatible historical WFM connector, AUXlogging allows the creation of a daily agent report that combines login/logout punches with AUX punches. This option, available for some historical WFM connectors, is called AUX Merge. This combined report can better

approximate an agent's actual productive time and can be used to replace the standard daily agent report that is sent to third-party WFM applications.

Combo (Integrated)

The combo package provides a combined (integrated) real time and historic data interface (data feed). This package gathers near real time (snapshot) ACD information and merges it with historic CMS data.

This data is the current CMS interval data combined with accumulated interval summary data for the day to form **running totals for the day**. To utilize this connector the customer or third party vendor must have a corresponding TCP "listener" process running on their receiving computer(s).

Each session of the combo interface uses approximately the same amount of system resources as two CMS login users. Additionally, at start up and the end of every CMS interval a custom historical report is run. The performance of the combo software package is subject to the same capabilities and restrictions as those of CMS Screen Painter reports. Specifically, as the CMS system load increases the minimum obtainable refresh rate will also increase.

There may be a slight delay in the recalculating and updating of running totals at the start of each CMS interval. This is because CMS utilizes a periodically summarized data model. The combo interface must wait for the CMS interval archiver (summarization) to complete, detect the completion of that archiving, and then recalculate the running totals. The running totals may therefore appear to be "old" (stale data) in the first 1-2 refresh cycles following the end of each CMS interval and then jump to the correctly calculated metrics once it catches up.

If an agent skill change occurs, CM logs that agent out and immediately logs them back in to the system. This causes CMS to archive the existing real-time agent record and create a new one. The result is that the combined data feed (real-time + historical) may look like the times decrement or "go backwards" by a small amount until the end of the defined interval (15 or 30 minutes). Once the interval archiver runs, all the times will "catch back up" and look correct. This only happens during change agent skill scenarios.

Due to the nature of the combo interface and the many different possible combinations of real-time and historical data items, it is highly recommended to open an Avaya Professional Services engagement to assist with determining the requirements for the Combo connector and assist with any customization that may be necessary.

Chapter 5: Paging and Emailing

The term **"page"** in this document refers to a text message that is **emailed** via the public Internet to a wireless device (e.g. cell phone) or an e-mail account.

Reports Emailing

This package enables the CMS users to send CMS Screen Painter historic reports to public Internet email addresses. This does not allow for sending CMS Supervisor reports as those are generated on each supervisor's client PC.

The package installation creates pseudo CMS printers. The pseudo CMS printers are configured with Internet email addresses. A user menu is included that enables the CMS administrator to make changes to the email lists associated with the respective pseudo CMS printers.

Admin Paging

This package is intended for CMS administrators. This package enables CMS administrators to receive a text message/page for a CMS system level outage, e.g. PBX data link down. This package includes limited threshold paging for critical or unmanned splits/skills such as VRU/IVR/Conversant, holiday and emergency splits/skills. A user menu is included for administration.

Lost RTA data feed scenarios covered by CMS Administrator Paging are: 1) PBX to CMS data link down, 2) CMS Data Collection turned off, 3) CMS turned off, and 4) CMS reboot.

Supervisor Paging

This package is intended for the split/skill supervisors. With this package **installed on the CMS server**, the CMS supervisor users may configure threshold paging for their splits/skills. Configuration is done via a user menu system.

Chapter 6: Performance Impact

Typically, the addition of real-time and historical connectors to CMS is not noticeable by the end users. The impact is minimal. When it runs, the impact of each real-time or historical session is comparable to one CMS user running a real-time report or a query against the database.

Actual CPU usage is dependent upon the customer's environment and configuration. As historical connectors run only once an interval or less frequently, the impact is even less noticeable.

On CMS systems that may be overloaded or being used to capacity, Avaya Professional Services can provide a billable remote investigation and analysis of system usage. A recommendation will be provided that could include items like lowering refresh rates, increasing hardware allocation, or even running interfaces on an additional CMS server.

Chapter 7: Connectivity to 3rd Parties

CMS is always the client and the receiving application acts as the server.

For real-time connectors, the receiving application runs a TCP listener process to accept the data connection. Each ACD requires a separate socket connection (or session). The receiving port number is configurable by Avaya and may be unique or shared, depending on the requirements of the receiving application.

