Meridian IVR

Planning and Engineering Guide

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This document is the first standard issue for Meridian IVR release 2.0/I.

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About this guide

Who should use this guide

This guide is intended to be used by Meridan IVR 2.0/I VADs, field technicians, and field support engineers. This guide is designed to assist in installing and configuring the Meridian IVR system.

How to use this guide

This manual contains the following chapters and appendices:

Chapter 1: Understanding Meridian IVR This chapter provides an overview of Meridian Mail and Meridian IVR requirements and dependencies.

Chapter 2: What you need to know This chapter provides helpful information for determining your system requirements.

Chapter 3: Recommended sizing procedures This chapter provides calculations for sizing components of the Meridian IVR system.

Chapter 4: Configuring your Meridian IVR system This chapter provides information for fine tuning the configuration of your Meridian IVR system.

Chapter 5: Planning applications This chapter provides concepts and requirements for application planning.

Appendix A: Sample configurations This appendix provides sample configuration models for Meridian IVR channel assignment.

Appendix B: Equipment ordering information This appendix provides a list of Meridian IVR hardware components and their order numbers.

Appendix C: System capacity limits This appendix lists the capacity limits defined for Meridian IVR 2.0/I.

Appendix D: Optional software packages This appendix provides a list of the optional software packages for Meridian IVR.

Appendix E: Valid Meridian IVR upgrades This appendix lists the valid upgrade combinations for Meridian IVR.

Appendix F: Relational database software This appendix lists the supported databases for Meridian IVR.

Appendix G: Erlang tables This appendix provides Erlang tables which are used for performing traffic calculations.

Appendix H: Power consumption This appendix provides power consumption statistics for Meridian IVR hardware components.

Related documentation

You may find the following documentation useful while reading this manual:

IVR 2.0/I documentation

The following documents are part of the Meridan IVR 2.0/I Operational and Developmental document suites:

- *Product Guide* (555-9001-010)
- *Installation Guide* (555-9001-210)
- *System Administration Guide* (555-9001-300)
- *Getting Started Guide* (555-9001-302)
- *Application Development Guide* (555-9001-310)
- *3270 Gateway Development Guide* (NTP 555-9001-312)
- *SQL Server Guide* (NTP 555-9001-314)
- *VT100 Gateway Development Guide* (NTP 555-9001-316)
- *5250 Gateway Development Guide* (NTP 555-9001-318)
- *Fax Application Guide* (555-9001-350)
- *Maintenance and Diagnostics Guide* (555-9001-500)

Third party documentation

The information supplied with your vendor's host connectivity package may be necessary for planning and engineering information. You should also have the documentation supplied with the following hardware and software:

- 8-port serial card
- Integrated UPS (hardware and software)
- External remote support modem
- Printer
- Monitor
- Mouse
- SCO UNIX software

Conventions used in this guide

Throughout this guide, several typographic conventions have been used to highlight certain types of information.

- Buffer names are shown in all upper case characters, for example, the CURRENT MESSAGE buffer.
- Commands you must type are shown in bold, for example, type **sam** at the prompt.
- Keyboards usually have a key named <Return> or <Enter> that performs the same function. This guide uses the keyname <Enter> to represent both keynames.
- Keynames you press are enclosed in angle brackets, for example, the <Enter> key.
- Softkeys shown on the screen which are mapped to function keys are enclosed in square brackets, for example, the [Save] softkey.
- Variables shown in command lines appear in italics, for example, the host_cfg*n* file, where *n* is a variable representing a board number.
- Screen output is shown in `courier`.

Chapter 1: Understanding Meridian IVR

Meridian IVR specifications

Hardware and software

Please refer to the *Meridian IVR Product Guide*, (NTP 555-9001-010) for all Release 2.0/I hardware and software specifications.

System administration

System administration activities include using Meridian IVR to run and manage applications and the application processor. The system administration includes a variety of tasks such as

- installing and running applications
- configuring and operating a system that may include several Meridian IVR systems
- managing the many telephone lines that Meridian Mail and Meridian IVR can control
- running reports
- recording and installing prompts (the recordings that applications use to communicate with callers)

Platform and release dependencies

Two distinct Meridian IVR Release 2.0/I product options are offered:

- the Development system, which provides the capability to develop, modify, and run applications
- the Run-Time system, which is used to run previously developed applications on the Meridian IVR system.

Supported Meridian IVR software

Meridian IVR Release 2.0/I supports shared and dedicated channel allocation and usage. It supports automatic restart of the system upon power failure.

Meridian IVR 2.0/I supports multiple ACCESS links. This, however, is dependant on the Meridian Mail platform used. With the standard configuration, two ACCESS links and up to 96 voice channels can be supported with one Application Processor (AP).

