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Admin-Sync Package for HA CMS
An Avaya Professional Services Offer

This guide explains how the extra-cost Admin-Sync add-on software package for HA CMS works, what it does and what it does not do. The Admin-Sync package may be used for an HA CMS, a Survivable CMS configuration with HA CMS, or a Survivable CMS configuration without HA CMS.

WHAT IS HA CMS?

HA CMS is not truly a CMS feature. HA CMS is actually a PBX feature. Purchasing HA CMS means that the multiple CMS/IQ data feeds feature will be authorized and activated within the PBX/ACD. The activation of the multiple CMS/IQ feature within the PBX enables the PBX to transmit the same data stream simultaneously to two CMS's (and two IQs). Thus **HA CMS is simply two standard CMS machines (redundant systems) connected to the same PBX/ACD.**

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

If the extra-cost add-on 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.

Installing the Admin-Sync package does NOT turn the two CMS's into a clustered system. **The Admin-Sync add-on package automatically keeps select CMS administrative data in synchronization between the two HA CMS's via a nightly copy (push) from the Primary to the Secondary (unidirectional).** In a nutshell, the Admin-Sync package merely automates tasks that the customer would otherwise have to perform manually and/or with tape backups/restores.

The physical requirements for the CMS systems are that the two CMS's be closely matched, i.e. very similar hardware. And they must have the same CMS base load release. Examples of the same CMS base load release are both R16 or both R16.1, but not an R16 paired with an R16.1. The two CMS do not have to be the same maintenance release. Thus an R16ab.a can be paired with an R16ab.d. The two machines must be closely matched so that historic call data can be transferred back and forth and administrative data can be copied (pushed) from the Primary to the Secondary.

Changes that CMS administrators make to the Primary CMS system must be synchronized (pushed) to the Secondary. A CMS administrator could type their changes into both CMS machines. But that would be a constant source of problems because of typing errors (typos) and omissions.

The **Admin-Sync** package automates the copying process for administrative changes. **Admin-Sync** transfers (copies) the administrative data via the customer's LAN/WAN from the Primary to the Secondary on a daily basis.

The add-on Admin-Sync package adds a new CMS Main Menu Addition, **HAusermenu**. HAusermenu is the customer's menu driven interface to the Admin-Sync software.

To run **HAusermenu**:

a) Login to CMS with the user ID 'cms' (**only 'cms' will work properly**)
b) Enter: cms
c) Pick "HAusermenu>" from the Main Menu
d) Pick from the menu and follow the on-screen instructions

Example HAusermenu menu:

HA CMS User Menu – PRIMARY
for
Interface Software Activation/Deactivation

1) Configure this system as active (for external data feeds)
2) Configure this system as inactive (for external data feeds)
3) Admin-Sync sub-menu
0) Exit

Selection?

The menu item terms **active** and **inactive** refer solely to the data transmissions from the CMS interfaces, e.g. ECH Handler, IEX-RTA, TCS-RTA, etc. **Both HA CMS's maintain their PBX data links and collect and store call data regardless of their Admin-Sync status.** See the section below titled "Active vs. Inactive Status…" for further details.

Example **Admin-Sync Menu**:

1) Schedule Admin-Sync
2) Un-Schedule Admin-Sync
3) Synchronize Administrative Data Now
4) Transfer & Restore a Day's Call Data, (pull) FROM Secondary HA CMS
5) Transfer & Restore a Day's Call Data, (push) TO Secondary HA CMS
6) Transfer & Restore Interval Call Data, (pull) FROM the Secondary HA CMS
7) Transfer & Restore Interval Call Data, (push) TO the Secondary HA CMS
8) Display Admin-Sync Version
9) Merge Login/Logout Records (for a Day)
10) View Log
0) Exit
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Choice ==>

HA CMS unique menu items will not be displayed if the configuration is Survivable CMS without HA CMS, i.e. items 4, 5, 6, 7 will be displayed as 'Reserved'. **UTC**/GMT interval start times are **not** supported (R16 and later).

Applicable administrative data (user logins, synonyms, etc.) is automatically synchronized (pushed) nightly from the Primary to the Secondary (see specific listings on a later page). The administrative data can also be synchronized (pushed) on-demand via "HAusermenu".

Operations that allocate database space must be performed manually on both HA CMS machines, e.g. Data Storage Allocation. Operations that can be synchronized via tape backup and restore are automatically synchronized by Admin-Sync. Operations that cannot be synchronized via tape backup and restore are not (and can not be) synchronized via Admin-Sync (exception: UNIX/Solaris passwords are synchronized).

Custom Reports

Custom Report Designer reports and custom Screen Painter reports will be synchronized as part of the nightly synchronization. **However, in order for Supervisor users on the Secondary to see changes to custom reports resulting from a nightly sync (push) the user must stop and restart the Supervisor application on their PC.** A simple logout-login is not sufficient to guarantee that Supervisor will flush its cache and re-read the report code to pick up any changes. When Admin-Sync performs its nightly push of custom reports from the Primary to the Secondary, CMS users logged into the Secondary will be logged off as a reminder to stop and restart their Supervisor application on their PC.

