

**Instant Capacity on Demand
for HP-UX CPUs**

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1. Introduction

This white paper outlines the Instant Capacity on Demand (iCOD) program requirements, in an easy to follow step by step process. This paper focuses on iCOD for HP-UX CPUs. This paper is designed educate readers regarding iCOD program requirements, how to activate iCOD CPUs and how to be in compliance with the iCOD program requirements.

2. iCOD Positioning

HP iCOD delivers higher server availability and no-risk pricing solutions for all of HP's current and future server customers. Key target markets are start-ups, small businesses, "dot-coms", service providers and large enterprises. Ideal for customers delivering products, applications and services over the internet, HP's iCOD solutions encompass the breadth of the HP 9000 server line: the L, N, V-Class and Superdome servers. In brief, the following section summarizes the key benefits of the iCOD Program.

Key Benefits

- **Reserve CPU capacity to meet growing business needs** - HP provides immediate increases in processing power to accommodate application traffic demands.
- **Eliminates system downtime when adding CPU capacity** - System throughput can be increased on-the-fly with no interruption of the application or the operating system.
- **Eliminates system downtime by automatically recovering from the most common CPU failures** - System recovers immediately (for most of the common failure modes) with a hot spare iCOD CPU in the unlikely event that a CPU fails, at no extra charge.
- **No-risk pricing solutions** - Customers get a server loaded with reserve CPUs, yet they purchase only the processors they plan to use on day one. Other than the right-to-access fee, there is no charge for the extra CPUs.

ICOD Activation Checklist

Step 1 - Contract Requirements



Customers wishing to purchase iCOD CPUs are required to sign a iCOD specific contract (terms and conditions).

For the specific details on your iCOD program requirements and terms and conditions, refer to your iCOD contract from HP or your authorized channel partner. Along with the standard purchase agreement, the following are required documents: E140 Direct Customer, E141 Reseller (VIP) and the E142 Reseller's Customer. Superdome required documents; E151, E152, E153. Below are some of the contract requirements for iCOD systems.

1. In order to activate an iCOD CPU and increase the number of active CPUs in an iCOD System, the customer is obligated to purchase the iCOD CPU. Within thirty (30) days of activation, the customer must place a valid purchase order to HP or its reseller for the purchase price of the activated iCOD CPU.
2. Customer agrees to configure its network and e-mail system so that each iCOD System can send emails to HP (see step 2 for e-mail requirements).
3. Upon activation and purchase of an iCOD CPU, customer must maintain the same level of support for that iCOD CPU as customer has for the iCOD System.
4. Participants of the iCOD program who do not meet these requirements may be in breach of contract and result in unnecessary expense for both the iCOD program participant and the Hewlett-Packard Company.

Step 2 - iCOD Software and e-mail activation



iCOD systems are required to run the iCOD CPU Agent Software (iCOD CPU Agent) that enables activation of iCOD CPUs and sends CPU monitoring e-mails to Hewlett-Packard.

Note: Running the iCOD CPU agent is automatic on iCOD systems as long as the iCOD software package is properly installed and configured - no further action is needed. The minimum software requirements for the iCOD CPU Agent Software are:

1. iCOD Client software bundle B9073AA (version 3 located on the SupportPlus media September 2000 or later) and at the following website: <http://software.hp.com/>.
2. HP-UX 11.0, or later

The kernel driver diag2 is part of standard HP-UX, since diag2 is an iCOD CPU Agent dependency, this driver must not be removed from the kernel.

Configuring Customer Contact Information

When a new iCOD system is received or when a non-iCOD system has been transformed into an iCOD system, it is important to enter customer contact information into the iCOD software. See the iCOD Release Notes, section titled; "iCOD Software Requirements", for more detailed information about using the `icod_modify -c` command to configure customer contact information.

E-mail Requirements

As part of the auditing process, HP, must be able to accurately monitor the use and disposition of their assets. E-mail was chosen as the data transport method because of its wide applicability to a broad scope of companies.

Note: For Superdome systems, ALL ICOD PARTITIONS need to be configured

to send email to HP. This is because each iCOD partition reports the iCOD CPU information for its partition. It is recommended that the email capability be configured and the iCOD software be installed on the non iCOD partitions as well. Performing this function will make it easier for you to redistribute iCOD CPUs to partitions that are not currently iCOD CPUs, if you decide to do so at a later time.

