



# **IP Communications Systems Test Release 1.1**

## **IPCC Release Notes**

### **Corporate Headquarters**

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA

<http://www.cisco.com>

Tel: 408 526-4000  
800 553-NETS (64387)  
Fax: 408 526-4100

Customer Order Number:

Text Part Number:

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# 1 Overview

This document comprises the IP Communications (IPC) Systems Test release notes for voice systems built upon CallManager 3.3(2) and ICM 4.6.2. It is standard methodology for Cisco to perform systems wide testing of IP Communications, supplementing the systems test performed on each IPC product.

A major deliverable of the IPC Systems test is a recommendation of compatible software releases, verified through the test. Customers that have deployed or are planning to deploy multiple voice application and voice infrastructure products in their network can adopt these recommendations. These recommendations are not exclusive, and are in addition to interoperability recommendations for each of the individual voice application or voice infrastructure products

The primary focus in this document is on the IP Contact Center (IPCC) component of these IP Communication systems. IP Telephony (IPT) components have also been tested. For the release notes for IPT, please refer to *IP Communications Systems Test Release 1.1: IPT Release Notes*.

The tested systems comprise a suite of IPC solutions containing a validated software set of the following components: Cisco CallManager, Intelligent Contact Manager, Cisco IP IVR, Cisco Voice Gateways, Cisco Catalyst Voice Gateways, Cisco routers, and Cisco Catalyst switches.

Access the documentation suite for voice products at:

<http://www.cisco.com/univercd/cc/td/doc/product/voice/>

Access the latest software upgrades and release notes for Cisco CallManager 3.3(2), Cisco IP IVR 3.0(3a), and ICS7750 on Cisco Connection Online (CCO) at:

<http://www.cisco.com/kobayashi/sw-center/sw-voice.shtml>

Access the latest software upgrades and release notes for IOS Routers and Gateways on Cisco Connection Online (CCO) at:

<http://www.cisco.com/kobayashi/sw-center/sw-ios.shtml>

Access the latest software upgrades and release notes for Catalyst Switches on Cisco Connection Online (CCO) at:

<http://www.cisco.com/kobayashi/sw-center/sw-lan.shtml>

## 2 System Requirements

The components of this solution are discussed below.

This section contains information on the platforms tested as part of this program. For additional information on specific hardware recommendations or bills of material for each product, refer to the links to product documentation in each subsection.

### 2.1 Cisco CallManager

Make sure that you install and configure Cisco CallManager Release 3.3(2) on a Cisco Media Convergence Server (MCS) or on a Cisco Integrated Communications System (ICS) 7750.

Platforms tested in this recommendation are :

- [MCS-7835-1266](#)

For MCS platform information, see:

<http://www.cisco.com/en/US/products/hw/voiceapp/ps378/index.html>

For system hardware component information and system requirements, refer to Installing Cisco CallManager Release 3.3:

[http://www.cisco.com/univercd/cc/td/doc/product/voice/c\\_callmg/3\\_3/install/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/c_callmg/3_3/install/index.htm)

### 2.2 Cisco Intelligent Contact Management Software (ICM)

Make sure that you install and configure Cisco ICM software, version 4.6.2 + HF117, on the platforms listed below.

Platforms tested in this recommendation are:

- ICM Rogger – 2 x [MCS-7835-1266](#) (with dual processor)
- ICM Hybrid PG – 2 x [MCS-7835-1266](#) (with dual processor)
- ICM AW/HDS – 1 x [MCS7825-1133](#)

### 2.3 Cisco Unity

Cisco Unity integration with IPCC was not tested as part of IP Communications Systems Test Release 1.1. However, Unity integration **was** tested as part of the IP Telephony components testing—see *IP Communications Systems Test Release 1.1: IPT Release Notes*.

### 2.4 Cisco IP IVR

Make sure that you install and configure Cisco IP IVR 3.0(3a) on a Cisco Media Convergence Server (MCS) or on a Cisco Integrated Communications System (ICS) 7750.

Platforms tested in this recommendation are:

- [MCS-7835-1266](#)
- [ICS 7750](#)

For IP IVR 3.0(3a) system requirements and supported hardware and software, see the following:

[http://www.cisco.com/univercd/cc/td/doc/product/voice/sw\\_ap\\_to/apps\\_3\\_0/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/sw_ap_to/apps_3_0/index.htm)

Release Notes for IP IVR 3.0(3a) are accessible from:

[http://www.cisco.com/univercd/cc/td/doc/product/voice/sw\\_ap\\_to/apps\\_3\\_0/english/admn\\_app/elnote/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/sw_ap_to/apps_3_0/english/admn_app/elnote/index.htm)

## 2.5 CTI OS Server

Make sure that you install and configure CTI OS Server on a Cisco Media Convergence Server (MCS).

