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Redundancy Options for Avaya Aura® Virtualized Environment (AAVE)

Avaya Aura Virtualized Environment is the Avaya solution for supporting Avaya Aura core applications on any VMware-based IT data center. The core applications are available as software downloads that are configured as OVA files for easy implementation onto an architecture consisting of servers running VMware vSphere 5.0 or 5.1. This solution enables existing Avaya customers and green field installations to integrate the latest Avaya Aura Collaboration features on a reduced hardware infrastructure that provides the same resiliency and survivability as a dedicated server solution.

This white paper reviews redundancy options available with Avaya Aura on VMware and describes how virtualization of the applications introduces expanded survivability options and management capabilities.

Avaya Aura® Communication Manager (CM) Software Duplication and Statefull Failover

Communication Manager is the controller for all communication processes in an Avaya Aura solution. As such it is important that CM preserve existing connections and communication capabilities during traumatic events. To accomplish this, CM software is duplicated using a primary and a secondary CM server. Linked to the primary by a high speed data connection, the secondary server continuously mirrors all activities of the primary and, should the primary fail (Figure 1), the secondary takes over. This move of call processing and control from the primary server to the secondary is instantaneous, with no perceivable loss of communications for any user. Transparency of CM-to-CM switching is built into the Avaya software duplication feature so, whether

dedicated server or virtualized solution, the software duplication feature is available for the Avaya installation.

Software duplication servers are configured as a common data center (not geographically separated) that allows data sharing. A typical redundant configuration for an Avaya Aura® solution

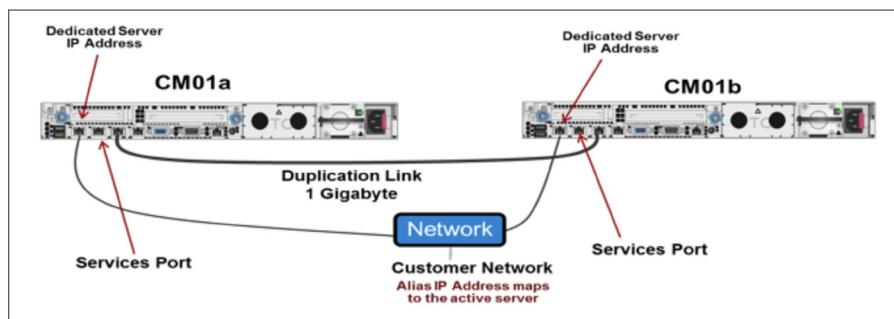


Figure 1

This solution enables existing Avaya customers and green field installations to integrate the latest Avaya Aura Collaboration features on a reduced hardware infrastructure that provides the same resiliency and survivability as a dedicated server solution.

using VMware applications consists of two separate host server clusters within a single data center that support the primary and backup CM virtual machines. Because these are virtualized instances of CM installed in server clusters, they can be managed and maintained easily by vCenter, VMware's management software.

As mentioned previously, the software duplication feature is available for dedicated server or virtualized instances of Communication Manager therefore it can be configured such that the feature utilizes a virtual machine in one host cluster as the primary and another virtual machine in a separate host cluster as the secondary (Figure 2). Dedicated appliance instances of Avaya Aura applications can be mixed in the same system as virtualized instances of the applications. It is important to note that the two servers used for the software duplication feature must be either dedicated appliances or virtual appliances (i.e., the same appliance type).