Before you Start:

The iCOD system must be network accessible to mail servers that are outside your company's firewalls.

Note: If your iCOD server is on an isolated network, email from the iCOD server will not reach HP. This will cause your iCOD server to be out of compliance with HP's iCOD Program.

Sendmail

Sendmail is included with the core HP-UX and is installed when HP-UX is ignited. Sendmail is the application used to send encrypted mail messages from the iCOD CPU Agent to HP. The sendmail daemon, if running, can also be used to receive email. For the purposes of this email set-up, only the ability to send email is required.

Mail applications invoke sendmail to send email. Sendmail has a configuration file called sendmail.cf that offers tremendous flexibility.

High Level Overview of email routing across the internet:

When sendmail is invoked to send email to HP by the iCOD software, it first determines where it should send the email to (the first hop). Mail often goes through multiple systems (hops) before it reaches the final destination. To determine the first hop for the email, sendmail will use one of the following:

- A. The email is routed to a mail relay host if it is configured in the sendmail.cf configuration file. If it is hard-coded software, sendmail will go to a relay host, which resides in the sendmail.cf configuration file. This is the easiest scenario to implement and can be done with just a one line change (DS) to the default sendmail.cf file.

Note: The relay host must be configured to

properly route (forward) the mail to the final destination.

- B. DNS MX records - this method requires that the iCOD server be in an environment (network) where DNS is operating and properly configured. Sendmail on the iCOD server will query a DNS server for the name of the mail server to forward the email to (the mail server for the first hop), in order for the email to reach the final destination (rsn.hp.com).

In both cases, the following requirements must be met:

HP's mail servers receiving mail from the internet, expect the host that is actually connecting to the HP mail server (the mail server in the last hop before reaching HP) to be properly registered in DNS (forward and reverse). Otherwise, the HP mail server will bounce/reject the email.

The 'From' field of the email must also be set so that it is a known address to the receiving mail server (i.e., the hostname is registered in DNS and advertised on the internet). Otherwise, the receiving mail server at HP will reject/bounce the mail. This field in the email too can be configured with a simple one line modification (DM) to the sendmail configuration file.

Note: In some DNS environments, no changes to the default sendmail configuration file may be needed to properly route email from the iCOD server to HP.

In some environments, configuring your iCOD server to properly send email from the iCOD software to HP can require as little as a two line edit to the sendmail.cf file. Configuring mail, including sendmail and DNS configurations, is usually administered by the IT team in most organizations.

Example edit to sendmail configuration (sendmail.cf) on an iCOD server:

Assume hostname is:

myICODsystem.my_sitge.my_company.com

example: DMmy_company.com
DSmailhub.my_company.com

In this example the From field of the email will be set to my_company.com rather than the exact hostname of the iCOD server. This is because most organizations do not advertise the names of their

internal servers to the internet, however they do advertise a few select high level, domain names to the internet. In this example, we are assuming the iCOD server is not advertised to the internet. In addition, e-mail is forwarded from the iCOD server to a mail relay host called mailhub. The mail server called mailhub may either be directly connected to the internet and send the e-mail directly to HP, or it may forward the e-mail to another mail server on its way to HP. The mail server finally contacting a mail server at HP must be fully DNS registered (forward and reverse) and accessible to the outside world (internet).

Configuring Your Server to Send but Not Receive E-Mail

For security reasons, some organizations may not want to allow incoming mail. If you just want the iCOD server to send e-mail and not to receive e-mail, simply disengage (kill) the sendmail daemon. See the iCOD Release Notes, *section: "Configuring Your Server to Send but Not Receive E-Mail"*, for additional information.

Verification: The Right Number of iCOD CPUs are Configured

Run `icod stat` command. The output of this command indicates how many iCOD CPUs are configured on this system (or partition for Superdomes).

Testing e-mail Connectivity from the iCOD Server to HP

To confirm your iCOD server is properly configured to send e-mail to HP, you can send a test e-mail to HP and request a confirmation reply. To do this type the command: `(/usr/sbin/icod_notify)`. Upon receiving the e-mail at HP, a confirmation e-mail from HP will be sent to the contact e-mail address.