For historical connectors, the receiving system runs an SFTP server or process to accept the historical data files from the CMS. Public Key Authentication must be administered on both the CMS and the receiving server for authentication and encryption.

The data can be sent to the same server using different directories/filenames or it can be sent to multiple servers, depending on the specific requirements of the other application.

Some applications can accept pushes of historical data via TCP socket connections, like a real-time connection.

Network connections

LAN/WAN traffic produced by these connectors is relatively small and historical connector file sizes range from a few Kilobytes to a few Megabytes.

Historical connectors have a timer built in to stop the transport attempt from the CMS if file transfer process does not complete within 10 minutes. This reduces the chances of the historical connectors having a negative impact on the CMS due to external circumstances.

CMS connectors support the following network protocols for data transfer.

Data Transfer Type or Protocol	Type	Default Port Number(s)	Dependencies
SFTP (recommended)	Historical	22	SFTP configured on the receiving server
FTP (deprecated)	Historical	20/21	FTP configured on the receiving server
Local Copy	Historical	NA	NA
TCP Socket Connection	Real-Time	Assignment agreed upon by Avaya, Customer & third party	Listener on the receiving server

TLS 1.2 Socket Connection	Real-Time	Assignment agreed upon by Avaya, Customer & third party	Listener configured for TLS 1.2 on the receiving server

Firewalls

The customer is responsible for making all network hardware and software transparent to the connection between CMS and the receiving server. Network hardware and software include, but is not limited to, routers, Ethernet switches, firewalls, proxy servers, and load balancers. When a network firewall is located between the CMS and the receiving server, the customer must configure their firewall to allow network traffic to pass through.

Avaya makes no express or implied guarantee that these software connectors will work when a firewall is located between the CMS and the receiving server. **Ensuring that the firewall is transparent to these connectors is the customer's responsibility.**

Chapter 8: Interoperability

The connectors make every attempt to keep the CM and CMS versions transparent to the receiving application.

New features and functions are added to the connectors from time to time. To utilize the added features or functionality, the customer must have the appropriate connector *and* CMS versions on which the feature or function was added.

As an example, support for 7-digit dial plans was added to the connectors when R3V11 CMS was released, support for 15-digit dial plans was added when R16 CMS was released, and SSH/SFTP support was added to the connectors when R12 CMS was released.

When upgrading CMS to a new version (e.g. R18 to R19), Avaya requires these connectors also be upgraded to obtain the latest bug fixes, performance enhancements, compatibility support and added features.

Applicable CMS caveats and limitations apply to all real-time and historical connectors, i.e. CMS connectors cannot exceed or bypass CMS and CMS release limitations.

Chapter 9: Licensing

See the "*Avaya CMS Connectors and WebLM Licensing Overview and Planning Guide*" on support.avaya.com for additional details on licensing.

WebLM is the default method for installing and managing licenses for Avaya products, including CMS Connectors.

The CMS Connectors need a license for each instance and session running on the CMS server. These licenses must be installed on a WebLM server that is accessible via the LAN/WAN from the CMS server.

A WebLM interface tool is installed on the CMS server to manage local cached licenses directly on the CMS. The interface tool caches licenses locally to helps avoid interruptions in the communication between the CMS and the WebLM server from causing abrupt stopping of the CMS Connectors due to transient licensing issues.

Once the local WebLM licenses are installed on the CMS server, the WebLM interface runs a validation every 11 minutes to validate/renew the local cached license.

