VISTA HEALTH LEVEL SEVEN (HL7) MULTI-LISTENERS USING TCP/IP SERVICES FOR OPENVMS

PATCH HL*1.6*84

February 2004

REVISION HISTORY

The following table displays the revision history for this document. Revisions to the documentation are based on patches and new versions released to the field.

Date	Revision	Description	Author
02/2004	HL*1.6*84	Supplement to patch description for Patch HL*1.6*84. Patch HL*1.6*84 provides support for the use of OpenVMS TCP/IP Services for Caché/VMS. It also provides instructions for replacing existing TCP/IP services running on DSM/VMS.	Raymond Hsu, José L. Garcia, Randy Stone

Patch Revisions

For a complete list of patches related to this software, please refer to the Patch Module on FORUM.

Document Revision History

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ORIENTATION

This documentation uses several methods to highlight different aspects of the material. "Snapshots" of computer dialogue (or other online displays) are shown in a non-proportional font and enclosed within a box. User responses to on-line prompts are highlighted in boldface. Boldface is also used to highlight a descriptive word or sentence. The Return or Enter key is illustrated by the symbol **<Enter>** when displayed in computer dialogue and is included in examples only when it may be unclear to the reader that such a keystroke must be entered. The following example indicates that you should type two question marks followed by pressing the Return or Enter key when prompted to select an option:

```
Select Primary Menu option: ??
```

Figure 99: How to access online help

M (MUMPS – Massachusetts General Hospital Utility Multi-Programming System) code, variable names, acronyms, the formal name of options, actual field names, file names, and security keys are represented with all uppercase letters.

Various symbols are used throughout the documentation to alert the reader to special information. The following table gives a description of each of these symbols:

Symbol	Description
ⓘ	Used to inform the reader of general information including references to additional reading material.
⚠	Used to caution the reader to take special notice of critical information.

Assumptions about the Reader
This manual is written with the assumption that the reader is familiar with the following:
❑ V*IST*A computing environment (e.g., Kernel Installation and Distribution System [KIDS]).
❑ VA FileMan data structures and terminology.
❑ M programming language.

Reference Materials
Readers who wish to learn more about the V*IST*A Health Level Seven (HL7) software should consult the following:

• V*IST*A Health Level Seven documentation is made available online in Adobe Acrobat Portable Document Format (PDF) at the **V*IST*A Documentation Library (VDL)**.

• Patch HL*1.6*84 Installation Instructions can be found in the description for HL*1.6*84 located in the National Patch Module (i.e., Patch User Menu [A1AE USER]) on FORUM.

Readers who wish to learn more about the Health Level Seven (HL7), Inc., Standards should consult the V*IST*A Health Level Seven (HL7) website: http://vista.med.va.gov/messaging/hl7/index.asp .

1. INTRODUCTION

This supplemental documentation is intended for use in conjunction with the Veterans Health Information System and Technology Architecture (V*IST*A) patch HL*1.6*84. It provides information that is specific to the use of the TCP/IP Services' functionality offered by the OpenVMS operating system.

Patch HL*1.6*84 has been created to provide the necessary code changes in the VistA HL7 package to enable Caché/VMS sites the external use of TCP/IP Services on OpenVMS for their multi-threaded listeners.   This supplement to the patch includes instructions for V*IST*A sites that are planning to migrate to a Caché/VMS environment.

> ⚠ **Warning: After installation of patch HL*1.6*84, Cache/VMS sites will no longer have the capability of starting their multi-listeners through the V*IST*A HL7 options; therefore, Cache/VMS sites must immediately create and enable their multi-listeners as OpenVMS TCP/IP services, as described in this supplement.**

Current V*IST*A sites running on DSM/VMS already have the use of TCP/IP Services via the TCP/IP service HLSEVEN and patch HL*1.6*19. This supplement also includes instructions for DSM/VMS sites that will opt to change their current HLSEVEN service (and any other HL7 type service) to a TCP/IP service that conforms to the TCP/IP service configurations enforced by this supplement.

2. TCP/IP SERVICES ON OPENVMS

The Transmission Control Protocol/Internet Protocol (TCP/IP) is an open communications standard that enables any connected host to communicate with any other connected host. The 'TCP/IP Services' for OpenVMS is a product that implements several of the protocols in the TCP/IP standard for the OpenVMS operating system. This supplement focuses only on those TCP/IP services configured to run as a TCP/IP server (listener) process.

2.1. TCP/IP Services and V*IST*A HL7

A TCP/IP service configured to run as a server permits multiple remote TCP/IP clients to connect and run concurrently up to the limits established by the service. A server listens on a particular TCP/IP communication port and launches a specified DCL (Digital Command Language) Login Command file that serves as a startup process for each client connection process. This startup file contains the necessary commands to execute the entry point into V*IST*A HL7. In essence, the TCP/IP service performs as a multi-threaded HL7 listener.

The TCP/IP service running as a concurrent server provides a more robust functionality than a TaskMan-based V*IST*A HL7 multi-listener; thus, installation of TCP/IP services replaces and disables the functionality of the V*IST*A HL7 options for starting and stopping a multi-listener.

2.2. Requirements for Setting a TCP/IP Service on OpenVMS

To set and enable a TCP/IP service, you need to create and configure the following components in V*IST*A HL7 and OpenVMS:

❑ V*IST*A HL7 logical link for the Multi-Threaded Listener.

❑ An OpenVMS account.

❑ An OpenVMS home directory.

❑ An OpenVMS DCL login command procedure. This is the startup command file that executes on every concurrent process. Default DCL login command files are provided in this document and can be downloaded as described in section 2.2.1.

❑ An OpenVMS TCP/IP service.

> ❑ It is strongly recommended that the person implementing the instructions in this supplement have OpenVMS system administrator privileges to create the above components and be familiar with the OpenVMS TCP/IP Services Management Control Program.
> ❑ You must choose the OpenVMS node where the TCP/IP service will be running. This is also the node whose IP address will be advertised to other systems as the location of your HL7 listener.

2.2.1. Pre-Configured DCL Command Procedure Files

For your convenience, the DCL login command files, HLS5000CACHE.COM and HLS5000DSM.COM, are included in this supplement document, and they can be downloaded from the [ANONYMOUS.SOFTWARE] directory at the following ftp sites:

```
CIO Field Office    FTP Address              Directory
-----------------------------------------------------------------
Albany              ftp.fo-albany.med.va.gov  [anonymous software]
Hines               ftp.fo-hines.med.va.gov   [anonymous software]
Salt Lake City      ftp.fo-slc.med.va.gov     [anonymous software]
```

2.3. Recommended Naming Convention for OpenVMS Components

The following names are used in the description for creating a TCP/IP service and are referenced throughout this chapter. All these names are suggestions. Your site might already have its own naming convention:

❑ HLSEVEN—OpenVMS user account name for an HL7 TCP/IP service.

❑ [HLSEVEN]—Name of home directory for the above HLSEVEN user

❑ HL7—Name of the owner

❑ HLS<port><M environment>.**COM**— Name of DCL login command procedure, where the <port> is the actual port number where the service will be listening, and the <M environment> is the actual **V***IST***A** M environment. For example:

   o HLS**5000DSM**.COM— represents the login command procedure for a TCP/IP service listening on **port 5000** that starts up a **DSM V***IST***A** HL7 listener concurrent process.

   o HLS**5000CACHE**.COM— represents the login command procedure for a TCP/IP service listening on **port 5000** that starts up a **CACHE V***IST***A** HL7 listener concurrent process..

❑ HLS<port><M environment>— Name of a TCP/IP service, where the <port> is the actual port number where the service will be listening, and the <M environment> is the actual **V***IST***A** M environment. For example

   o HLS**5000DSM**— represents the TCP/IP service listening on **port 5000** that starts up a **DSM V***IST***A** HL7 listener concurrent process.

   o HLS**5000CACHE**— represents the TCP/IP service listening on **port 5000** that starts up a **CACHE V***IST***A** HL7 listener concurrent process.

❑ You can set up more than one TCP/IP service for HL7, although it is not necessary to do this. To set up more than one TCP/IP service for HL7, follow the steps in this supplement for each listener; however, use different command file name and TCP/IP service name for each listener, with a different port number in each command file.

❑ You can optionally use different user accounts and directories for each listener.

