Avaya™ Interactive Response
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Troubleshooting

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- Utilization (of capabilities special to the accessed equipment)
- Theft (such as, of intellectual property, financial assets, or toll facility access)
- Eavesdropping (privacy invasions to humans)
- Mischief (troubling, but apparently innocuous, tampering)
- Harm (such as harmful tampering, data loss or alteration, regardless of motive or intent)

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- Installation documents
- System administration documents
- Security documents
- Hardware-/software-based security tools
- Shared information between you and your peers
- Telecommunications security experts

To prevent intrusions to your telecommunications equipment, you and your peers must carefully program and configure:

- Your Avaya-provided telecommunications systems and their interfaces
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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Contents

Troubleshooting

An Avaya IR system interacts with other systems and relies on them for critical functions. Consequently, troubleshooting may involve testing connections and checking other systems where databases, speech functions, and host services reside. This section guides you in resolving many Avaya IR system problems and includes information on basic LAN, server, and host troubleshooting. Additionally, Avaya technical support provides troubleshooting assistance that is specific to your Avaya IR system and the current problem.

This section includes the following topics:

Troubleshooting overview

This overview explains how the Avaya IR system works and and identifies potential problem areas.

Requirements for successful operations

Interactions between the IR system and other systems and applications are essential to voice response operations. This section explains the requirements for successful operations to help you to prevent problems and identify them more quickly when they occur.

The public switched telephone network (PSTN)

Calls come into the IR system from the public switched telephone network (PSTN). Calls from the PSTN can reach the IR system in one of three ways:

- A MultiVantage (DEFINITY) system receives the calls from the PSTN and passes them to the IR system through direct digital connections between the two systems.

- An IP-enabled DEFINITY or MultiVantage system receives calls from the PSTN, converts them to packet-based signals, and sends them to the IR system over a Local Area Network (LAN) connection.
- Calls come from the PSTN directly to the IR system through digital connections.

For successful voice response operations, all of the connections described above and the telephony network that supports them–including central offices–must be working and free from errors.

Switches

IR systems can be linked to DEFINITY or MultiVantage systems that route calls to and from the IR system and perform call handling functions. For successful operations, switches must be free of hardware problems and must be administered correctly. Additionally, connections between the switch and the IR system must be operating properly and not be overloaded.

DEFINITY and MultiVantage systems come with a comprehensive set of self-tests that you can use to troubleshoot problems with the switch and with connections, such as trunks. Procedures are documented in detail in the various administration manuals. Switch troubleshooting should be done with the aim of bringing connections into service. Once the connections are in service, there is a good chance that the problem is not with the switch.

Voice response applications

Voice response applications manage the interactions between callers and play the information that callers hear. For successful operations, voice response applications must perform a variety of tasks, such as:

- Interpreting caller input and taking appropriate action
- Communicating with hosts, databases, and proxy speech servers
- Transferring values entered by callers to other applications
- Providing information to callers in the form of recorded speech or speech generated through the Proxy Text-to-Speech feature

As you can see, voice response applications are central to the successful operation of an IR system.

Connections and communications

Connections to other systems, and the communications that take place across them, are critical to smooth voice operations. Major connections and communications are as follows:

- Digital lines and LAN connections that bring calls in from and send calls out to the public switched telephone network (PSTN)
- Connections between any MultiVantage systems and the IR system
- Connections from the back of the IR system to other devices, and to the LAN
- LAN connections between the IR system and servers that provide speech functions, database information, or both

A breakdown in any of these connections can affect voice response operations.

System and LAN capacity

Like any computer, the IR system has a certain amount of memory, drive space, and CPU capacity to support system operations. Additionally, the IR system requires LAN capacity to communicate with servers that provide critical functions. For successful operation, both IR system capacity and LAN capacity must be adequate.

Possible malfunctions and errors

This section explains the types of problems that may affect voice response operations.

Hardware malfunctions and failures

Hardware malfunctions and failures may stop or interfere with voice operations. These include problems in:

- The IR system itself
- Servers providing speech functions, database information, or both
- Connected MultiVantage (DEFINITY) systems

Hardware malfunctions and failures are relatively easy to identify. However, they are rarely a cause of problems.

Incorrect system administration

Errors in IR system administration can cause problems with voice operations. Examples are:

- A service cannot be assigned to a channel, resulting in the service not functioning when calls come in.

- TCIP/IP connections between the IR system and a server might be set up incorrectly, so that required data is not available to callers.

Application errors

Applications manage voice response functions, so errors can be devastating to operations. For instance, an application may call for the playing of recorded speech that does not exist, or try to access the wrong server for speech. Applications that are not sufficiently tested, or that are not tested under realistic conditions, can function poorly when used for business operations. Voice response applications that are large and complex or that use system resources inefficiently are the most common cause of performance problems.

Connection and communication problems

When any connection that supports voice response applications experiences a problem, operations may be affected. Disruptions may occur in the public switched telephone network (PSTN), MultiVantage (DEFINITY) system, servers that support operations, or in the LAN.

Circuit-based configurations

Circuit-based configurations allocate a physical cable (or part of a cable by using Time Division Multiplexing) to each telephone call. Obviously, problems with these cables might affect voice response applications.

Packet-based configurations

When the VoIP feature is used, the voice data is transmitted in small packets that contain a fraction of the entire spoken transmission. Rather than a dedicated cable being used between the end-points, packets traverse the network between the end-points via one or more available routes. With this type of transmission, packets may get lost. An overloaded network might delay or lose packets.

Overloading

Overloading may occur in these ways:

- An overloaded IR system exhibits performance problems. Causes of system overloaded include:
  - — Voice response applications that use system resources inefficiently or are too complex or lengthy
  - — Excessive system processes that are external to voice response operations

- LAN overloading may result from competition with other processes for LAN capacity. The result can be delays and breaks in the availability of required data and functions.

If the call load increases beyond the capacity of the IR system, call handling problems are likely to occur. A new system, or re-routing of calls, is generally required.

Speech

The IR system provides information to callers through recorded or generated speech. For successful operation:

- Recorded speech must exist, be of acceptable quality, and be accessible to voice response applications.
- Generated speech must be constructed properly by the Proxy Text-to-Speech feature and the voice response application.
- Recorded speech must be transferred from a server, so that the application can play it for the caller.

Communication between the IR system and the server or host must be adequate to deliver speech in a timely manner.

Identifying possible causes of problems

Generally, you will work with Avaya support representatives to identify the cause of the problem and correct it. However, you may find that some problems are easy to identify and resolve on your own.

The following table describes common problems and suggests actions you can take to identify them:

Problems	Effects	Actions
Disconnection or poor connection of cables to the back of the IR system	Possible effects include: • Monitor, keyboard, or mouse are not operating. • Speech functions and data resident on servers are not accessible.	Check the cable connections. See Checking cable connections on page 43 for more information.

Inadequate or expired feature licensing **Note:** Renaming the IR system may cause loss of feature licensing.	Affected features are not functioning, or are not functioning as expected.	• From web administration, go to the Feature Licensing screen (Configuration Management > Feature Licensing) to identify the features licensed for the system. • Contact your Avaya support representative if you have renamed the IR system or to purchase more features, if you require them.
Calls not terminating on the IR system.	Callers hear a fast busy signal.	• From web administration, go to Configuration Management > System Control. • Stop and start the voice system.
Poor communication or no communication with required servers across the LAN	Possible effects include: • Response times for speech functions and data retrieval are slow, interrupted, or both. • Speech functions and data resident on servers are not accessible to voice response applications.	• Test the LAN connection. See Checking LAN communications on page 36 for more information. • Work with your LAN administrator as needed to resolve the problem. • Add additional proxy speech servers or speech server resources
Incorrect system administration, such as errors in channel assignments, server assignments, and other configuration information	Degraded or non-functional voice response services	• From web administration, go to the Display Equipment screen (Configuration Management > Voice Equipment > Display Equipment) and check the system settings. • Make corrections as needed.
Inadequate system resources (memory, CPU, disk)	Poor response times, speech breaks, load-related messages and alarms, increased hold times and blocking of calls	Assess the load and reduce it, if necessary. Manage better the performance of your system in the future.
Voice response application coding errors	• Degraded or non-functional voice response services • Dropped calls	Contact the vendor or internal staff who develop your applications.

Troubleshooting procedure

If a problem develops with voice response operations, follow this general procedure to resolve it:

1. Go to the Message Log Report screen (Reports > Message Log Report) and check for messages about events related to the problem.

   Events may generate alarms. The level of the alarm (critical, major, or minor) indicates the severity of the problem.

2. Follow repair procedures for any events related to the problem.

   On the Message Log Report screen, you may display repair procedures by using the **Explain** function. Explanations of messages and related repair procedures are included in this online help as well.

3. If you cannot resolve the problem based on events and related repair procedures, check the indications of the problem against information in Troubleshooting based on observations on page 15 and take action based on your findings there.

4. Before contacting others for assistance, gather data on the problem:

   — Alarms received

   — Application involved

   — Type of channel protocol in use

   — Type of card

   — Type of switch

   — System history related to the problem

5. Contact other resources for assistance as needed. Contact your:

   — Avaya support representative for problems related to IR system operations

   — Application developer for problems related to voice response applications

   — LAN administrator for problems with remote access that are not related to configuration of remote resources on the IR system

   — Database administrator for problems with database functions

   — Host support personnel for problems with host operations

Using IR system events

The first step in the general troubleshooting procedure is to check for messages about events related to the problem. This topic provides more information about troubleshooting based on events.

Events on the Avaya IR system are logged, and alarms are generated when those events cause or might cause a problem with voice response operations.

To troubleshoot using Avaya IR system alarms and errors:

1. When a problem arises, check the Message Log Report screen (Reports > Message Log Reports) for messages about events related to the situation.

   Events include a time stamp, event ID, and brief explanatory text. See the sample event that follows:

   ```
   Mon May 12 00:15:05 2003 CDH CDH007 -- -- --- (CDH_TRASUM) trasum
   failed. Reason: Could not connect to the database
   ```

2. If you find events that are relevant to the problem, view additional information on the event.

   Additional information includes priority, description, and repair procedures. You may display additional information by using the **Explain** option in the Message Log Report screen, or by going to the online Help topic for the message.