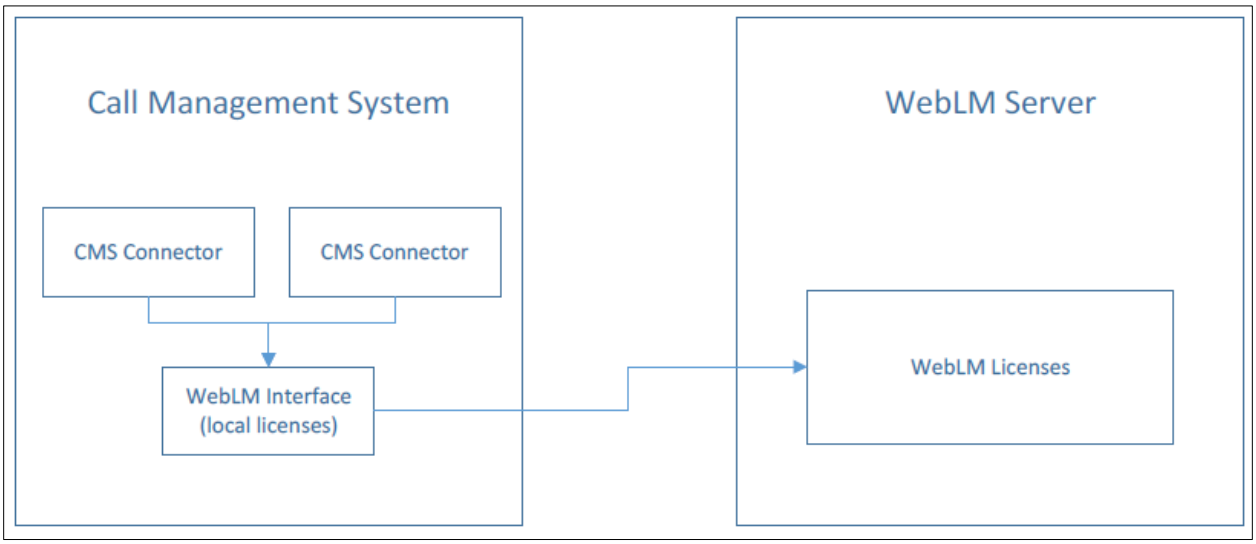

Figure 1: CMS Connectors and WebLM Licenses

Each CMS Connector verifies that the local license cache has the appropriate licensing for the main feature and for each session.

CMS Connectors do support legacy licenses (binary license files) for older CMS installations and situations where customers may not be able to use WebLM licenses. These binary license files can only be generated by Avaya Professional Services and are additional cost to create and install.

Chapter 10: Customizations

Customizations can be done by Avaya Professional Services on a statement of work basis. Contact Avaya APS through your authorized business partner or directly via the Avaya website.

Appendix A: Connectors Matrix

Application	Avaya Real-time Connector	Avaya Historical Connector
Avaya WFO	WFO-RTA	WFO Historical
Nice / IEX TotalView	IEX-RTA	IEX Historical
Aspect / TCS eWFM	TCS-RTA	TCS Historical
Verint WFO	BP-RTA	Blue Pumpkin Historical
Pipkins WFM	PIP-RTA	Pipkins Historical
Calabrio WFO	CALA-RTA	Calabrio Historical
Verint / GMT Planet	GMT-RTA	GMT Historical
Avaya Desktop Wallboard (ADW)	RT-DSI	Historical ADW connector
Spectrum XorceView	RT Socket	
Aceyus RealDash	Generic-RTA	NA (customers typically use ODBC)
Cobox	Generic-RTA	
Intradiem (formerly Knowlagent)	Generic-RTA	
InVision Injixo	Generic-RTA	
Netlert N-Focus	Generic-RTA	
Symmetrics nVision	Generic-RTA	
Witness Voice Recording	Generic-RTA	
Avaya Agent Map	Generic-RTA	
Monet	Generic-RTA	
Noble Systems Shift Track	Generic-RTA	

(formerly Open Wave)		
Centerforce RightForce	Generic-RTA	
Teleopti	Generic-RTA	
Nice Uptivity (formerly CallCopy)	Generic-RTA	NA (customers typically use ODBC)
Vision-X VisionWFM	Generic-RTA	
Voran Tephra	Generic-RTA	
Avaya Admin-Sync	Admin-Sync	
Avaya Admin Paging	Admin Paging	
Avaya AUXlogging	AUXlogging	
Avaya ECH Handler	ECH Handler	
Kronos Payroll	NA	Payroll
Avaya Supervisor Paging	Supervisor Paging	
Avaya Unload	Unload	
DayLight Logepal	PS Combo	
Geomant	RT Socket	
Inova LightLink	RT Socket; Generic RTA (optional)	Inova Historical
Omnivex	RT Socket	
Logisys	RT Socket	