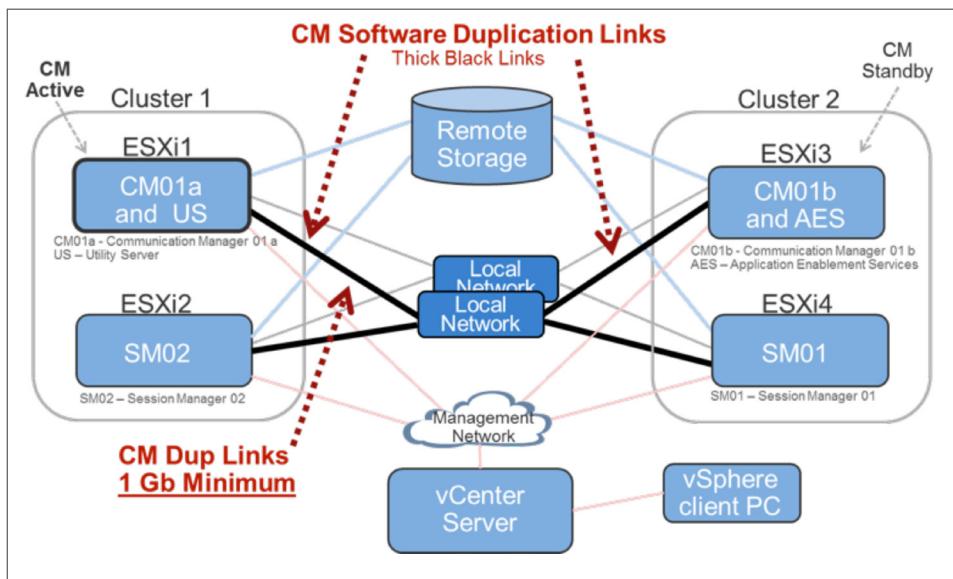


Figure 2

Note: It is not necessary to use separate host clusters for the primary and secondary CM instances as long as the duplicated pairs are on separate physical servers. To assure that VMware HA does not attempt to replicate the CM replacement on the same blade server, Avaya prefers separate clusters.

“VMware High Availability ensures that capacity is always available in order to restart all virtual machines affected by server failure. HA continuously and intelligently monitors capacity utilization and reserves spare capacity to be able to restart virtual machines.”

In the failure scenario depicted below in Figure 3, assume ESXi 1 in cluster 1 has a fault and goes off-line. ESXi3, the stand-by CM, is supporting software duplication.

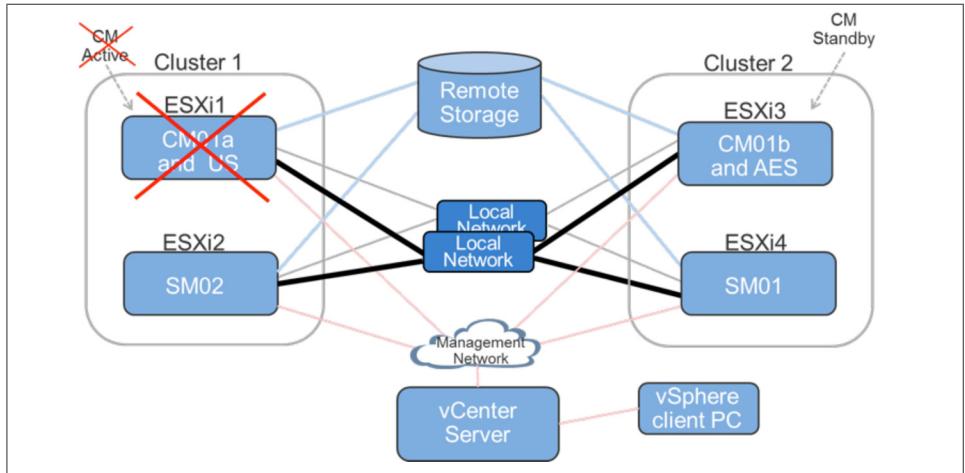


Figure 3

In Figure 4, as the primary CM goes down, the backup CM takes over all calls and communication control. Existing calls are maintained and new calls are handled milliseconds after the primary fault.