Timetables and Short Cuts

Timetables and Short Cuts are not synchronized by Admin-Sync. This allows customers to **load balance** scheduled jobs by scheduling different Timetable jobs on each HA CMS. Timetables that print reports would cause double copies of the reports to be printed if scheduled on both CMS's. Timetables that perform administrative tasks, such as moving agents to different skills, would cause conflicts if sync'ed between and thus scheduled on both HA CMS's.

Shortcuts are closely tied (coupled) with Timetables so the Shortcuts can't be separated for synchronization purposes.

Active vs. Inactive Status, the Heartbeat Function and Fail-over

During normal operation the Primary is marked as "active". When an HA CMS is marked as "active" a flag is set. If an add-on interface is duplicated on both CMS's the flag will be examined by the interface. If the active flag is set on the specific CMS the respective add-on interfaces will transmit data. If the "active" flag is not present the respective interfaces will not transmit data. If the interface software package is loaded on only one HA CMS the flag will not be examined.

This concept of Active vs. Inactive is not applicable to the RTA-Geo (GeoTel) interface.

The Primary is always the Primary and the Secondary is always the Secondary. What changes is their "active" status. Via the Admin-Sync menus, the CMS's can manually be marked as "active" or "inactive".

The Primary and Secondary can not both be marked “active” at the same time if they are still able to communicate between them (that would cause duplicate ECH, WFM, etc. data to be sent). Therefore, if the two CMS’s can communicate between themselves, the Primary must be marked Inactive before the Secondary can be marked Active.

Admin-Sync includes a “**heartbeat**” function. Approximately every 20 seconds the heartbeat function tests LAN/WAN communication between the Secondary and the Primary. If the Secondary cannot ‘talk’ to the Primary the Secondary will mark itself as “active”. When the Secondary marks itself as “active” it will call the startup programs for rt_socket, Generic-RTA, IEX-RTA, TCS-RTA and BP-RTA if they are present, loaded on both HA CMS’s and configured to be HA CMS aware. The Secondary will also take over the ECH data feed (if present).

If the two CMS’s can communicate between themselves, and the Primary is marked Active, the heartbeat function will ensure that the Secondary is marked Inactive.

If the two CMS’s can communicate between themselves, and the Primary is marked Inactive, the heartbeat function will ensure that the Secondary is marked Active.

The heartbeat function applies only to **total outages** of the Primary. If the Primary has suffered a partial outage and can still respond to LAN/WAN communication requests from the Secondary the heartbeat function will not mark the Secondary “active”. In partial outage situations the customer must manually mark the Primary as “inactive” via the Admin-Sync menu if the customer desires that the Secondary take over the interface data feed duties.

In other words, if the customer can still log into both HA CMS’s and if they want the Secondary to be active they should and will have to manually mark the Primary as inactive. The heartbeat function will detect that the Primary is marked inactive and configure the Secondary as active.

The heartbeat function does not apply to the RTA-Geo (GeoTel) interface. The details of the RTA-Geo (GeoTel) interface functionality in an HA environment are covered in a separate document.

The fail-over functions performed by Admin-Sync’s heartbeat feature do not apply to nor have any effect on user login sessions (e.g. CMS Supervisor logins). A prolonged total outage of the Primary HA CMS would necessitate that the users log into the Secondary HA CMS. A partial outage of the Primary would necessitate that only the affected users log into the Secondary. As an example, if only the PBX data link for ACD 3 goes down then only those CMS users that monitor ACD 3 would need to log into the Secondary (provided the ACD 3 data link is up on the Secondary).

When the Primary has experienced a total outage and is restored to operation the heartbeat function will restore the Secondary to inactive status and stop any interfaces that it started. If the customer manually marked the Primary as inactive because of a partial outage the Secondary will remain marked as active until the customer manually marks the Primary as active.

Data Restore Functionality

If one of the HA CMS boxes is out of service it obviously can not store **call data** (ACD data). After the disabled CMS is repaired it needs to receive a copy of the missing call data from the CMS that remained in service. The Admin-Sync package has functions (menu choices) that will transfer one day's worth of call data from one HA CMS to the other via TCP/IP over the customer's LAN/WAN. If three days of data are missing the customer would run the menu item three times, once for each missing day. If only a few CMS intervals are affected, a single interval may be copied at a time.

The data restore functions do not include the Call Record (aka ICH) data and the Agent Trace data. Call Record data is not interval based and involves a circular buffer style table. And Agent Trace data is unique to each CMS.

Neither the administrative data nor the call data synchronization process requires taking the CMS out of service (it's non service affecting).

Historic call data can be manually restored via Admin-Sync menu items #4 & #5 (day at a time) or items #6 & #7 (intervals at a time). This functionality can be used to restore missing call data after one of the HA CMS boxes has been temporarily out of service.

If one of the HA CMS boxes is out of service for an extended time period (i.e. many days or longer) Avaya recommends that a standard tape backup/restore procedure be used to synchronize the two historic databases. If CMS resident administrative changes were made on the Secondary during the extended outage, those changes should also be synchronized via the standard tape backup/restore procedure.