The following table summarizes the Meridian Mail platforms which can be used with Meridian IVR and the compatible software releases. It also provides the corresponding number of ACCESS links supported, and the number of Application Processors that can be used for each Meridian Mail platform.

Table 1-1
Compatibility with Meridian Mail

Meridian Mail Platform	Link Type	Max Ports	MM Rls 8	MM Rls 9	MM Rls 9.2	MM Rls 9.4	MM Rls 9.5	MM Rls 9.6	MM Rls	ACCESS Links		# of AP's
										MM 8-9	MM 10*	
Card Option	AML/CSL	12				√		√	√	1	2	1
Modular Option (Classic)	AML/CSL	64	√							2		1
Modular Option (Classic) with MMP40	AML/CSL	64					√	√	√	2	8	1
Shelf Option	AML/CSL	24	√							1		1
Shelf Option with MMP40	AML/CSL	24					√	√	√	1	6	1
Modular Option (EC)	AML/CSL	64	√	√			√	√		2		1
Modular Option (EC) with MMP40	AML/CSL	96					√	√	√	2	8	1
Modular Option (GP)	SMDI	64	√							2		1

Table 1-1
Compatibility with Meridian Mail (Continued)

Meridian Mail Platform	Link Type	Max Ports	MM Rls 8	MM Rls 9	MM Rls 9.2	MM Rls 9.4	MM Rls 9.5	MM Rls 9.6	MM Rls	ACCESS Links		# of AP's
										MM 8-9	MM 10*	
Modular Option (GP) with MMP40	SMDI	64					√	√	√	2	8	1
MSM	SMDI	192	√		√			√	√	4	8	2
End												

* Speed of ACCESS Links will vary according to the number of links and number of MMail nodes.

About Meridian ACCESS

Meridian ACCESS is used to provide specialized services combining the convenience of a telephone with the power of a computer. Often these services are Interactive Voice Response (IVR) applications which enable you to retrieve information or place an order over the telephone simply by pressing the telephone keys.

Preconfiguration requirements

Meridian Mail, your private branch exchange (PBX) and your UNIX workstation must all meet the following requirements before you can configure your system for Meridian IVR.

Meridian Mail

Your Meridian Mail system must

- be fully installed according to Meridian Mail *Installation Procedures* (NTP 555-70x1-210)
- have the Meridian ACCESS feature enabled. See the Meridian Mail *System Installation and Modification* (NTP 555-7001-215) for details.
- have sufficient voice ports (channels) installed
- have sufficient storage (disk space) for voice prompts and messages
- have a dataport available for ACCESS links

Meridian Mail serial ports on the RS-232 Service Module (RSM) card are configured as Data Terminal Equipment (DTE). Serial ports on the Single Board Computer (SBC) card are configured as Data Communications Equipment (DCE). Only the transmit, receive, and ground pins (pins 2, 3, and 4) are required for the ACCESS link to operate.

Notes:

1 Meridian Mail serial ports on the Card Option platform can be configured as either DCE or DTE. However, it is recommended that you configure serial port 2 for ACCESS, which eliminates any potential reconfiguration problems if you already have serial ports configured for Hospitality Voice Services. For more information on how to configure the serial ports refer to *Option 11: Installation and Maintenance* (NTP 555-7071-210).

2 For EC Meridian Mail systems, all dataports are configured as DTE on both the utility pack and the SBC. For MSM systems, dataports require a current loop adapter to convert the signal to RS-232. The adapters are usually configurable to either DCE or DTE.

3 Turn on silence compression if you are using the *Voice Prompt Editor User Guide* (NTP 555-7001-318) to develop voice prompts.

More information on some of these requirements can be found under "Planning applications" on page 5-1.

Private branch exchange

Your private branch exchange (PBX) must

- meet the requirements for Meridian Mail as specified in the Meridian Mail *Site and Installation Planning Guide* (NTP 555-70x1-200)
- be fully configured for Meridian Mail according to Meridian Mail *Installation Procedures* (NTP 555-70x1-210)
- have all voice channels configured
- have sufficient incoming and outgoing trunks and line cards installed and configured

Meridian IVR hardware platform

The Meridian IVR system refers to the hardware platform which uses the Meridian IVR product. The hardware platform does not necessarily have to be installed before configuration begins, but it must be functioning by the time you are ready to install and test the Meridian IVR system. The workstation must

- be connected to a dataport on Meridian Mail
- have the Meridian ACCESS-based application system fully installed

Chapter 2: What you need to know

System performance

Factors affecting system performance

Factors affecting system performance are application dependent. They are a combination of the system limits and the nature of the applications. It is recommended that the Meridian IVR applications be designed so that the response time is less than 1 second. Thus, the system should respond with voice within 1 second after a DTMF digit or string of digits are entered.