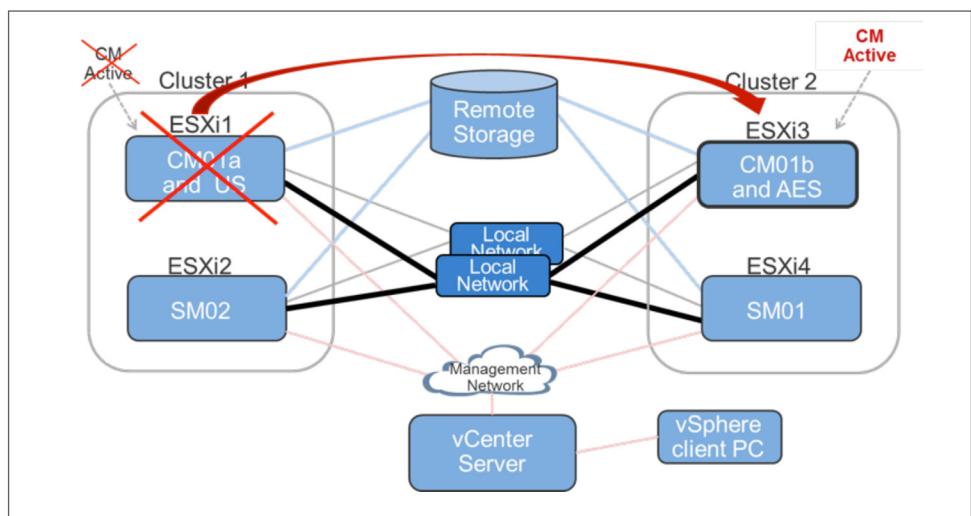


Figure 4

VMware High Availability

VMware High Availability is a feature (supported in vSphere 5.0 and 5.1.) that switches automatically to a backup virtual machine if the primary fails. As VMware states:

Geo-redundancy defines the ability to have backup instances of key Avaya Aura applications both in a separate server host cluster and in a completely separate data center that is geographically removed from the main data center.

“VMware High Availability ensures that capacity is always available in order to restart all virtual machines affected by server failure. HA continuously and intelligently monitors capacity utilization and reserves spare capacity to be able to restart virtual machines.”

Often called Fast Reboot HA within Avaya, the name of this type of redundant switchover refers to the fact that, while the secondary virtual machine (vm) is ready to take over, the process requires that the second vm start boot-up in order to begin processing information. To provide an extra level of resiliency to the virtualized Avaya Aura configuration, Avaya Aura on VMware supports VMware HA.

In Figure 5, VMware HA is added to the scenario depicted above (in Figure 4) and, just as it did in Figure 4, CM primary has a fault and CM secondary takes over communications control and maintains existing connections. But now, with VMware HA, the primary CM can also be provided with a backup virtual machine within the same host cluster.

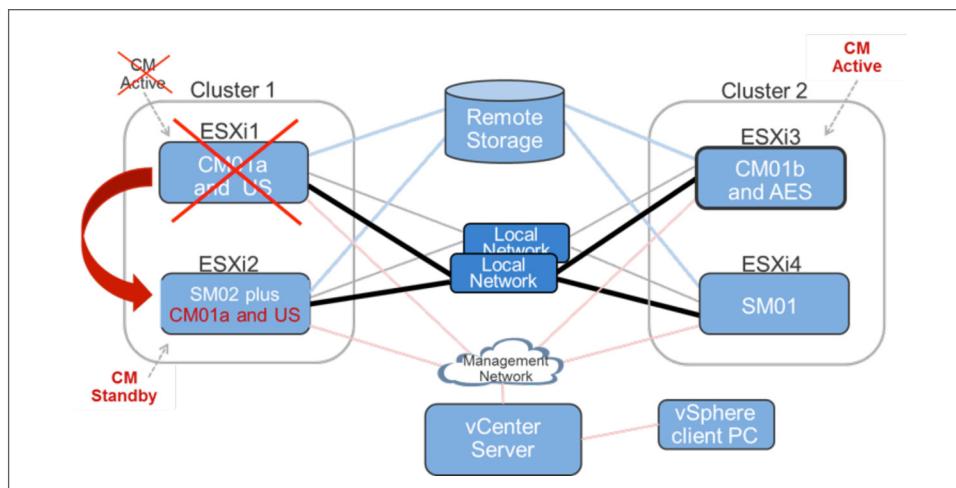


Figure 5

As Figure 5 shows, CM secondary (ESXi 3) takes over communications but, with VMware HA enabled, CM primary (ESXi1) is automatically moved to an active virtual machine. Once this new instance of CM is started (shown here as ESXi2) the system automatically initializes the new ESXi2 instance of CM as the new backup Communication Manager supporting software duplication of the CM at location ESXi3. While this replication of the primary (now backup) CM by the VMware HA feature is not instantaneous like software duplication, it does assure that the software duplication feature is now, once again, a viable backup scenario – all without ever requiring a call to services or a truck roll. With VMware HA, the Avaya Aura virtualized applications provide the call preserving features of the dedicated server version and continuously make sure that the software duplication feature is supported whenever possible.