3. Follow the repair procedure for the event.

   The repair procedure may provide specific instructions, direct you to contact your Avaya support representative, or link to other topics in the online Help or to other resources.

Gathering information on a problem

The next step of the general procedure for troubleshooting is to gather information on the problem. The topics in this section explain how to gather the information. You may do this on your own or under the direction of an Avaya support representative.

Reviewing the Display Equipment screen

Go to the Display Equipment screen (**Configuration Management** > **Voice Equipment** > **Display Equipment**) to view configuration information, such as:

- Type of card
- Type of channels

- Services (voice response applications) assigned to channels
- Service state

  The following table shows state descriptions and their meanings.

State	Meaning
INSERV	In service
MANOOS	Manually out of service
FOOS	Facility out of service
BROKEN	Not functioning, possibly needing replacement

Monitoring live operations

Use the **sysmon** command to observe voice response operations as they occur. You can see calls coming in, digits entered by callers, and line conditions, such as off-hook.

Note:
Monitoring live operations places a heavy demand on system resources. Using the **sysmon** command at times of heavy system activity might result in overload and interference with call processing.

Checking system history

Researching the history of your IR system helps you to identify the current problem. Talk to others and check records external to the system to find out about:

- Previous problems and support calls
- Recent changes to the system, including upgrades and repairs
- Changes to the LAN configuration in your organization

Check the Message Log Report screen (**Reports** > **Message Log Report**) for previous intermittent problems that may indicate a pattern.

Using Sun diagnostic tests

Three types of diagnostic tests are available through Sun applications. Use the following Sun diagnostic tests:

- Validation Test System (VTS) to test and validate major hardware components
- OpenBoot Diagnostics system to perform root cause failure analysis on various IR devices
- PROM Diagnostics to check system processes, such as the error rate and type for Ethernet packets

Sun Fire V210 and V240 Servers Administration Guide explains how to run these diagnostic tests on the Sun Fire V240 platform. The *Sun Fire 280R Server Service Manual* explains how to run these diagnostic tests on the Sun Fire 280R platform. The *Sun Blade 150 Service Manual* explains how to run these diagnostic tests on the Sun Blade 150 platform.

These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Using commands

Execute IR system administrative commands to check components and processes. Information available through administrative commands includes:

- The allocation of resources for all devices
- Resources and space available in the database
- Feature packages installed on your IR system
- A report of all active fax jobs

Since the Solaris operating system is Solaris-based, you also can run Solaris commands that check devices, processes, and files.

Troubleshooting based on observations

Troubleshoot based on observations when:

- You have reviewed the Message Log Report screen and cannot identify any events related to the problem.
- The suggested repair procedure for the event does not completely resolve the problem.
- Further investigation is required, such as when you are investigating an intermittent problem.

Investigating operations problems

Problems central to voice response functions can affect business operations and may result in missed calls and caller frustration. Most of the problems described in this section require prompt attention. To investigate these problems, you should have a good understanding of the Requirements for successful operations on page 6.

Call-handling problems

Call handling problems include issues related to responding to and transferring voice and fax calls. This section provides information about how to resolve various call-handling problems.

Voice system not answering

The voice system will not take calls. The voice system rings but does not answer, or the voice system is busy.

Note:
If you depend on a host system for caller services, refer to Host interaction problems on page 22.

To check on possible causes of the problem:

1. Determine whether the voice response application required for the service is running.

   — If the application is a permanent process, use the Solaris **`ps`** command to list the running processes and look for the application process.

   — If the application is started on demand, the AD (application dispatch) process starts it when a call arrives for that application.

2. If the application is *not* running, take any required actions to correct the operation of the voice response application.

   The application may not be installed or there may be errors in coding. For instance, the voice response application should contain an action to answer the phone. Check with the person responsible for development of voice response applications for more information.

3. If the voice response application is running correctly and does not contain errors, ensure that all cards are in the in service (INSERV) state by taking one of the following actions:

   — Enter **display card *all*** and press **Enter.**

   — Go to the Display Equipment screen (Configuration Management > Voice Equipment > Display Equipment).

4. If cards are not in service, either try to restore them or contact your Avaya support representative.

   See Restoring cards and channels on page 48 for procedures that may bring cards back into service.

5. If cards are in service, go to the Channel Services screen (Voice Equipment > Voice Services > Channel Services) and verify that required voice response applications are assigned to the appropriate channels.

6. If Speech Recognition or Text-to-Speech are in use, make sure that those applications are working and that servers running the applications are accessible.

7. Go to the Message Log Report screen (Reports > Message Log Report) and check for messages indicating that the Transaction State Machine process (TSM) is respawning due to an excessive number of channels in the system.

   The message MTC017 (MTC_RESPAWN) indicates respawning of a system maintenance process.

8. If TSM is respawning due to an excessive number of channels, reassign channels to another Avaya IR system or contact your Avaya support representative to order more channels.

Calls dropped

The Avaya IR system can drop calls at the initial prompt or at any other time.

Calls dropped at initial prompt

The IR system may drop calls when the initial prompt is playing if the prompt was recorded over background noise, such as a fan or ventilation system. The background noise may be detected as a dial tone following connection by the caller. If this happens, the call is dropped by the IR system. To fix the problem, re-record the prompt without the background noise.

Note:
For sound quality, you should record in an environment that is free of background noise.

All calls dropped

Take these actions when all calls are dropped:

Note:
If you depend on a host system to provide information to callers, refer to Host interaction on page 22 problems.

1. Go the Message Log Report screen (**Reports** > **Message Log Report**) and scan it for messages related to the trouble.

Look for messages that occurred just before and at the time when calls began dropping. If calls are handled by VoIP, look for the messages VOIP_DISABLED_CALL_PROC or VOIP_CALL_FORCE_CLEARED.

2. Type **who -rpb** and press **Enter** to display a log of system processes.
3. Search for different time stamps on the processes.

   A recent date different from most of the others may indicate that the process respawned.
4. If you find different time stamps, record the situation that caused the problem and take steps to correct it.

Calls not transferred properly

A transfer may fail simply because the number receiving the call is busy. However, if there are repeated problems with transfer operations, the cause may be:

- Digits are being dialed incorrectly.
- The switch does does not support transfer operations.
- There are mismatches between the anticipated number of digits in an ANI or DID pass and the actual number received. (This situation applies to the R2MFC protocol only.)

To resolve the problem:

1. Ensure that digits are being dialed correctly:

   a) Type **sysmon** and press **Ente**r to observe system operations.

   b) Observe transfer operations to determine if the correct digits are being dialed.

   c) If the wrong digits are being dialed, make the required correction in the voice response application.
2. If the correct digits are being dialed, verify that the transfer number is valid and that the switch supports transfer operations.
3. If the R2MFC protocol is in use, try to match the anticipated number of digits in an ANI or DID pass and the actual number received:

   a) Type **sysmon** and press **Ente**r to observe system operations.

   b) Observe transfer operations to determine the number of digits passed in ANI and DID operations.

   c) Use the **nms** command to specify the correct number of digits.

   Note:
   It might not be possible to specify the correct number of digits for each call instance.

No DTMF tones (WINK protocol)

If voice response applications are not responding correctly to caller input, you may suspect that DTMF tones (the tones that identify the called number) are missing. For calls handled with the WINK start protocol, run a trace to determine if the NMS card is receiving the tones.

To set up the trace:

1. Set the following values in the cta.cfg file:
   - Tracemode=1
   - Tracemask=allevt
   - Tracefile=cta.log
2. Stop and start the voice system.
3. Review the ctdaemon file.

   The system displays trace output.
4. Check the trace output to determine whether digits are being sent.

   In the trace output, the digits in parentheses for the **val** field identify digits sent. In the sample trace output that follows, val entries indicate that the digits 1, 2, and 3 were sent. (The digit 3 is not significant, and the val entries are in bold here to help you find them.)

```
MESG: Tue May 13 17:08:48 2003

   | pid=580 tid=578 ctahd=80000001 (CTATEST) uid=0 tag=4006 sev=0

   | DISPEVT: ? NCCEVN_RECEIVED_DIGIT (1c201d) (val=31) objhd=1
   src=1c dst=2000 time=235a9a97 uid=0 size=0 buf=0

MESG: Tue May 13 17:08:48 2003

   | pid=580 tid=578 ctahd=80000001 (CTATEST) uid=0 tag=14001
   sev=0

   | ? Msg:854D Ch#01 Obj:0000 Np=16 Nb=0 0032 0000 0000 0000 0000
   0000 ...

MESG: Tue May 13 17:08:48 2003

   | pid=580 tid=578 ctahd=80000001 (CTATEST) uid=0 tag=4006 sev=0

   | DISPEVT: ? NCCEVN_RECEIVED_DIGIT (1c201d) (val=32) objhd=1
   src=1c dst=2000 time=235a9b32 uid=0 size=0 buf=0
```

```
MESG: Tue May 13 17:08:48 2003

   | pid=580 tid=578 ctahd=80000001 (CTATEST) uid=0 tag=14001
   sev=0

   | ? Msg:854D Ch#01 Obj:0000 Np=16 Nb=0 0033 0000 0000 0000 0000
   0000 ...

MESG: Tue May 13 17:08:48 2003

   | pid=580 tid=578 ctahd=80000001 (CTATEST) uid=0 tag=4006 sev=0

| DISPEVT: ? NCCEVN_RECEIVED_DIGIT (1c201d) (val=33) objhd=1 src=1c
dst=2000 time=235a9bd7 uid=0 size=0 buf=0
```

This trace output shows that digits were sent.

Poor audio quality on VoIP calls

The performance of the self-service IP network has impact on the quality of the audio during calls. A busy network can delay or loose packets with audio information, causing poor audio performance. To help in troubleshooting such problems, you can set up the VoIP subsystem to send copies of RTCP packets to a VoIP Monitoring Manager (VMM), which is a call-quality monitoring application for calls that use packet-forwarding technology. VMM helps you to identify audio quality problems and take steps to resolve them.