3. CREATING A MULTI-THREADED LISTENER FOR DSM ON OPENVMS

3.1. Set Up a Logical Link in VISTA

In **V**ISTA HL LOGICAL LINK file (#870), create an entry for the Multi-Threaded Listener with the fields populated as follows:

Link Settings for Multi-Threaded Listener, DSM for OpenVMS using TCP/IP Services

Field	Description
LLP TYPE	TCP
TCP/IP Address	null
TCP/IP Port	Port to listen on, e.g., 5000 (make note of the exact port number)
TCP/IP Service Type	MULTI LISTENER
SHUTDOWN LLP ?	**null** (setting this field to YES will cause each arriving connection to terminate immediately)
Startup Node	null
Autostart	null
Ack Timeout	(Increase from default if network is slow)

Figure 1: Multi-Threaded Listener link settings for DSM for OpenVMS using TCP/IP Services

❑ The port number you select must be an available TCP/IP port number. The port number will also be used in the configuration and naming of the TCP/IP service described in the following sections.

❑ If the HL7 multi-listener will be used by an application at the national level, you must register the port number with the DBIA manager on Forum.

Because, the new HL7 listener will be externally controlled by the TCP/IP service on OpenVMS, the V*IST*A HL7 options for starting and stopping logical links will no longer have effect on this listener.

3.2. Create OpenVMS User Account

❑ Determine an unused User Identification Code (UIC), typically in the same group as other DSM for OpenVMS accounts.

❑ Using the OpenVMS Authorize utility, add the new HLSEVEN account with the unused UIC. You must have SYSPRV to do this.

❑ Verify that the account settings for the new HLSEVEN account are the same as they appear in the example that follows; or, if they are different, verify that the impact of the different settings is acceptable for your system. For security, make sure that the DisCtlY, Restricted, and Captive flags are set.

There are two different ways to set up a new user account, and you are free to choose the one you prefer. The following two examples illustrate two different ways to set up an OpenVMS User account:

a. One way to set up a OpenVMS User is to copy your existing XMINET (TCP/IP MailMan) account to a new account with an unused UIC. For example:

```
$ SET DEF USER$    (use your local user device-name)
$ MC AUTHORIZE
UAF> COPY /ADD XMINET HLSEVEN/UIC=[51,45]/DIR=[HLSEVEN]
%UAF-I-COPMSG, user record copied
%UAF-W-DEFPWD, copied or renamed records must receive new password
%UAF-I-RDBADDMSGU, identifier HLSEVEN value [000051,000045] added to rights
database
UAF>
```

b. Add the new HLSEVEN OpenVMS account. For example:

```
$ SET DEF USER$    (use your local user device-name)
$ MC AUTHORIZE
 UAF> ADD HLSEVEN /UIC=[100,45]/OWNER="HL7" - (must use continuation
character "-")
_UAF> /DEVICE=USER$/DIRECTORY=[HLSEVEN] -
_UAF> /NOACCESS/NETWORK/FLAGS=(DISCTLY,RESTRICTED,NODISUSER) -
_UAF> /PRIV=(NETMBX,OPER,SHARE,TMPMBX) -
_UAF> /DEF=(NETMBX,OPER,SHARE,TMPMBX)/LGICMD=NL:
%UAF-I-ADDMSG, user record successfully added
%UAF-I-RDBADDMSGU, identifier HLSEVEN value [000100,000045] added to rights
data
base
UAF>


UAF> SHOW HLSEVEN

Username: HLSEVEN                              Owner:  HL7
Account:                                      UIC:    [100,45] ([HLSEVEN])
CLI:     DCL                                  Tables: DCLTABLES
Default: USER$:[HLSEVEN]
LGICMD:  NL:
Flags:  DisCtlY Restricted
Primary days:   Mon Tue Wed Thu Fri
Secondary days:                     Sat Sun
Primary   000000000011111111112222  Secondary 000000000011111111112222
Day Hours 012345678901234567890123  Day Hours 012345678901234567890123
Network:  ##### Full access ######            ##### Full access ######
Batch:    -----  No access  ------            -----  No access  ------
Local:    -----  No access  ------            -----  No access  ------
Dialup:   -----  No access  ------            -----  No access  ------
Remote:   -----  No access  ------            -----  No access  ------
Expiration:           (none)    Pwdminimum: 6   Login Fails:    0
Pwdlifetime:       90 00:00    Pwdchange:     (pre-expired)
Last Login:           (none) (interactive),         (none) (non-
interactive)
Maxjobs:        0  Fillm:       100  Bytlm:        64000
Maxacctjobs:    0  Shrfillm:      0  Pbytlm:           0
Maxdetach:      0  BIOlm:       150  JTquota:       4096
Prclm:          8  DIOlm:       150  WSdef:         2000
Prio:           4  ASTlm:       250  WSquo:         4000
```

```
Queprio:           4  TQElm:          10  WSextent:      16384
CPU:         (none)  Enqlm:        2000  Pgflquo:       50000
Authorized Privileges:
  NETMBX          OPER           SHARE          TMPMBX
Default Privileges:
  NETMBX          OPER           SHARE          TMPMBX
UAF> Exit
%UAF-I-DONEMSG, system authorization file modified
%UAF-I-RDBDONEMSG, rights database modified
$
UAF> SHOW HLSEVEN

Username: HLSEVEN                              Owner:  HL7
Account:                                       UIC:    [51,45] ([HLSEVEN])
CLI:       DCL                                 Tables: DCLTABLES
Default:   USER$:[HLSEVEN]
LGICMD:    NL:
Flags:  DisCtlY Restricted Captive
Primary days:   Mon Tue Wed Thu Fri
Secondary days:                     Sat Sun
Primary    00000000001111111111222  Secondary 00000000001111111111222
Day Hours 012345678901234567890123  Day Hours 012345678901234567890123
Network:  ##### Full access ######            ##### Full access ######
Batch:    -----  No access  ------            -----  No access  ------
Local:    -----  No access  ------            -----  No access  ------
Dialup:   -----  No access  ------            -----  No access  ------
Remote:   -----  No access  ------            -----  No access  ------
Expiration:    (none)    Pwdminimum:  6   Login Fails:      0
Pwdlifetime:   90 00:00    Pwdchange:       (pre-expired)
Last Login:    (none) (interactive),         (none) (non-interactive)
Maxjobs:        0  Fillm:        500  Bytlm:        100000
Maxacctjobs:    0  Shrfillm:       0  Pbytlm:            0
Maxdetach:      0  BIOlm:        150  JTquota:        4096
Prclm:          8  DIOlm:         18  WSdef:          1344
Prio:           4  ASTlm:        176  WSquo:          2688
Queprio:        4  TQElm:         10  WSextent:      65536
CPU:         (none)  Enqlm:      3000  Pgflquo:      100000
Authorized Privileges:
  NETMBX    OPER       SHARE      TMPMBX
Default Privileges:
  NETMBX    OPER       SHARE      TMPMBX

UAF> EXIT

%UAF-I-DONEMSG, system authorization file modified
%UAF-I-RDBDONEMSG, rights database modified
```

3.3. Create OpenVMS Home Directory

This directory will house the DCL command procedure, which is executed whenever a client connects. A log file is created for every instance of a connection for that listener. Make sure that the owner of the directory is the HLSEVEN account.

For example, to create a home directory named [HLSEVEN] with ownership of HLSEVEN:

```
$ CREATE/DIR [HLSEVEN]/OWNER=HLSEVEN
```

3.4. Create a DCL Login Command Procedure

Create a DCL command procedure (shown below) in the home directory for HLSEVEN account and name it according to the recommended convention. Make sure the command procedure file is owned by the HLSEVEN account.

1. To create a DCL login command procedure that will use a given port, for port 5000, name your command procedure file as HLS5000DSM.COM.
2. Adjust the DSM command line (environment, UCI, and volume set) for your system.
3. If access control is enabled, ensure that the HLSEVEN account has access to this UCI, volume set, and routine (see "Access Control List (ACL) Issues", later in this chapter).
4. In the DCL login command procedure, **if necessary**, replace the port number to the actual port number. For example, to use port=6788, change the following line:

```
$ dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" PORT^HLCSTCPA
to
$ dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^6788" PORT^HLCSTCPA
```

5. Ensure that the name of the DCL login command file, as described in step 1, matches the port assignment. For example, if you changed the port number from 5000 to 6788, then rename your HLS5000DSM.COM file to HLS6788DSM.COM

For your convenience, you can cut and paste the following DCL login command procedure file into your OpenVMS HLSEVEN device and directory. In addition, you can download the file from the sites listed in section 2.2.1.