When performing a system restore from a 'cmsadm' backup tape, the network cables should be unplugged. As with all computer hard drive restores, unplugging the network cables ensures that no undesirable effects occur while the restore process is occurring. Once the tape restore has completed and the system has been rebooted and returned to a fully functional state, then the network cables can be safely plugged back in.

Admin-Sync's Historic data restore feature supports restoring 'per ACD' or "all" ACDs. The 'per ACD' feature facilitates support for HA CMS boxes that are in geographically different locations (disaster recovery model) and that have multiple ACDs.

R3V9 CMS (and above): The ACD **Admin Log** is unique to each HA CMS machine so synchronization is not applicable.

Configuration data (splits/skills to be monitored) for RTA-Geo (GeoTel), IEX-RTA, BP-RTA, TCS-RTA, and Generic-RTA is synchronized nightly and on demand via the Admin-Sync menus. This is a configuration/setup item. If requested, Avaya can change this setting.

Beginning with Admin-Sync version 5.10 (22 Sept 2008) **Pseudo ACD's** may be created/loaded on either the Primary or Secondary HA CMS. However, Pseudo ACD administrative data is excluded from the Admin-Sync nightly and manual synchronization. And Pseudo ACD call data is excluded from the push-a-day, pull-a-day, push-an-interval and pull-an-interval features.

Admin-Sync (version 3.8 and later) has AUXlogging package compatibility.

When a per-Interval restore is performed, the agent **login/logout records** associated with that day may be merged the following day (or later) via the menu.

If the optional AUXlogging package is installed, the auxstart/auxstop records can be merged via the Merge Login/Logout Records menu option.

The implementation of **NTP** on the PBX and CMS is required for the merge function to work properly. If the customer does not have NTP implemented, the merged data will likely contain numerous "duplicate" records.

Administration operations "automatically synchronized" by the switch/PBX

When CMS is used to make switch/PBX translation changes those changes will appear to be automatically synchronized between the Primary and Secondary CMS. This is because the changes are actually done to the switch/PBX translations. Those changes include:

a) changes to VDN Skill Preferences
b) VDN assignments
c) Vector contents
d) Multi-agent skill changes
e) Change Agent Skills

Administration operations requiring manual synchronization

The following operations cannot be synchronized between the two CMS servers via Admin-Sync. Instead, these operations must be performed manually on each CMS server.

a) Agent Trace Administration
b) Activate Agent Trace
c) Exception Administration
d) CMS Supervisor scripts
e) Scheduling of Timetables
f) Changing the CMS state
g) Data Storage Allocation changes
h) Free Space Allocation changes
i) External Call History state
j) Load Pseudo ACD data
k) Pseudo ACD setup
l) Storage Interval changes
m) Turning data collection on and off
n) Data Summarizing
o) Call Work Code administration
p) Custom table creation
q) Custom database items
r) Custom Calculations
s) Custom Constants
t) Deletion of user's home directory (Solaris) on Secondary CMS following deletion of user from CMS on Primary CMS

Administration operations synchronized by Admin-Sync

The following CMS administration operations will be synchronized from the Primary to the Secondary HA server.

a) Custom Screen Painter Reports
b) CMS Supervisor Designer Reports
c) Data Dictionary operations - synonyms
d) User Permissions
e) User passwords
f) User home directories (see note below)
g) Split/Skill Call Profile
h) VDN Call Profile
i) Admin Paging package duty list
j) Main Menu Additions

When CMS user accounts are removed from the Primary their Solaris home directories will not be removed from the Secondary. Retaining the home directories on the Secondary serves as a safeguard in case there are scripts or other files of value that could be useful or even vital in the future.

CMS Administration

Main Menu Addition administration must be performed on the Primary. If a Main Menu Addition is not applicable to one of the HA boxes, the addition will have to be stubbed off on that box, but it must still appear in the CMS menu system on both CMS's.

Security

Admin-Sync (version 4.2 and later) provides SSH support. SSH support also requires R12 or later CMS. SSH must be configured/setup by Avaya for non-interactive file transfer (Public Key Authentication) as 'root'.

SSH root login between the two CMS's (and only between the two CMS's) is required to be authorized ("PermitRootLogin without-password"). This setting blocks root login from all other computers but still enables the required root level file transfers between the two CMS's.

Firewalls

It is expected that both CMS's will be on the same side of the firewall in "normal" situations and configurations. This software package will work through a Screening Firewall provided the customer "opens" the relevant ports on their Screening Firewall. However, this software package will NOT work through a "Proxy Server" (also referred to as a Proxy Firewall).

LAN/WAN Requirements

The load from the nightly synchronization (data push) is very similar to the load produced by the nightly running of historical data reports and transmitting those reports to network printers. Therefore the nightly synchronization is scheduled to run in the early hours of the morning. The default start time is 03:15, but can be changed by Avaya if requested.

The historical call data restore function also uses a non-trivial amount of computer resources and network bandwidth. This should be kept in mind when doing large data restores. Just as with printing numerous historic CMS reports, running large data restore requests is best done during off hours to avoid any potential noticeable performance degradation.