Touchtone not interpreted correctly

If touchtone is not working properly:

- Verify that the action to collect data from the caller matches the intended use in the voice response application.
- If there is no problem with the action and its usage in the voice response application, contact your Avaya support representative for assistance.

Fax problems

Fax problems are often caused by simple errors, so understanding the common causes of problems will help you resolve them.

Typical fax problems

The most common reasons that a fax is not sent are:

- The remote fax machine is busy or out of paper.

- There is no fax machine at the remote number.

Once you have checked these two possibilities, troubleshoot fax problems using the information in this section.

Locating fax errors

For internal errors:

1. Check for fax errors by taking one of the following actions:

   — Go to the Message Log Report (**Reports** > **Message Log Report**) and check for fax errors *or*

   — Type **trace date FAXOOC sbFaxProc NMSIP chan # area all level all** and press **Enter**.

2. Provide the output to technical support.

You may also learn of errors through negative return values on a FAX action. Refer to Interpreting negative fax values on page 21 for explanations of negative errors.

Interpreting negative fax values

Review the fax_tool.h file for negative return values for FAX actions. Negative return values indicate that an error has occurred in a FAX process. Use the following list of return values to determine the cause of the error.

Value	Meaning
-1	Another **`faxit`** command is executing.
-2	Fax transmission failed (internal).
-3	Channel was denied (internal).
-4	File cannot be opened or does not exist
-5	There are no previous queued faxes.
-8	**`faxit`** command timed out (internal).
-12	Cannot set timer (internal).
-13	File was not specified.
-14	Unix call failed (internal).
-15	Destination was not supplied.
-17	Command was not supplied.
-18	Return string was not supplied.
-19	Cover page merging failed (internal).

-20	Subprog to sbFaxHpr failed (internal).
-21	IRAPI call failed (internal).
-23	Wrong subprog message was received (internal).
-24	Max. sbFaxHpr instances was reached (internal).

Reviewing fax repair procedures

When problems arise with fax operations, the Message Log Report screen might display various events related to fax operations. The **Explain** text and help topics for these events include suggested repair procedures. If you see fax events in the Message Log Report screen, review the related repair procedures to determine your course of action.

Fax text or file not found

Take action depending on whether the problem occurred in transmission or receipt of the fax:

- Request to transmit a fax file to the caller failed: Verify, using either the Fax Loading and Printing screen or the full path specified in the voice response application, that the file exists.
- Caller did not receive the fax: Consider manually transmitting the fax message to the caller by using the delivery number contained in the error message.

Host interaction problems

This section contains very basic information on problems that might occur when a IR system interacts with a host system. Most often, you will work with the vendor of your host system to resolve these issues.

Host sessions recover repeatedly

To resolve the problem:

1. Go to the Message Log Report screen (**Reports** > **Message Log Report**) and check for messages related to the trouble.

   Alarms related to host interaction begin with the letters HOST, and range in severity from minor to critical.

2. Verify that a Transaction Base screen has been specified.
3. Verify that the Login and Recovery sequences both keep the host session at a Transaction Base screen.

No response for application with host interface

A voice response application that relies on a host system for data might receive no answer intermittently or consistently.

To resolve the problem:

1. Go to the Message Log Report screen (**Reports** > **Message Log Report**) and check for events related to the trouble.

   The event HOST001 (HOST_NORESP) should appear in the log.

2. Follow the repair procedure for the event.

Calls to host dropped

When all calls to the host are dropped, take these steps:

- Type **hstatus all** and press **Enter** to check the status of the host.

  If all sessions are recovering or logging in, this could cause the trouble.

- If the problem occurs frequently, consider speeding up connections between the IR system and the host.

Speech and TTS problems

This section describes how to find and resolve problems related to speech recognition and Text-to-Speech (TTS) features.

Speech delayed or cut off

Delayed or cut off speech can cause callers to disconnect.

When messages are cut off, make the following changes in the voice response application to correct the problem:

- Add a few seconds of initial silence (0.2 to 0.5 seconds) to the beginning of the message to be played.
- Construct a phrase consisting of a few seconds of silence and play that phrase first.
- Ensure that the prompt does not allow voice barge-in. If it does, any background noise or talk by the caller will interrupt the prompt.

Speech recognition not available as resource

To resolve the problem:

1. Go to the Speech Resource Status screen (**Features** > **Speech and DPR Administration** > **Display Status** > **Speech Resource Status**), select a speech resource type from the drop-down list, and select **Submit**.

   The configuration listing for the selected type of speech resource is displayed.

2. Review the speech resource listing to verify that the resource is administered and is in the in service (IN SERV) state.

3. Repeat the previous steps with all types of speech resources.

4. If no speech resource is administered, go to the Speech Recognition Configuration screen (**Features** > **Speech and DPR Administration** > **Administration** > **Speech Recognition or DPR Configuration**) and make the required entries to configure speech resources.

5. If speech resources are configured, but are not in the IN SERV (in service) state, verify that the speech server or servers and related connections are operating.

Cannot configure speech recognition

If the **Speech Recognition Configuration** option is not available on the Speech Proxy Administration screen, the Natural Language Speech Recognition packages are *not* installed. The AVsproxy and AVsrproxy packages are required for the Natural Language Speech Recognition feature. If WholeWord speech recognition is required (AVasr, AVwwasr), one or more of the language packages (AVwwau, AVwwbp, AVwwcf, AVwwcs, AVwwfr, AVwwgr, AVwwit, AVwwjn, AVwwms, AVwwnl, AVwwuk, Avwwus) are also needed. For SpeechWorks OpenSpeech Recognizer (OSR), AVosr204 is required.

All ports BROKEN on speech server

If all ports for a proxy speech server are in the BROKEN state when viewed either by recognition type or by server type, the speech recognition proxy is not able to connect to the specified server with the configured port.

To correct the problem:

1. Ensure that the speech recognition server is up and running.

   See Troubleshooting speech server disconnections on page 37 for more information.

2. Run the **`netstat -a`** command on the recognition server to verify that the recognition server is listening on the configured port.

Speech resource bad or non-configured

If you see the following system message when you try to display a speech configuration resource, there is no server administered for the specified recognition type.

```
Error: Bad or Non-configured Resource type
```

Go to the Speech Recognition or DPR Configuration screen (Feature Packages > Speech and DPR Administration > Administration > Speech Proxy Administration > Speech Recognition Administration > Speech Recognition or DPR Configuration) and administer a server.

Speech server not running

For earlier releases of OSR, run the command **`swisvc -start`** to restart the speech server after every Avaya IR system re-start.

Starting with OSR 2.x, you can set OSR service to start automatically after every system restart. To do so, make the following change on the OSR 2.x server:

1. Locate and open the file c:\Program Files\SpeechWorks\OpenSpeechRecognizer\confg\SpeechWorks.cfg
2. Change the SWIsvcMonAutoRestart and SWIsvcMonAutoStart lines to be set to 1. Verify that the lines look like this:
   - SWIsvcMonAutoRestart=1
   - SWIsvcMonAutoStart=1
3. Save the SpeechWorks.cfg file.

Speech response delayed

Delays in speech response may be caused by:

- Inadequate IR system or LAN resources. Managing the performance of your IR system helps to prevent delays in speech response.
- Limited recognition resources in a speech recognition application. All remote application resources might be busy and not available for allocation to other calls. You must wait for resources to become available or increase the number of resources the system can use.
- Overloaded host communications. If interactions between the host and the IR system are too busy, the result may be delays in speech response.
- Mismatches between the anticipated number of digits in an ANI or DID pass and the actual number received (R2MFC protocol only). Use the **`nms`** command to specify the anticipated number of digits.

Speech recognition rejecting many responses

ScanSoft OSR 2.0 uses new confidence scores to obtain the recognition result. Some of the borderline utterances that would have been accepted in OSR 1.x might be rejected in OSR 2.0.

Try one of the following changes to increase the recognition rate:

- If you want to use the OSR 1.x confidence score scale, set the attribute swirec_backward_compatible_confidence_scores to **1.1** in the OSR server user configuration file. Refer to the Scansoft OSR 2.x reference manual for further information.
- If you want to use the OSR 2.x confidence score but you want to increase the recognition rate, try decreasing the **confidencelevel** property in the /vs/data/vxml/defaults.xml file on the Avaya Interactive Response system, then restart the voice system.

Speech recognition not working

If Avaya speech recognition is not working, the cause may be:

- Incorrect or incomplete administration of the Natural Language Speech Recognition feature or proxy speech server on the IR system
- Disconnection or malfunction of the proxy speech server
- Inadequate LAN or proxy speech server resources (for example, CPU usage at or above 80 percent)

The procedures in this section explain what to do when speech recognition is not working at all. PROXY alarms and messages contain repair procedures for a variety of speech recognition problems.

Speech not playing

Speech may not play for a variety of reasons, including the following:

- The voice response application does not contain, or fails to find, the required phrase.
- The required voice response application is not assigned to the channel.
- A proxy server providing Text-to-Speech service is disconnected or experiencing intermittent problems.

Checking the voice response application and system administration

To check the application and the administration settings:

1. If a particular phrase of recorded speech is not playing, check to see that it is recorded and record it, if necessary.
2. Go to the Display Equipment screen (Configuration Management > Voice Equipment > Display Equipment) and check to see if the correct service is assigned to the channel or channels.
3. If the correct service is not assigned, go to the Channel Services screen (Configuration Management > Voice Equipment > Voice Services > Channel Services) and make the required changes.

Checking the server connection

See Troubleshooting speech server disconnections on page 37 for a complete procedure on checking and testing the connection.

Checking for errors

To check for errors:

1. Go to the Message Log Report screen (Reports > Message Log Report) and check for messages related to the trouble.
2. Enter the following commands as needed to analyze operations:

   — Type `trace tsm chan all | tee /tmp/trace.out` and press **Enter** to trace all levels of operations for the call.