Sample DCL Login Command Procedure file follows next:

```
$! HLS5000DSM.COM - for incoming tcp connect requests with port=5000 and
$! using "DSM" command line to enter the M environment
$! File name HLS5000DSM.COM is recommended to be changed to reflect the
$! change of the TCPIP port number.  For example, file name could be
$! changed to HLS6788DSM.COM if port=6788.
$!
$!this file is copied and modifed from HLSEVEN.COM
$! Revision History:
$! Patch HL*1.6*19 & HL*1.6*56--Documentation only
$! Patch HL*1.6*70--HL71_6P70.COM
$! Patch HL*1.6*84--HLS5000CACHE.COM and HLS5000DSM.COM
$!-----------------------------------------------------------
$ set noon        !Don't stop
$ set noverify    !change as needed
$! set verify     !change as needed
$ purge/keep=5 sys$login:*.log !Purge log files only
$ set proc/priv=(share)  !Required for MBX device
$ x=f$trnlnm("sys$net")  !This is our MBX device
$!
$ write sys$output "Opening "+x !This can be viewed in the log file
$! Check status of the BG device before going to either DSM or Cache'
$ cnt=0
$ CHECK:
$ stat=f$getdvi("''x'","STS")
$ if cnt .eq. 10
$ then
$ write sys$output "Could not open ''x' - exiting"
$ goto EXIT
$ else
$    if stat .ne. 16
$    then
```

```
$    cnt=cnt+1
$    write sys$output "''cnt'> ''x' not ready!"
$    wait 00:00:01 !Wait one second to assure connection
$    goto CHECK
$    else
$    write sys$output "''x' is now ready for use - entering DSM or Cache"
$!-------------------------------------------------------------
$! **START OF INFORMATION ONLY SECTION**
$! This section describes the basic commands for starting a generic
$! listener.
$! For DSM, replace 5000 below with the actual port number, and
$! change the file name to reflect the change of the port number
$! as recommended above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" port^hlcstcpa
$! For Cache, replace 5000 below with the actual port number, and
$! change the file name to reflect the change of the port number as
$! recommended above.
$! port=port number
$! cache "-U" "VAH" "port^hlcstcpa"
$! **END OF INFORMATION ONLY SECTION**
$!-------------------------------------------------------------
$! **Be sure the command line(s) in the COMMAND LINE SECTION
$! **below is correct for your system and if access control is
$! **enabled, that this account has access to this uci,vol & routine.
$! **An entry in file 870 for this logical link with the specified
$! **unique port number and its device type as "MS"(Multi-threaded
$! **server) must be existed.
$!
$! **Also, comment or uncomment the appropriate lines for your system.
$!
$!-------------------------------------------------------------
$! COMMAND LINE SECTION:
$! ===================
$!-------------------------------------------------------------
$! for DSM, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$ dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" PORT^HLCSTCPA
$!-------------------------------------------------------------
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! PORT=5000
$! cache "-U" "VAH" "PORT^HLCSTCPA"
$ endif
$ exit:
$ logout/brief
```

3.5. Set Up and Enable the TCP/IP Service

To create the TCP/IP service to listen for connections, you must ensure the following:

❑ Choose the OpenVMS node where you want to run the TCP/IP service listener. This is also the node whose IP address will be advertised to other systems as the location of your HL7 listener;

❑ Choose the TCP/IP port number as chosen in section 3.1, Set Up a Logical Link in **V**IST**A**;

❑ Use the same user account as created in section 3.1, Create OpenVMS User Account; and

❑ Use the same DCL login command file name as the one created in section 3.4, Create a DCL Login Command Procedure.

3.5.1. Set up the TCP/IP Service

❑ Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

❑ It is possible to run the TCP/IP service on multiple nodes. This may or may not be necessary, depending on your site's configuration needs. For instance, the impersonator VMS feature allows for the possibility of all nodes in the cluster to become the surrogate. This allows for the listening process uninterrupted if the TCP/IP service is enabled on all nodes in the cluster. For this reason, it is recommended that you enable the TCP/IP service on all nodes in the cluster.

Ensure that your new TCP/IP service uses the recommended naming convention. For example, to set up a service that will be listening on port 5000 and use a corresponding DCL login command file HLS5000DSM.COM.

Set the service name as HLS5000DSM as follows:

```
$ TCPIP         (must use continuation character "-" at end of long lines)
TCPIP> SET SERVICE HLS5000DSM/USER=HLSEVEN/PROC=HLS5000DSM /PORT=5000-
_TCPIP> /PROTOCOL=TCP/REJECT=MESSAGE="All channels busy" -
_TCPIP> /LIMIT=50/FILE=USER$:[HLSEVEN]HLS5000DSM.COM
```

❑ If you get an error because you mistyped any of the above lines or forgot to use the continuation character "-", we suggest you do the following to remove the corrupted service and repeat the above commands.

```
        TCPIP> SET CONFIG ENABLE NOSERVICE  HLS5000DSM
        TCPIP> SET NOSERVICE  HLS5000DSM

TCPIP> SHO SERVICE HLS5000DSM/FULL

Service: HLS5000DSM
                        State:     Disabled
Port:             5000  Protocol: TCP            Address:  0.0.0.0
                        User_name: not defined   Process:  HLS5000DSM
```

3.5.2. Enable and Save the TCP/IP Service

Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

```
TCPIP> ENABLE SERVICE HLS5000DSM                 (enable service immediately)
TCPIP> SET CONFIG ENABLE SERVICE HLS5000DSM  (save service for reboot)
TCPIP> SHO SERVICE/FULL HLS5000DSM

Service: HLS5000DSM
                        State:     Enabled
Port:             5000  Protocol: TCP            Address:  0.0.0.0
Inactivity:          5  User_name: HLSEVEN       Process:  HLS5000DSM
Limit:              50  Active:    0             Peak:     0

File:         USER$:[HLSEVEN] HLS5000DSM.COM
Flags:        Listen
```

```
Socket Opts:  Rcheck Scheck
 Receive:            0      Send:                 0


Log Opts:     None
 File:        not defined


Security
 Reject msg:  All channels busy


 Accept host: 0.0.0.0
 Accept netw: 0.0.0.0


TCPIP> SHO CONFIG ENABLE SERVICE


Enable service
     FTP, FTP_CLIENT, HLS5000DSM, MPI, TELNET, XMINETMM
TCPIP> EXIT
```

3.6. Access Control List (ACL) Issues

Some sites use DSM's ACL feature, which controls access explicitly to each OpenVMS account that
needs to enter that DSM environment. If your site is using ACL, you should set up the HLSEVEN
account with PROGRAMMER access, and then specify the Volume set and UCI name that the
HLSEVEN user account has authorization to access. Ensure that the OpenVMS HLSEVEN account
prohibits Batch, Local, Dialup, and Remote logins, allowing only Network logins.

An example of setting this level of access for an HLSEVEN account is provided below:

```
$ DSM /MAN ^ACL

Environment Access Utilities

    1.  ADD/MODIFY USER                 (ADD^ACL)
    2.  DELETE USER                     (DELETE^ACL)
    3.  MODIFY ACTIVE AUTHORIZATIONS    (^ACLSET)
    4.  PRINT AUTHORIZED USERS          (PRINT^ACL)

Select Option > 1  <Enter>  ADD/MODIFY USER

OpenVMS User Name:   >  HLSEVEN

ACCESS MODE     VOL       UCI        ROUTINE
-----------     ---       ---        -------

No access rights for this user.

Access Mode ([M]ANAGER, [P]ROGRAMMER, or [A]PPLICATION):   >  P
Volume set name:   >   VAH
UCI:   >  ROU
UCI:   >  <Enter>
Volume set name:   >  <Enter>
Access Mode ([M]ANAGER, [P]ROGRAMMER, or [A]PPLICATION):   >  <Enter>

USER            ACCESS MODE     VOL       UCI        ROUTINE
----            -----------     ---       ---        -------

HLSEVEN         PROGRAMMER      ROU       VAH
```

```
OK to file?   <Y>    <Enter>

OpenVMS User Name:   >     <Enter>

OK to activate changes now?    <Y>      <Enter>

Creating access authorization file:   USER$:[DSMMGR]DSM$ACCESS.DAT.
```

3.7. Controlling the Number of Log Files Created by TCP/IP Services

The HLS5000DSM TCP/IP service automatically creates log files (TCP/IP services does this and it
cannot be prevented) in the HLSEVEN directory named HLS5000DSM.LOG;xxx where 'xxx' is a file
version number. New versions of this file will be created until that file version number reaches the
maximum number of 32767. In order to minimize the number of log files created, you may want to
initially rename this log file to the highest version number with the command:

```
$ RENAME USER$:[HLSEVEN]HLS5000DSM.LOG; USER$:[HLSEVEN]HLS5000DSM.LOG;32767
```

Alternatively, you can set a limit on the number of versions of the log file that can concurrently exist in
the HLSEVEN directory:

```
$ SET FILE /VERSION_LIMIT=10 USER$:[HLSEVEN]HLS5000DSM.LOG;
```

You probably should not limit the number of versions of the log file until you know that your
HLS5000DSM service is working correctly; keeping the log files can help when diagnosing problems
with the service/account.