It is physically impossible for Avaya to provide meaningful LAN/WAN bandwidth usage estimates. There are far too many variables, unknowns and site unique factors involved. No matrix or set of formulas can possibly account for all these elements with any acceptable degree of accuracy.

The only reasonably accurate method of determining bandwidth requirements is by measuring actual usage. For any scenarios of high concern, Avaya advises the customer to measure their actual bandwidth usage immediately after the Admin-Sync software is installed. If the customer determines that they do not have sufficient available bandwidth they should notify the Avaya consultant that performed the software installation. The Avaya consultant will then disable the nightly data copy. Once the customer has resolved their bandwidth capacity issue, the Avaya consultant can re-enable the nightly data copy.

If the customer has any scenarios of high concern and can not perform bandwidth usage testing right away after software installation, they may direct the Avaya consultant to disable the nightly data copy and user menu until they have performed their bandwidth usage testing. If the customer is also concerned that a manual data restore may inadvertently be run by their CMS administrators, the Avaya consultant can also disable the Admin-Sync user menu.

However, with the above cautions in mind, note that Avaya's experience has been that customers with healthy networks, healthy CMS's, and properly configured CMS NIC cards have had no bandwidth issues. Only a very small number of customers with already existing performance and/or network issues have had any bandwidth and/or CMS performance issues resulting from the addition of the Admin-Sync software package.

HA CMS and Avaya Add-On Interface Software

Third party vendor's applications run on either a Microsoft Windows server or a UNIX server. The term **vendor's server** will be used in this document to represent a third party application (TCS Manpower, IEX TotalView, NICE Analyzer, Blue Pumpkin, etc.) that runs on another vendor's server.

If both HA CMS machines were to send call data to the vendor's server the vendor's server would receive the same data twice, i.e. double data. Therefore, the two HA CMS machines must have a mechanism to designate which CMS system is to send data to the vendor's server. The CMS that is currently designated/configured to send data to the vendor's server is referred to as the **active** CMS.

The two HA CMS machines must also be designated as a **primary** and a **secondary**. The primary vs. secondary designation applies to the physical CMS machines. The customer must do their administration and configuration work on the primary HA CMS. Since these are physical designations, the primary is always the primary and the secondary is always the secondary regardless of the scenario or operational status. The **active** designation is a logical designation that could apply to either physical CMS machine depending on operational status.

When Avaya add-on interface software is installed on HA CMS machines the CMS receives a user interface (menu) named **HAusermenu**. The customer must manually run HAusermenu to designate which CMS is the active CMS (Avaya will run it the 1st time as part of the installation). The CMS that is configured as active is the CMS that sends data to the 3rd party vendor's server. If the primary CMS is in service by convention it is configured as the active CMS.

Avaya add-on software will look for a flag (special lock file) that was created by running HAusermenu. If the file is present that particular CMS system will send data to the vendor's server. If the file is absent (not the active CMS) that particular CMS will not send data to the vendor's server. Thus only one of the two HA CMS systems will send data to the vendor's server at any given time.

FREQUENTLY ASKED QUESTIONS (FAQ's)

Q: Do the HA CMS's fail-over automatically on failure?

A: Yes (with caveats), if Admin-Sync is installed. If the primary CMS goes out of service, a heartbeat signal mechanism from the secondary detects the failure and runs HAusermenu on the secondary CMS to configure it as the active CMS. Thus enabling the data transfers to the various 3rd party vendor's systems.

However, the heartbeat function only detects a total loss of service, e.g. a root hard disk failure. If a PBX data link goes down, but the CMS (Solaris) system is still running, the heartbeat function will not detect a failure.

Also, the CMS users will need to manually log into the CMS that is still in service. Therefore the user community needs to know the IP address or DNS name of both HA CMS machines.

Q: How often does Admin-Sync run?

A: Admin-Sync's nightly data push runs once a day at 3:15 AM (configurable). If a CMS administrator makes critical or extensive administrative changes and doesn't want to wait until the automatic nightly synchronization they can manually run the administrative data synchronization via the Admin-Sync menu.

Q: If my primary CMS has a service outage and my split/skill supervisors switch over to (log into) the secondary CMS what restrictions are there?

A: To maintain control of changes, all CMS administration (with the exception of Timetables and Short Cuts) must be done on the primary CMS. However, user changes such as dynamically moving agents between skills can be performed on either CMS since those changes are stored on the PBX. In other words, configuration changes that are stored on the PBX can be done from either CMS. Configuration changes that are stored on the CMS must be done on the primary CMS only.

Q: Can users (split supervisors) be distributed across the two HA machines for **load balancing**?

A: The HA CMS product documentation states not to do this (it's not condoned by Avaya Labs). However, there is no physical or logical reason to preclude doing this. If the primary CMS is heavily loaded it may even be advisable to distribute the load between the two systems. The only concern is that all administrative changes that are stored on CMS must be made on the primary CMS, e.g. Data Dictionary changes.

