# Introduction

This document will discuss the Continuity of Operations (COOP) strategies for the Centralized VistA Imaging Exchange service (CVIX).

If you consider the CVIX in isolation, a switch from the production CVIX in the Philadelphia Sungard data center to the COOP CVIX at the Capital Region Readiness Center (CRRC) in Martinsburg is accomplished by changing the siteserver.vista.med.va.gov and vhacvixclu2.r04.med.va.gov DNS-A records from 10.186.5.13 to 10.208.151.145. In each case, the IP address points to a CVIX virtual cluster being projected by a load balancer.

## Why two DNS-A records?

The vhacvixclu2.r04.med.va.gov DNS-A record is used as the endpoint for all CVIX operations, namely:

* Web browsers use this to access the Advanced Web Information Viewer (AWIV) web application.
* VIX servers use this to access DoD information
* BHIE servers use this to access VA information.

The siteserver.vista.med.va.gov DNS-A record originally pointed to a Internet Information Services (IIS ) web server in Albany managed by the VistA Web Services team. As part of Patch 104, the CVIX assumed the hosting responsibilities for the site service and at that time the DNS-A record was pointed at the CVIX production cluster at 10.186.5.13. On a weekday, the CVIX cluster will process 300,000+ site service requests.

## The CVIX is not an island

The CVIX needs to be aware of two other systems when considering COOP best practices:

* The Bi-directional Health Information (BHIE) Framework which has a COOP site at the CRRC.
* The Department of Defense (DoD) Health Artifact and Image Management Solution (HAIMS) system which is in the process of implementing a COOP site at Aurora.

The BHIE framework and the CVIX are normally co-located for efficiency. The CVIX uses the BHIE systems as follows:

* The Station 200 VistA system is used to form a BSE security context when the DoD queries the VA and to do Treating Facility lookups.
* The BHIE Imaging Adapter (BIA) is the bi-directional interface allowing the CVIX and HAIMS to query for DICOM study lists (pass 1 query) and DICOM images (pass 2 retrieve).
* The BHIE Document Search Cross Community Access (DSXCA) interface is a bi-directional interface allowing the CVIX and HAIMS to query for artifact lists (pass 1 query). An artifact is essentially anything that is not a DICOM image (i.e. everything else).

The CVIX and HAIMS system communicate directly for artifact retrieval (pass 2 retrieve).

# Normal Operations

The diagram below shows the CVIX, BHIE, and HAIMS in their normal production configurations. Let’s discuss how data moves between each system to establish a baseline for the various COOP scenarios we need to consider. Note that in all cases, incoming requests to the CVIX will be routed through the CVIX load balancer, which will send the request to a CVIX server based on a round robin algorithm.



## VA Site Service Requests

Site service queries originate from within the VA enterprise. VistA Imaging software such as the VIX and Clinical Display use the site service to determine how to connect to remote VistA databases and VIX systems. The VistA kernel will use the site service as a last ditch method to determine how to connect to a site. There are probably other systems as well that use the site service since it has been used at the VA for many years.

In all cases, site service queries to the siteserver.vista.med.va.gov DNS-A record will be received by the CVIX load balancer, which will route the request to a CVIX server. The CVIX will server will then respond to the request using the data contained in its vhasites.xml file which serves as the database backing the site service.

## CVIX requests to HAIMS

All CVIX requests, regardless of the source, are made to the vhacvixclu2.r04.med.va.gov DNS-A record or the IP address represented by this record. Each of these requests is received by the CVIX load balancer and routed to a CVIX server. How the CVIX server handles the request depend on the type of request.

* Requests for HAIMS metadata (i.e. lists of available DICOM studies and artifacts) will result in two queries to the BHIE Framework; one to BIA and one to DSXCA. In each case the BHIE framework passes these queries through to HAIMS.
* Requests for DICOM images will be sent to the BIA which will retrieve the image from HAIMS.
* Requests for HAIMS artifacts will result in the request being sent directly to HAIMS. In this case, the CVIX server will send the request to haims-wny.med.osd.mil which maps to 146.73.8.26 in the shared address space provided by the VA-DoD gateways. The request pops out on the DoD side of the gateway and ends up being sent to the HAIMS load balancer at 214.1.18.153. The load balancer allocates a request to a HAIMS server which does the work and returns the artifact to the CVIX where it is cached and returned to the requester.