3.8. Starting and Stopping the Listener

Although the multi-threaded listener for OpenVMS systems requires the setup of a link, you never
actually start or stop this link with V*IST*A HL7 options. Instead, because the listener is implemented as a
TCP/IP service, start it up and shut it down by using the generic tools TCP/IP services provides to enable
and disable a TCP/IP service. For example:

```
TCPIP> ENABLE SERVICE HLS5000DSM          (Start up TCP/IP service)
TCPIP> DISABLE SERVICE HLS5000DSM         (Stop TCP/IP service)
```

4. REPLACING AN EXISTING HLSEVEN SERVICE WITH THE HLS5000DSM SERVICE FOR DSM ON OPENVMS

If you are a DSM/VMS site that is currently using an existing HLSEVEN service that uses the internal entry number of **V**IST**A** file #870 as a parameter, and you intend to replace it with the recommended HLS5000DSM service, it is recommended that you follow the instructions listed below:

First, navigate to the OpenVMS device and directory where your HL7 user account is located and invoke the OpenVMS TCP/IP Services Management Control Program. For example:

```
$SET DEF USER$:[HLSEVEN]   (use your local user device-name:[HLSEVEN])
$TCPIP
TCPIP>
```

4.1. Disable the HLSEVEN TCP/IP Service

```
TCPIP>DISABLE SERVICE HLSEVEN
```

4.2. Remove the HLSEVEN TCP/IP Service

```
TCPIP> SET CONFIG ENABLE NOSERVICE   HLSEVEN
TCPIP> SET NOSERVICE   HLSEVEN
```

4.3. Create a DCL Login Command Procedure HLS5000DSM

Create a DCL command procedure file in the home directory for HLSEVEN account and name it according to the recommended convention.

For your convenience, you can cut and paste the following DCL login command procedure file into your OpenVMS HLSEVEN device and directory. Also, you can download the file from the sites listed in section 2.2.1.

Sample DCL Login Command Procedure file follows next:

```
$! HLS5000DSM.COM - for incoming tcp connect requests with port=5000 and
$! using "DSM" command line to enter the M environment
$! File name HLS5000DSM.COM is recommended to be changed to reflect the
$! change of the TCPIP port number.  For example, file name could be
$! changed to HLS6788DSM.COM if port=6788.
$!
$!this file is copied and modifed from HLSEVEN.COM
$! Revision History:
$! Patch HL*1.6*19 & HL*1.6*56--Documentation only
$! Patch HL*1.6*70--HL71_6P70.COM
$! Patch HL*1.6*84--HLS5000CACHE.COM and HLS5000DSM.COM
$!-----------------------------------------------------------
$ set noon        !Don't stop
$ set noverify    !change as needed
$! set verify     !change as needed
$ purge/keep=5 sys$login:*.log !Purge log files only
$ set proc/priv=(share)  !Required for MBX device
$ x=f$trnlnm("sys$net")  !This is our MBX device
```

```
$!
$ write sys$output "Opening "+x !This can be viewed in the log file
$! Check status of the BG device before going to either DSM or Cache'
$ cnt=0
$ CHECK:
$ stat=f$getdvi("''x'","STS")
$ if cnt .eq. 10
$ then
$ write sys$output "Could not open ''x' - exiting"
$ goto EXIT
$ else
$    if stat .ne. 16
$    then
$    cnt=cnt+1
$    write sys$output "''cnt'> ''x' not ready!"
$    wait 00:00:01 !Wait one second to assure connection
$    goto CHECK
$    else
$    write sys$output "''x' is now ready for use - entering DSM or Cache"
$!----------------------------------------------------------------
$! **START OF INFORMATION ONLY SECTION**
$! This section describes the basic commands for starting a generic
$! listener.
$! For DSM, replace 5000 below with the actual port number, and
$! change the file name to reflect the change of the port number
$! as recommended above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" port^hlcstcpa
$! For Cache, replace 5000 below with the actual port number, and
$! change the file name to reflect the change of the port number as
$! recommended above.
$! port=port number
$! cache "-U" "VAH" "port^hlcstcpa"
$! **END OF INFORMATION ONLY SECTION**
$!----------------------------------------------------------------
$! **Be sure the command line(s) in the COMMAND LINE SECTION
$! **below is correct for your system and if access control is
$! **enabled, that this account has access to this uci,vol & routine.
$! **An entry in file 870 for this logical link with the specified
$! **unique port number and its device type as "MS"(Multi-threaded
$! **server) must be existed.
$!
$! **Also, comment or uncomment the appropriate lines for your system.
$!
$!----------------------------------------------------------------
$! COMMAND LINE SECTION:
$! ===================
$!----------------------------------------------------------------
$! for DSM, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$ dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" PORT^HLCSTCPA
$!----------------------------------------------------------------
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! PORT=5000
$! cache "-U" "VAH" "PORT^HLCSTCPA"
$ endif
$ exit:
$ logout/brief
```

4.4. Set Up and Enable the TCP/IP Service

4.4.1. Set Up the TCP/IP Service

ℹ️
- ❑ Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

- ❑ It is possible to run the TCP/IP service on multiple nodes. This may or may not be necessary, depending on your site's configuration needs. For instance, the impersonator VMS feature allows for the possibility of all nodes in the cluster to become the surrogate. This allows for the listening process uninterrupted if the TCP/IP service is enabled on all nodes in the cluster. For this reason, it is recommended that you enable the TCP/IP service on all nodes in the cluster.

Ensure that your new TCP/IP service uses the recommended naming convention. To set up a service that will be listening on port 5000 and use a corresponding DCL login command file HLS5000DSM.COM.

Set the service name as HLS5000DSM as follows:

```
$ TCPIP  (must use continuation character "-" at end of long lines)
TCPIP> SET SERVICE HLS5000DSM/USER=HLSEVEN/PROC=HLS5000DSM /PORT=5000-
_TCPIP> /PROTOCOL=TCP/REJECT=MESSAGE="All channels busy" -
_TCPIP> /LIMIT=50/FILE=USER$:[HLSEVEN]HLS5000DSM.COM
```

ℹ️
- ❑ If you get an error because you mistyped any of the above lines or forgot to use the continuation character "-", we suggest you do the following to remove the corrupted service and repeat the above commands.

```
    TCPIP> SET CONFIG ENABLE NOSERVICE  HLS5000DSM
    TCPIP> SET NOSERVICE  HLS5000DSM
```

```
TCPIP> SHO SERVICE HLS5000DSM/FULL

Service: HLS5000DSM
                        State:     Disabled
Port:            5000   Protocol:  TCP            Address:  0.0.0.0
                        User_name: not defined    Process:  HLS5000DSM
```

4.4.2. Enable and Save the TCP/IP Service

Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

```
TCPIP> ENABLE SERVICE HLS5000DSM               (enable service immediately)
TCPIP> SET CONFIG ENABLE SERVICE HLS5000DSM  (save service for reboot)
TCPIP> SHO SERVICE/FULL HLS5000DSM

Service: HLS5000DSM
                        State:     Enabled
Port:            5000   Protocol:  TCP            Address:  0.0.0.0
Inactivity:         5   User_name: HLSEVEN        Process:  HLS5000DSM
Limit:             50   Active:      0            Peak:        0

File:        USER$:[HLSEVEN] HLS5000DSM.COM
```

```
Flags:          Listen

Socket Opts:   Rcheck Scheck
 Receive:               0       Send:               0

Log Opts:       None
 File:          not defined

Security
 Reject msg:    All channels busy

 Accept host: 0.0.0.0
 Accept netw: 0.0.0.0

TCPIP> SHO CONFIG ENABLE SERVICE

Enable service
     FTP, FTP_CLIENT, HLS5000DSM, MPI, TELNET, XMINETMM
TCPIP> EXIT
```

5. CREATING A MULTI-THREADED LISTENER FOR CACHÉ ON OPENVMS

5.1. Set Up Link

Create a new link entry in **V**IST**A** file HL LOGICAL LINK (#870) for the Multi-Threaded Listener as follows:

> *Note: If your site is migrating from DSM/VMS to Caché/VMS, your site can reuse any existing multi-listener logical link entry.*

Link Settings for Multi-Threaded Listener, CACHÉ for OpenVMS (using TCP/IP services):

Field	Description
LLP TYPE	TCP
TCP/IP Address	null
TCP/IP Port	Port to listen on, e.g., 5000 (make note of the exact port number)
TCP/IP Service Type	MULTI LISTENER
SHUTDOWN LLP ?	**null** (setting this field to YES will cause each arriving connection to terminate immediately)
Startup Node	null
Autostart	null
Ack Timeout	(Increase from default if network is slow)

Figure 2: Multi-Threaded Listener link settings for CACHÉ for OpenVMS (using TCP/IP services)

5.2. Set Up OpenVMS User Account

- ❑ Determine an unused User Identification Code (UIC), typically in the same group as other Caché for OpenVMS accounts.