   — Type `trace tsm chan date | tee /tmp/trace.out` and press **Enter** to trace operations for the identified date. (Trace output will be prefixed by the date and timestamp.)

   — Type `trace tsm chan VROP | tee /tmp/trace.out` and press **Enter** to trace voice response operations specifically.

   The trace output from the above commands is sent to the console and to the file **/tmp/trace.out**.
3. Place a call to the server.
4. Review the trace output for failure indications or error messages and take action to correct the problems.

MRCP problems

This section describes how to find and resolve problems related to the MRCP feature.

MRCP connections and protocols

Avaya IR communicates with MRCP servers using the following protocols:

- Signaling requests for call set-up and tear-down between servers use Real-time Streaming Protocol (RTSP) connections.
- Audio data (speech delivered to an ASR engine for recognition and synthesized speech delivered from a TTS engine) is carried over a Real-time Transport Protocol (RTP) connection.

The two protocols use different ports and port ranges. For IBM WVS servers (and typically other MRCP-compliant vendor engines):

- RTSP uses a base port of 554

- RTP uses a base port of 10,000

The MRCP configuration file

Installing the MRCP feature on Avaya IR creates a configuration file (/vs/sproxy/cfg/mrcp.cfg) and the default settings shown in the following table.

The configuration file sets parameters for the ports used for signaling and the timing intervals that Avaya IR uses to determine if it has lost touch with speech resource servers. Under most circumstances, there is no need to change these default settings.

Parameter	Description	Default Setting
RTPNumberofPorts	The number of ports on Avaya IR available for RTP connections to MRCP servers. **Note:** The default setting is higher than the number of ports that Avaya IR can support for ARS and TTS combined. This helps prevent port conflict.	1000
RTPBasePort	The base port number on Avaya IR for the range of ports used for RTP connections to MRCP servers. This value, combined with the RTPNumberofPorts value, defines the range of ports reserved for connections to MRCP servers. ASR requests use the lower half of the range, while TTS requests use the upper half of the range. The default setting has been set to prevent conflicts with the RTP ports needed for Voice Over IP. Change this value only if you experience port conflicts.	10000
RTPPacketRate	The rate, measured in milliseconds, at which data is transmitted over each RTP connection. Change this value to match the packet rate of the MRCP server at the other end of the connection.	20

RTSPNoActivityTimeout	The number of seconds Avaya IR will wait for a response from an MRCP server before sending a DESCRIBE message as a test of the connection. If a second timeout interval elapses with no response, Avaya IR decides that the server or the connection is out of service. It then places the server into the maintenance state called FOOS (facility out-of-service), logs the event, and raises an alarm. Reducing this interval will improve the speed at which lost connections are detected, but it will also increase the messaging overhead between Avaya IR and the servers. MRCP servers may use a similar approach to monitoring connectivity. If so, make sure that the interval set on Avaya IR s not higher than what is set on the server. If the interval on Avaya IR is inadvertently set higher than on the server, the server may erroneously assume that its connection to Avaya IR has failed when, in fact, it has not.	15
ResponseTimer	The number of seconds that an Avaya IR application will wait for a response from an MRCP server providing ASR or TTS support. **Example:** When applications attempt to allocate a speech processing resource, a SETUP message is sent to the server that provides that support and this timer starts. If Avaya IR receives no response to the SETUP request within the specified interval, the application is told that the allocation failed.	5
PerPortConnection	A setting that indicates whether the MRCP implementation uses port 554 for a single connection for signaling or for multiple, per-port connections. If TRUE, multiple, per-port connections are used for signaling. (This is required in Avaya IR release 1.2.1 and release 1.3? if the MRCP server is an IBM WVS.) If FALSE, a single connection is used for signaling.	TRUE

BuiltinLocale	A setting that indicates the language to be used for built-in ASR grammars such as numbers or phone numbers. In Avaya IR release 1.2.1 and release 1.3, the IBM WVS supports only one language at a time but does offer several different languages. Refer to the IBM WVS documentation for the full range of language options. Change this setting if the MRCP server supports a language other than US English.	en-US

Erratic availability of MRCP speech resources

If speech resources are erratically available to your applications-sometimes they're available, but sometimes they're not-there may be problems with port contention between applications.

Check the port ranges used by the MRCP feature and the other applications and utilities running on your system.

If there is a port conflict, edit the MRCP configuration file (/vs/sproxy/cfg/mrcp.cfg) to reset the **`RTPBasePort`** setting to prevent ongoing conflict.

MRCP servers are frequently out of service

When Avaya IR loses its connection with an MRCP server, it places the server into the Far end Out Of Service (FOOS) state. (Avaya IR will not place the server into the BROKEN state.)

This may be a temporary condition as connections between Avaya IR and the MRCP server are dropped and reestablished during normal operations.

However, when links between the Avaya IR system and the MRCP servers regularly end up out of service (FOOS), several things may contribute to the problem.

To investigate the problem:

1. Check to ensure the server has been properly administered.

   In particular, check the server name and base port number. If the server is an IBM WVS, the server name must be entered in the form *`name`***`/media`** and the base port number must be set to **`554`**.

   Use the table below to check the server name abd base port number entered.

ASR Servers	Server Name	Base Port Number
IBM WVS	<hostname>/media/recognizer	554
Scansoft SWMS	<hostname>/media/speechrecognizer	4900
Nuance MRCP Server	<hostname>/recognizer	554

TTS Servers	Server Name	Base Port Number
IBM WVS	<hostname>/media/synthesizer	554
Scansoft SWMS	<hostname>/media/speechsynthesizer	4900
Nuance MRCP Server	<hostname>/synthesizer	554

Note:

The suffixes above are automatically appended when the above media servers are configured through Web Administration.

2. Check the performance of your LAN.

   Slow or interrupted LAN communications can result in failed processes for speech recognition, Text-to-Speech, or database operations. The cause is generally overloading of the Avaya IR system or the LAN.

   For more information, see Checking LAN communications on page 36.

3. Check for speech server disconnect problems.

   For more information, see Troubleshooting speech server disconnections on page 37.

4. Run a trace using debug level 5 and examine the MRCP message exchange.

   Use the command **`sproxyadm -r OPSRx -D 5`**

Text-to-Speech output is not heard

If TTS output does not play in an application, use the following procedure to investigate the problem.

To investigate the problem:

1. Check for allocation errors (TTS008) in the error log.

   This error indicates that a request for a TTS resource was denied, and the associated TTS will not be heard. This error occurs when there are no TTS resources in service. Either there are not enough TTS resources administered for the application or the resource is temporarily out of service because the connection dropped. In either case, consider adding more TTS ports on the Avaya Interactive Response.

2. Run a trace of the application and/or the Avaya Interactive Response VROP process.

3. MRCP errors (called status codes or completion causes) are logged in the VROP trace and are reported to an application. At the highest trace level (5), the VROP trace will show all MRCP messages exchanged. A SPEAK request will contain the TTS intended for play and the corresponding SPEAK-COMPLETE from the server will contain the status code or completion cause for that request.

   Interpret the trace results using the MRCP specification and by consulting with the MRCP server vendor as needed.

Automatic Speech Recognition fails

If speech recognition fails, use the following procedure to investigate the problem.

To investigate the problem:

1. Check for allocation errors (PROXY011) in the error log.

   This error indicates that a request for a recognition resource was denied and speech recognition will fail. This error occurs when there are no recognition resources in service. Either there are not enough resources administered for the application in use or the resource is temporarily out of service because the connection dropped. In either case, consider adding more ASR ports on the Avaya Interactive Response.

2. Run a trace of the application and/or the Avaya Interactive Response ASRPROXYMGR.

   MRCP errors (called status codes or completion causes) are logged in the ASRPROXYMGR trace and are reported to an application. At the highest trace level (5), the ASRPROXYMGR trace will show all MRCP messages exchanged. A recognition request spans several MRCP messages, each with a corresponding response. If the request fails, then the response will contain a status code or completion cause.

   Interpret the trace results using the MRCP specification and by consulting with the MRCP server vendor as needed.

Text-to-Speech problems

This section describes how to find and resolve problems related to the Text-to-Speech (TTS) feature.

Speechify or RealSpeak TTS port state stays INSERV when LAN is down

The SpeechWorks Speechify or RealSpeak proxy software on the Avaya IR system does not detect when the LAN connection to the speech server is inactive and leaves the TTS port state as INSERV. As a result, callers hear silence, since the port on the IR system is still in service. The caller must hang up to terminate the call, even if the LAN connection comes back up. When the LAN connection is active again, the proxy software resets the port state so that new calls can be handled properly.

R2.0: Returning TTS resource state to INSERV

If connectivity with RealSpeak, Speechify, or SAPI-compliant Text-to-Speech (TTS) servers has been interrupted, you may need to set the resource state to INSERV to resume TTS services.

To set the resource state to INSERV:

1. At the IR system command prompt, enter **`sproxyadm -r TTSx -d`** to show the resource state.

   For more information about the **sproxyadm** command, see sproxyadm command.

2. If the resource state is FOOS, BROKEN, or INSERV, enter **`sproxyadm -r TTSx -f INSERV`** to change the resource state to INSERV.

3. Repeat Step 1 to check the resource state.

4. If the resource state does not change to INSERV, you must restart the TTS service on the Windows NT server and repeat Steps 1 through 3 above.

5. For a Speechify or RealSpeak engine, if the resource state does not change to INSERV, follow instructions in the Speechify or RealSpeak documentation to restart the TTS service, then repeat Steps 1 through 3 above.

6. For a SAPI TTS engine, if the resource state does not change to INSERV, use the following steps to restart the Windows NT TTS service, then repeat Steps 1 through 3 above.

   a) On the Windows NT server, open the Control Panel window (Start > Settings > Control Panel).

   b) Select **Administrative Tools**.

   c) Select **Component Services**.

d) The system displays the **Component Services** window.

e) On the **Tree** tab, select **Services (Local)**.

f) Select the Text-to-Speech service from the list of services in the lower-right window.

g) From the **Action** menu, select **Stop**.

h) The **Status** of the service is blank.

i) From the **Action** menu, select **Start**.

j) The Status of the service is started.

k) Close the **Component Service**s window.