Geo-redundancy

Geo-redundancy defines the ability to have backup instances of key Avaya Aura applications both in a separate server host cluster and in a completely separate data center that is geographically removed from the main data center. This design adds value by maximizing system availability in the event of catastrophic failures. If a single location becomes unavailable, this architecture provides a backup communications solution for a percentage of the total enterprise user group. Geo-redundancy is key to the reliability and resiliency of any Avaya Aura installation. Avaya Aura 6.2 FP2 provides geo-redundancy for Communication Manager, Avaya Aura® Session Manager (SM) and Avaya Aura System Manager (SMGR) in both dedicated server and virtualized deployments.

Since we are mainly discussing UC solutions we are not detailing other Avaya applications now available on VMware including Call Center Elite, Elite Multi-channel, Experience Portal and CMS. In fact, CMS also offers geo-redundancy in the virtualized application.

Because distances typically assumed for geographic dispersion can be great, some information can be lost due to delay in the transfer of information and, therefore, this design does not guarantee call preservation. It does, however, provide an ongoing communication environment that will take over within a few minutes at most.

Depicted below in Figure 6 is a typical configuration for this type of architecture.

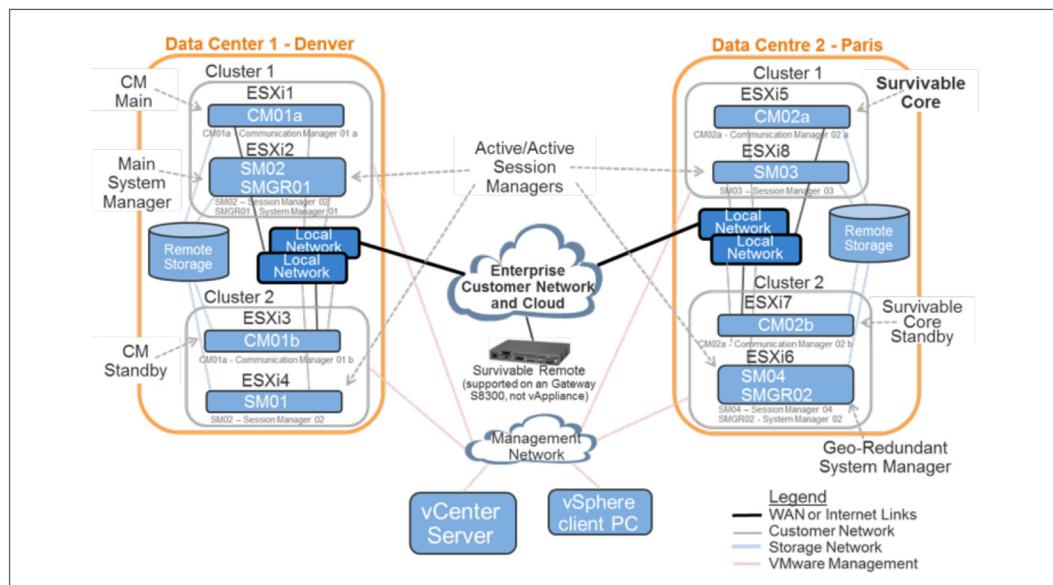


Figure 6

The system shown in Figure 6 contains two discrete data centers, Denver and Paris. Designed to maximize availability of the communications solution, the Avaya Aura system in each data center contains primary and secondary Communication Manager instances that support software duplication. This set up will continue to work as

described in section one of this paper; if the primary CM (CM01a) fails, the secondary (CM01b) takes over, preserving existing calls and supporting ongoing communications traffic.

