

# Chapter 16

## *Instant Capacity (iCAP)*



***HP-UX Handbook  
Revision 13.00***

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## Introduction

HP Instant Capacity software provides the ability to instantly increase or decrease computing capacity on specified HP enterprise servers. It is a part of the HP Utility Pricing Solutions program.

With Instant Capacity, you initially purchase an HP enterprise server with a specified amount of active processing capacity, and a specified amount of inactive processing capacity. Processing capacity consists of the system components:

- Processors containing cores
- Cell boards
- Memory

For each type of component, the number of components that can be active is equal to the number of usage rights applied to the complex for that type of component. Components that are purchased with a part number identifying them as “Instant Capacity” and without the label “Right to Use” come without usage rights. Components that are not labeled “Instant Capacity” implicitly include usage rights that can be applied to any component of that type that is installed on the complex.

Prior to activation of an inactive component, you must obtain additional usage rights. The fundamental method is to purchase usage rights by purchasing the appropriate Instant Capacity products that include the label “Right to Use (RTU)”. HP then supplies an RTU codeword. When the codeword is applied to the HP enterprise server, the inactive component can be activated.

Additional methods for activating components for which usage rights have not been purchased include:

- TiCAP – temporary use of iCAP hardware components
- IAC – Instant Access Capacity (TiCAP included with purchase)
- GiCAP – allows to share capacity between different servers

Most of the provided information is collected from several sources, especially from the HP Instant Capacity User Guide and the HP Instant Capacity Release Notes, available at [www.hp.com/go/hp-icap-docs](http://www.hp.com/go/hp-icap-docs). Please note that this chapter should only be used as short reference and is not designed to replace the complete and official guides.

Instant Capacity must be run on a partitionable system. In an Integrity Virtual Machines (VM) environment, Instant Capacity software provides meaningful functionality only on the VM Host system; it does not run on a virtual machine (also known as a “guest”).

Instant Capacity consists of the following main elements:

- Instant Capacity system hardware (including cells, cores, and memory)

- Instant Capacity software
- Utility Pricing Solutions Portal
- Instant Capacity Administration System
- Instant Capacity database
- Other system management commands

### Program Requirements

To participate in the Instant Capacity version 10.x program, you must comply with the following conditions of the HP Utility Pricing Solutions program:

- Maintain the HP Instant Capacity software on each HP-UX or OpenVMS partition in the system. The Instant Capacity software is a non intrusive, low-overhead software module that resides on the partition.
- Migrate to later Instant Capacity software versions as they become available. For specifics about your individual program requirements, see the Utility Pricing Solutions contract from HP or your authorized channel partner.

**IMPORTANT:** Participants in the Utility Pricing Solutions program who do not meet these requirements might be in breach of contract. This can result in unnecessary expense for both the program participant and HP.

## iCAP Software and Hardware Requirements

### Hardware Requirements

Operating System Version	Software and Version	Supported Hardware Platform – HP Integrity	Supported Hardware Platform – HP 9000
HP-UX 11i v1	iCAP B.11.11.09.02.00 (B9073BA)	Not supported.	<ul style="list-style-type: none"> <li>• Superdome</li> <li>• rp8440</li> <li>• rp8420</li> <li>• rp8400</li> <li>• rp7440</li> <li>• rp7420</li> <li>• rp7410</li> </ul>
HP-UX 11i v2	iCAP B.11.23.10.00.01	• Superdome	• Superdome

	(B9073BA)	<ul style="list-style-type: none"> <li>• rx8640</li> <li>• rx8620</li> <li>• rx7640</li> <li>• rx7620</li> </ul>	<ul style="list-style-type: none"> <li>• rp8420</li> <li>• rp8400</li> <li>• rp7420</li> <li>• rp7410</li> </ul>
HP-UX 11i v3	iCAP B.11.31.10.03.00.00 (B9073BA)	<ul style="list-style-type: none"> <li>• HP Integrity Superdome 2</li> <li>• Superdome</li> <li>• rx8640</li> <li>• rx8620</li> <li>• rx7640</li> <li>• rx7620</li> </ul>	<ul style="list-style-type: none"> <li>• Superdome</li> <li>• rp8440</li> <li>• rp8420</li> <li>• rp8400</li> <li>• rp7440</li> <li>• rp7420</li> <li>• rp7410</li> </ul>