Host access

Host access is a factor which is not directly related to Meridian IVR but on the performance of the remote host and the quality of communications between the two machines. For instance, VT100 access is CPU intensive, and no recommendations can be made for this release of Meridian IVR. However, as a general rule, if the duration of host access time is going to be longer than a second, the application should play voice while the access is occurring.

ACCESS link capacity

The ACCESS link is a 9600 baud link transmitting approximately 1000 characters per second (pre-MM10). Most of the messages on the link are generated during DTMF collections and voice prompt playing.

Application digit density

Each digit generates an access message of 24 bytes. It is recommended that applications be designed so that the digit density on each Access link is no more than 20 digits per second (This applies when using ACCESS Link with 9600 baud rate only). The following table illustrates different digit density capacity for different ACCESS link speed.

Table 2-1
Digit Density rate

Link Speed	Digit-rate/Second
4800	15.0
9600	20.0
19200	25.0
38400	32.0

Fax conversion processes

Several Fax Response processes, such as conversion of PostScript files and ASCII files to tagged information format (TIFF) data files, are very CPU intensive.

Number of voice prompts played

Each request to play a voice prompt generates a play prompt and a finished playing message. This is not normally limiting because human voice prompts last far longer than the time it takes to transmit the request messages.

The Meridian Mail system

Meridian Mail systems are normally self-engineering in the sense that they are multiple CPU systems and grow as the system grows. However, if Meridian Mail is attached to a very active Meridian IVR system and is shared with call answering, the Meridian IVR system should be dedicated to its own node to minimize bus traffic.

Chapter 3: Recommended sizing procedures

Meridian IVR software

Base software packages

The following software is provisioned according to how many channels are requisitioned:

- Development Base Package (4 channels)
- Development Expansion Packages (in 4-channel increments) (optional)

The Development Base Package gives the Meridian IVR system a 4-channel capacity. If additional channels are required, capacity can be added by purchasing additional channels. This method increases system capacity in 4-channel increments.

> ***Note:*** This is valid only for non-card option systems. For a card option Meridian Mail system the minimum channel configuration is 2 and it can be incremented in units of two.

Host communication software

Host connectivity is supported in Release 2.0/I via the “COMI”, “COMO”, and “COMA” Cells (Host Communication Input, Output, and Abort) for Meridian IVR Release 2.0/I. This provides high-level support for the IBM /3270 SNA/5250 and VT100 interfaces. By emulating an operator providing input and/or retrieving output from a 3270/5250 or VT100 sessions, the Meridian IVR application can easily access required information that is normally displayed on the terminal screen.

The following templates are needed:

- Screen templates that define the location of input and output fields on the terminal screen. This is accomplished either via row and column offset or via a unique field identifier that serves as a tag to identify the field.
- Action templates that connect the screen templates into a logical transaction that must be traversed in order to accomplish the desired action. This emulates actions such as a terminal operator entering an account number on the first screen, completing the input by then pressing a function key, and finally obtaining a screen output that contains the desired account balance.

Host card

The hardware used to support IBM mainframe connectivity is the EXPRESS high performance adapter (SYNC570) card. The SNA/3270 communications software, integrated with the host communication cells provides connectivity to an IBM mainframe by emulating an IBM 3274 cluster controller with 3278/3279 terminals. Through customer defined user functions, application developers can integrate additional communications software available from Apertus.

This includes:

Host connectivity through cells:

- IBM SNA/3270 (including 3274, 3278, 3279)
- SDLC and over Token Ring
- VT100 emulation over serial ports
- 5250 over token ring (LLC) and SDLC

Host Connectivity through a user functions (not provided as part of the product)

- Native or LAN Token Ring and Ethernet
- IBM 3270 over X.25 (European requirement, QLLC)
- Standard RS232 serial interface

5250 host connectivity

For Meridian IVR Release 2.0/I, in addition to 3270 emulation, the new host communication cells will also provide the same level of interface for 5250 terminal emulation over Token Ring (LLC) or through Expresscard (SDLC).

Other host connectivity

Access to hosts using ASCII async (RS232/422), X.25, and Ethernet data communications protocols will be facilitated via the use of the User Function cell. It will require that the code to support these forms of connectivity be written by the application developer in the C programming language.

For Meridian IVR Release 2.0/I, in addition to 3270 emulation, the new "COMI", "COMO" and "COMA" host interface cells will also provide the same level of interface for VT100 terminal emulation via RS-232.