Q. Can Timetable jobs be distributed across the two HA machines for **load balancing**?

A. Again, load balancing is not officially condoned by Avaya Labs. However, there is no physical or logical reason to prevent doing so.

Q: Do I need duplicate copies of Avaya add-on interface software on the secondary HA CMS machine?

A: It depends of the software package. RTA-Geo and ECH handling software absolutely should be duplicated.

Duplicating Real Time Adherence packages such as IEX-RTA and TCS-RTA is strictly a business decision (Can you do without RTA data if the primary goes down?).

Historic data feeds such as IEX Historic and TCS Historic have a resend feature. When the primary CMS is down the secondary CMS collects and stores the historic call data. When the primary is put back into service the missed data can be transferred from the secondary to the primary. Then the missed IEX or TCS historic data can be sent to the vendor's server via the resend function. So there is no compelling reason to duplicate IEX Historic or TCS Historic software.

Q: I understand that HA CMS requires closely matched (duplicated) CMS machines. What other hardware has to be duplicated?

A: The CLAN cards in the PBX should always be duplicated, i.e. a separate CLAN card for each HA CMS. This prevents the CLAN card from being a single point of failure.

Q: I have an existing SUN E3500 CMS connected to my PBX via an X.25 data link. When I add the second CMS to create HA CMS can I connect it to my PBX via the same X.25 card?

A: No. X.25 is not supported for HA CMS. All the connections must be TCP/IP over a LAN/WAN. The PBX and both CMS's must all be able to 'talk' to each other via TCP/IP.

Q: Does Avaya Operational Analyst (OA) support HA CMS?

A: No. In an HA CMS environment, the OA system must be configured to receive its various CMS data feeds solely from the Primary HA CMS. If the OA system is configured to receive data from the Secondary HA CMS, OA will treat that data as if it came from a second, standalone CMS (different source ID). In other words, OA is not and cannot be made HA CMS aware. OA cannot distinguish between a true 2nd CMS and a Secondary HA CMS.

Q: Is it okay to give other users besides 'cms' access to the HAusermenu menu addition?

A: No. Only the built in user ID 'cms' has the necessary permissions to do data restores. CMS will allow you to give permission to the HAusermenu menu addition to other users, but they will experience problems with some of the menu items.

Q. Shouldn't HA CMS behave similar to the way my Sun Cluster system does?

A. If you have any knowledge of or prior experience with disk mirroring, or Clustered systems (e.g. sharing a RAID array via Fiber Channel), or Fault Tolerant systems, or Sun Clustering, or Solstice HA, then put aside those concepts and models when thinking about HA CMS. The workings of HA CMS are totally unrelated to those models.

However, as with Sun Clustering, current users of CMS are impacted during the failover period. Specifically, clients connected to the node on which the failure occurs are impacted. Those clients must reconnect to the surviving node. CMS Supervisor does not have an automatic reconnect function so the reconnection is manual (the user must login to the surviving node).

Q. I've heard that HA CMS is "technically" not a High Availability system. Is this true?

A. "High Availability" is no more a technically specific term than the term "High Performance". Technically speaking, what is "High Availability"? Technically speaking, what is "High Performance"? The answer to both questions is the same. They are both what ever the manufacture defines (advertises) them to be. In the case of "High Performance", it may mean that their high performance model has two CPU's as opposed to their standard version's one CPU. In the case of HA CMS it simply means the configuration has two CMS's instead of one.

Q: How does Avaya Operational Analyst (OA) handle CMS data in an HA CMS environment?

A: The OA product does not support HA CMS. The OA product treats HA CMS data as if it originated from two independent and unrelated standalone CMS's. It is not possible through any kind of custom work to gracefully and cleanly circumvent this fact. The data must be combined or merged prior to be transferred from the Primary HA CMS to the OA system.

Q: I understand that the sync'ing of CMS resident administrative data is a one way push from the Primary to Secondary, done at 03:15 each morning. But what if my Primary is out of service for an extended time, several days or more. My CMS users might need to make numerous CMS resident admin changes that just can not be postponed until the Primary is back in service. How do I handle that scenario so that we do not lose all the changes and have to re-enter them?

A: Before bringing the Primary back into service, get Avaya Professional Services (APS) involved. You will need to approve T&M charges. Or if the work will be done Out Of Hours (OOH) you will need to approve OOH charges.

As noted earlier in this document, when ever the scheduled nightly sync (push) runs it overwrites the admin data on the Secondary. So when the Primary is brought back into service the nightly sync (push) must be disabled by APS before its scheduled run time (03:15).

Then APS will need to remove the Admin-Sync from both CMS's and reinstall it from the Secondary. The Secondary will temporarily become the Primary. And the Primary will temporarily become the Secondary. Then a manual admin data sync can be run (via the menu) to push the admin data across. Once the manually initiated admin data push has completed, then APS can remove the Admin-Sync software from both CMS's and re-install it the way it was originally.

Granted, the two removals and installations are somewhat time consuming. But this method is a "necessary evil" to minimize problems caused by human error and forgetfulness.

After the Primary-Secondary configuration has been restored to original, then the Admin-Sync menu can be used to pull (copy) the missed ACD call data from the Secondary over to the Primary.