## Software requirements HP-UX 11.11

- HP-UX 11i v1
- iCAP software bundle B9073BA (version 9.x or later)
- The kernel configuration must include the diag2 module.
- WBEM B8465BA bundle (version A.02.05 or higher)
- nParProvider bundle (version B.12.01.06.02 or higher, available from the OE media)
- If you have a virtual partitioned environment, the Virtual Partitions (vPars) software (bundle T1335AC) must be version A.03.05 or higher. vPars is available separately and is not included with the OE.
- (GiCAP only) The CIM Server configuration property sslClientVerificationMode must be set to a value of “optional” on all GiCAP Group Managers and on all OS instances of all member systems.
- Patches:
  - PHKL\_22987: S700\_800 11.11 pstat() patch (only if your system runs MeasureWare)
  - PHKL\_23154: S700\_800 11.11 dflush() patch
  - PHKL\_25218: S700\_800 11.11 PDC Call retry, PDC\_SCSI\_PARMS, iCOD hang fix
  - PHKL\_26232: S700\_800 11.11 Psets Enablement patch, FSS iCOD patch
  - PHKL\_30197: S700\_800 11.11 Psets & vPar, Reboot hangs, serial number
  - PHCO\_24396: S700\_800 11.11 /etc/default/tz patch
  - PHCO\_24477: S700\_800 11.11 sar (1M) patch
  - PHCO\_29832: S700\_800 11.11 reboot(1M) patch
  - PHCO\_29833: S700\_800 11.11 killall(1M) patch

For the most recent required patches, see the Instant Capacity Installation page on the HP Software Depot (search for “B9073BA”).

## Software requirements HP-UX 11.23

- HP-UX 11i v2
- iCAP software bundle B9073BA (version 10.x)
- The kernel configuration must include the diag2 module.
- WBEM B8465BA bundle (version A.02.05 or higher)
- nParProvider bundle (version B.23.01.06.02 or higher, available from the OE media)
- If you have a virtual partitioned environment, the Virtual Partitions (vPars) software (bundle T1335BC) must be version A.04.01 or higher. vPars is available separately and is not included with the OE.
- (GiCAP only) The CIM Server configuration property sslClientVerificationMode must be set to a value of “optional” on all GiCAP Group Managers and on all OS instances of all member systems.

NOTE: On HP-UX 11i v2 systems, updated firmware might be required by the nPar or Virtual Partition software, as documented for these products.

- Patches:
  - PHKL\_33752: S700\_800 11.23 Itanium 2 Processor speed reporting patch  
(required only for IA systems)
  - PHCO\_34721: killall(1M) patch
  - PHKL\_35174: \_CS\_PARTITION\_IDENT patch  
(required for GiCAP on rx8640 and rx7640 systems)

For the most recent required patches, see the Instant Capacity Installation page on the HP Software Depot (search for “B9073BA”).

## Software requirements HP-UX 11.31

- HP-UX 11i v3
- iCAP software bundle B9073BA (version10.x)
- The kernel configuration must include the diag2 module.
- WBEMSVcs bundle (version A.02.05 or higher)
- nParProvider bundle (version B.31.01.07.01 or higher, available from the OE media)
- If you have a virtual partitioned environment, the Virtual Partitions (vPars) software (bundle T1335BC) must be version A.05.01 or higher. vPars is available separately and is not included with the OE.
- (GiCAP only) The CIM Server configuration property sslClientVerificationMode must be set to a value of “optional” on all GiCAP Group Managers and on all OS instances of all member systems.
- For Instant Capacity Version 10.00 and later, on HP-UX 11i v3 HP Integrity systems, patch PHCO\_40927 must be installed. This is a co-requisite.

HP OpenView measurement products, such as MeasureWare and GlancePlus, must be version C.02.60 or later to provide correct measurements. Earlier versions of the OpenView measurement products might not work correctly on Instant Capacity systems.

## Installing/Updating the iCAP Software

The following brief overview lists the steps for the installation and configuration of an iCAP system. Consult the official documentation for a full description.

The Instant Capacity software is installed by HP on all HP enterprise factory integrated servers, even those without Instant Capacity components. The Instant Capacity software is automatically installed when the HP-UX 11i v1, 11i v2, or 11i v3 Operating Environment (OE) is installed.

To verify the Instant Capacity software is installed on your system, execute the following HP-UX command:

```
# /usr/sbin/swlist -l product iCOD
```

Output similar to the following is displayed:

```
iCOD      B.11.31.10.03.00.06 Instant Capacity
```

To verify that the Instant Capacity software installation has not been corrupted, execute the following HP-UX command:

```
# /usr/sbin/swverify iCOD
```

The command will display the message “Verification succeeded”.