To meet international standards, the template files use translation tables for character conversion to map to host computers using local variants of 7-bit ASCII. Translation tables are provided with the SNA/3270 communications software for each language for which character conversion is required.

Meridian IVR Fax Response software

Meridian IVR Fax Response is an option for Meridian IVR Release 2.0/I which provides send and receive fax capability through the telephone by means of DTMF and audio.

Meridian IVR Fax Response uses the graphic user interface (GUI) on the Meridian IVR palette to include fax functions (that is, to receive a fax, send a fax, and so on).

In addition, Meridian IVR Fax Response closely integrates with the data base and host computer functionalities on the Meridian IVR. This allows fax data to be easily derived from these sources.

Meridian IVR Fax Response uses Meridian Mail as its voice processing platform.

Meridian IVR Fax response incorporates, in addition to all Meridian IVR components, internal fax modems and Meridian IVR Fax Response software.

SQL database support

Structured Query Language (SQL), is a popular user interface for interactive database sessions. SQL database support will be an optional feature which will only be installed if purchased by the customer. Meridian IVR support of SQL makes possible the creation of IVR applications that can interface with these databases.

The SQL interface into the database provides SELECT, INSERT, UPDATE, DELETE, and COUNT capabilities (interface cells).

Eight SQL database configurations will be supported in Meridian IVR Release 2.0/I:

- Local and Remote Informix
- Local and Remote Ingres
- Local and Remote Oracle
- Local and Remote Sybase

For a SQL database access, the optional SQL package must be ordered and the database software required to install and run the local or remote SQL database must be purchased by the customer directly from the corresponding database vendor.

Traffic principles

Terminology

Centi-call seconds

This chapter uses the value of centi-call seconds (ccs) to express traffic, traffic is calculated as follows:

> Traffic (in ccs) is expressed as the busy hour call volume multiplied by the average call length in seconds divided by 100.

Grade of service

Grade of service is expressed as GOS.

Meridian IVR traffic model

The traffic model which you design to use with an IVR system depends on how the Meridian switch treats incoming calls.

The IVR system provides a finite number of channels on which calls can be processed. If all the channels are busy, the switch can either block incoming calls destined for the IVR system, or it can queue up these calls.

Queueing The queueing model is used by all Meridian IVR systems fronted by a Meridian 1 PBX.

Blocking systems fronted by a DMS will block calls when used in conjunction with UCD queues, and the Multi-Line Hunt Group. A Meridian 1 PBX can also block calls by equating the number of incoming IVR trunks to the number of IVR channels.

Target Grade of Service

The target Grade of Service (GOS) is a means of simply determining when a caller is queued beyond a certain amount of time, or when a caller is blocked. A number of factors affect the Grade of Service

1 the call volume (for example, the number of calls in a busy hour)

2 the average length of the calls

3 the number of channels available to service these calls

4 whether the channels are dedicated or shared

Factors 1 and 2 together make up the traffic intensity. For example, if an application expects 100 calls in the busy hour and each call lasts an average of 2 minutes, then the traffic intensity on that application is 100 X 120 seconds, which is 12 000 call seconds or 120 centi-call seconds (120 ccs).

The GOS is dependent on the call hold time which makes it indirectly dependent on the response time characteristics of the application. An application with bottlenecks (for example, a slow external host) will lead to higher call hold times and, hence, a deteriorated Grade of Service.

There is a one-to-one correspondence between the number of Meridian Mail channels which may be used for Meridian IVR and the number of Meridian IVR channels. Therefore, a 96-channel Meridian IVR system must have exactly 96 Mail channels used for IVR in shared or dedicated mode. If IVR channels are shared with Meridian Mail services, the traffic generated by the mail services affects the GOS for Meridian IVR.

GOS for queueing traffic model In a queueing traffic model, the recommended GOS is a five percent probability that the delay in the queue will exceed one ring cycle. This is known as a P.05 GOS. One ring cycle is approximately six seconds.

GOS for blocking traffic model In a blocking traffic model, the recommended GOS is a two percent probability that a caller will be blocked. This is a P.02 GOS.

Target response time dependencies

While the GOS is not directly dependent on MIVR CPU power, the response time is. In addition, if external factors like 3270 hosts are present, the response time becomes dependent on their response characteristics as well.

One response time which is always dependent on Meridian IVR is the time between when a caller finishes entering DTMF input and when the system responds by playing a prompt. This time should be less than two seconds 95 percent of the time and should average under 1 second. This target should be met even if the response time includes local data retrieval.