In this Denver/Paris design, the Denver Communication Manager, Session Manager and System Manager are controlling the entire communications network. They support all calls, all system information and monitor all parameters within both data centers. SMGR01 is the main System Manager with a geo-redundant backup in Paris (SMGR02). SM02 in Denver is the primary Session Manager and is backed up (in an active-active configuration) by a Session Manager in Paris (SM03).

Figure 7 (below), depicting the ‘normal’ enterprise communications set up, will help clarify this complicated scenario.

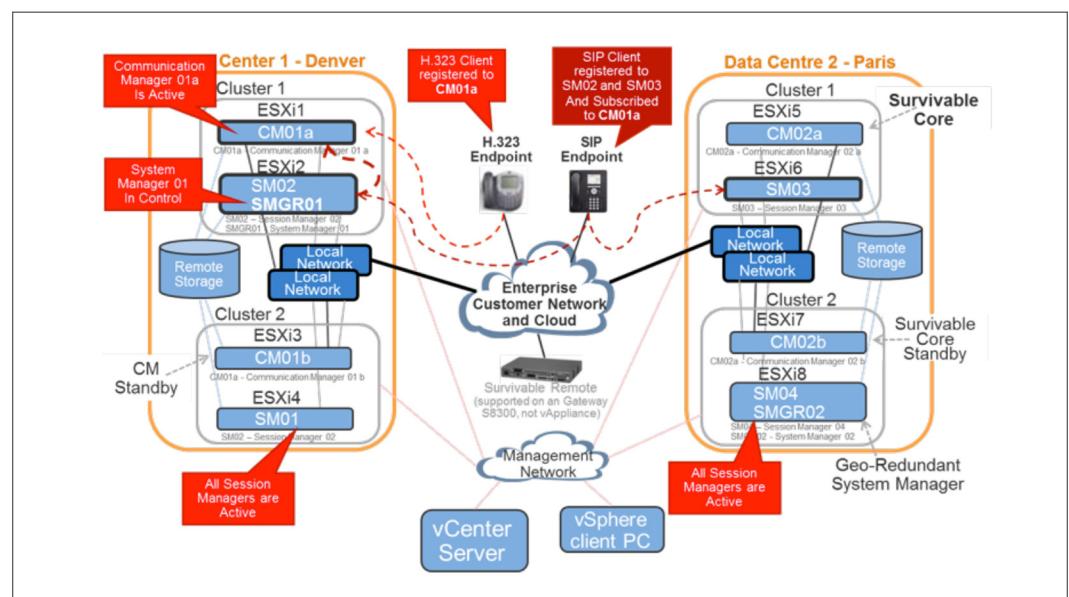


Figure 7

CM01a is active and the main communication processor and System Manager (Denver (SMGR01)) is the primary management system. All Session Managers are active and are sharing information in real-time; this is the active-active feature for Session Manager. A typical h.323 end-point is registered to the primary CM (CM01a). A SIP end-point can be registered to multiple Session Managers, in this case SM02 and SM03, but is subscribed to the primary Communication Manager (CM01a).

The second data center (located in Paris) is the designated Survivable Core backup to the main center in Denver. As described earlier, the CMs in Denver are duplicated to assure call preserving switchover. Within the Paris center the backup servers also provide a duplicated pair of CMs for maximum availability. If a failure occurs (as described in section one of this paper) the switchover between primary and secondary Communication Managers will be supported within the Denver data center and the CM in the secondary host cluster, CM01b, will take over for CM01a and, because it is a software

To enable customers to get the same level of system reliability whether using a virtualized solution, a dedicated server implementation or a mix of the two, Avaya has designed system survivability into the virtualized solution.

duplication connection, calls are maintained and the system continues to process new connections with essentially no noticeable issues.

Now in Figure 8 (below) let's consider what some refer to as a 'rainy day' scenario in which the connection between the two data centers is lost, possibly due to a network outage between the two sites.