If you do need to install the Instant Capacity software, it is available from the following media/location:

- HP software depot at <http://www.hp.com/go/softwaredepot>
- HP-UX 11i v3 Operating Environments (OE) media
- HP-UX 11i v2 Applications Software media
- HP-UX 11i v1 Applications Software media

After you have successfully installed the Instant Capacity software using the swinstall command, perform the following procedure to validate your installation:

1. Execute the icapstatus command:

```
# /usr/sbin/icapstatus
```

2. Verify that the icapstatus command output indicates the correct number of components without usage rights for cells, cores, and memory. If any number is incorrect, contact your local HP Response Center and request iCAP assistance.

3. Log in as root

4. HP recommends that you specify a system contact's email address on each partition in your system. Set the system contact information by entering the following command:

```
# /usr/sbin/icapmodify -c <contact_email_address>
```

5. If you want to configure asset reporting, then ensure that outgoing mail can be sent to HP mail servers from your system, even if the system is behind a firewall.

Test the transmission of your asset report, via email to HP, by entering the following command:

```
# /usr/sbin/icapnotify <reply_address>
```

The icapnotify command sends an asset report to HP, root, and the supplied reply address.

HP responds with an email to the reply address after the asset report is received. Use an email client to verify the return email from HP to the reply email address.

**IMPORTANT:** Do not attempt to remove the Instant Capacity software.

## Activating and deactivating iCAP CPUs

To activate new cores check if there are unassigned cores with available usage rights.

```
# /usr/sbin/icapstatus
```

Look for "Additional cores that can be activated/assigned with current usage rights".

There are different ways to activate these cores:

- Immediately by using

- ```
# /usr/sbin/icapmodify -a <# of cores> [desc[:user_name]]
```
- Deferred until the next reboot by using

```
# /usr/sbin/icapmodify -a <# of cores> -D [desc[:user_name]]
```

Unless you have a balance of Instant Access Capacity (IAC) or temporary capacity (or usage rights available from a GiCAP group), you must purchase additional usage rights before activation of an inactive core. If there are no cores with available usage rights:

1. Purchase a RTU (Right To Use) or a TiCAP product. Keep in mind that it may take some time for an order to be listed on the iCAP portal.
2. Acquire an RTU codeword from the iCAP portal located at <http://www.hp.com/go/icap/portal>. The output of “`icapstatus -s`” and the Sales Order Number are needed. You do not need to apply the complete order at once or even to a single system.
3. Apply the RTU codeword using the command:  
`# /usr/sbin/icapmodify -C <codeword>`
4. Activate the number of new cores needed using the command:  
`# /usr/sbin/icapmodify -a <# of cores> [desc[:user_name]]`  
to immediately activate the cores or  
`# /usr/sbin/icapmodify -a <# of cores> -D [desc[:user_name]]`  
to defer the activation until the next reboot.

Ensure that all HP and third party software has the proper licensing for the number of cores activated. If an application is running when an additional core is activated, it may not recognize the newly activated core as available for processing. It is recommended to restart the application in this case.

To deactivate a number of cores choose between instant and deferred activation. The commands are:

- Immediately by using:  
`# /usr/sbin/icapmodify -d <# of cores> [desc[:user_name]]`
- Deferred until the next reboot by using:  
`# /usr/sbin/icapmodify -d <# of cores> -D [desc[:user_name]]`

Note: Pending deferred activation/deactivation of cores may be overridden by using `icapmodify` again.

If an active core fails with a Low Priority Machine Check (LPMC) in a partition with Instant Capacity, its processing capacity is replaced instantly by an inactive core, if any are available in

the partition. The exception is the monarch processor as it cannot be deactivated by the LPMC monitor. The failed core is marked for deconfiguration during the next system reboot.

If an active core fails with a High Priority Machine Check (HPMC), then upon reboot the failed core is deconfigured and its processing capacity is instantly replaced by an inactive core, if any are available in the partition.

## Activating and Deactivating iCAP cells and memory

An appropriate Right to Use (RTU) codeword is required to activate new cell boards. Purchase the RTU for the cell as well as the usage right for all of the memory of the cell board as you cannot activate a cell without activating all memory on that cell. Depending on the available number of core RTUs in the complex you may also need additional RTUs for cores. An active cell board must have a minimum of 1 active core.

However, when a **new** partition is created via the parcreate command, core usage rights must be available for *all* cores configured on the new partition's cells, and core usage rights are automatically assigned to these new cells.