Fax response traffic model

The Fax response traffic model has both queuing and blocking capabilities. A pure queuing model is used for Callback fax. The application initiates a callback request. The fax is queued up and sent out once it reaches the top of the queue and a fax modem becomes free.

The Same Call model is more complex. An application wishing to use Same Call fax first has to reserve a modem. It is recommended that the modem be reserved as close as possible to the time when it is to be used. If a reserved modem remains idle for more than five minutes, it is freed up by the system. The application can also specify a time that it is willing to wait to reserve a modem. The Same Call model thus becomes

- the blocking model if that time is set to zero
- the queuing with a time-out model if the time is nonzero
- the application dequeus if the time in queue reaches a threshold.

Modems can also be shared between Same Call and Callback usage if all the modems in either set are busy.

Target Fax Grade of Service

The factors affecting the fax GOS are

1 the number of faxes requested in a busy hour

2 the average number of pages and their resolution

3 average rendering time per page

4 the number of fax ports available

Fax rendering and sending are one operation to an IVR application. Therefore, factors 2 and 3 determine for how long a fax port is held. Together with factor 1, they determine the fax traffic intensity.

The Fax GOS is important in a Same Call situation because the fax operation will take place on the same IVR call. The GOS is the probability that a fax modem does not become available in a certain time (which could be 0).

The target GOS for Callback fax is a measure of the probability that a fax sitting in the queue waiting to go out exceeds a certain time limit. This is important when an IVR application promises to send a fax within a certain time.

Another factor which may affect Callback fax is the probability that the remote machine is busy. If the fax is being sent with a retry option, it will be queued up again. For the purposes of this document, this factor is ignored.

Fax on demand (Callback delivery)

The Fax Application traffic must be estimated and channel requirements determined for the number of faxes requested in the busy hour. This is done by

- estimating the average session length for each defined fax application
- estimating the expected maximum number of busy hour calls to that application

The traffic from a "Callback" fax delivery should include the duration of the call to receive the request, and also the duration of the call that delivers the faxes. The call receiving the request consists of the following components

- time to listen to voice menus (15 seconds)
- time to select options (10 seconds for each option selected)
- time to enter callback number and extension (30 seconds)

The session time for each fax delivery can be estimated as follows

- a 10-second time to set up the call
- a 14-second time to answer call
- a 12-second time to establish protocol
- 40 seconds per page in normal resolution and 80 seconds per page in fine resolution
- a 10-second time to complete fax delivery

This assumes that the fax will be delivered on the first attempt. Additional time should be added if this is not the normal case.

When the application is running, the fax delivery report can be periodically monitored to see if the actual wait times are within the desired limits.

Fax on demand (Same Call delivery)

The Voice Menu traffic must be estimated and channel requirements determined for the number of faxes requested in the busy hour. This is done by estimating the average session length for each menu defined, the number of pages in the fax to be delivered, and the expected maximum number of busy hour calls to that menu.

The traffic from a Same Call fax delivery call should include the following components:

- time to listen to greeting prompt
- time listen to voice menus and select as many faxes as required
- time to receive ‘Same Call’ faxing instructions
- time to transmit the faxes selected
  - — a 12-second time to establish protocol
  - — 40 seconds per page in normal resolution and 80 seconds per page in fine resolution
  - — a 10-second time to complete fax delivery

Tables have been generated for fax session lengths of 234 seconds (3.9 minutes). The tables indicate the traffic which can be handled by a given number of multimedia channels. Refer to the Fax GOS tables in Appendix G: "Erlang tables" on page G-1 for more information.

> ***Note:*** An analysis was done for fax session length and number of pages in each fax at the TOR site (for MM9). The average session length was 234 seconds and the average number of pages in each fax was 4.8. These figures were considered a useful starting point for the fax traffic tables used in this document.

Fax storage limit

Since all fax data is stored under a single directory hierarchy, standard UNIX utilities (du) can be used to determine when fax storage has been exceeded. The system will not receive any more faxes when the file system threshold is exceeded.

Hard disk storage

At 60 Kbytes per Fax page, approximately 30 Mbyte of disk space is needed for 500 pages of Fax data.

Second hard disk

The second Hard drive is used when a large area for Fax storage is required, or Database software and other data has occupied a large amount of hard disk space so there is not enough space for the Fax data. The size of the second hard disk is 1012 Mbytes in total. When the Meridian IVR system has been installed there is 10.31 Mbytes free disk space remaining.

Notes:

1 The second hard disk is used *only* for storing the Fax data.

2 There is only one partition on second hard disk (sdisk).

Storage calculations

There are two primary components of capacity for every Meridian Mail system: channels and hours of storage. The size of the system, in channels and hours, determines the number of users who can use the system, and the level of service that Meridian Mail/IVR provides.