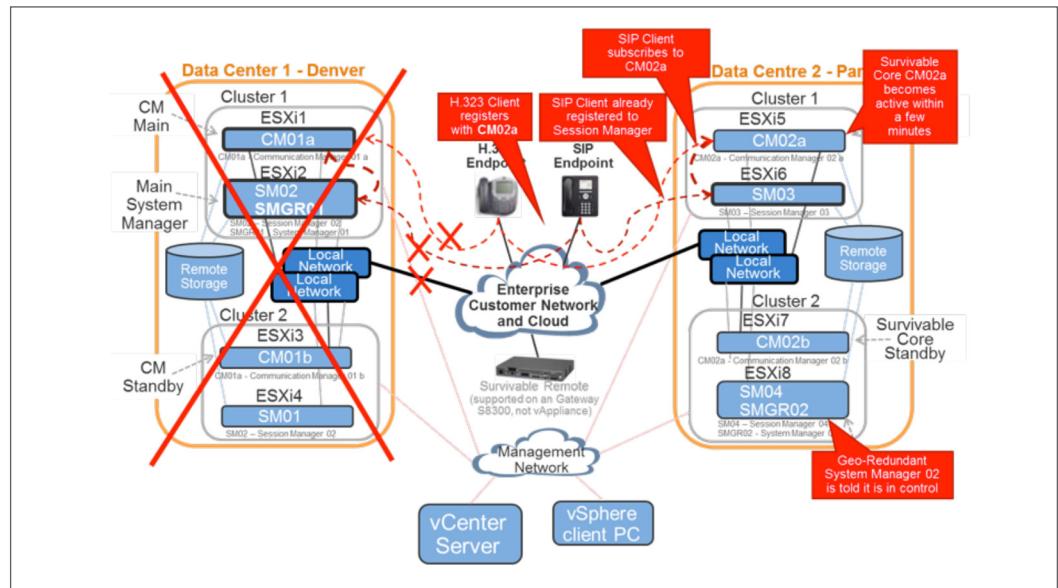


Figure 8

With complete loss of connection to the primary data center, the following system responses are key to survivability and system reliability:

CM02a as the survivable core backup server will begin to handle all communications processes. Since this is a geographically separated switchover, system takeover delay is greater than a duplication failover within a data center. Due to the delay, some existing calls are dropped and, because the centers are separate and no longer in communication, communications activities in the Denver data center may or may not continue.

The Paris data center can no longer support Denver because it no longer has connectivity to those users. Within the Paris data center CM02a becomes the primary Communication Manager so the h.323 client will now subscribe to this CM (if it has access). The SIP client is already registered to the SM03 (due to active-active redundancy) and will subscribe to the new CM (CM02a). The System Manger in Paris will be used to take control of all parts of the system it can access because the primary System Manager is no longer communicating.

Communication based in Paris continues to function as designed and there are backup Communication Managers and Session Managers within the same host cluster (Paris)

About Avaya

Avaya is a global provider of business collaboration and communications solutions, providing unified communications, contact centers, networking and related services to companies of all sizes around the world. For more information please visit www.avaya.com.

for continued reliability. Once the Denver center reconnects to the network, system administrators can re-configure the network to meet geo-redundant availability requirements.

Avaya Aura® on VMware

The scenarios discussed in this paper are intended to provide, at most, a preliminary overview of the capabilities of Avaya Aura® on VMware. To enable customers to get the same level of system reliability whether using a virtualized solution, a dedicated server implementation or a mix of the two, Avaya has designed system survivability into the virtualized solution. Adding a VMware capability, such as VMware High Availability, makes the system even more resilient and, for added flexibility, Avaya applications are compatible with key VMware vCenter tools. Avaya Aura on VMware combines the best of Avaya Aura Collaboration and VMware virtualization.



Avaya Aura® core applications take a major step forward in the deployment of real time collaboration with the integration of VMware virtualized server architecture.

References:

AAVE Fact Sheet

[http://www.avaya.com/usa/resource/assets/factsheet/
AuraVirtualizedEnvironment.pdf](http://www.avaya.com/usa/resource/assets/factsheet/AuraVirtualizedEnvironment.pdf)



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