To activate a cell board:

1. Purchase RTU (Right To Use) for cell(s), the entire amount of iCAP memory on the cell board and any cores (if needed).
2. Acquire the RTU codewords from the iCAP portal located at <http://www.hp.com/go/icap/portal>. The output of “`icapstatus -s`” and the Sales Order Number are needed.
3. Apply the RTU codewords using the command:  
`# /usr/sbin/icapmodify -C <codeword>`
4. Activate the new cell board using the command:  
`# /usr/sbin/parmodify -p <partition #> -m <cabinet>/<cell #>::y::y:`
5. Reboot the nPartition.

Or

1. Create a new partition using the command:  
`# parcreate -P <partition name> -c <cabinet #>/<cell #>:base:y:ri`

## 2. Install the OS and iCAP software

To deactivate the cell board set the cell board's use-on-next-boot flag to no:

```
# /usr/sbin/parmodify -p <partition #> -m <cabinet>/<cell>::n:
```

Reboot the nPartition, or (on HP-UX 11.31 OEUR 0709 or later) perform a Cell Online Deactivation. This step is not necessary if there was no reboot after the activation.

Any cell board can be assigned to an nPartition with the use-on-next-reboot flag set to "n" (no), whether usage rights are available for activation or not.

## Temporary Instant Capacity – TiCAP

You can purchase an amount of temporary capacity (TiCAP) time for inactive cores without usage rights in your Instant Capacity system. Temporary capacity can be purchased in units of 30 processing days. Temporary capacity allows one or more inactive cores to be activated for up to the specified period of prepaid processing time, without requiring permanent usage rights for the cores. You can also temporarily activate one or more cores using the Instant Access Capacity (IAC) provided with the purchase of Instant Capacity processors.

To use TiCAP or IAC:

1. Acquire a TiCAP or IAC codeword from the iCAP web portal located at <http://www.hp.com/go/icap/portal>.

2. Apply the IAC / TiCAP codeword using the command:  
`# /usr/sbin/icapmodify -C <codeword>`

3. Activate the number of new cores needed using the command:

```
# /usr/sbin/icapmodify -t -a <# of cores> [desc[:user_name]]  
to immediately activate the cores
```

```
# /usr/sbin/icapmodify -t -a <# of cores> -D [desc[:user_name]]  
to defer the activation until the next reboot
```

Note: Ensure that all HP and third party software has the proper licensing for the number of cores activated. If an application is running when an additional core is activated, it may not recognize

the newly activated core as available for processing. It is recommended to restart the application in this case.

Temporary capacity activations are persistent. You need to deactivate cores to stop consumption of temporary capacity. The core deactivation does not need to be on the same partition as the one where they have been activated. If temporary capacity is depleted and still more cores are active than usage rights are applied, during the next reboot of any partition in the complex software will automatically deactivate cores in order to bring the system into a state closer to compliance. If there is a negative balance of TiCAP the exception information is also written to the /var/adm/syslog/syslog.log file.

To get a notification before TiCAP is deleted, a warning period may be specified with the command:

```
# icapmodify -w <warning period in days>
```

By default an expiration reminder is sent 15 days before TiCAP is projected to expire. If the TiCAP balance should be listed on the iCAP portal, e-mail connectivity to HP needs to be configured. The listed amount of available TiCAP time is decreased in amount of 30 minutes per activated core – after the time is consumed.

If you shut down a partition for 12 hours or more, it should be powered off or deactivated to avoid additional charges. To power off the partition, execute the PE command from the system MP.

On HP-UX systems, always use the shutdown -R -H command when shutting down or rebooting an Instant Capacity partition. If the partition is already shut down, use the “rr” command from the system MP to reset cells for reconfiguring.

## Global Instant Capacity – GiCAP

With GiCAP capacity can be shared not only within a complex but within a group of servers. It also provides pooled TiCAP time across the group. A Global Instant Capacity (GiCAP) group consists of a list of server and/or complexes that are allowed to share Instant Capacity usage rights (for cores, cell boards, and memory) and temporary capacity.

For each group, an HP-UX system must be designated as the Global Instant Capacity Group Manager, which is the system that maintains information about the group, group resources and the grouping rules. A GiCAP Group is managed using the icapmanage command. The system running the Group Manager does not need to have any iCAP components nor does it need to be a partitionable system. A Group Manager cannot run on a virtual machine guest. The system must

have a machine-readable serial number, as displayed by the command:

```
# getconf CS_MACHINE_SERIAL
```

To use GiCAP purchase a special GiCAP Sharing Rights codeword. After purchase, the codeword can be retrieved from the iCAP Portal at <http://www.hp.com/go/icap/portal>. To acquire the codeword provide:

- Serial number of the Group Manager system
- Partition information for the Group Manager
- Sales order number

Applying this codeword on a HP-UX system running iCAP enables the creation of a GiCAP Group with members.