Q: When MIS is busied out in the PBX/ACD and then released do the data links to CMS (and IQ) pump-up in parallel?

A: When there are multiple CMS and/or IQ links trying to come into service at the same time the first one to initiate hand-shaking get's pumped up. The other links that request pump-up during this time are flagged internally in the software and a BUSYOUT message is returned to the calling CMS or IQ. When the ACD data link currently pumping up finishes a RELEASE is sent to one of the waiting links and it gets pumped up. And so on and so forth until all the waiting links are pumped up.

APPENDIX 1

Admin-Sync Support for Survivable CMS

Admin-Sync offers support for Survivable CMS via an add-on supplemental package. This appendix documents the extra-cost **Survivable CMS Supplemental Package for Admin-Sync**.

Any functionality or feature that is not explicitly stated in the main document or in this appendix is not supported by the Admin-Sync package.

Terminology

Main CMS – aka Primary CMS - one CMS server supporting 1 to 8 ACD's

Survivable CMS – a backup CMS server used for survivability – the term is also be used to reference the overall CMS configuration

Dual-Role CMS – Secondary HA CMS server that is configured to function as a Survivable CMS during Fragmentation

aggregate – summarize or add together the peg counts for the CMS's in the configuration

merge – combine data from the CMS's in the configuration and then remove the "duplicate" data records

Features of Admin-Sync Survivable CMS support:

(1) Admin-Sync performs a nightly, automatic 'push' (copy) of CMS administrative data from the primary CMS to each survivable CMS. The list of CMS administrative operations synchronized by Admin-Sync is the same as listed in the main document for the nightly push to the Secondary HA CMS.

The nightly push to the survivable CMS's does not push real-time interface (e.g. RTA) configuration files.

(2) The login/logout data merge function includes agent data from all configured survivable CMS's.

(3) All restrictions and limitations listed in the main document also apply to the survivable CMS's.

(4) The Main CMS may be either a standalone CMS or the Primary CMS in an HA CMS pair.

(5) With the restrictions listed later in this appendix, a Dual-Role HA/Secondary CMS functions as an HA/Secondary CMS during normal operations and then switches to functioning as a Survivable (backup) CMS during CM fragmentation.

(6) In a Survivable CMS configuration, the Primary/Main CMS, a Secondary HA CMS, or a Dual-Role Secondary/Survivable CMS may be configured with multiple ACD's.

(7) Each individual Survivable CMS supports only one ACD. The ACD number in the Survivable CMS must be the same ACD number as used in the Primary/Main CMS. As an example, if the ACD is number 7 in the Main/Primary then it must be configured as ACD 7 in the Survivable CMS.

(8) **Processor Ethernet (PE) connectivity to Survivable CMS is only supported with a simplex server** (e.g. S8500, S8300). When a duplex server (e.g. S8500) is used as an ESS connected to a Survivable CMS then PE connectivity is not supported. A gateway (e.g. G650) with CLAN card is required.

Example Admin-Sync Menu with Survivable CMS Support

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1) Schedule Admin-Sync
2) Un-Schedule Admin-Sync
3) Synchronize Administrative Data Now
4) Transfer & Restore a Day's Call Data, (pull) FROM Secondary HA CMS
5) Transfer & Restore a Day's Call Data, (push) TO Secondary HA CMS
6) Transfer & Restore Interval Call Data, (pull) FROM the Secondary HA CMS
7) Transfer & Restore Interval Call Data, (push) TO the Secondary HA CMS
8) Display Admin-Sync Version
9) Merge Login/Logout Records (for a Day)
10) View Log
11) Aggregate Call Data from Survivable CMS's
0) Exit
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Choice ==>

Note: HA CMS unique menu items will not be displayed if the configuration is Survivable CMS without HA CMS, i.e. items 4, 5, 6, 7 will be displayed as 'Reserved'.

Call Data Aggregation and Login/Logout Records Merging

Data aggregation is an automated (not automatic) process that the CMS administrator initiates using the Admin-Sync menu. The menu prompts the administrator to enter the date and interval start time that the enterprise became fragmented, and the date and interval start time that the enterprise returned to normal operation.

Fragmented interval data from survivable CMS's will be aggregated with the data on the Main CMS for the defined time period. Fragmented agent login/logout data for the defined time period will be merged with the respective data on the Main CMS.

After the interval data has been aggregated, Admin-Sync will automatically submit applicable daily, weekly and monthly background archiver requests for the defined time period. The CMS administrator may check the status of archiver requests using the standard CMS Archiving Status or Error Log features.

It is not possible for Avaya to estimate how long aggregation will take because of numerous variables and unknowns, e.g. user activity, scheduled reports, the fragmentation period, the CMS hardware capacity, network speed, etc.

Avaya recommends that data aggregation be done during non-peak hours. Data aggregation may be performed as soon as the day following the fragmentation incident. Likewise, data aggregation must be performed before the data is aged off of the CMS's as per the parameters set in Data Storage Allocation on the respective CMS's.