System process problems

Problems with system processes can affect callers and voice response operations, causing speech breaks, delays, and interruptions in call handling.

Unix commands failing or disk errors

If Unix commands are failing, or if the system reports disk failures, go to the Message Log Report screen (Reports > Message Log Report), check for events related to the problem, and follow the repair procedures in the related **Explain** text or online Help topic. The following are possible problems:

- DSKMG messages report file access failures that affect speech or data operations.
- Unix messages report problems with the Unix operating system.

Execute Unix command failed

Most likely, the problem is with the command or shell script. Make sure that the command or shell script that was attempted works when executed manually. If it does, verify that its full path name is provided to the script.

vi editor causes core dump

If the vi editor causes a core dump, split the file into multiple segments:

- Type **`split - n`** ***`filename name`*** and press **Enter**, where ***`n`*** is the number of lines in each piece (1000 is the default), ***`filename`*** is the name of the files you want to split, and ***`name`*** is the new segment you are creating.

Database problems

If you are using databases on the LAN, communications problems with those databases may affect voice operations. Troubleshooting database server disconnections on page 38 covers what to do when the IR system is not communicating with the database server at all. The following topics explain how to check on less serious problems with databases.

Checking JDBC operations

Use the following commands to check JDBC function:

- **`netstat -a`** lists port usage. Review the output to verify that ports are functioning and are not overloaded.
- **`trace chan all`** ***`DBDIP3`*** traces DIP activity. Review the output to verify that all DIPs are functioning in the desired way.

Review the following system processes related to JDBC operations:

- /vs/bin/vrs/idbcint *DIP num*
- /vs/bin/vrs/jdbcdip dipnumber
- /usr/bin/../java/bin/../bin/SPARC/routine_threads/java -Dpname=ais3 -cp /webadm
- /usr/bin/../java/bin/../bin/SPARC/routine_threads/java -Dpname=ais(dip number) -cp /webadm

Checking Oracle object size limits

An *extent* is a user-defined unit of storage in the Oracle **storage** clause used when defining an Oracle object. It is used as MINEXTENTS or MAXEXTENTS in the storage clause. An Oracle object (that is, a table, an index, a rollback segment) grows one extent in size each time the object needs to be expanded.

When the maximum allowed number of extents is reached, the object will not be able to grow further. The object needs to be redefined so that either the size of each extent is increased or the initial object size is increased, to reduce the number of extents required for the storage of this object. The maximum allowed number of extents in a system is 2,147,483,645.

To check the number of extents:

1. Type **dbused** and press **Enter**.

   The system displays the Space Allocated screen.

2. Compare the value in the **EXTENTS** column to the value in the **MAX_EXTENTS** column.

   If the value in the **EXTENTS** column is greater than or equal to the value in the **MAX_EXTENTS** column, the table has reached its maximum size.

3. Redefine the database table storage, if necessary.

Note:
Contact your internal database administrator or your database vendor for help with this and other database tasks.

A word about the Tomcat server log

In Avaya IR Release 2.0, the Web Administration tool uses Tomcat as both the Web server and servlet engine. Tomcat periodically writes data to a log on the Avaya IR server.

Since the Tomcat server does not provide a method internally to delete old data, it continually adds to this data and will continue to do so unless cleaned up from time to time. We recommend that you check these log files on a regular basis and delete old data files when the size of the log file directory gets too large.

This file can be found at the following location:

/webadm/jakarta-tomcat-5.0.28/logs/localhost_log.<*yyyy-mm-dd*>.txt

where <*yyyy-mm-dd*> is the date of the last time time the log was written to. For example, if the last date the log was written to was May 7, 2004, then the name of the log file would be:

localhost_log.2004-05-07.txt

Checking communications

Because voice system functions may be reliant on servers, checking LAN communications is an important aspect of troubleshooting. You might need to work with your LAN administrator to completely investigate LAN problems.

Checking LAN communications

To support voice response operations, an Avaya IR system may communicate with remote servers that store databases, with proxy servers for Text-to-Speech and speech recognition, or both. Using servers outside the IR system provides flexibility and increased storage capacity.

However, problems with LANs and with servers can interrupt or stop access to required functions. Understanding how to check LAN communications helps you to identify the cause of voice response problems faster when servers are involved. If the VoIP feature is used, LAN operations are critical to transmitting calls. With VoIP, the goal of troubleshooting the

network is to enable the DEFINITY or MultiVantage system and the Avaya IR system to communicate with each other using the UDP and TCP protocols on the network.

Typical causes of LAN problems

The following are typical causes of problems with server communications over the LAN:

- Incorrect administration of server communication settings, such as IP addresses
- Breakdowns in the LAN system or malfunction of the server itself
- Overloading the Avaya IR system or the LAN

Resources for LAN troubleshooting

The following resources are available to help you troubleshoot problems with LAN communications:

- Technical books and Web sites in the public realm explain how to analyze LAN problems.
- The Solaris operating system provides network troubleshooting tools.
- DEFINITY and MultiVantage systems have built-in network troubleshooting tools.

Additionally, you can receive help with troubleshooting server problems from your LAN administrator and from Avaya. Before seeking assistance, be sure to:

- Research the situation
- Make sure that servers are administered correctly in the Avaya IR system

Troubleshooting speech server disconnections

To investigate the problem:

1. Go to the Speech Server Status screen (Feature Packages > Speech and DPR Administration > Display Status > Speech Server Status) to check server status and settings.
2. Select the desired speech server from the list and select **Submit**.

   The system displays setting and status information for the server.
3. Verify that the correct ports, server name, and IP address are in use.

   If you have recorded the server name and IP address on the *IR System Data Form*, refer to it now.
4. If there are errors in the configuration of the server, take the following actions:

a) Go to the appropriate proxy configuration screen and make the required corrections.

   To correct speech recognition configuration errors, go to the Speech Recognition or DPR Configuration screen (Feature Packages > Speech and DPR Administration > Administration > Speech Proxy Administration > Speech Recognition or DPR Configuration).

   To correct text-to-speech configuration errors, go to the Text-to-Speech Configuration screen (Feature Packages > Speech and DPR Administration > Administration > Text-to-Speech Configuration).

b) Return to the Speech Server Status screen to see if the server status is in service (INSERV).

5. If the server status is not INSERV, go to the Solaris operating system and execute the **`ping`** command to test the connection.
6. If the **`ping`** command fails, take the following actions:

   a) Verify that the LAN cables are correctly connected between the Avaya IR, the server, and the LAN hub (where applicable).

   b) Make sure that the voice response application is referring to the correct server.

   c) Contact your LAN administrator to determine whether there are problems with the server or with network connections.

7. If no network problems exist, check license administration on the remote server to ensure that the maximum number of licenses has not been exceeded.
8. If the server remains disconnected, contact your Avaya technical support representative for assistance.

Troubleshooting database server disconnections

To investigate the problem:

1. Go to the JDBC Administration screen (Configuration Management > JDBC Administration) to check server status and settings.
2. Select the database data interface process (DIP) that interacts with the server in question.

   The system displays the JDBC Administration - Edit screen.

3. Check the DIP settings, particularly those for ports, hostname and DB name, and make any required corrections.

   If multiple DIPs interact with the server, you must check them separately.

4. Click **Test** to check communications between the Avaya IR system and the database server.

The connection between the Avaya IR system and the database server is tested and the results are reported. If the connection is not working, the related error message is included in the output.

5. Continue checking settings, testing connections, and making corrections for all DIPs that communicate with the database server.
6. If the database server is still not responding, take the following actions:
   a) Check the /etc/hosts file to make sure that it has the correct IP address and name for the server.
   b) Verify that the LAN cables are correctly connected between the Avaya IR system , the server, and the LAN hub (where applicable).
   c) Make sure that the voice response application is referring to the correct server.
   d) Contact your LAN administrator to determine whether there are problems with the server or with network connections.
7. If the /etc/hosts file is correct and no network problems exist, check license administration on the remote server to ensure that the maximum number of licenses has not been exceeded.
8. If the server remains disconnected, contact your Avaya technical support representative for assistance.

Troubleshooting intermittent LAN problems

Slow or interrupted LAN communications can result in failed processes for speech recognition, Text-to-Speech, or database checking. The cause is generally overloading of the Avaya IR system or the LAN.

Troubleshooting persistent server problems

If you experience persistent problems with a server, you might want to reconfigure and retest the server.

To reconfigure and retest the server:

1. Put all systems used in the application that is experiencing problems on a dedicated LAN hub, completely isolated from the rest of the LAN.
2. Configure the systems to communicate with each other over the dedicated LAN hub.
3. Use the **`ping`** command to verify that the server responds.
4. If none of these solutions work, contact your field support representative.

Pinging server connections

The **ping** command indicates whether a remote host can be reached. It can also display statistics about packet loss and delivery time.

The **ping** command is available through the Solaris operating system. Use it with the attributes shown in the table that follows.

Attribute	Function
-d	Set the SO_DEBUG socket option.
-l	Send the packet to the given host and back again.
-L	Turn off loopback of multicast packets.
-n	Display the network addresses as numbers.
-r	Bypass the normal routing tables and send directly to a host on an attached network.
-R	Set the IP record route option and store the route of the packet inside the IP header.
-v	List any ICMP packets, other than ECHO_RESPONSE, that are received.
-i	Specify the outgoing interface to use for multicast packets.
-I	Specify the interval between successive transmissions.
-t ttl	Specify the IP time to live for multicast packets.

Monitoring Ethernet packets

The Sun Solaris operating system provides Watch-Net and Watch Net-All diagnostics that monitor Ethernet packets to identify good packets and packets with errors. Refer to the service manual for your platform:

- *Sun Fire V210 and V240 Servers Administration Guide*
- *Sun Fire 280R Server Service Manual*
- *Sun Blade 150 Service Manual*

These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Tracing LAN activities

LAN trace utilities help you to understand how LAN communications are operating and identify problems. Although, the LAN trace utilities have the following disadvantages, they are still very helpful:

- Only traffic on the subnet to which the IR system is attached can be traced.