- ❑ Using the OpenVMS Authorize utility, add the new HLSEVEN account with the unused UIC. You must have SYSPRV to do this.

- ❑ Verify that the account settings for the new HLSEVEN account are the same as they appear in the example that follows; or, if they are different, verify that the impact of the different settings is acceptable for your system. For security, make sure that the DisCtlY and Restricted flags are set. DO NOT set the Captive flag as this will prevent the multi-threaded listener from working on Caché/VMS systems.

Add the new HLSEVEN OpenVMS account. For example:

```
$ SET DEF USER$    (use your local user device-name)
$ MC AUTHORIZE
```

```
 UAF> ADD HLSEVEN /UIC=[100,45]/OWNER="HL7" - (must use continuation
character "-")
_UAF> /DEVICE=USER$/DIRECTORY=[HLSEVEN] -
_UAF> /NOACCESS/NETWORK/FLAGS=(DISCTLY,RESTRICTED,NODISUSER) -
_UAF> /PRIV=(NETMBX,OPER,SHARE,TMPMBX) -
_UAF> /DEF=(NETMBX,OPER,SHARE,TMPMBX)/LGICMD=NL:
%UAF-I-ADDMSG, user record successfully added
%UAF-I-RDBADDMSGU, identifier HLSEVEN value [000100,000045] added to rights
data
base
UAF>


UAF> SHOW HLSEVEN

Username: HLSEVEN                                Owner:   HL7
Account:                                         UIC:     [100,45] ([HLSEVEN])
CLI:      DCL                                     Tables: DCLTABLES
Default:  USER$:[HLSEVEN]
LGICMD:   NL:
Flags:  DisCtlY Restricted
Primary days:   Mon Tue Wed Thu Fri
Secondary days:                       Sat Sun
Primary   000000000011111111112222  Secondary 000000000011111111112222
Day Hours 012345678901234567890123  Day Hours 012345678901234567890123
Network:  ##### Full access ######           ##### Full access ######
Batch:    -----  No access  ------           -----  No access  ------
Local:    -----  No access  ------           -----  No access  ------
Dialup:   -----  No access  ------           -----  No access  ------
Remote:   -----  No access  ------           -----  No access  ------
Expiration:          (none)   Pwdminimum: 6   Login Fails:     0
Pwdlifetime:        90 00:00   Pwdchange:      (pre-expired)
Last Login:          (none) (interactive),         (none) (non-
interactive)
Maxjobs:        0  Fillm:        100  Bytlm:        64000
Maxacctjobs:    0  Shrfillm:       0  Pbytlm:           0
Maxdetach:      0  BIOlm:        150  JTquota:       4096
Prclm:          8  DIOlm:        150  WSdef:         2000
Prio:           4  ASTlm:        250  WSquo:         4000
Queprio:        4  TQElm:         10  WSextent:     16384
CPU:         (none) Enqlm:       2000  Pgflquo:      50000
Authorized Privileges:
  NETMBX        OPER         SHARE         TMPMBX
Default Privileges:
  NETMBX        OPER         SHARE         TMPMBX
UAF> Exit
%UAF-I-DONEMSG, system authorization file modified
%UAF-I-RDBDONEMSG, rights database modified
$
```

5.3. Set Up Home Directory for the HL7 User Account

You need to create a home directory for the HL7 user account. This directory will house the DCL command procedure, which is executed whenever a client connects. A log file is created for every instance of a connection for that listener. Make sure that the owner of the directory is the HLSEVEN.

For example, to create a home directory named [HLSEVEN] with ownership of HLSEVEN:

```
$ CREATE/DIR [HLSEVEN]/OWNER=HLSEVEN
```

5.4. Create a DCL Login Command Procedure for the HL7 User

Create a DCL command procedure (shown below) in the home directory for HLSEVEN account and name it according to the recommended convention. Make sure the command procedure file is owned by the HLSEVEN account.

1. To create a DCL login command procedure that will use a given port, for port 5000, name your command procedure file as HLS5000CACHE.COM.
2. Adjust the Caché command line (environment, UCI, and volume set) for your system.
3. If access control is enabled, ensure that the HLSEVEN account has access to this UCI, volume set, and routine (see "Access Control List (ACL) Issues", later in this chapter).
4. In the DCL login command procedure, **if necessary**, replace the port number to the actual port number. For example, to use port=6788, change the following line:

   ```
   $ PORT=5000
   ```

   to

   ```
   $ PORT=6788
   ```

5. Ensure that the name of the DCL login command file, as described in step 1, matches the port assignment. For example, if you changed the port number from 5000 to 6788, then rename your HLS5000CACHE.COM file to HLS6788CACHE.COM

For your convenience, you can cut and paste the following DCL login command procedure file into your OpenVMS HLSEVEN device and directory. Also, you can download the file from the sites listed in section 2.2.1.

Sample DCL Login Command Procedure file follows next:

```
$! HLS5000CACHE.COM - for incoming tcp connect requests with port=5000 and
$! using "cache" commnad line to enter the M environment
$! File name HLS5000CACHE.COM is recommended to be changed to reflect the
$! change of the TCPIP port number.  For example, file name could be
$! changed to HLS6788CACHE.COM if port=6788.
$!
$!this file is copied and modifed from HLSEVEN.COM
$! Revision History:
$! Patch HL*1.6*19 & HL*1.6*56--Documentation only
$! Patch HL*1.6*70--HL71_6P70.COM
$! Patch HL*1.6*84--HLS5000CACHE.COM and HLS5000DSM.COM
$!----------------------------------------------------------
$ set noon        !Don't stop
$ set noverify    !change as needed
$! set verify     !change as needed
$ purge/keep=5 sys$login:*.log !Purge log files only
$ set proc/priv=(share)  !Required for MBX device
$ x=f$trnlnm("sys$net")  !This is our MBX device
$!
$ write sys$output "Opening "+x !This can be viewed in the log file
$! Check status of the BG device before going to either DSM or Cache'
$ cnt=0
$ CHECK:
$ stat=f$getdvi("''x'","STS")
$ if cnt .eq. 10
$ then
$ write sys$output "Could not open ''x' - exiting"
```

```
$ goto EXIT
$ else
$    if stat .ne. 16
$    then
$    cnt=cnt+1
$    write sys$output "''cnt'> ''x' not ready!"
$    wait 00:00:01 !Wait one second to assure connection
$    goto CHECK
$    else
$    write sys$output "''x' is now ready for use - entering DSM or Cache"
$!---------------------------------------------------------------
$! **START OF INFORMATION ONLY SECTION**
$! This section describes the basic commands for starting a generic
$! listener.
$! For DSM, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" port^hlcstcpa
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! port=port number
$! cache "-U" "VAH" "port^hlcstcpa"
$! **END OF INFORMATION ONLY SECTION**
$!---------------------------------------------------------------
$! **Be sure the command line(s) in the COMMAND LINE SECTION
$! **below is correct for your system and if access control is enabled,
$! **that this account has access to this uci,vol & routine.
$! **An entry in file 870 for this logical link with the specified
$! **unique port number and its device type as "MS"(Multi-threaded
$! **server) must be existed.
$!
$!---------------------------------------------------------------
$! COMMAND LINE SECTION:
$! ====================
$!---------------------------------------------------------------
$! for DSM, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" PORT^HLCSTCPA
$!---------------------------------------------------------------
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$ PORT=5000
$ cache "-U" "VAH" "PORT^HLCSTCPA"
$ endif
$ exit:
$ logout/brief
```

5.5. Set Up and Enable the TCP/IP Service

To create the TCP/IP service to listen for connections, you must ensure the following:

❑   Choose the OpenVMS node where you want to run the TCP/IP service listener. This is also the
      node whose IP address will be advertised to other systems as the location of your HL7 listener;

❑   Choose the TCP/IP port number as chosen in section 3.1, Set Up a Logical Link in **V**ɪsᴛ**A**;

❑   Use the same user account as created in section 3.1, Create OpenVMS User Account; and

❑ Use the same DCL login command file name as the one created in section 3.4, Create a DCL Login Command Procedure.