Note: *There may be delay before the confirmation e-mail is received.*

Step 3 - Dynamic vs. Manual Activation Modes of iCOD Processors



iCOD offer two modes of activating iCOD CPUs. The modes are called online activation mode and offline activation mode. The customer must decide which mode they wish to use. The default mode is online activation:

- **Online (dynamic) activation mode**
 - Instantly activate iCOD CPU
 - No reboot necessary
 - Possible software compatibility issues
 - Uses the `icod_modify` command to achieve desired CPU bandwidth, while activating as many iCOD CPUs that the customer wishes to purchase.
- **Offline (manual) activation mode**
 - Requires a system reboot
 - Eliminates the risk of software compatibility issues
 - Processors can be manually configured at the boot interface and then activated with the `icod_modify` command (after booting to the UNIX prompt)

Offline Activation on Superdome

Offline activation is also supported on hardware-partitionable systems, such as Superdome, however, this is not a customer executable operation. Customers operating in offline activation mode must contact their Customer Engineer (CE) to get a CPU activated or deactivated in offline activation mode. The customer will also need to contact a CE to convert the system to offline activation mode since online activation mode is the default factory shipped mode. There may be a fee for this service.

IMPACT TO SOME APPLICATIONS:

Using iCOD in dynamic activation mode can convert your system into a dynamic system. Specifically if a CPU is activated on-the-fly the number of active CPUs is instantly increased. Hence the number of active CPUs becomes a DYNAMIC parameter.

Some software applications size themselves based on the number of available processors when the application is started. Therefore, it may be necessary to restart this type of application, before it recognizes the presence of newly activated processors. Some applications may also need to be reconfigured before being restarted for maximum performance benefits of the newly activated iCOD CPU.

Note that some HP-UX commands such as TOP, SAR had to be modified to work properly on iCOD systems as part of the iCOD development. Measureware also had to be modified to work properly on iCOD systems.

Online vs. Offline Activation Methods

Most applications will work fine with either online (dynamically) or offline (manually) iCOD activation methods. However, processors that are configured as iCOD processors and not yet activated may cause some application software to work in unexpected ways. In addition, some applications may not work as expected when a iCOD CPU is dynamically activated.

You may want to test your application for proper operation in online activation mode. For details, see Step 4 below.

If you are not satisfied with your application behavior in the dynamic online activation mode, you may want to switch the system to offline activation mode. For information on configuring your system in off-line activation mode, see "Offline Configuration and Activation of iCOD Processors," in Appendix A of the iCOD Release Notes.

Step 4 - Testing Online Activation Mode for Your Environment



You may want to do some testing to verify your applications will work properly on iCOD systems in online activation mode. The following testing guidelines are meant to be an aid to your test plan. You may need to get consulting help to develop a detailed test plan.

1. Test your applications for proper functionality and performance with all of the iCOD processors inactive. Be sure to check measurement tools that monitor CPU usage.

2. Contact HP to get authorization for test activation, see the following section on "HP's iCOD Test Activation Policy".
3. Do an online activation of an iCOD CPU while your applications are running, see step 5 for "Your iCOD CPUs" .
4. Verify to ensure your applications are benefiting from the performance of the extra CPUs (as per your expectations for your applications). Note that some applications may need to be restarted or reconfigured to take advantage of the newly activated CPUs.
5. Check to ensure measurement tools that monitor CPU usage properly account for the newly activated CPU.
6. Have the CE turn off the newly activated CPUs to avoid paying for those CPUs.

If the test results are unexpected or you experience erroneous behavior in your applications or measurement tools, you may want to convert to offline activation mode for your iCOD processors.

HP's iCOD Test Activation Policy

HP recognizes that new users of iCOD may want to test iCOD to make sure iCOD works as expected in their environment and to verify online activation is acceptable for their environment. During such testing, the user will not want to be charged for activating an iCOD CPU. HP's iCOD test activation policy is designed to deal with these situations.