- When traffic on the LAN is very heavy, some packets might be lost because the server cannot keep up with the flow.

To better understand the results, you might want to seek support from your Avaya support representative when running the LAN utilities.

Detecting incorrect IP addresses (arp)

The **arp** command provides information about Ethernet/IP address translation. You can use the command to detect systems on the LAN that are configured with an incorrect IP address. The table that follows identifies the different options and functions for the **arp** command.

Command	Function
arp -a [Unix[kmem]]	Display all of the current ARP entries by reading the table from the file kmem (default /dev/kmem), based on the kernel file Unix (default /kernel/Unix)
arp -d *hostname*	Delete an entry for the host called **hostname**. **Note:** This option can be used only by the super-user.
arp -s *hostname ether_address* [temp] [pub] [trail]	Create an ARP entry for the host called **hostname** with the Ethernet address **ether_address**.
arp -f *filename*	Read the file named filename and set multiple entries in the ARP tables

Displaying network statistics (netstat)

Use the **netstat** command to display statistics about each network interface and socket and statistics about the network routing table. Use the **netstat** command with the attributes shown in the table that follows.

Attribute	Function
-a	Display the state of all sockets and all routing table entries.
-f *address_family*	Limit the statistics or address control block reports to those of the specified family. (The address family can be inet for the AF_INET family or Unix for the AF_Unix family.)
-g	Display the multicast group memberships for all interfaces.
-i	Display the state of the interfaces that are used for TCP/IP traffic.
-m	Display the STREAMS statistics.
-n	Display the network addresses as numbers.
-p	Display the address resolution tables.

-r	Display the routing tables.
-s	Display the per-protocol statistics.
-v	Display additional information for the sockets and the routing table.
-I *interface*	Display the state of a particular interface.
-M	Display the multicast routing tables.
-P *protocol*	Limit the display of statistics or state of all sockets to those applicable to protocol.

Displaying packet route (traceroute)

Use the **traceroute** command to display the route that packets take when going to a remote system. Use the **traceroute** command with the attributes shown in the table that follows.

Attribute	Function
-f	Set the initial time-to-live used in the first outgoing probe packet.
-F	Set the **don't fragment** bit.
-d	Enable socket level debugging.
-g	Specify a loose source route gateway.
-i	Specify a network interface to obtain the source IP address for outgoing probe packets.
-I	Use the ICMP ECHO instead of UDP datagrams.
-m	Set the max time-to-live (max number of hops) used in outgoing probe packets.
-n	Print hop address numerically rather than symbolically.
-p	Set the base UDP port number used in probes. (Default is 33434.)
-r	Bypass the normal routing tables and send directly to a host on an attached network.
-s	Use the following IP address (which usually is given as an IP number) as the source address in outgoing probe packets.
-t	Set the type of service in probe packets to the following value.
-v	List the ICMP packets other than TIME_EXCEEDED and UNREACHABLE.
-w	Set the time (in seconds) to wait for a response to a probe.
-x	Toggle checksums.

Checking hardware

Hardware failures and malfunctions can stop or interfere with voice system operations. This section explains how to check various types of hardware connections and components.

Resolving a problem when the monitor does not display

It has been observed on Sun Fire headless systems (such as the 280R and the V240), that when the console is left disconnected for an extended period of time, the system can stop sending output to the port where the console monitor would be connected. Then, when a monitor is reconnected to the port, console messages are not sent to the monitor.

If this happens, you may be able to log in to the system remotely to effect a graceful shutdown and restart of the system. Console messages are then redirected to the monitor when the system comes back up.

If, however, you are **not** able to log in remotely, you must power down the system manually by pressing the power switch/button.

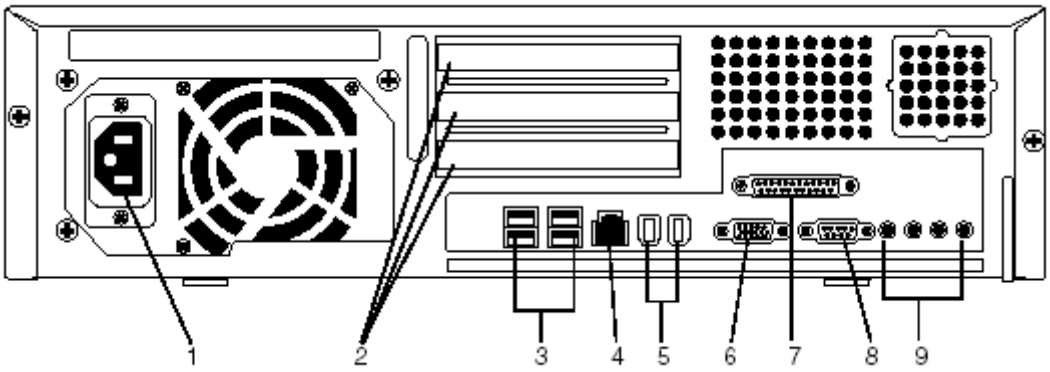
Because this problem involves a complete power down and restart of the system, you should plan to do this during non-peak hours, if at all possible.

Checking cable connections

Make sure that the cables that connect your IR system to other devices and systems are firmly in place and functioning properly.

Sun Blade 150 cable connections

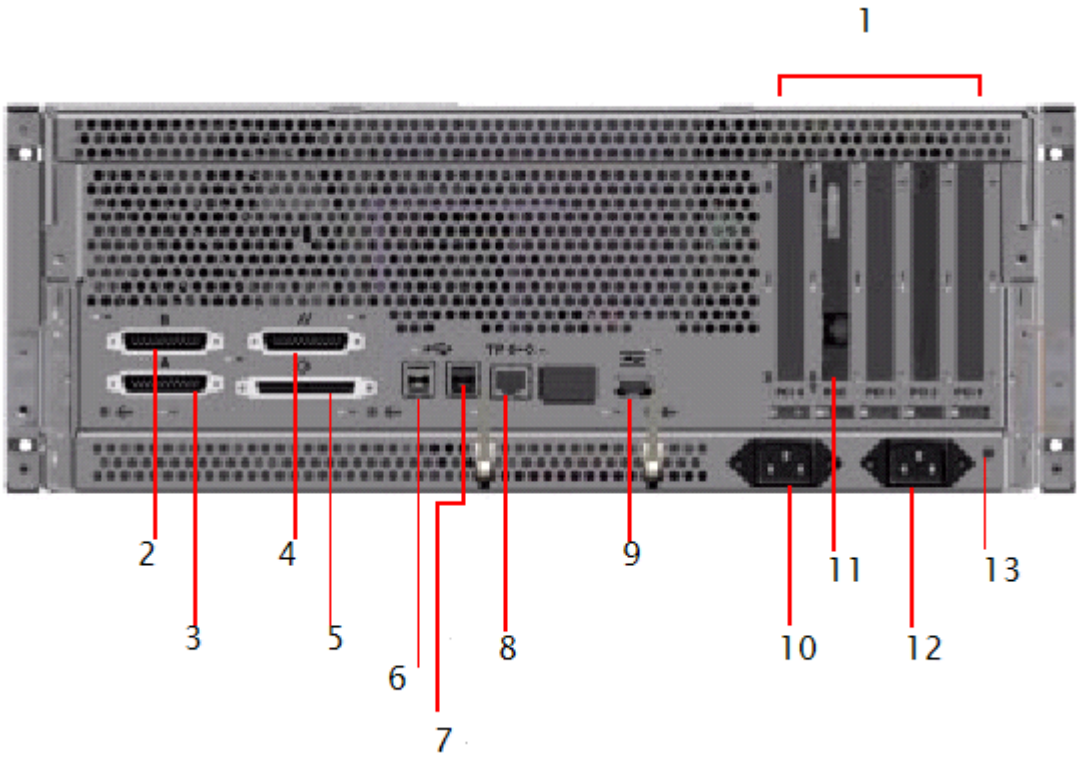
The following figure shows where cables connect to the back of the back of the Sun Blade 150 platform.



Label	Function and troubleshooting considerations
1	Power connector - Cable provides power to the IR system. Disconnection from the plug results in loss of power and function.
2	PCI card slots - Cables connect NMS cards to the MultiVantage (DEFINITY) system or to digital telephony lines. Problems here may interfere with receiving and handling calls.
3	USB connectors (four) - Two of these connectors are reserved for the keyboard and mouse that are part of the country kit. If a keyboard is not connected, and the IR system is rebooted, you might not be able to log into the IR system. Your organization might use the remaining USB connectors for other purposes.
4	Twisted-pair Ethernet connector - Cable connects the IR system to the LAN. Problems here may interfere with access to voice response applications, databases, proxy speech servers, and other IR system components that reside on servers on the LAN. If VoIP is in use, a loose connection here may cause problems with call processing.
5	IEEE 1394 (Fireware) connectors (two).
6	VGA video connector - The cable connects the video monitor to the IR system. Problems here may cause the video monitor to appear blank, even though the IR system is still processing calls.
7	Parallel connector
8	Serial connector (RS-232) - The cable connects the IR system to the external modem, which controls dial-up access to the system for Avaya support technicians. Problems here might mean that Avaya support technicians are unable to access the IR system for troubleshooting purposes.
9	Audio module connectors

Sun Fire 280R cable connections

The following figure shows where cables connect to the back of the back of the Sun Fire 280R platform.



Label	Function and Troubleshooting Considerations
1	PCI card slots - Cables connect NMS cards to the MultiVantage (DEFINITY) system or to digital telephony lines. Problems here may interfere with receiving and handling calls.
2	Serial connector a - The cable connects the video monitor to the IR system. Problems here may cause the video monitor to appear blank, even though the IR system is still processing calls.
3	Serial connector b - Cable connects the IR system to the external modem, which controls dial-up access to the system for Avaya support technicians. Problems here might mean that Avaya support technicians are unable to access the IR system for troubleshooting.
4	Parallel connector
5	UltraSCSI connector
6, 7	USB connectors (four) - Two of these connectors are reserved for the keyboard and mouse that are part of the country kit. If a keyboard is not connected, and the IR system is rebooted, you may not be able to log into the IR system. Your organization may use the remaining USB connectors for other purposes.