Channels

The number of channels on a system determines the number of users who can access IVR at one time. For example, a 12-channel system allows twelve users to use IVR at any one time.

Hours of storage

All the voice prompts (system as well as prompts and voice messages recorded by Meridian IVR) are stored in Meridian Mail mailboxes. Individual mailboxes can contain a maximum of six hours of voice storage. Hours of storage must be determined as the accumulated storage requirements of the total number of mailboxes used by the Meridian IVR system.

Types of channels

Meridian Mail channels for Meridian IVR can be configured as dedicated or shared channels. If dedicated, the channels are used for Meridian IVR only, while shared channels are used for Meridian Mail or Meridian IVR as determined by the incoming call.

The channels dedicated to Meridian IVR can be common to all Meridian IVR applications or can be dedicated to specific Meridian IVR applications only. This allocation of channels has a direct impact on the number of channels that have to be provisioned.

By dedicating channels, you can control the Grade of Service and caller access, but channel use will be less efficient. In this document, three grades of service are discussed: two percent delay, five percent delay, and a recommended grade. Two and five percent refer to the percentage of callers that will experience a delay, that is, to wait in a queue before their call is answered. When a delay is experienced the average is about a 10-second delay. The average delay of all callers will be well under one second.

At the recommended Grade of Service, the average delay of callers experiencing a delay will be about 10 seconds, and the average delay for all callers will be under two seconds. Such delays would be expected during the busy hours. At other hours with less traffic, delays will be less frequent.

Estimating the number of channels

Channel requirements are determined using standard traffic engineering principles that take into account busy hour traffic and the desired Grade of Service. The busy hour is the highest traffic hour for a customer. For Meridian Mail/Meridian IVR, traffic capacity is stated in ccs, hundreds of seconds of connect time per hour. Refer to "Traffic principles" on page 3-4 in this chapter for more information about determining traffic capacity for your Meridian IVR system.

Determining requirements

You must analyze the customer's specific applications before you can determine the channel requirements for Meridian IVR. Meridian IVR channel requirements can vary widely in terms of the number of calls requiring processing and the holding times of those calls.

To ensure that Meridian Mail provides adequate capacity, follow these steps for each Meridian IVR application:

1 Estimate the average length of a call in seconds. An average holding time for a short IVR application may be 60 seconds, while a lengthy IVR application may be 300 seconds.

2 Estimate the number of calls per busy hour.

3 Estimate the total traffic load for Meridian IVR in ccs by multiplying the step 1 estimate by the step 2 estimate and dividing by 100. Do this for each planned application.

4 Decide whether channels for these applications will be shared or dedicated between Meridian Mail and Meridian IVR. If Meridian IVR will share channels with Meridian Mail voice messaging, you only need to add this traffic to Meridian Mail voice messaging requirements. By dedicating channels, you can control the Grade of Service and caller access, but channel use is less efficient. It the application will have channels dedicated to it, you need to designate channels per service configuration.

5 To determine the fewest number of channels required to accommodate the total activity for the system, use the number from step 3 and refer to Table G-1 "Grade of service and traffic formula" on page G-1 to find the number that best accommodates the total activity calculated above given the Grade of Service required.

Note: Outbound applications (those which make calls) require dedicated channels.

6 For each group of applications that share common channels, sum the traffic loads from step 3.

7 To determine the fewest number of channels required to accommodate each group of applications, use the numbers from Step 5 to find the number of channels that best accommodates the total activity calculated above given the Grade of Service required.

8 The total of the numbers from step 6 gives the number of channels that are required to accommodate the total activity for the system.

Note: Meridian IVR supports a maximum of 48 channels and up to 24 shared (dynamically allocated) channels. See Table 3-7, ACCESS link capacity limits, on page 3-21.

Example of multiple application requirements

A customer has three Meridian IVR applications. The main IVR application answers all calls to the company, and will invoke the other two IVR applications, IVR2 and IVR3 if necessary. All three applications use the same dedicated Meridian IVR channels. The average delay for callers must not exceed one second, and no more than five percent of the callers should encounter a delay in the busy hour (this equates to a five percent delay Grade of Service).

Table 3-1
Example table for GOS P.05

Procedure	Step 1	X Step 2	= Step 3
Application	**Calls in Busy Hour**	**X Holding Time (seconds)**	**Total Time (seconds)**
Main IVR	200	X 20	4000 seconds
IVR2	20	X 240	2400 seconds
IVR3	30	X 180	5400 seconds
Total Time			32000 seconds or 118 ccs

Total system activity for all IVR applications is 106 ccs. Refer to Table 3-1 for 106 ccs and the recommended Grade of Service. Total port requirements are 8 ports for IVR.