1. You (the customer) may not test a CPU more than once over a 6-month period, and you are responsible for any testing costs.
2. The test activation period can last no more than five days. The test activation period is defined as the period between activating the iCOD CPUs and the start of rebooting the system after having an HP CE deactivate the iCOD CPUs.
3. Before testing, contact the HP iCOD Administrator to get an "iCOD Test Authorization Number." HP has the right to refuse authorization in certain situations. Allow for at least one week for HP to process the authorization. To request authorization for the testing, send an e-mail

message to the iCOD administrator at icod_admin@hp.com stating the following:

- customer- name
- customer contact e-mail address
- customer contact phone number
- system serial number of Software ID of the system to be test
- number of CPUs to be temporarily activated
- time period for test activation period (this can be a window of time greater than five days, as long as the actual activation period does not exceed five days)

The iCOD Administrator will reply to the contact e-mail address with an e-mail containing an authorization number for the specific system and specific time period for testing. E-mail or some other form of written authorization from HP must be received before starting the iCOD test.

4. You must make arrangements with your HP CE to have the iCOD CPUs deactivated prior to the expiration of the five- day test period. You are responsible for paying any CE costs.

As long as these 4 points are followed, you will not be obligated to purchase the " iCOD CPU enablement product" for those CPUs activated as part of the authorized testing activity.

Step 5 - Activating Your iCOD CPUs



The moment an iCOD CPU is activated, an order should be submitted to Hewlett-Packard or the authorized channel partner for compensation. Therefore, exercise caution to ensure that an iCOD CPU is activated purposefully and with organizational approval.

All personnel with system administrator access to an iCOD system, should read and understand the contents of the iCOD Release Notes Document.

When you activate an iCOD CPU, the number of active processors in the system increases. Consequently, this can require you to upgrade the license for some of the software on your system. A license may be required for HP-UX, HP-supplied software, or software from other application providers.

Some software applications size themselves based on the number of available processors when the application is started. Therefore, it may be necessary to restart this type of application before it recognizes the presence of newly activated processors. Some applications may also need to be reconfigured before being restarted for maximum performance benefits of the newly activated iCOD CPU.

Note: V-Class processors must always be activated in pairs.

iCOD Activation Sample Session for N-, L-, and V-Class Systems:

In the following session, the customer has a total of 8 processors in their N-, L-, or V-Class system; 6 are activated and 2 are iCOD (HP-owned) processors. In this example, the Customer activates 2 processors, leaving them with 8 active processors and no more iCOD processors.

```
# icod_modify -m
```

```
Total processors:          8
Activated processors:      6
```

```
ICOD deactivated processors:  2
Other deactivated processors:  0
Firmware deconfigured processors:  0
```

```
-----
Total number of unused processors  2
Number of HP-owned (iCOD) processors specified:  2
```

```
Enter new number of HP-owned (iCOD) processors: 0
```

```
Enter reason for change [optional]: extra capacity for webservers
```

```
Enter your name: Dirk Grunley
```

```
Enter authorizing manager's name: Zeb Fernwald
```

```
Enter authorizing manager's e-mail address: Zeb@corp.com
```


Enter authorizing manager's phone number: **123-456-7890**

Note: iCOD processor activation will occur instantly.

Note: Activating HP-owned (iCOD) processors will result in your company having to pay for these processors. Consequently, if you choose to continue, your company will be under obligation to purchase the new processors being turned on.

Note: Ensure that your HP and 3rd party software licenses have been upgraded to take into account the additional processors being activated.

Enter 'yes' if you understand and want to continue; any other response will terminate this operation:
yes

Old number of HP-owned (iCOD) processors: **2**
New number of HP-owned (iCOD) processors: **0**
Number of processors now activated; **8**
Asset report sent

Step 6 - When iCOD Program Requirements End



iCOD program requirements end when the last iCOD CPU in the iCOD system is activated and subsequently purchased from Hewlett-Packard or the authorized channel partner. At this point, the system is no longer an iCOD system and:

1. The iCOD CPU Agent Software should be uninstalled (see "Uninstalling the iCOD CPU Agent Software", of the iCOD Release Notes).
2. The capability to e-mail to Hewlett-Packard is no longer required.

3. The iCOD sticker may be removed from the system.

When to Place the Purchase Order

The moment an iCOD CPU is activated, an order should be submitted to Hewlett-Packard or the authorized channel partner for compensation. Therefore, exercise caution to ensure that an iCOD CPU is activated purposefully and with organizational approval.