Platforms tested in this recommendation are:

- [MCS7825-1133](#)

## 2.6 Cisco IOS Router and Voice Gateways

Platforms tested in this recommendation are:

- Cisco IOS Gateways – 12.2(13)T3
- Cisco 6608 Gateway – CatOS 6.3(10)
- Cisco 2691 (MGCP and H323 Gateways)
- Cisco 3660 (MGCP and H323 Gateways)

For Cisco 3660 System Requirements, see:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/xprn122t/122tfeat.htm - 1003904>

For Cisco 2691 System Requirements, see:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/xprn122t/122tfeat.htm - 54895>

## 2.7 Cisco Catalyst Switches and Voice Gateways

Platforms tested in this recommendation are:

- Catalyst 3524XL

For Catalyst 3524XL System Requirements, see:

[http://www.cisco.com/univercd/cc/td/doc/product/lan/c2900xl/29\\_35wc5/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/lan/c2900xl/29_35wc5/index.htm)

### 3 Install and Upgrade Documentation and Links

For Cisco CallManager, see

[http://www.cisco.com/univercd/cc/td/doc/product/voice/c\\_callmg/3\\_3/install/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/c_callmg/3_3/install/index.htm)

For Cisco Intelligent Contact Management, see

<http://www.cisco.com/univercd/cc/td/doc/product/icm/icm50/icmfam/entered/core/index.htm>

For Cisco IP IVR, see

[http://www.cisco.com/univercd/cc/td/doc/product/voice/sw\\_ap\\_to/apps\\_3\\_0/english/admn\\_app/getst303/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/sw_ap_to/apps_3_0/english/admn_app/getst303/index.htm)

### 4 Software Version Matrix

Table 4.1 lists the recommended software releases of the system components.

*Table 4.1: Software recommendations for the IP Communications Systems Release 1.1 - IPCC*

Component	Release Version
CallManager	3.3(2) spC
7960 (Phone Sets)	P00303030202
Intelligent Contact Manager (ICM)	4.6(2) Hotfix 117
CTI OS	4.7 Hotfix 5
IP IVR	3.0(3a) spA
CS3660 (Gateway)	12.2(13)T3
CS2691 (Gateway)	12.2(13)T3
CAT6506 (Core Switch)	6.3(10)
CAT6509 (Access Switch)	6.3 (10)
CAT4006 (Access Switch)	7.5.1
CAT3524 (Access Switch)	12.0(5)WC5
JTAPI	1.4(2.3)
CAT6608 Gateway	CatOS 6.3(10)

### 5 Limitations

#### 5.1 Open Caveats for IP Communications Systems Release 1.1 - IPCC

Table 5.1 lists and describes open caveats related to the testing of the IP Communications Systems Release 1.1 – IPCC that were not resolved at the time of this recommendation.

**Tip:** If you have an account with Cisco.com (Cisco Connection Online), you can use the Bug Toolkit to find caveats of any severity for any release.

To access the Bug Toolkit, go to [http://www.cisco.com/cgi-bin/Support/Bugtool/launch\\_bugtool.pl](http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl).

**Table 5.1: Open Caveats for IP Communications Systems Release 1.1- IPCC**

Identifier	Headline	Summary
CSCdz66421	On hook during consult request is ignored.	<p><b>Symptom:</b> Agent initiated consult request failed with reason of time out, but original call was hung up, and the agent did not see the call cleared in the agent desktop</p> <p><b>Workaround:</b> Cycle the phone by pressing keys on the phone in the following five-character sequence: <b>***#**</b>. This recovers the agent state.</p>
CSCma23447	Conference failed, call not cleared, no end_call event	<p><b>Symptom:</b> During an automated load test, a request to conference a call was successful, but when the call was torn down, the agent was left in the held state.</p> <p><b>Conditions:</b> IPCC - CM 3.3(2) spC during a load test which included conferences.</p> <p><b>Workaround:</b> Reset the agent state by logging them out and back in again, or by resetting the phone by pressing keys on the phone in the following five-character sequence: <b>***#**</b>.</p>
CSCdz86763	CiscoRTPInputStarted events are missing intermittently	<p><b>Condition:</b> IP IVR 3.0(3a) spA + CM 3.3(2) spC + JTAPI 1.4(2.3)</p> <p><b>Symptom:</b> CiscoRTPInputStartedEvent is missing (does not arrive within TIMEOUT period) so when the call is made to route point, it gets dropped intermittently.</p> <p><b>Workaround:</b> Please access this bug with Bug Toolkit to obtain further information.</p>

## 5.2 Important Notes

The following lists a number of design/configuration recommendations that should be considered for all IPCC implementations that require high availability and/or high call completion rates.