Example of multiple fax application requirements

The customer has four IVR applications, the main IVR application (IVR_MAIN) answers all calls to the company and walks the caller through the fax menu.

The customer has three other IVR fax applications: IVR_Fax_1, IVR_Fax_2 and IVR_Fax_3.

The typical session duration for the IVR_MAIN menu is 45 seconds (time to listen to the voice menu, plus time to select an option, plus time to enter the callback number if required):

- IVR_Fax_1 is 214 seconds (4.8 pages of fax in standard resolution)
- IVR_Fax_2 is 480 seconds (6 pages in fine resolution)
- IVR_Fax_3 is 382 seconds (3 pages)

For simplicity assume that IVR_Fax_1 and IVR_Fax2 will use Callback channels, and IVR_Fax_3 will use Same Call channels.

Table 3-2
IVR_Fax_1 holding time values

Measurable actions	Time (in seconds)
listen to fax menu	25
time to set up call	10
time to answer call	14
time to establish protocol	12
time to complete fax delivery	10
Add (for 4.8 pages, standard format):	(4.8 * 40)
Holding time:	263 seconds

Table 3-3
IVR_Fax_2 holding time values

Measurable actions	Time (in seconds)
listen to fax menu	25
time to set up call	10
time to answer call	14
time to establish protocol	12
time to complete fax delivery	10
Add (for 3 pages, fine format):	(3 * 80)
Holding time:	311 seconds

Table 3-4
IVR_Fax_3 holding time values

Measurable actions	Time (in seconds)
listen to fax menu	55
time to establish protocol	12
time to complete fax delivery	10
Add (for 3 pages, standard format):	(3 * 40)
Holding time:	197 seconds

Table 3-5
Example table for GOS P.05 and P.02

Procedure	Step 1	Multiply	Step 2	= Step 3
Application	**Calls in Busy Hour**	**X**	**Holding Time (seconds)**	**Total Time (seconds)**
IVR_MAIN	30			
IVR_Fax_1 (Callback)	10	**X**	(25+10+14+12+ 10+(4.8 * 40))	2630
IVR_Fax_2 (Callback)	10	**X**	(25+10+14+12+ 10+(3 * 80))	3110
IVR_Fax_3 (Same Call)	10	**X**	(55+12+10+(3 * 40))	1970
Total Time for P.05 (Callback)				5,740 (57 ccs)
Total Time for P.02 (Same Call)				1970 (20 ccs)

Total system activity for all Callback IVR Fax applications is 57 ccs and 20 ccs for Same Call Fax applications. Refer to the Fax GOS tables in "Appendix G: Erlang tables" on page G-1 for 57 ccs and 20 ccs the recommended Grade of Service.

Total port requirements for Callback ports are five ports and three ports for Same Call Fax.

In some cases, when it is determined that the use of Callback channels is high in certain hours and may exceed the limit where use of Same Call channels is low, it is a good idea to turn some of the Same Call channels into Shared channels or vice versa.

Ongoing channel sizing

After the Meridian Mail system is installed, the system administrator uses Operational Measurements reports to provide statistics on system traffic and activity. By monitoring these reports, the administrator can keep track of system capacity and forecast when, and if, an increase in the number of channels is required.

> ***Note:*** If dedicated channels are used, Meridian IVR acquires the channels permanently when the application is started, and Meridian Mail Operational Measurements reports the channels as active from the time the Meridian IVR application is running. Therefore, the Meridian IVR Call Detail report should be used to determine actual ccs for applications using dedicated channels. Alternatively, Meridian MAX reports provide a view of actual call traffic on Meridian Mail channels.

Table 3-6
Port addition increment for Fax and IVR

	Minimum # of IVR Ports	Addition of channels by increment of	Maximum # of channels
8-Mbyte Card Option	2	2	12
Other supported MMail platforms	4	4	96
Fax option	2	1	8

Control of maximum number of channels

Meridian IVR controls the utilization of Meridian IVR channels purchased by customers. Keycodes are used to restrict the customer from using more than the number of channels purchased.

The maximum number of fax ports available to the customer are also limited if the Fax Response option is purchased.

Deciding between dedicated and shared channels

Meridian Mail channels can be dedicated to Meridian IVR, or they can be shared with other Meridian Mail services like call answering. Consider the following points when deciding between shared and dedicated channels:

1 The traffic intensities of the IVR applications and Meridian Mail should first be considered separately.

If one intensity is low compared to another, it may be better to dedicate the appropriate numbers of channels separately. A guideline is if one is a tenth of the other. For example, if IVR traffic is going to be 6 ccs and mail traffic 60 ccs, size each service separately and dedicate the channels separately.