All personnel with system administrator access to an iCOD system should read and understand the contents of the iCOD Release Notes Document.

4. Redistributing iCOD CPUs across Superdome partitions

iCOD offers dynamic resizing of partitions on Superdome systems. Specifically, iCOD CPUs can be redistributed across any or all partitions of a Superdome system.

The ability to move iCOD CPUs across partitions allows you to instantly partition at no charge to you. Its flexibility allows you to move computing power from partitions where there is an excess of computing power. Thereby, redistributing the excess computing power to partitions where more computing power is needed.

Note that cell boards cannot be shared across partitions; consequently iCOD CPUs on a cell board cannot be shared across partitions.

When distributing iCOD CPUs across SD partitions the total number of active CPUs in the Superdome complex does not change. However, the number of active CPUs in some partitions decrease, while the number of active CPUs in other partitions increase.

- As long as system is in online activation mode, there is no charge. CE operations required for offline activation mode, may require a CE service fee.
- A newly deactivated CPU in another partition offsets the cost of a newly activated CPU.

Example:

Starting scenario:

Superdome with 2 partitions; partition 1 has 3 iCOD CPUs, partition 2 has 2 iCOD CPUs.

Modification Scenario:

You need to add CPUs to partition 1 but you can afford to take away CPUs from partition 2 because the active CPUs are underutilized.

Solution: Decrease iCOD CPUs in partition 1 by activating one of the iCOD CPUs. Increase iCOD CPUs in partition 2, this will result in deactivating one of the active CPUs in partition 2.

Final Scenario:

Superdome with 2 partitions; partition 1 has 2 iCOD CPUs, Partition 2 has 3 iCOD CPUs.

5. Utility Computing

Value Proposition: Unlike standard purchasing or leasing, which only provide traditional acquisition options, utility-pricing enables an internet powerhouse to better align costs with their revenue stream.

Utility pricing reduces significant capacity planning challenges by providing the ability to rapidly provision the necessary resources to address business volumes in a financially viable model.

Server utility is based on a fixed/variable model. The fixed component is a reoccurring monthly access fee. The variable component is based on the percentage of system utilization.

Utility computing benefits from all the technical enablers of iCOD: example: you can bring additional CPUs online—with just a single command *and* at a moment's notice and additionally, take them back off line.

Expected availability: 2nd half 2001 on Superdome

- **Example of Utility Model being considered:**
 - Term: 36 months
 - Rate: XX% fixed & XX% variable
 - Flexibility: can order 32 or 64 CPUs

- **When compared to leasing:**
 - Term: 12-36 months
 - Rate: 100% fixed
 - Flexibility: 8-64 CPUs

Partition Pricing:

HP has also announced a simple, easy-to-implement, Partition Pricing program for Superdome that addresses customers who want to own a Superdome but want to incrementally activate, and pay for additional partitions at specified intervals.)

APPENDIX

Definition of Terms

This section describes how the following terms are used in conjunction with iCOD.

activated processors

Processors that are running and available to HP-UX to process your workloads.

allocated processors

Same as (**activated processors**)

Configured iCOD processors

iCOD processors that have been configured at the boot interface and are available for activation.

deallocated processors

Same as **deactivated processors**.

deactivated processors

Processors that are not available to HP-UX to process your workloads. Processors that are configured and deactivated are usually available for instant activation.

deconfigured processors

Processors that have not yet been configured at the boot interface.

iCOD Compliance

A customer who has met all terms and conditions of the iCOD purchase agreement including the email setup requirements.

online activation

The ability to activate an iCOD CPU while HP-UX is running. No reboot is required. This is done by activating an iCOD processor using the `icod_modify` command. This is the default behavior as of iCOD version 2.0.

offline configuration and activation

To manually configure an iCOD CPU for activation from the boot interface and then boot to the UNIX prompt and use the `icod_modify` command to activate the processor as you would in the online activation mode (a two step process). A reboot is required.

Partitioning

Breaking up a Superdome Complex into multiple logical systems.

Information Reported to Hewlett-Packard

The iCOD CPU Agent sends an encrypted e-mail to HP over the Internet. Data fields sent to HP include system identification, system contact information, Number of active CPUs. Details can be found in the release notes for iCOD.