### A note on address translation

There is an entry for haims-wny.med.osd.mil in the VA DNS system. Unfortunately it points to the DoD address (214.1.18.153) of the HAIMS load balancer which is not directly reachable from the VA. To force the proper address each CVIX server uses a hosts file entry to ensure resolution to 146.73.8.26. Also note that the HAIMS implementation requires that the query be made by the Fully Qualified Domain Name (FQDN) haims-wny.med.osd.mil so that certificates will resolve to the correct host name.

## CVIX requests from HAIMS

* Requests for VA metadata from HAIMS will result in two queries from the BHIE Framework to the CVIX; one from the BIA and one from DSXCA.
* Requests for VA DICOM images will be sent from the BIA.
* Requests for VA artifacts will result in the request being sent directly from HAIMS to the CVIX. In this case, the HAIMS server will send the request to vhacvixclu2.r04.med.va.gov which maps to 146.73.10.32 in the shared address space provided by the VA-DoD gateways. The request pops out on the VA side of the gateway and ends up being sent to the CVIX load balancer at 10.186.5.13. The load balancer allocates a request to a CVIX server which does the work and returns the artifact to the HAIMS.

### A note on address translation

To force the proper address each HAIMS server uses a hosts file entry to ensure resolution to 146.73.10.32. Also note that the CVIX implementation requires that the query be made by the Fully Qualified Domain Name (FQDN) vhacvixclu2.r04.med.va.gov so that certificates will resolve to the correct host name.

# Partial CVIX COOP – Site service only

In this scenario, the siteserver.vista.med.va.gov DNS –A record is changed to point the COOP CVIX load balancer at 10.208.151.145 to route all site service traffic to the COOP CVIX cluster at the Capital Region Readiness Center (CRRC) located on the same campus as the Martinsburg Virginia VA hospital. All other CVIX traffic remains pointed at the production CVIX load balancer. This is the only COOP scenario that has been tested to date. The reason for this will be discussed in the next section.



This option has proven useful when Cisco switch maintenance needs to be performed in the production data center. With the site service sustained, the only loss of functionality is access to HAIMS and the CVIX hosted AWIV web application. Communications between VA systems are preserved.

### A note on BHIE COOP

The BHIE Framework team will only initiate a COOP failover if an outage is going to last more than 48 hours. Since the CVIX site service is critical for VA hospital communications, it is recommended that COOP transfers be made before scheduled maintenance or immediately after a system failure that renders the production CVIX unusable.

## COOP Procedure

Open a high priority Remedy ticket requesting the DNS template and request the following:

Please make the following DNS a record change to re-route production traffic from the Production VistA Imaging CVIX to the COOP CVIX:

siteserver.vista.med.va.gov from 10.186.5.13 to 10.208.151.145

Please notify me when this has been done so I can verify the transfer.

The request should be routed to the engineers available on the following email group: **VA IT Engineering CIS Directory Services** [**VHAETMADTeam@va.gov**](mailto:VHAETMADTeam@va.gov)**.**

Use ping to verify that the address change has propagated to your DNS server and leave the Remedy ticket open.

When it is time to change back, send a follow up email to the engineer who handled the initial change:

Please make the following DNS A record change to re-route production traffic from the COOP VistA Imaging CVIX to the Production CVIX:

siteserver.vista.med.va.gov from 10.208.151.145 to 10.186.5.13

Please notify me when this has been done so I can verify the transfer.

Use ping to verify that the address change has propagated to your DNS server. After the DNS change has taken effect, you can close the Remedy ticket.