8	Twisted-pair Ethernet connector - Cable connects the IR system to the LAN. Problems here may interfere with access to voice response applications, databases, proxy speech servers, and other IR system components that reside on servers on the LAN. If VoIP is in use, a loose connection here may cause problems with call processing.
9	FC-AL
10, 12	Power connectors - Cable provides power to the IR system. Disconnection from the plug results in loss of power and function.
11	RSC card

You can also test port function. The Sun OpenBoot Diagnostics system performs root cause failure analysis on the ports. *Sun Blade 150 Service Manual* and *Sun Fire 280R Server Service Manual* explain how to run OpenBoot Diagnostic tests. These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Testing platform hardware

When hardware problems occur with the IR system, you can use the Sun Validation Test System (VTS) to test and validate the hardware. You use Sun VTS in the event of failures in:

- Powering on
- Video output
- The hard drive, CD-ROM, or DVD-ROM drives
- Dual in-line memory module (DIMM) function

Refer to the service manual for your platform:

— Sun Fire V240 Server manuals:

Sun Fire V210 and V240 Servers Installation Guide

Sun Fire V210 and V240 Servers Administration Guide

Sun Fire V210 and V240 Servers Parts Replacement Manual

Sun Fire V210 and V240 Servers Product Notes

— *Sun Fire 280R Server Service Manual*

— *Sun Blade 150 Service Manual*

These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Checking NMS card configuration

Check the configuration of the NMS card or cards with the commands described in the table that follows.

Commands	Functions
nmsboards	Identifies NMS digital telephony boards, their types (E1 or T1), and their slot numbers.
pcidev	Identifies board type and communicates with PCI files. Can be run without having to configure an NMS board or run **ctdaemon**.
boardinf	Provides detailed information on the board, communicates with board, and provides real-time memory display. Requires an installed NMS board and **ctdaemon** running.
trunkmon	Identifies trunk status
shows95	Shows trunks ABCD bits being toggled and is a good tool for Loop or Wink (E&M) protocols. Requires an installed NMS board and **ctdaemon** running.
showcx95	Provides board timeslot information. Requires an installed NMS board and **ctdaemon** running.
ctavers	Identifies version of NMS software

Checking card and channel states

If you think a problem is caused by the failure or malfunction of an Avaya IR system channel, NMS card, or VoIP card, you can check the state of the component. To check card and channel states, go to the **Display Equipment** screen (Configuration Management > Voice Equipment > Display Equipment). The IR system displays information about cards and channels, which should show an in service (INSERV) state. If cards and channels are not in the INSERV state, you may be able to restore them. See Restoring cards and channels on page 48.

Performing root cause failure analysis

The Sun OpenBoot Diagnostics system performs root cause failure analysis on various IR devices by testing internal registers, confirming subsystem integrity, and verifying device functionality. Refer to the service manual for your platform:

- *Sun Blade 150 Service Manual*
- *Sun Fire 280R Server Service Manual*

These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Restoring cards and channels

Channels and voice operations cards on the IR system can go out of service for a variety of reasons. When that happens, following the procedures presented in this section may restore channels, NMS cards, or VOIP cards to service. Most out-of-service conditions are the result of administration errors or intermittent problems, rather than actual hardware failures. By taking the time to troubleshoot, you may be able to resolve the problem yourself.

When you troubleshoot problems with cards and channels, bear in mind that as long as even one channel on a card is operating, the card will be in the in service (INSERV) state. If a card is out of service, *all* channels connected to the card are not operating.

Restoring MANOOS cards and channels

The MANOOS (manually out of service) state is the result of one of the following events:

- A user requested that the card or channel be taken out of service.
- An internal error put the card or channel in this state to allow for an attempted recovery.

To restore a channel or card in the MANOOS state:

1. Type **`restore channel`** ***`channel #`*** or **`restore card`** ***`card#`*** and press **Enter**.

   `channel #` and ***`card #`*** represent the number of card or channel you want to restore.

2. Go to the **Display Equipment** screen (Configuration Management > Voice Equipment > Display Equipment) to determine if the card or channel has returned to the INSERV state.

   The card of channel may remain in the MANOOS state or go to another out-of-service state.

3. If the card or channel has not returned to the INSERV state, contact your Avaya support representative.

Restoring NETOOS cards and channels

The NETOOS state indicates that the card or channel was taken out of service by some network or physical channel error. This state refers only to channels that are defined as PRI protocol.

To restore a card in the NETOOS state:

1. Go to the **Message Log Report** screen (Reports > Message Log Report) and review any messages related to the particular card or channel.
2. Check connections and indicators on the back of the IR system and re-seat the connection, if necessary:
   a) Check the physical connection to the card and determine if it is seated correctly.

      The card should not have worked its way out of the connection. See Checking cable connections on page 43 for more information.

   b) If the connection is loose, re-seat it.
3. If you have reseated the connection, go to the **Display Equipment** screen (Configuration Management > Voice Equipment > Display Equipment) to see if the card or channel is now in the INSERV state.
4. If the card or channel is still not in service, take the following actions:
   a) Check the status of the card or channel on the switch system administration interface.
   b) Run diagnostics from the switch system administration interface to identify any errors with the switch connections
   c) If errors are identified, correct them.
   d) Busy out and release the card or channel on the switch to try to clear the problem.
   e) If necessary, re-check the status of the card or channel on the Display Equipment screen.
5. If the card or channel is still not in service, contact your Avaya support representative about the problem and share the information you have gathered.

Restoring FOOS cards and channels

The FOOS state indicates that the card or channel was taken out of service by some physical channel error.

To restore a card or channel in the FOOS state:

1. Go to the **Message Log Report** screen (Reports > Message Log Report) and review any messages related to the particular card or channel.

2. Check connections and indicators on the back of the IR system and reseat the connection, if necessary:

   a) Check the physical connection to the card and determine if it is seated correctly.

      The card should not have worked its way out of the connection. See Checking cable connections on page 43 for more information.

      VoIP may use a network interface (NIC) card that is different from the one used by other web-based processes for the Avaya IR system. If this is the case, check the connection for the card.

   b) If the connection is loose, re-seat it.

   c) Make note of other information about the card, such as lit LEDs, connection to the telephony switch for T1/E1 connections, LAN status for VoIP connections, and so forth.

3. If you have reseated the connection, go to the **Display Equipmen**t screen (Configuration Management > Voice Equipment > Display Equipment) to see if the card or channel is now in the INSERV state.

4. If the card or channel is still not in service, contact your Avaya support representative about the problem and share the information you have gathered.

Restoring BROKEN NMS and VoIP cards

The BROKEN state can result from conditions other than actual malfunction of the card or channel. For example, the card or channel may be unconfigured, or configured incorrectly. Note that individual channels do not come up in the BROKEN state, so the procedures in this section apply only to NMS and VoIP cards.

Inspecting the IR system platform

When an NMS or VoIP card is in the BROKEN state, inspect the IR system platform:

1. If the BROKEN card is an NMS card, there should be a card in the identified slot.

   VoIP function is provided through the Ethernet connection, so there will not be a card in the slot.

2. If there is no NMS card in the slot, take one of the following actions:

   — Install an NMS card.

   — Disregard the BROKEN state if no card is required in the slot.

      An IR system may operate using one or two NMS cards. If the system is configured for two NMS cards, but has only one, system messages and screens report a BROKEN card for the empty slot.

3. Check the connection for the BROKEN card or channel on the back of the IR system.

   The card or channel should not have worked its way out of the connection. See Checking c on page 43able connections for more information.

4. If the connection is loose, re-seat it.

5. If you have reseated the connection, go to the **Display Equipment** screen (Configuration Management > Voice Equipment > Display Equipment) to see if the card or channel is now in the INSERV state.

6. If the card is still not in service, verify that it is administered correctly.

   See Checking card administration on page 51 for more information.

Checking card administration

If a card is present in the slot and securely connected, the next step is to check the IR system administration settings for the card.

To check administration settings:

1. Check configuration settings for the BROKEN card:

   — For the NMS digital interface card, go to the **Display Digital Interface Card** screen (Configuration Management > Switch Interfaces > > Digital Interfaces Protocols > Display Parameters > Display Digital Interface Card) to view the card parameters.

   — For the VoIP card, go to the **Display VoIP Parameters** screen (Configuration Management > Switch Interfaces > Voiceover IP > Display Parameters > Display VoIP Parameters) to view card parameters.

   Configuration settings should match the type of card installed. VoIP cards should be enabled.

2. If the card is configured incorrectly, make the required corrections:

   — For the NMS card, go to the **Change Card** screen for the appropriate type of digital interface (Configuration Management > Switch Interfaces > Digital Interfaces > Digital Interfaces Protocols > Change Parameters > Change Card - Digital Interfaces), and choose subsequent screens based on card type.

   See Checking NMS card configuration on page 47 for useful commands related to NMS cards.

   — For the VoIP card, go to the **Change VoIP Card** screen (Configuration Management > Switch Interfaces > Voiceover IP > Change Parameters > Change VoIP Parameters > Change VoIP Card) and change parameters.

3. If you have corrected the card configuration, go to the **Display Equipment** screen (Configuration Management > Voice Equipment > Display Equipment) to verify the card state.

4. If the card is still not in service, type **`display card`** ***`card _number`*** and press **Enter** and verify that the card is found.

   Note:i
   If there are problems with licensing, there may be no usable channels on the card, and the card will not be found when the **`display card`** command is run.

5. If the card is not found, go to the **Feature Licensing** screen (Configuration Management > Feature Licensing) and verify that there are enough Right-to-Use licenses (RTUs) for the channels supported by the card.
6. If you do not have an adequate number of RTUs for channels in operation, contact your Avaya support representative to arrange to acquire more RTUs.
7. If RTUs are not an issue, and the card is still not in service, you may be able to bring it back into service by removing and restoring it.