Example aggregation menu:

1) Aggregate Interval Data and Merge Agent Login/Logout Data
2) Merge Agent Login/Logout Data Only
q) Exit
==========
Select 1 or 2 (or 'q' to quit) =>

The data aggregation function does not support ACD number translation (mapping). The ACD number on a Survivable CMS must be configured to be the

same ACD number as the corresponding ACD number on the Main/Primary CMS. As an example, if the ACD is configured as ACD 2 on the Main/Primary it must also be configured as ACD 2 on the Survivable CMS (and ACD 1 on the Survivable CMS would be unused).

Data on the survivable/backup CMS's is deleted once it has been aggregated with data from the Main/Primary CMS. Deleting the data is necessary in order to prevent the data from being aggregated more than once.

Misc. Provisions for Admin-Sync Survivable CMS Support

Multiple ACD's – The configured start/stop days for the week must be the same across ACD's.

AUXlogging is an optional, extra cost, add-on package for CMS. It is not supported on Survivable CMS.

Dual-Role Secondary HA CMS Provisions

- **A Dual-Role Secondary HA CMS must have its PBX data link connected via a CLAN card in a Port Network**. The PBX data link to a Dual-Role Secondary HA CMS may not be connected via the Processor Ethernet (PE) card in the PBX. Since LSP's (which use a PE) do not support Port Network connectivity, the Secondary HA CMS can not be used (configured) in a Dual-Role configuration when the backup PBX is an LSP.

- The PBX to Survivable CMS data link is normally up (connected) with an LSP. The PBX to Survivable CMS data link is down (disconnected) to an ESS (which uses a CLAN) during normal operation. The PBX to Survivable CMS data link is not brought up until fragmentation occurs.

- The Port Network must be physically located at the same customer site as the ESS and Secondary CMS.

- It is necessary that during the Survivability mode of operation that the Secondary HA CMS connect to the same CLAN card that is used during normal operations. This is required to maintain the proper ACD identity. This requirement helps ensure the reporting integrity during Survivable mode operations by reducing the chances of the Port Network inadvertently 'registering' with an unintended (the wrong) ESS because of unavoidable timing or network issues.

- The partial CMS interval call data for the starting interval of fragmentation will not be aggregated. Likewise, the data for the partial interval when the configuration is returned to normal operation will not be aggregated. Aggregating the starting and/or ending interval would result in “double data” for a portion of the respective interval.

- Fragmentation will result in an unavoidable loss of some call data. This will occur as noted in the previous bullet item. It will also occur to a lesser extent when the PBX data link connection to the Main PBX is lost and then established to the ESS PBX.

- Aggregated data permanently replaces fragmented data on both the Primary and Secondary CMS. It is not possible to back out aggregation and merging once it has been performed.

Dual-Role Secondary HA CMS
Why the Start & Stop Fragmentation Intervals Can Not Be Aggregated

The following example scenario will be used to illustrate why the ACD call data collected during the start & stop intervals of a fragmentation occurrence can not be aggregated by the Admin-Sync software when the Secondary HA CMS is configured in a Dual-Role (Secondary during normal operation, Survivable CMS during fragmentation).

From 10:00-10:15, the Main PBX (S8720) takes 100 ACD calls. Both the Primary and Secondary HA CMS’s ‘peg’ those 100 calls within their respect real-time dB (main memory).

At 10:15 the network fragments. From 10:15-10:30 the Main PBX takes 50 calls, which are recorded on the Primary CMS.

The ESS (e.g. S8500) also takes 50 calls, which are recorded on the Secondary CMS.

Thus, from 10:00-10:30, the enterprise received 200 ACD calls.

At 10:30 CMS’s interval archiver runs on both HA CMS’s. The archiver summarizes the calls that were pegged (held in its real-time dB) and writes the summarized data to hard disk (secondary storage).

The Primary archives the 100 Main PBX calls that it pegged before fragmentation with the 50 Main PBX calls that it pegged after fragmentation (150 total calls).

The Secondary archives the 100 Main PBX calls that it pegged before fragmentation with the 50 ESS calls that it pegged after fragmentation (150 total calls).

If the interval that fragmentation started (10:00-10:30 in this example) is aggregated, it would result in a total of 300 calls (150 from each CMS). But the enterprise only took 200 calls.

Where did the extra 100 calls come from? The 1st 15 minutes of the 10:00 o'clock interval was not fragmented. Thus those calls would be counted twice if the data from the Secondary were aggregated with (added to) the data from the Primary.

The CMS real-time dB keeps a running total of calls taken during the interval. It is impossible for the Secondary CMS's archiver to distinguish calls that were taken during 'normal' operation versus calls taken during fragmentation.

It is important that the CMS administrator not try to defeat this restriction by entering start and stop times that are beyond the actual start and stop times of the fragmentation. Defeating this restriction in this manner will result in double counted data for a portion of the start and stop intervals of the fragmentation.