In order to use GiCAP the following requirements must be fulfilled:

- All partitions on all servers in the group must be running Instant Capacity version 9.0 or later.
- Every GiCAP group member must be hardware-compatible with other GiCAP group members as determined by the GiCAP grouping rules.
- The active Group Manager must be an HP-UX system running Instant Capacity software version 9.0 or later.
- WBEM version A.02.05 or higher must be installed on the Group Manager and on all member systems in order to use GiCAP. The CIM Server configuration property sslClientVerificationMode must be set to a value of “optional” on all GiCAP Group Managers and on all OS instances of all member systems.

Unlike other iCAP code words, GiCAP code words must be generated for and applied to a specific partition, if the Group Manager is on a partitionable system.

Use the “icapmanage -s” command on the Group Manager system to get the serial number and the nPAR ID, or vPAR code that if applicable.

Here is a short description how to create a new group and add members to that group.

- The first step is to create the new group. This is done using the command:

```
# icapmanage -a -g <groupname>
```

- The next step is to download and apply the grouping rules. The rules must be downloaded from the iCAP Portal <http://www.hp.com/go/icap/portal>. They are defined based on a server class. To install the encrypted rules on the Group Manager system by issuing the command:

```
# icapmanage -i -U <full path to rulefile>
```

- To view the hardware grouping information, run the command:

```
# icapmanage -R
```

- Now the members need to be added by specifying the name for the new member along with a list of hosts. Specify an OS instance (host) for each nPartition or virtual partition of the complex (do not specify virtual machine or guest OS instances). A member of a group must encompass all nPar and vPar OS instances of a complex, and each OS instance specified as a host must be accessible (ping-able) in order for the command to succeed. To add members issue the command:

```
# icapmanage -a -m <member name>:<member hostnames> <groupname>
```

When you first add new members to a group, you will be prompted for the root password for each specified host. The password is used only to establish secure communication and is not saved or stored.

- When adding groups to a Group Manager system, the compatibility for one or more host systems can be tested in order to determine which groups the system can join.

```
# icapmanage -T <member hostname> -g <groupname>
```

Each member that joins the group decreases the available GiCAP sharing rights by the number of cores without usage rights contributed by that member complex.

You can create multiple GiCAP groups that can be managed by the same Group Manager or by different Group Manager systems. Systems with no any Instant Capacity components can be part of a GiCAP group. Deactivating resources on these systems allows them to loan usage rights to other members in the group.

A server complex can only be a member of a single GiCAP group at a time. In order to participate in a different group, it must be removed from its group before being added to the other group.

A larger number of group members can cause an increase in startup time for the Group Manager and can also affect the performance of icapmodify commands when a transfer of usage rights occurs. If temporary capacity is being used, then the size of the group may also increase the amount of communication time needed for tracking of temporary capacity.

### Removing a GiCAP Group Member

Before removing a member from a GiCAP group, all the borrowed usage rights must be returned and all outstanding loans reclaimed.

When a member is removed from a group, some number of sharing rights are released and made available for future use. The number freed is equal to the number of cores without usage rights on the removed member.

- To remove a member from a group, issue the command  
`# icapmanage -r -m <member name>`
- To remove a group use the command  
`# icapmanage -r -g <groupname>`

### Group Manager Availability

If the active Group Manager becomes unavailable and a standby Group Manager is not defined or not used, management of the GiCAP group is unavailable until the Group Manager is restored or replaced. The GiCAP group members continue to operate as isolated Instant Capacity systems, using whatever usage rights and temporary capacity they had available when the Group Manager became unavailable. A GiCAP group member using borrowed usage rights can continue using those usage rights. A GiCAP group member that has loaned usage rights to other members in the GiCAP group cannot recover those usage rights until the Group Manager is restored.

If the active Group Manager system becomes unavailable and a standby Group Manager has previously been defined, the standby Group Manager can be used to take over GiCAP group operations from the Group Manager.

When a member system is reconfigured by adding or deleting an nPartition, you must first remove the system from the group, add or delete the nPartition, and then re-add the member to the group specifying all nPartitions.

If the Group Manager is run on a partitionable system, changing the configuration of the partitions may result in the Group Manager becoming inoperative.