   See Removing and restoring cards on page 52 for more information.

Removing and restoring cards

If the connection to a card is seated properly, and the card is configured correctly, try removing and restoring the card. Repeat the remove and restore process anytime that you change a configuration parameter or reseat a cable. Removing and restoring causes the IR system to attempt re-initialization of the card.

To remove and restore a card:

1. To remove the card, type **remove card *card number*** and press **Enter**.
2. To restore the card, type **restore card *card number*** and press **Enter**.

   The IR system attempts to configure the card again. The reconfiguration process may bring the card back into service.
3. If the card remains in the BROKEN state, check the card configuration in the switch and make any required corrections.
4. Remove and restore the card again on the IR system.

   Even if you have made no changes to the card configuration on the switch, removing and restoring the card at this point may clear the problem.
5. If the card is still BROKEN, busy out and release the card on the switch.
6. Remove and restore the card once more on the IR system.

If the card remains in the BROKEN state, you need to find out more and then contact your Avaya support representative. See Gathering data on card operations on page 53 for more information.

Gathering data on card operations

Follow the procedures in this section to learn more about the exact nature of the problem. Then contact your Avaya support representative for assistance in troubleshooting the card.

Displaying data on NMS cards

To display information about NMS cards:

1. Type **trunkmon-b *card#*** and press **Enter** to display information about a specific card.

   — ***card#*** represents the number of the card you want to check.

   — The **alarms** column should show a steadily-displayed entry of **NONE**, and the **Frame sync** column should show a steadily-displayed entry of **OK**. If either of these entries is fluctuating between the identified values and another value, note the other value for discussion with your Avaya support representative.

2. Press **Esc** to return to the command-line interface.

Displaying data on VoIP cards

To display information about VoIP cards:

1. Run the following diagnostics:

   — SunVTS OpenBoot diagnostics for the network connection

   — Watch-Net and Watch Net-All diagnostics

   All of these diagnostics monitor Ethernet packets and identify both good packets and packets with errors. Refer to the service manual for your platform:

   — Sun Fire V240 Server manuals:

   Sun Fire V210 and V240 Servers Installation Guide

   Sun Fire V210 and V240 Servers Administration Guide

   Sun Fire V210 and V240 Servers Parts Replacement Manual

   Sun Fire V210 and V240 Servers Product Notes

   — *Sun Fire 280R Server Service Manual*

   — *Sun Blade 150 Service Manual*

   These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

2. Note the results for discussion with your Avaya support representative.

Performing root cause failure analysis

The Sun OpenBoot Diagnostics system performs root cause failure analysis on various IR devices by testing internal registers, confirming subsystem integrity, and verifying device functionality. Refer to the service manual for your platform:

— Sun Fire V240 Server manuals:

Sun Fire V210 and V240 Servers Installation Guide

Sun Fire V210 and V240 Servers Administration Guide

Sun Fire V210 and V240 Servers Parts Replacement Manual

Sun Fire V210 and V240 Servers Product Notes

— *Sun Fire 280R Server Service Manual*

— *Sun Blade 150 Service Manual*

These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

Replacing a failed hard disk drive

For systems with the Disk Mirroring feature, a failed hard disk drive must be replaced.

Checking for hard disk drive failures

To check the hard disk drives from problems:

1. If you are not logged in, log in as root.
2. At the command prompt, enter **metadb**

   The system displays information about each hard disk drive.

   The following example shows the results of the **metadb** command for a system with hard disk drive problems.

```
        flags          first blk   block count
     a m  p  luo        16          1034        /dev/dsk/c1t0d0s4
     a    p  luo        1050        1034        /dev/dsk/c1t0d0s4
     a    p  luo        2084        1034        /dev/dsk/c1t0d0s4
     a    p  luo        3118        1034        /dev/dsk/c1t0d0s4
```

```
a    p  luo       4152       1034       /dev/dsk/c1t0d0s4
a    p  luo       5186       1034       /dev/dsk/c1t0d0s4
a    p  luo       6220       1034       /dev/dsk/c1t0d0s4
a    p  luo       7254       1034       /dev/dsk/c1t0d0s4
 W   p  l         16         1034       /dev/dsk/c1t1d0s4
 W   p  l         1050       1034       /dev/dsk/c1t1d0s4
 W   p  l         2084       1034       /dev/dsk/c1t1d0s4
 W   p  l         3118       1034       /dev/dsk/c1t1d0s4
 W   p  l         4152       1034       /dev/dsk/c1t1d0s4
 W   p  l         5186       1034       /dev/dsk/c1t1d0s4
 W   p  l         6220       1034       /dev/dsk/c1t1d0s4
 W   p  l         7254       1034       /dev/dsk/c1t1d0s4
```

Where:

- `o` = Replica active prior to last mddb configuration change
- `u` = Replica is up to date
- `l` = Locator for this replica was read successfully
- `c` = Replica's location was in /etc/lvm/mddb.cf
- `p` = Replica's location was patched in kernel
- `m` = Replica is master, this is replica selected as input
- `W` = Replica has device write errors
- `a` = Replica is active, commits are occurring to this replica
- `M` = Replica had problem with master blocks
- `D` = Replica had problem with data blocks
- `F` = Replica had format problems
- `S` = Replica is too small to hold current data base
- `R` = Replica had device read errors

The Ws in the first column indicate that there is a problem writing to partitions on the secondary disk (c1t1d0s4).

If you want to check for additional disk status information, you can run the metastat command on page 55.

If you detect problems with the hard disk drive, you must remove the failed drive and replace it with a good one. For more information, see Removing a failed hard disk drive on page 56.

Running the metastat command

For additional disk status information when using Disk Mirroring, you can run the metastat command.

To run the metastat command:

1. If you are not logged in, log in as root.
2. At the command prompt, enter **`metastat`**

The system displays detailed information for each metadevice (virtual device) similar to the following sample output:

```
d1: Mirror
    Submirror 0: d11
      State: Okay
    Submirror 1: d12
      State: Okay
    Pass: 2
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4202688 blocks

d11: Submirror of d1
    State: Okay
    Size: 4202688 blocks
    Stripe 0:
        Device              Start Block  Dbase State        Hot
Spare
        c1t0d0s1                  0     No    Okay

d12: Submirror of d1
    State: Okay
    Size: 4202688 blocks
    Stripe 0:
        Device              Start Block  Dbase State        Hot
Spare
        c1t1d0s1                  0     No    Okay
```

In this sample, d1 is the metadevice that contains the submirrors d11 and d12. Submirror d11 is actually c1t0d0s1 (slice 1 on disk 0) and d12 is c1t1d0s1 (slice 1 on disk 1). In this sample, the status of all three devices is "Okay." If there are errors you will see it in the output for the affected device.

For more information about this command and the possible errors, see the documentation for the DiskSuite tools for your system (http://docs.sun.com/db/doc/ http://docs.sun.com/db/doc/).

Removing a failed hard disk drive

If you detect failure in disk drive on a mirrored system, you must remove and replace it with a good one.

To remove a failed hard disk drive:

1. If you are not logged in, log in as root.

2. At the command prompt, enter **stop_vs.**

   The voice system stops.

3. Enter **mirror_admin detach.**

   The system displays the following prompt:

   ```
   Prompt for hard disk drive to detach
   ```

4. Type the number that corresponds to the hard disk drive to detach and press **Enter**.

   The system detaches all submirrors from the failed hard disk drive.

5. Physically remove the failed hard disk drive.

   For information on how to remove a disk drive, see the *Sun Fire V210 and V240 Servers Parts Replacement Manual* or the *Sun Fire 280R Server Service Manual.* These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

When you are ready to install the replacement drive, see Activating disk mirroring for a new hard disk drive on page 57.

Activating disk mirroring for a new hard disk drive

To activate disk mirroring for a new hard disk drive:

1. If you are not logged in, log in as root.
2. Enter **stop_vs** to stop the voice system.
3. Install a new hard disk drive that has the same geography and size as the drive that failed.

   For information on how to remove a disk drive, see the *Sun Fire V210 and V240 Servers Parts Replacement Manual* or the *Sun Fire 280R Server Service Manual.* These documents are available in *Avaya IR System Help* (under "Print documents") or from the Sun Web site (http://www.sun.com).

4. Enter **mirror_admin replace.**

   The new hard disk drive is partitioned and synchronized to the other hard disk. It takes approximately 20 minutes for each 10 GB to copy data to the new hard disk.

   For more information on this command, see mirror_admin command.

Restoring the system if both hard disk drives fail

If both hard disk drives fail, after replacing the hard disk drives, you must do one of the following:

- Rebuild your system from CD media.
- Rebuild your system by restoring the system from a backup, which may be preferable if you have applications, data, and feature administration that also needs to be restored.

If you choose to restore the system from a backup, after the restore completes and the system starts to reboot, you will see a message similar to the following:

```
Stale DB, insufficient DB replicas.

Press Ctrl-D to come up normally or enter the root password for
maintenance mode.
```

Use the following procedure to complete the system restore and synchronize the new hard disk drives:

1. Enter the root password to go into maintenance (single-user) mode.
2. At the command prompt, enter **`mirror_admin detach`**

   Specify the secondary disk as the disk to detach.
3. To exit single-user mode, press Ctrl+d.
4. At the command prompt, log in as root.
5. Enter **`stop_vs`** to stop the voice system.
6. Enter **`mirror_admin replace`**

   Specify the secondary disk as the disk to replace.

The system automatically reboots and then starts to synchronize the hard disk drives. The secondary hard disk is partitioned and synchronized to the primary hard disk. It takes approximately 20 minutes for each 10 GB to copy data to the secondary hard disk.

Disabling disk mirroring

Use the following procedure to disable disk mirroring.

1. If you are not logged in, log in as root.
2. Stop the voice system by typing **`stop_vs`** and pressing **Enter**.
3. To disable disk mirroring, type **`mirror_admin cleanup`** and press **Enter**.

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