External Data Feeds from Survivable CMS's To Third Party Vendor Applications

There are no known third party vendor applications that offer support for Survivable CMS. When the customer's network fragments or portions of their network are unavailable third party applications do not have consistent methods of dealing with the outage. Avaya CMS interfaces such as RTA, Historic WFM, GeoTel (RTA-Geo), and ECH are highly discouraged on a Survivable CMS. Avaya makes no guarantee, explicit nor implied, as to the suitability of a CMS add-on interface package when installed on Survivable CMS.

Please contact your third party software vendor to request support for Survivable CMS. Please note that, when requested by the third party vendor's development organization, Avaya is willing and fully prepared to work with the third party vendor in their development effort to add Survivable CMS support to their application.

APPENDIX 2A

Manual Data Feed Fail-over
(Manual Fail-over)

By default, the fail-over of the external HA CMS data feeds is automatic. The fail-over is triggered based upon the Secondary not being able to communicate with (ping) the Primary. The status of individual PBX data links is not factored into the automatic fail-over. If the Secondary is able to communicate with (ping) the Primary, the external data feeds will not become active on the Secondary unless they are manually forced to fail-over. See pages 4 and 5 of the above Admin-Sync Users Guide for additional information on the automatic fail-over.

If the customer prefers to manually fail-over the external data feeds to the Secondary HA CMS, they may do so by overriding the HA heartbeat functionality that communicates from the Secondary to the Primary.

To manually force a fail-over of the external data feeds to the Secondary HA CMS, mark the Primary HA CMS as “inactive” via the HAusermenu menu.

Steps to manually force the external data feeds to fail-over to the Secondary:

1) Login to CMS via Terminal Emulation (not via Supervisor) using the CMS administrative login ID “cms”.
2) Pick “HAusermenu>” from CMS’s Main Menu.
3) Pick “2) Configure this system as inactive …”

Within 20 seconds the HA heartbeat process on the Secondary will detect that the Primary has been marked inactive. The heartbeat function will then mark the Secondary active and start up all real-time data feeds that are configured to be HA aware (not applicable to RTA-Geo/GeoTel and OA data feeds). The HAusermenu will stop the real-time data feeds on the Primary. If present, the ECH data feed to NICE Analyzer will detect that the CMS is marked inactive and abort the file transfers and vice versa.

To switch the external data feeds back to the Primary, use the HAusermenu sub-menu to mark the Primary as active. Within 20 seconds the HA heartbeat process on the Secondary will detect that the Primary has been marked inactive. It will then mark the Secondary inactive and stop all HA aware real-time data feeds. The HA aware real-time data feeds on the Primary will be restarted by HAusermenu when the Primary is marked active.

APPENDIX 2B

Real-time Data Feeds from Secondary During Normal Production Mode

An RTA data feed session that has been configured as non-HA aware and that has been stopped via the respective CMS Main Menu Addition menu will remain stopped indefinitely until manually started via the respective Main Menu Addition.

For load balancing purposes, some customers prefer to have the real-time data feeds (e.g. TCS-RTA, IEX-RTA, BP-RTA, etc.) provided by the Secondary HA CMS during normal production mode. In that situation, the RTA data feeds should be configured as standalone (not HA CMS aware). Then, via the respective RTA package Main Menu Addition, the CMS administrator can start or stop the RTA data feed on the desired CMS. Thus the CMS administrator can manually stop the RTA data feed on the Primary HA CMS and correspondingly manually start the RTA data feed on the Secondary. Additionally, the HA heartbeat program on the Secondary should be disabled so that it does not try to override the manual settings.

APPENDIX 3

ECH in an HA CMS Environment

Avaya recommends that copies of the ECH Handler package be purchased for both the Primary and Secondary HA CMS. This facilitates redundant ECH data collection.

However, purchasing ECH Handler for the Secondary HA CMS is strictly a business decision, not a technical requirement. If ECH Handler is purchased for only the Primary CMS then the package will simply be configured as standalone.

See the discussion of the HA heartbeat function in the main part of this document for details of the detection and failover of data feeds from Primary to Secondary when the Primary is out of service or marked Inactive.

When ECH Handler is purchased for both the Primary and Secondary HA CMS:

NICE Analyzer expects the ECH binary data files to be placed into a specifically named folder. The folder name must be the same as the hostname of the Primary CMS. When the Primary is out of service the Secondary copies the ECH files to the Primary hostname folder on the Analyzer server, i.e. the folder that is named with the hostname of the Primary.

Avaya Operational Analyst (OA) does not support HA CMS. The OA product treats HA CMS data as if it originated from two independent and unrelated standalone CMS's. It is not possible through any kind of custom work to gracefully and cleanly circumvent this limitation. None the less, purchasing ECH Handler for the Secondary facilitates redundant ECH data collection.

Aspect DataMart can retrieve (pull) copies of the binary ECH data files from both the Primary and Secondary HA CMS. Contact Aspect for details.

ASCII ECH data files will be sent from the Secondary HA CMS when the Primary is out of service. Avaya Professional Services (APS) **Contact Analyzer** utilizes the ASCII conversion and file transfer feature offered by ECH Handler.

Duplicate data records are unavoidable when the Primary goes out of service and the Secondary takes over the data feeds. NICE Analyzer and APS Contact Analyzer will discard any duplicate ECH records received.