When a failure occurs on a partition in an active group member, use the “`icapmanage -x`” command to acquire core usage rights from the specified host to make them available to other group members. This is known as rights seizure. The specified host must be known to the GiCAP Group Manager (it appears in the output of the `icapmanage -s` command) and not currently running. The “`icapmanage -x`” operation can be performed once for each hard partition on the member.

On a system with full usage rights, the `icapd` daemon does not constantly verify the system configuration. It can take up to 12 hours for each partition of a system converted from non-iCAP to iCAP to discover that it is now an iCAP system. To force a faster conversion, kill the `icapd` daemon and wait for it to restart.

## TiCAP for GiCAP systems:

Temporary capacity can be shared across servers for better efficiency and ease of use. Temporary capacity within a GiCAP group is always available to all members of a group without the need to purchase temporary capacity for each server. You can exercise some control over how “willing” each GiCAP member system is to share temporary capacity by setting its “temporary capacity warning period”.

Initially, only 30 minutes of temporary capacity are transferred per core activated with temporary capacity. Every 30 minutes the daemon determines whether temporary capacity is depleted and acquires more from the group as needed.

## iCAP In a Virtual Partition Environment

The minimum required versions of vPars software for HP-UX systems are as follows:

- HP-UX 11i v1: vPars version A.03.05
- □HP-UX 11i v2: vPars version A.04.01
- □HP-UX 11i v3: vPars version A.05.01

Each of these versions provides a virtual partition environment which is tightly integrated with Instant Capacity, making it less likely for a complex to be misconfigured or to violate contractual compliance.

The Instant Capacity software must be installed on all virtual partitions in an Instant Capacity system.

Cores that are not assigned to any virtual partition are considered inactive. Unassigned cores can be assigned (activated) or deassigned (deactivated) using either the icapmodify command or the vparmodify command:

- When usage rights freed by deactivating cores are to be used in a different nPartition, use the icapmodify command.
- When usage rights freed by deactivating cores are to be used by another virtual partition within the same nPartition, use the vparmodify command. The vparmodify command does not change the value for the number of intended active cores for the nPartition.

Deferred activations and deactivations are not supported in any vPar environment.

## Boot Time Compliance

A compliance check is performed whenever a virtual partition is booted. If the total number of cores assigned to all virtual partitions in the current vPar database exceeds the nPartition's intended active core count, the Instant Capacity software notifies the vPar monitor. The monitor prevents any virtual partition from booting until the user first performs a hard partition boot and then modifies either the vPar configuration or the Instant Capacity intended active count for the nPartition.

## psets on vPars

In a vPar environment, the Instant Capacity software passes the request for a core activation or deactivation to the vparmodify command.

With vPars version A.04.01 or later, vPars is pset-aware to some extent. With vPars versions earlier than A.04, no special consideration is given to psets from the vparmodify command's perspective.

## TiCAP and vPars

If temporary capacity is being consumed in any virtual partition environment, deactivating a core with the "vparmodify -d" command temporarily reduces the consumption of temporary capacity. Use the "icapmodify -d" command to immediately decrease or cease the use of temporary capacity.

## LPMC Deactivations in vPars

In a vPar environment, if the LPMC monitor deactivates a core, it automatically replaces the failing core with an Instant Capacity core from the free pool, if such a core is available. The failing core remains in the virtual partition until either the virtual partition or the virtual partition monitor is rebooted.

## iCAP e-mail requirements

Instant Capacity version B.07.x and later no longer require email connectivity or asset reporting. However, you can choose to configure it because it can be useful for viewing complex-wide asset information at the Utility Pricing Solutions portal.

The root user or the system contact if designated receives the following types of email notifications from the Instant Capacity software:

- Core activation or deactivation

- Compliance exception
- Temporary capacity expiration
- Instant Capacity enforcement
- Virtual partition boot time compliance
- Hardware incompatibility in a GiCAP group

Starting with iCAP version 8.02, asset reporting is turned off by default for new installations. If asset reporting is configured (icapnotify -a on), and the system has email connectivity to HP, these messages are sent to HP:

- icapnotify (on demand)
- System startup and system shutdown
- icapd (daily at noon)

The following are requirements for email connectivity:

- The Instant Capacity system or partition must have the sendmail utility installed and configured so that it can send email to the hp.com domain.
- The domain name in the Instant Capacity FROM email address, for the email sent from the Instant Capacity system to HP, must be DNS resolvable by HP.