# Full CVIX COOP – no BHIE

In this scenario, both the siteserver.vista.med.va.gov and vhacvixclu2.r04.med.va.gov DNS –A records are changed to point the COOP CVIX load balancer at 10.208.151.145 to route all traffic to the COOP CVIX cluster at the CRRC.



## COOP Procedure

Open a high priority Remedy ticket requesting the DNS template. Request the following:

Please make the following DNS a record change to re-route production traffic from the Production VistA Imaging CVIX to the COOP CVIX:

siteserver.vista.med.va.gov from 10.186.5.13 to 10.208.151.145

vhacvixclu2.r04.med.va.gov from 10.186.5.13 to 10.208.151.145

Please notify me when this has been done so I can verify the transfer.

The request should be routed to the engineers available on the following email group: **VA IT Engineering CIS Directory Services** [**VHAETMADTeam@va.gov**](mailto:VHAETMADTeam@va.gov)**.**

Use ping to verify that the address change has propagated to your DNS server and leave the Remedy ticket open.

When it is time to change back, send a follow up email to the engineer who handled the initial change:

Please make the following DNS A record change to re-route production traffic from the COOP VistA Imaging CVIX to the Production CVIX:

siteserver.vista.med.va.gov from 10.208.151.145 to 10.186.5.13

vhacvixclu2.r04.med.va.gov from 10.208.151.145 to 10.186.5.13

Please notify me when this has been done so I can verify the transfer.

Use ping to verify that the address change has propagated to your DNS server. After the DNS change has taken effect, you can close the Remedy ticket.

# Full CVIX COOP – with BHIE

In this scenario a full CVIX transfer is done as discussed in the previous section. In addition, the BHIE team has elected to do a COOP transfer of the BHIE Framework so the CVIX site service will need to be reconfigured to use the COOP BHIE systems.



## COOP Procedure

Perform a full CVIX COOP transfer as discussed in section Full CVIX COOP – no BHIE.

Edit the current version of the vhasites.xml file as follows:

* Search and replace hiep.r04.med.va.gov with hiec.vaco.va.gov
* Search and replace vhabhiebia3.r04.med.va.gov with vhacrrbhiebia4.vaco.va.gov
* Search and replace hiep.r04.med.va.gov with bhiecapp1.vaco.va.gov

Then, when the BHIE team is ready, update site service on the CRRC CVIX servers as discussed in the CVIX COOP configuration.docx document section Update site service.

To change back to production, follow the procedure as discussed in section Full CVIX COOP – no BHIE. Then update the update site service on the CRRC CVIX servers with the production version of the vhasites.xml file.

# HAIMS IP changes

HAIMS is in the process of setting up its COOP site. When the COOP site comes online it will be necessary to make a change to the site service to sustain the production HAIMS connection.



## One time Procedure

When notified perform the following changes on each production and COOP CVIX server:

* Add a hosts file entry for central.haims.mhsi.health.mil 146.73.8.163

Modify the vhasites.xml as follows:

* Search and replace haims-wny.med.osd.mil with central.haims.mhsi.health.mil

Update the site service on each production and COOP CVIX server node.

# HAIMS COOP

This scenario assumes that the VA is operating in its normal configuration and HAIMS has shifted operations to its COOP system.



## Procedure

When notified perform the following changes on each production and COOP CVIX server:

* Change each hosts file entry for central.haims.mhsi.health.mil from 146.73.8.163 to 146.73.8.162.

When HAIMS changes back to the production, perform the following changes on each production and COOP CVIX server:

* Change each hosts file entry for central.haims.mhsi.health.mil from 146.73.8.162 to 146.73.8.163.

# Full CVIX COOP with HAIMS COOP

In this scenario, both the CVIX and HAIMS are running in their COOP configurations.



## Procedure

Place the CVIX into its COOP configuration according to either the Full CVIX COOP – no BHIE or Full CVIX COOP – with BHIE sections.

Reconfigure the CVIX to use the HAIMS COOP site according to the HAIMS COOP section.

Follow the instructions in these sections to change back to the respective production configurations.