5.5.1. Set Up the TCP/IP Service

❑ Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

❑ It is possible to run the TCP/IP service on multiple nodes. This may or may not be necessary, depending on your site's configuration needs. For instance, the impersonator VMS feature allows for the possibility of all nodes in the cluster to become the surrogate. This allows for the listening process uninterrupted if the TCP/IP service is enabled on all nodes in the cluster. For this reason, it is recommended that you enable the TCP/IP service on all nodes in the cluster.

Ensure that your new TCP/IP service uses the recommended naming convention. For example, to set up a service that will be listening on port 5000 and use a corresponding DCL login command file HLS5000CACHE.COM.

Set the service name as HLS5000CACHE as follows:

```
$ TCPIP     (must use continuation character "-" at end of long lines)
TCPIP> SET SERVICE HLS5000CACHE/USER=HLSEVEN/PROC=HLS5000CACHE /PORT=5000-
_TCPIP> /PROTOCOL=TCP/REJECT=MESSAGE="All channels busy" -
_TCPIP> /LIMIT=50/FILE=USER$:[HLSEVEN]HLS5000CACHE.COM
```

❑ If you get an error because you mistyped any of the above lines or forgot to use the continuation character "-", we suggest you do the following to remove the corrupted service and repeat the above commands.

```
TCPIP> SET CONFIG ENABLE NOSERVICE  HLS5000CACHE
TCPIP> SET NOSERVICE  HLS5000CACHE
```

```
TCPIP> SHO SERVICE HLS5000CACHE/FULL

Service: HLS5000CACHE
                         State:      Disabled
Port:            5000    Protocol: TCP            Address:  0.0.0.0
                         User_name: not defined   Process:  HLS5000CACHE
```

5.5.2. Enable and Save the HLSEVEN TCP/IP Service

Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

```
TCPIP> ENABLE SERVICE HLS5000CACHE                  (enable service immediately)
TCPIP> SET CONFIG ENABLE SERVICE HLS5000CACHE     (save service for reboot)
TCPIP> SHO SERVICE/FULL HLS5000CACHE

Service: HLS5000CACHE
                         State:      Enabled
Port:            5000    Protocol: TCP            Address:  0.0.0.0
Inactivity:         5    User_name: HLSEVEN       Process:  HLS5000CACHE
```

```
Limit:                50      Active:        0              Peak:          0

File:           USER$:[HLSEVEN]HLS5000CACHE.COM
Flags:          Listen

Socket Opts:  Rcheck Scheck
 Receive:             0      Send:                0

Log Opts:       None
 File:          not defined

Security
 Reject msg:  All channels busy

 Accept host: 0.0.0.0
 Accept netw: 0.0.0.0

TCPIP> SHO CONFIG ENABLE SERVICE

Enable service
     FTP, FTP_CLIENT, HLS5000CACHE, MPI, TELNET, XMINETMM
TCPIP> EXIT
```

5.6. How to Control the Number of Log Files Created by TCP/IP Services

The HLS5000CACHE TCP/IP service automatically creates log files (TCP/IP services does this and it cannot be prevented) in the HLSEVEN directory named HLS5000CACHE.LOG;xxx where 'xxx' is a file version number. New versions of this file will be created until that file version number reaches the maximum number of 32767. In order to minimize the number of log files created, you may want to initially rename this log file to the highest version number with the command:

```
$ RENAME USER$:[HLSEVEN]HLS5000CACHE.LOG;
USER$:[HLSEVEN]HLS5000CACHE.LOG;32767
```

Alternatively, you can set a limit on the number of versions of the log file that can concurrently exist in the HLSEVEN directory:

```
$ SET FILE /VERSION_LIMIT=10 disk$:[HLSEVEN]HLSEVEN.LOG;
```

You probably should not limit the number of versions of the log file until you know that your HLS5000CACHE service is working correctly; keeping the log files can help when diagnosing problems with the service/account.

5.7. Starting and Stopping the Listener

Although the multi-threaded listener for OpenVMS systems requires the setup of a link, you never actually start or stop this link with V*IST*A HL7 options. Instead, because the listener is implemented as a TCP/IP service, start it up and shut it down by using the generic tools TCP/IP services provides to enable and disable a TCP/IP service. For example:

```
TCPIP> ENABLE SERVICE HLS5000CACHE  <Enter>          (Start up TCP/IP service)

TCPIP> DISABLE SERVICE HLS5000CACHE  <Enter>         (Stop TCP/IP service)
```

6. MIGRATION INSTRUCTIONS FOR DSM/VMS TO CACHÉ/VMS

It is required that your site have HL7 Patch HL*1.6*84 installed before migrating to Caché/VMS.

This section documents issues and considerations that may be involved in migrating from other platforms to Caché/VMS. At this time, the only platform documented is Digital Standard MUMPS (DSM)/Virtual Memory System (VMS). The platform Caché/NT is not included because there are not configuration changes needed on the NT platform prior to migrating to Caché/VMS. Since DSM sites will retain their underlying VMS operating system, all configuration changes documented in this chapter are related to VMS.

If you are a DSM/VMS site and you intend to migrate to Caché/VMS, it is recommended that you follow the instructions listed below to make the necessary changes VMS configuration. These changes MUST ONLY be done prior to migrating to Caché/VMS and just after shutting down DSM.

First, navigate to the OpenVMS device and directory where your HL7 user account is located and invoke the OpenVMS TCP/IP Services Management Control Program. For example:

```
$SET DEF USER$:[HLSEVEN]    (use your local user device-name:[HLSEVEN])
$TCPIP
TCPIP>
```

6.1. Disable the HL7 TCP/IP Service(s)

For example, to disable the HLSEVEN service, do the following:

```
TCPIP>DISABLE SERVICE HLSEVEN
```

6.2. Remove the HL7 TCP/IP Service(s)

For example, to remove the HLSEVEN service, do the following:

```
TCPIP> SET CONFIG ENABLE NOSERVICE   HLSEVEN
TCPIP> SET NOSERVICE   HLSEVEN
```

6.3. Modify the existing HLSEVEN User

Modify the existing HLSEVEN user and ensure that the CAPTIVE flags are not enabled. Here is an example:

```
$ MC AUTHORIZE
UAF> MODIFY HLSEVEN /FLAGS=(NOCAPTIVE)
%UAF-I-MDFYMSG, user record(s) updated
UAF> EXIT
%UAF-I-DONEMSG, system authorization file modified
```

In the example above, you optionally changed the User Identification Code (UIC) . It is important to point out that if you do this, you must change the IDENTIFIER accordingly so that the HLSEVEN identifier

corresponds to the new UIC. In addition, you must change both the OWNER_UIC of the [HLSEVEN] directory and any files inside that directory. You should end up with a HLSEVEN UAF entry similar to what is described in the Caché/VMS sites section.

6.4. Create a DCL Login Command Procedure HLS5000CACHE

Create a DCL command procedure file in the home directory for HLSEVEN account and name it according to the recommended convention.

For your convenience, you can cut and paste the following DCL login command procedure file into your OpenVMS HLSEVEN device and directory. Also, you can download the file from the sites listed in section 2.2.1.