The email is rejected by the mail servers at HP if, for email sent from the Instant Capacity system to HP, the domain name in the “From” field is not DNS resolvable by HP. Also, because asset reports are encrypted and must be decrypted at the HP portal, the decryption process might not work correctly if outgoing email sent from your system is automatically modified in any way, for example, to include a privacy notice.

If email connectivity to HP is not possible, this causes your system to be out of compliance with your Instant Capacity contract if you are using temporary capacity (TiCAP).

To verify e-mail connectivity:

- Send an email message from your system to an email address in the same domain (intranet).
- Send an email message from your system to an email address outside of your domain.
- Send an email message from your system to someone at HP.
- As root, execute the following command:

```
# /usr/sbin/icapnotify <reply_address>
```

This sends an email message to HP’s audit application. HP sends a confirmation email message to the *reply\_address*. Receipt of the confirmation email message confirms successful email configuration.

- If all the previous steps are successful, but asset reports are still not visible on the HP portal, examine your email configuration to determine whether outgoing messages are automatically being modified or appended.

## Troubleshooting iCAP

If iCAP does not work properly, the first steps are to verify the software is installed properly and all prerequisites are met:

- Verify that the Instant Capacity software is installed and not corrupted:

```
# /usr/sbin/swverify iCOD
```

- Verify that the status of your Instant Capacity system or partition is correct and gather system snapshot information. The snapshot information can be used to verify the status on the HP Utility Pricing Solutions portal:

```
# /usr/sbin/icapstatus  
# /usr/sbin/icapstatus -s
```

- Verify that the icapd daemon is running on the system or partition:

```
# ps -e | grep icapd
```

The following entry is added to /etc/inittab in order to have icapd start and respawn itself:

```
icap:23456:respawn:/usr/lbin/icapd # Instant Capacity daemon
```

If it is not running, view the system log file (syslog) for icapd error messages. This daemon is not started on hardware that is not supported under the Instant Capacity program.

- Make sure that the kernel driver diag2 is built into the kernel.
- Make sure that the nParProvider bundle is installed.
- Make sure that the required WBEM provider modules are installed and running. WBEM B8465BA bundle (version A.02.05 or higher) must be installed and the following provider modules must be loaded:

```
# /opt/wbem/bin/cimprovider -ls | more
```

| MODULE                | STATUS |
|-----------------------|--------|
| ...                   |        |
| HP_NParProviderModule | OK     |
| HP_iCODProviderModule | OK     |

|                                     |    |
|-------------------------------------|----|
| <code>HP_iCAPProviderModule</code>  | OK |
| <code>HP_GiCAPProviderModule</code> | OK |

- Make sure partition commands, such as parstatus, are working. For failures in virtual partitions, check the vPar commands such as vparstatus.
- Check the iCAP log file and syslog file for any error messages:  
`/var/adm/syslog/syslog.log`  
`/var/adm/icap.log`  
`/var/adm/icap.log.old`

### Compliance Exceptions

A complex can get out of compliance with the Instant Capacity contract if any of the following occurs (this can be verified from the "Instant Capacity Resource Summary" section of the `icapstatus` output or the Exception status returned by the same output):

- More cells are active than expected (not enough inactive cells).
- More memory is active than expected (not enough inactive memory).
- More cores are active than expected (not enough inactive cores).
- There is a negative temporary capacity balance.
- (GiCAP) Sharing rights are insufficient.
- (GiCAP) Hardware is added that is incompatible with the group.

This could happen under conditions such as:

- When a partition is at an EFI boot prompt on an Integrity server or BCH prompt on an HP 9000 server or at “vpmon” prompt (with no vPars booted) for both Integrity and HP 9000 servers
- Shutdown (without using the **-R -H** option with the **shutdown** command) of a partition
- icapd or cimserver daemons not running or responding correctly (for example, due to a file system full condition under `/var`) on a partition
- System experiences a hardware failure of the cell which has Inactive iCAP cores.
- Removing hardware on a system with iCAP cores.
- No HP-UX or OpenVMS installed in a partition where the number of Intended Active cores is less than the total number of cores in that partition.

For further details see the manual “*Maintaining Compliance on iCAP Systems*” and the technical white paper “*Script for Monitoring iCAP Systems*”.