## 5.2.1 JTAPI Client Parameter Tuning

**In order to speed up the detection of a CTI Manager failure on either the PG or the IP IVR, it is recommended that the JTAPI Server Heartbeat Interval be reduced from the default 30 seconds to 5 seconds.**

### **Rationale:**

Under normal operations, JTAPI client either waits for  $2 * ServerHeartbeatInterval$  before closing the connection to the CTI Manager, or closes it when *socket closed* is detected. Therefore, for a 30sec Heartbeat value, JTAPI closes sockets either after  $2 * 30 = 60$ sec or whenever socket closed is detected. For a 5sec Heartbeat value, JTAPI closes sockets either after  $2 * 5 = 10$ sec or whenever socket closed is detected. (In testing it was determined that the change in time for detection of the failure condition improved 35-45 seconds).

Minimum safe heartbeat timer value is 5sec. If it is less than this, CTI will default to a 30sec value. Heartbeat values become important only when the system is idle. If call activity is present, CTI/JTAPI will not handshake using heartbeats, but will rely on each other's messages. When the system is idle, heartbeat handshaking goes into effect. So, in essence, a low timer value causes some traffic in the system during idle state, and high timer value causes less traffic during idle state. Since this occurs only when the system is idle, a low timer value is not problematic.

**In order to speed up the fail-over of the IP IVR from primary CTI Manager to backup CTI Manager, it is recommended that the Provide Retry Interval be reduced from the default 30 seconds to 5 seconds. (This is in addition to the Server Heartbeat Interval setting).**

### **Rationale:**

Tuning both Server Heartbeat Interval and Provider Retry Interval parameters improves CTI Manager failure detection (Server Heartbeat Interval Parameter) and connecting to backup CTI Manager (Provider Retry Interval Parameter).

### **Considerations:**

Decreasing the JTAPI client parameters is recommended for IPCC servers only and not regular JTAPI client applications.

1. Decreasing the timers exposes the application to the effect of network congestion.
2. For server applications, lowering these parameters is not problematic, but for client applications, like Softphone, decreasing retry interval means that all softphones will try to connect to CTI Manager around the same time.

It is assumed that an IPCC deployment will not suffer from either of these considerations in that all communication between PG or IP IVR and CTI Manager will be over a local high capacity network or protected via QoS over any WAN links. Additionally, the current recommendations for a standalone CallManager cluster result in the total number of JTAPI connections to each CTI Manager being less than 5—thus avoiding the connection startup overload problem.

## 5.2.2 Configure /LOAD 0 parameter for PG

**In deployments using ICM 4.6.2 and CTI OS, it is highly recommended that the "Configuration parameters" field on the "Peripheral" tab of the PG in the PG Explorer, left blank by default, be changed to /Load 0 to avoid extended failover downtime and state issues upon recovery—particularly for contact centers with more than 50 agents.**

### **Rationale:**

In the PG Explorer there is a field for “Configuration Parameters” for each peripheral. One parameter defines PIM behavior for failover whenever there is a CTI failure that could include closing the agent desktop without logging out, CTI OS failover, or CTI Server failure. This configuration parameter can be set to “/LOAD 0” or “/LOAD 1”. The PIM will default to using “/LOAD 1” behavior if no /LOAD parameter is configured.

/LOAD 1 will log out the agent on any CTI failure. /LOAD 0 will attempt to set the agent to “NotReady” on any CTI failure.

In essence, the PIM wants to prevent calls being routed to agents who were in the “Available” State before the client disconnected. The two approaches used are setting agents to either “NotReady” (/LOAD 0) or forcing agents to be logged out (/LOAD 1). In both cases a special reason code (50002) is passed as an Event Reason Code with the AgentState event and will be captured in the Agent\_Logout table and reports.

In a CTI OS failover case, each CTI OS client attempts to restore state to its last known state after the agents have failed over to the alternate CTI OS server.