Sample DCL Login Command Procedure file follows next:

```
$! HLS5000CACHE.COM - for incoming tcp connect requests with port=5000 and
$! using "cache" commnad line to enter the M environment
$! File name HLS5000CACHE.COM is recommended to be changed to reflect the
$! change of the TCPIP port number.  For example, file name could be
$! changed to HLS6788CACHE.COM if port=6788.
$!
$!this file is copied and modifed from HLSEVEN.COM
$! Revision History:
$! Patch HL*1.6*19 & HL*1.6*56--Documentation only
$! Patch HL*1.6*70--HL71_6P70.COM
$! Patch HL*1.6*84--HLS5000CACHE.COM and HLS5000DSM.COM
$!-----------------------------------------------------------
$ set noon         !Don't stop
$ set noverify     !change as needed
$! set verify      !change as needed
$ purge/keep=5 sys$login:*.log !Purge log files only
$ set proc/priv=(share)  !Required for MBX device
$ x=f$trnlnm("sys$net")  !This is our MBX device
$!
$ write sys$output "Opening "+x !This can be viewed in the log file
$! Check status of the BG device before going to either DSM or Cache'
$ cnt=0
$ CHECK:
$ stat=f$getdvi("''x'","STS")
$ if cnt .eq. 10
$ then
$ write sys$output "Could not open ''x' - exiting"
$ goto EXIT
$ else
$    if stat .ne. 16
$    then
$    cnt=cnt+1
$    write sys$output "''cnt'> ''x' not ready!"
$    wait 00:00:01 !Wait one second to assure connection
$    goto CHECK
$    else
$    write sys$output "''x' is now ready for use - entering DSM or Cache"
$!-----------------------------------------------------------
$! **START OF INFORMATION ONLY SECTION**
$! This section describes the basic commands for starting a generic
$! listener.
$! For DSM, replace 5000 below with the actual port number, and change
```

```
$! the file name to reflect the change of the port number as recommended
$! above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" port^hlcstcpa
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! port=port number
$! cache "-U" "VAH" "port^hlcstcpa"
$! **END OF INFORMATION ONLY SECTION**
$!----------------------------------------------------------------
$! **Be sure the command line(s) in the COMMAND LINE SECTION
$! **below is correct for your system and if access control is enabled,
$! **that this account has access to this uci,vol & routine.
$! **An entry in file 870 for this logical link with the specified
$! **unique port number and its device type as "MS"(Multi-threaded
$! **server) must be existed.
$!
$!----------------------------------------------------------------
$! COMMAND LINE SECTION:
$! ====================
$!----------------------------------------------------------------
$! for DSM, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^5000" PORT^HLCSTCPA
$!----------------------------------------------------------------
$! For Cache, replace 5000 below with the actual port number, and change
$! the file name to reflect the change of the port number as recommended
$! above.
$ PORT=5000
$ cache "-U" "VAH" "PORT^HLCSTCPA"
$ endif
$ exit:
$ logout/brief
```

6.5. Set Up and Enable the TCP/IP Service

6.5.1. Set up the TCP/IP Service

❑ Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

❑ It is possible to run the TCP/IP service on multiple nodes. This may or may not be necessary, depending on your site's configuration needs. For instance, the impersonator VMS feature allows for the possibility of all nodes in the cluster to become the surrogate. This allows for the listening process uninterrupted if the TCP/IP service is enabled on all nodes in the cluster. For this reason, it is recommended that you enable the TCP/IP service on all nodes in the cluster.

Ensure that your new TCP/IP service uses the recommended naming convention. To set up a service that will be listening on port 5000 and use a corresponding DCL login command file HLS5000CACHE.COM,

Set the service name as HLS5000CACHE as follows:

$ TCPIP (must use continuation character "-" at end of long lines)

```
TCPIP> SET SERVICE HLS5000CACHE/USER=HLSEVEN/PROC=HLS5000CACHE /PORT=5000-
_TCPIP> /PROTOCOL=TCP/REJECT=MESSAGE="All channels busy" -
_TCPIP> /LIMIT=50/FILE=USER$:[HLSEVEN]HLS5000CACHE.COM
```

ℹ️ ❑ If you get an error because you mistyped any of the above lines or forgot to use the continuation character "-", we suggest you do the following to remove the corrupted service and repeat the above commands.

```
        TCPIP> SET CONFIG ENABLE NOSERVICE   HLS5000CACHE
        TCPIP> SET NOSERVICE   HLS5000CACHE
```

```
TCPIP> SHO SERVICE HLS5000CACHE/FULL

Service: HLS5000CACHE
                        State:     Disabled
Port:           5000    Protocol:  TCP           Address:  0.0.0.0
                        User_name: not defined   Process:  HLS5000CACHE
```

6.5.2.   Enable and Save the TCP/IP Service

Since TCP/IP Services is node specific, make sure you are on the same node that you want the listener to run on.

```
TCPIP> ENABLE SERVICE HLS5000CACHE                (enable service immediately)
TCPIP> SET CONFIG ENABLE SERVICE HLS5000CACHE    (save service for reboot)
TCPIP> SHO SERVICE/FULL HLS5000CACHE

Service: HLS5000CACHE
                        State:     Enabled
Port:             5000  Protocol:  TCP           Address:  0.0.0.0
Inactivity:          5  User_name: HLSEVEN        Process:  HLS5000CACHE
Limit:              50  Active:     0            Peak:        0

File:           USER$:[HLSEVEN] HLS5000CACHE.COM
Flags:          Listen

Socket Opts:  Rcheck Scheck
 Receive:               0     Send:                0

Log Opts:     None
 File:        not defined

Security
 Reject msg:  All channels busy

 Accept host: 0.0.0.0
 Accept netw: 0.0.0.0

TCPIP> SHO CONFIG ENABLE SERVICE

Enable service
     FTP, FTP_CLIENT, HLS5000CACHE, MPI, TELNET, XMINETMM
TCPIP> EXIT
```

You are now ready to migrate to Caché. Perform the necessary steps for migration including any backups, disk conversions and shutdown of DSM.

After the migration is complete and Caché is activated for use, remember to enable the HL7 TCP/IP service(s), if you have not already done so.

❑ If you've enabled the impersonator VMS feature, it is recommended that you enable the HL7 TCP/IP service(s) on all nodes in the cluster.

HL7 Multi-Listener/TCP/IP: Supplement to Patch Description
Patch HL*1.6*84

7. APPENDIX

7.1. HLSEVEN.COM DCL Login Command Procedure

This DCL login command procedure file, HLSEVEN.COM, is included in the appendix for reference. This command procedure is no longer recommended as it is being replaced by command procedures that use the actual port number of its corresponding TCP/IP service.

```
$!HLSEVEN.COM - for incoming tcp connect requests
$! Revision History:
$! Patch HL*1.6*19 & HL*1.6*56--Documentation only
$! Patch HL*1.6*70--HL71_6P70.COM
$! Patch HL*1.6*84--HL71_6P84.COM
$!------------------------------------------------------------
$ set noon          !Don't stop
$ set noverify      !change as needed
$! set verify       !change as needed
$ purge/keep=5 sys$login:*.log !Purge log files only
$ set proc/priv=(share)  !Required for MBX device
$ x=f$trnlnm("sys$net")   !This is our MBX device
$!
$ write sys$output "Opening "+x !This can be viewed in the log file
$! Check status of the BG device before going to either DSM or Cache'
$ cnt=0
$ CHECK:
$ stat=f$getdvi("''x'","STS")
$ if cnt .eq. 10
$ then
$ write sys$output "Could not open ''x' - exiting"
$ goto EXIT
$ else
$       if stat .ne. 16
$       then
$       cnt=cnt+1
$       write sys$output "''cnt'> ''x' not ready!"
$       wait 00:00:01 !Wait one second to assure connection
$       goto CHECK
$       else
$       write sys$output "''x' is now ready for use - entering DSM or Cache"
$!------------------------------------------------------------
$! **START OF INFORMATION ONLY SECTION**
$! This section describes the basic commands for starting a generic listener.
$! for DSM TCP/IP
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^999" en^routine
$! for Cache TCP/IP
$! assign  'f$trnlnm("SYS$NET")' SYS$NET
$! ccontrol session <configname> "-U" "namespace" "tag^routine"
$! For a Cache batch routine
$! cache "-U" "VAH" "^routine"
$! **END OF INFORMATION ONLY SECTION**
$!------------------------------------------------------------
$! **Be sure the command line(s) in the COMMAND LINE SECTION
$! **below is correct for your system and if access control is enabled,
$! **that this account has access to this uci,vol & routine.
$! **The number 999 should be replaced with the internal entry
```

```
$! **number in file 870 for this Logical Link.
$!
$! **Also, comment or uncomment the appropriate lines for your system.
$!
$!-------------------------------------------------------------
$! COMMAND LINE SECTION:
$! ====================
$!-------------------------------------------------------------
$! for DSM
$! dsm/env=dsmmgr/uci=vah/vol=rou/data="''x'^999" EN^HLCSTCP
$!-------------------------------------------------------------
$! for Cache
$ assign  'f$trnlnm("SYS$NET")' SYS$NET
$ pipe (write sys$output "D CACHEVMS^HLCSTCP(""999"")" | cache -"U" "VAH")
$!-------------------------------------------------------------
$       endif
$ exit:
$ logout/brief
$
```