Refer to the appendix of the current “*HP Instant Capacity user guide*” for special considerations such as:

- “Assumed Values in `icapstatus` Command”
- “Upgrading to Instant Capacity version B.06.x or later (HP-UX)”

- “Dual-Core Support in Instant Capacity Systems”
- “New Partition Creation and Instant Capacity”
- “Implications of Removing a Cell from an Instant Capacity System ”
- “Shutting Down a Partition with Instant Capacity Cores”
- “Instant Capacity and Reinitializing the nPartition (Genesis Partitions)”
- “par Commands from PC System Management Station”
- “Instant Capacity Compatibility with Processor Sets (HP-UX)”
- “Configuring Email on Instant Capacity Systems”
- “Measurement Software and Instant Capacity Systems”
- “Dynamic Processor Resilience (HP-UX)”
- “Security Issues”

The documents listed above are available at [www.hp.com/go/hp-icap-docs](http://www.hp.com/go/hp-icap-docs).

## Most important iCAP commands

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| icapmanage | GiCAP management commands for GiCAP groups. They are intended to be invoked only on a Group Manager system in order to create, manage, and remove the group. The command can be used to install a grouping rules file; apply a GiCAP Sharing Rights codeword; create and remove GiCAP groups; test if a server can be added to a GiCAP group; add and remove members from a GiCAP group; show status for a GiCAP group; show grouping rules and supported hardware, and extract usage rights from one member of a GiCAP group to be used by another member of the group. |
| icapmodify | iCAP command to activate or deactivate cores, specify system contact or Instant Capacity “from” e-mail address, apply iCAP codewords, change the system identifier, specify a warning notification period before temporary capacity expires, and change Instant Capacity configuration information.                                                                                                                                                                                                                                                                      |
| icapnotify | iCAP command to enable asset reporting, configuration change notification and configure the reply e-mail address.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| icapstatus | iCAP command to displays Instant Capacity status and configuration information, counts, status, and allocation of Instant Capacity components (cores, memory, and cells) for an Instant Capacity system. If the system is a member of a Global Instant Capacity (GiCAP) group, membership information and status on any borrowed or loaned usage rights is displayed. Optionally, system snapshot information containing encrypted audit data is displayed with the option -s.                                                                                           |

## iCAP Glossary

**Actual active cores:** This value is listed in the icapstatus output and displays the current number of active cores in the partition. In a virtual partition, the count represents the total number of cores assigned to all virtual partitions.

**Core:** The actual data-processing engine within a processor. A single processor can have multiple cores, and a core can support multiple execution threads.

**Configured processor:** A processor that has been configured at the Boot Console Handler (BCH) and whose cores are now available for activation.

**Deconfigured processor:** A processor that has not yet been configured at the boot console handler (BCH). The iCAP software cannot activate a processor core that is deconfigured.

**iCAP component:** Also called a component without usage right. An Instant Capacity component is a core, cell board or memory that is physically installed in an iCAP system but is not authorized for use.

**Inactive cell:** A cell that is not available for use by software running on an nPartition. This term is usually used to describe a cell that has the following status:

- The slot is present and is populated
- Power is enabled
- Boot-is-blocked
- The cell is assigned to an nPartition

**Inactive core:** A core that either has not yet been activated or that has been turned off by the Instant Capacity software and returned to the pool of inactive cores. Inactive cores are available for activation.

**Instant Access Capacity (IAC):** An amount of temporary capacity included with the purchase of an Instant capacity Component.

**Intended active cores:** The number of cores a user requests to be active for a partition by the Instant Capacity software at the next reconcile operation. A reconcile operation is normally a reboot, although other actions can trigger a reconcile operation, such as moving cores between virtual partitions. You adjust the number of intended active cores by using the icapmodify -a, -d, and -s options. Other commands, such as parmodify and parcreate, can also affect this value.

**Online activation:** The ability to activate a deactivated core while HP-UX is running. No reboot is required. This is done by `icapmodify` or `vparmodify` in a virtual partition.

**Pay per Use (PPU):** The HP software product that is a part of the HP Utility Pricing Solutions program. You acquire a specific hardware platform and number of cores and then are charged for usage of the cores based on system demand.

**Right to Use (RTU):** A type of codeword used to activate and adjust available usage rights for Instant Capacity components (memory, cell board, or core). An RTU codeword can be applied only to the system for which it was purchased, and the application of an RTU codeword adjusts the number of component-specific usage rights on the system.

**Temporary capacity (TiCAP, TiCOD):** An HP product that enables customers to purchase prepaid core activation usage rights, for a specified (temporary) period of time. Temporary capacity is sold in 30 processing-day increments.

## Additional Information

- HP Instant Capacity user guide
- iCAP manual pages: `icap`, `icapmanage`, `icapmodify`, `icapnotify`, `icapstatus`, `icapd`
- iCAP Portal: <http://www.hp.com/go/icap/portal>