### **LOAD 0 Characterization:**

#### **Advantages**

1. Faster failover time than /LOAD 1 because agents are not fully logged out after disconnect. Instead, they are forced to the NotReady state so calls will not be routed to them.
2. Generally a better state for the transition during failover for reporting purposes because agents are not reported as logged out during the outage period.
3. More call context is maintained (i.e., peripheral and ECC variables, PeripheralCallType indicating whether it is a conference call, transfer call, etc.).

### **Disadvantages**

1. In some circumstances (rarely), when the CallManager provides an unexpected CTI event stream, the agent state can be out of step with the actual hard phone state. Normally the agent is left in a held or talking state but there is no call on the phone. The default method to recover the agent state used to be to close the agent desktop and log back in. This method of recovery does not work with the /LOAD 0 option. Other options include:
  - a. Press keys on the hard phone in the following five-character sequence: **\*\*#\*\***. This resets the phone.
  - b. An administrator can reset the phone from the CCMAAdmin web page.
2. In hot-seating scenarios, LOAD 0 may lead to a condition where agent login is rejected. This can happen because the previous agent who used a phone simply closed their desktop as a means to end their session. Possible remedies for this situation include:
  - a. Set inactivity timer in agent desk settings on the ICM configuration so agent is logged out after the defined inactivity time.
  - b. Use Supervisor phone to force agent to logout.
  - c. Use CTI OS AllAgents tool to force agent to logout.
  - d. Reset the instrument by pressing keys on the phone in the following five-character sequence: **\*\*#\*\***
  - e. Reset the instrument from the CallManager Administration program.

### **Caveats**

1. Customers must configure the Ring No Answer timeout and associated ring no answer dialed number in the ICM Agent Desk Settings. This is in the event that an agent is recovered to available after a failover, but that agent has stepped away—the call is then redirected to another available agent.
2. Customers must set the Agent No Activity timer in the ICM agent desk settings to log agents out after a period of inactivity while in the “NotReady” state. This reduces the occurrence of hot-seating agents not being logged into the same instrument at a later time.

### **LOAD 1 Characterization:**

### **Advantages**

1. If an agent disconnects without logging out, the next hot-seating agent will have no problem logging in with the same instrument because the previous agent was forcibly logged out.

### **Disadvantages**

1. Can take a long time for failover (possibly several minutes) because it takes a while to log out and re-log in a lot of agents. The amount of time will vary with the number of agents and other factors such as heavy call load and number of skill groups per agent.
2. Softphone may appear to recover quickly but then logs out because it fails over to the alternate server before the PIM has forcibly logged out the agent. The automatic login that occurs after this may take a long time as described in the item above.
3. Has a negative impact on reporting because agents are reported as having logged out during the outage period.
4. Some call context may be lost when the call is recovered, e.g., peripheral call variables, ECC variables, and PeripheralCallType (particularly barge in, supervisor assist, and emergency assist PeripheralCallTypes).

### **Recommendations:**

1. For CTI OS with more than 50 agents, and with the caveats above, /LOAD 0 is recommended.
2. For CTI OS with less than 50 agents, /LOAD 1 should be acceptable.

## **5.2.3 Implement Agent Busy and Ring No Answer (RNA/RONA) call logic for agent ACD lines**

**Implement a Route Point(s) and associated ICM routing scripts to recover calls normally lost due to line busy condition. Configure the Call Forward Busy (CFB) CallManager parameter on the agent ACD line pointing to this Route Point.**

### **Rationale:**

In traditional ICM ACD implementations, the RONA (Roll Over No Answer) logic implemented by the ICM CallRouter appears to be sufficient to handle call recovery in cases where call state failures occur (e.g., agent does not answer the ringing extension). In an IPCC environment this event corresponds to a Ring No Answer (RNA) event. In both of these cases the call is correctly routed to an on-hook extension and the error event is the failure to answer.

A new problem exists in the more distributed IPCC implementation that is similar to RNA but not identical. It is possible due to various race conditions in the end-to-end call signaling, to have inconsistent line state in the ICM CallRouter and the CallManager. While in most cases this is a transitory effect, it is possible to encounter scenarios where the ICM CallRouter will direct a call to a line that is currently busy. This is an uncommon problem in low call volume environments but is experienced in high volume scenarios and/or system error conditions. [Higher call volume scenarios currently may experience end-to-end call state signaling latencies in the 1-3 second range.]

In order to provide call recovery for this situation, it is highly recommended that another Route Point and associated ICM routing script be used that is distinct from, but implements similar logic to, the RNA call recovery logic. A distinct Route Point provides a mechanism to track the

occurrences of this specific error and allow for proactive actions to be taken if the event is seen occurring on a regular basis.