8. GLOSSARY

ACL	Access Control List
CALLABLE ENTRY POINT	Authorized programmer call that may be used in any V*IST*A application package. The DBA maintains the list of DBIC-approved entry points.
DATA	A representation of facts, concepts, or instructions in a formalized manner for communication, interpretation, or processing by humans or by automatic means. The information you enter for the computer to store and retrieve. Characters that are stored in the computer system as the values of local or global variables. VA FileMan fields hold data values for file entries.
DBA	Database Administrator, oversees package development with respect to V*IST*A Standards and Conventions (SAC) such as namespacing. Also, this term refers to the Database Administration function and staff.
DBIA	Database Integration Agreement, a formal understanding between two or more V*IST*A packages, which describes how data is shared or how packages interact. The DBA maintains a list of DBIAs.
DCL	Digital Command Language
DEFAULT	Response the computer considers the most probable answer to the prompt being given. It is identified by double slash marks (//) immediately following it. This allows you the option of accepting the default answer or entering your own answer. To accept the default you simply press the Enter (or Return) key. To change the default answer, type in your response.
DEPARTMENT OF VETERANS AFFAIRS	The Department of Veterans Affairs, formerly called the **V**eterans **A**dministration.
DSM	Digital Standard MUMPS
ENTRY	VA FileMan record. It is uniquely identified by an internal entry number (the .001 field) in a file.
FIELD	In a record, a specified area used for the value of a data attribute. The data specifications of each VA FileMan field are documented in the file's data dictionary. A field is similar to blanks on forms. It is preceded by words that tell you what information goes in that particular field. The blank, marked by the cursor on your terminal screen, is where you enter the information.
FILE	Set of related records treated as a unit. VA FileMan files maintain a count of the number of entries or records.
FILE MANAGER (VA FILEMAN)	The V*IST*A's Database Management System (DBMS). The central component of the Kernel that defines the way standard V*IST*A files are structured and manipulated.
FORUM	The central E-mail system within V*IST*A. It is used by developers to communicate at a national level about programming and other issues. FORUM is located at the CIO Field Office - Washington, DC (162-2).
GLOBAL VARIABLE	Variable that is stored on disk (M usage).

HL7	Health Level Seven (HL7) is an application protocol for electronic data exchange in health care environments. The HL7 protocol is a collection of standard formats that specify the implementation of interfaces between computer applications from different vendors. This communication protocol allows healthcare institutions to exchange key sets of data amount different application systems. Flexibility is built into the protocol to allow compatibility for specialized data sets that have facility-specific needs.
HL7 BATCH PROTOCOL	Protocol utilized to transmit a batch of HL7 messages. The protocol uses FHS, BHS, BTS and FTS segments to delineate the batch.
KERNEL	Set of **V**ISTA software routines that function as an intermediary between the host operating system and the **V**ISTA application packages such as Laboratory, Pharmacy, IFCAP, etc. The Kernel provides a standard and consistent user and programmer interface between application packages and the underlying M implementation.
LINK	Non-specific term referring to ways in which files may be related (via pointer links). Files have links into other files.
MENU	List of choices for computing activity. A menu is a type of option designed to identify a series of items (other options) for presentation to the user for selection. When displayed, menu-type options are preceded by the word "Select" and followed by the word "option" as in Select Menu Management option: (the menu's select prompt).
MESSAGE	A message is the atomic unit of data transferred between systems. It is comprised of a group of segments in a defined sequence. Each message has a message type that defines its purpose. For example, the ADT Message type is used to transmit portions of a patient's ADT data from one system to another. A three-character code contained within each message identifies its type.
MESSAGE TYPE	Each message has a message type that defines its purpose. For example, the ADT Message Type is used to transmit portions of a patient's ADT data from one system to another. A 3-character code contained within each message identifies its type.
NAMESPACING	Convention for naming **V**ISTA package elements. The DBA assigns unique character strings for package developers to use in naming routines, options, and other package elements so that packages may coexist. The DBA also assigns a separate range of file numbers to each package.
NT	New Technology
OPTION	An entry in the OPTION file. As an item on a menu, an option provides an opportunity for users to select it, thereby invoking the associated computing activity. Options may also be scheduled to run in the background, non-interactively, by Task Manager.
PACKAGE	The set of programs, files, documentation, help prompts, and installation procedures required for a given software application. For example, Laboratory, Pharmacy, and PIMS are packages. A **V**ISTA software environment composed of elements specified via the PACKAGE file (#9.4). Elements include files and associated templates, namespaced routines, and namespaced file entries from the OPTION, HELP FRAME, BULLETIN, and FUNCTION files. As public domain software, packages may be requested through the Freedom of Information Act (FOIA).
POINTER	The address at which a data value is stored in computer memory. A relationship between two VA FileMan files, a pointer is a file entry that references another file (forward or backward). Pointers can be an efficient means for applications to access data by referring to the storage location at which the data exists.

PROMPT	The computer interacts with the user by issuing questions called prompts, to which the user issues a response.
RECORD	Set of related data treated as a unit. An entry in a VA FileMan file constitutes a record. A collection of data items that refer to a specific entity (e.g., in a name-address-phone number file, each record would contain a collection of data relating to one person).
ROUTINE	Program or a sequence of instructions called by a program that may have some general or frequent use. M (previously referred to as MUMPS) routines are groups of program lines, which are saved, loaded, and called as a single unit via a specific name.
SAC	Standards and Conventions. Through a process of verification, V*IST*A packages are reviewed with respect to SAC guidelines as set forth by the Standards and Conventions Committee (SACC). Package documentation is similarly reviewed in terms of standards set by the Documentation Standards and Conventions Committee (DSCC).
SACC	V*IST*A 's Standards and Conventions Committee. This Committee is responsible for maintaining the SAC.
SEGMENT	An HL7 segment is a logical grouping of data fields. Segments of a message may be required or optional. They may occur only once in a message or they may be allowed to repeat. Each segment is identified by a unique three-character code known as the Segment ID.
SEGMENT (RECORD)	A typed aggregate of fields (fields) describing one complete aspect of a message. For example, the information about one order is sent as type of segment (OBR), the information related to an observation is sent as another segment (OBX). The segment in a message is analogous to a record in a database, and in previous versions of the standard we used record in place of the word segment. We have changed the nomenclature to be consistent with HL7 and other standards organizations in this version.
TCP/IP	**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol
TEMPLATE	Means of storing report formats, data entry formats, and sorted entry sequences. A template is a permanent place to store selected fields for use later. Edit sequences are stored in the INPUT TEMPLATE file (#.402), print specifications are stored in the PRINT TEMPLATE file (#.4), and search or sort specifications are stored in the SORT TEMPLATE file (#.401).
VA	The Department of Veterans Affairs, formerly called the Veterans Administration.
VA FILEMAN	Set of programs used to enter, maintain, access, and manipulate a database management system consisting of files. A package of online computer routines written in the M language, which can be used as a stand-alone database system or as a set of application utilities. In either form, such routines can be used to define, enter, edit, and retrieve information from a set of computer stored files.
VARIABLE	Character, or group of characters, that refers to a value. M (previously referred to as MUMPS) recognizes 3 types of variables: local variables, global variables, and special variables. Local variables exist in a partition of main memory and disappear at sign-off. A global variable is stored on disk, potentially available to any user. Global variables usually exist as parts of global arrays. The term "global" may refer either to a global variable or to a global array. A special variable is defined by systems operations (e.g., $TEST).

V*IST***A** Veterans Health Information Systems and Technology Architecture (**V***IST***A**) (formerly the Decentralized Hospital Computer Program [DHCP]) of the Veterans Health Administration (VHA), Department of Veterans Affairs (VA). **V***IST***A** software, developed by VA, is used to support clinical and administrative functions at VA Medical Centers nationwide. It is written in M, and, via the Kernel runs on all major M implementations regardless of vendor. **V***IST***A** is composed of packages, which undergo a verification process to ensure conformity with namespacing and other **V***IST***A** standards and conventions.

VMS Virtual Memory System