[Please note that it is highly recommended to implement RNA call recovery in addition to line busy recovery. System overload and error conditions may produce both failure events. RNA logic provides protection against system errors as well as failure of agents to answer.]

### **5.2.4 Avoid Conference and Consultative Transfers Involving IP IVR ports**

Do not implement business logic that may invoke a consultative transfer or conference involving an IP IVR port.

#### **Rationale:**

Currently the JTAPI messaging between CallManager and ICM does not provide a mechanism to handle all the potential call state events involved in this process and may fail under certain scenarios.

In high touch service scenarios it is often required that an agent attempt a warm transfer of a customer to a specialized agent group. If the environment requires that this customer be re-queued to an IVR if no agent is available, then this needs to be implemented as a manual two-step process.

1. Attempt a consultative transfer to specific skill group via Route Point.
2. If no agents are available (need to build logic into the first routing script to indicate this to agent) then the agent terminates the attempted conference/transfer event.
3. Agent then initiates a blind transfer of the customer call to a second queuing route point for the required skill group.

Currently this requires two route points and two routing scripts breaking up the business logic, but it is not possible to direct an attempted conference or consultative transfer to an IP IVR port and guarantee successful transfer.

### **5.2.5 Implement Call Recovery Logic for IP IVR Route Points and CTI Ports**

**Configure CFB, CFF, CFNA on all IP IVR Route Points and CTI Ports directing the call to an ICM call recovery Route Point(s) and associated routing script(s).**

#### **Rationale:**

System/Server resource and call state information may be delayed between the various IPCC components resulting in call loss if error recovery mechanisms are not implemented. During various timing windows it is possible for ICM to direct CallManager to send a call to an IP IVR which is unable to process that call (e.g., IP IVR failover, IP IVR is out of service or is in partial service and only has one of 60 configured CTI ports operational). Implementing a mechanism that provides a way to recover from failure of the IP IVR to respond or process a call also allows

the entire solution to provide a level of redundancy and availability beyond that possible using only a standard configuration.

To maximize call processing success rates, it is recommended that you implement a layered call recovery design as described in these recommendations.

## 5.2.6 Implement Call Recovery Logic for ICM Route Points

**Configure CFB, CFF, CFNA on all ICM Route Points (Post and Translation routes) directing the call to an independent call-processing component (e.g., Cisco Unity or standalone Cisco IP IVR).**

### Rationale:

The interface between CallManager and ICM is a single threaded JTAPI client connection. This connection has a redundant configuration but with the following limitations:

1. Failure of CTI Manager or PG results in 60 second Contact Center outage
2. JTAPI messaging congestion or failure results in lost calls

To minimize both of these limitations, it is recommended that CallManager be configured to forward calls to a third party application for processing. In failure tests it was possible to successfully answer > 95% of all calls arriving during the failure event window.

**Note:** These calls are not handled by ICM and thus do not appear in any ICM reports.

## 5.2.7 Disable Call Waiting

**Set CallManager Cluster Call Waiting Flag to False**

### Rationale:

Inconsistency of device/line state between CallManager and ICM due to system error, race condition, or messaging latency can result in ICM directing calls to agent lines which are already off-hook. In order for the RNA/Agent Busy call recovery mechanisms to detect and recover this call, it is necessary to disable Call Waiting for the Contact Center agents. This enables CallManager to immediately detect failure of the agent to handle the call and invoke the ICM recovery scripts. [The assumption is made that these scripts have been implemented, see Section 4.2.3 above.]

<p>Call Waiting Enable Flag</p>	<p>This parameter enables or disables call waiting for the Cisco CallManager System. This is a required field. Default: true. &lt;&lt;&lt; change to false</p>
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## **5.2.8 Disk Drive Recommendations for High Traffic Systems**

### **Add additional disk drive for logfiles if sustained high traffic levels are anticipated**

**In cases where long periods of traffic at or above the system's engineered capacity are expected, directing logfiles to a disk drive that does not contain the OS or operating software is recommended.**

#### **Rationale:**

During the course of system load and stress testing, it was observed that long periods of traffic at or above the system's engineered capacity ran with lower CallManager CPU rates if system logfiles were directed to a disk drive that did not contain the OS and operating software. This was especially true when log levels were set higher than normal (more data being logged simulating a troubleshooting activity). If the conditions described above are anticipated, it is highly recommended that a second disk drive be added to all nodes in a CallManager cluster, including any IP IVR servers.