If both are roughly equal, it may be better to share channels so that, if unexpected peaks occur, there is a bigger pool of channels to draw upon depending on the busy hours.

2 The traffic patterns of the two services should be considered when sharing channels. If the busy hours coincide, then the traffic intensities should be added up to give total traffic, and this figure would be used to determine the number of channels.

If the busy hours are separated, then the busy hour with greatest traffic intensity should be used in determining the number of channels (for example, if both IVR and call answering have busy hour traffic of 60 ccs each, but IVR busy hours are in the morning and call answering busy hours in the afternoon). There is also a constant call answering load of 10 ccs in the morning and 5 ccs of IVR in the afternoon.

In this example, the morning busy hour load is 70 ccs and the afternoon load is 65 ccs. Thus, 70 ccs would be used in sizing the system.

3 There may be a case where the decision is made in the context of the service being offered. In the case of a service provider, the provider may be selling channels to customers. Here, obviously, the channels would be dedicated and sized by the intensity and GOS which the customer wants.

Shared channels put a slight overhead on Meridian Mail. The advantage is that there is a bigger pool of channels to draw upon for unexpected peaks. Also, there is a limit of 24 channels per ACCESS link, (running at 9600 baud) which can be shared with Meridian Mail services. For more information see Table 3-7, ACCESS link capacity limits, on page 3-21.

Note: The Voice Prompt Editor needs one shared channel.

Sharing channels among IVR applications

This is another option where the application to be executed is dependent upon the called number. All 96 IVR channels can be shared amongst Meridian IVR applications.

Outcalling applications

A Meridian IVR application can use the outcalling feature. Depending on the numbers and length of these calls, a number of outcalling channels must be configured. This number is determined in the normal way although the GOS can be lessened depending on the application (a machine is calling now and it can try again if it is blocked). These channels *cannot* be used for incoming calls.

Determining hours of storage

The Meridian IVR prompts and incoming voice messages recorded by Meridian IVR are stored in Meridian Mail mailboxes. Each Meridian Mail mailbox can contain a maximum of six hours of voice storage. All voice prompts used by Meridian IVR and all voice messages recorded by Meridian IVR, must fit into this limit. If the six-hour limit is not sufficient, multiple mailboxes must be assigned.

Estimates must be made to determine the amount of storage (expressed in hours) that all of the prompts for the IVR applications will take prior to creating a storage mailbox for the Meridian IVR system. This can be easily performed by examining the nature of the prompts, (for example, are they short or long), and the quantity of prompts for all of the IVR applications that will exist. Also, determine if voice messages will be created by the IVR application and the amount of storage required to support them. A good starting value for an IVR mailbox is 90 minutes.

Meridian Mail mailboxes are assigned to channels during the initial configuration of Meridian IVR, and multiple channels can use the same mailbox. The exact allocation of mailboxes will be determined by the nature of the applications. In a simple case, one mailbox is used for all Meridian IVR channels, and the prompts for all applications are stored in that single mailbox.

To minimize the storage requirements of the mailboxes, individual applications can be assigned to different groups of channels and each group of channels then use one mailbox. In this case, the full set of application prompts are not stored in each mailbox, rather only the application prompts required by the applications assigned to a group of channels are stored in that one mailbox.

System prompts must exist in every mailbox, regardless of the storage requirements of the mailbox. If more than 24 channels use a single mailbox, there may be a performance degradation when the Meridian Mail system is used. To avoid this situation, a second mailbox should be assigned on a different Meridian Mail node, and the channel allocation should be divided between the two mailboxes.

Notes:

1 Since Meridian Mail Release 8 has fully implemented the prompt caching feature, it is unnecessary to create a second mailbox to store duplicate IVR prompts on 24-channel and larger systems.

2 While a Meridian Mail system is engineered to provide one to three minutes of storage per user, limits on the maximum amount of storage can and should be set higher for Meridian IVR mailboxes.

Estimating the amount of voice storage

The size of the mailbox is dependent on the number of languages used. An initial value to start off with is 90 minutes of storage for two languages. This would be on top of Meridian Mail requirements if the system was also used for voice mail.

If applications take voice messages, then they must make sure that the messages are removed from the prompt mailbox and delivered to a user mailbox. This would then be considered a voice mail use and must be included in the standard Meridian Mail voice storage determination.

> ***Note:*** The storage requirement for Meridian IVR system prompts is 50 minutes.

To determine disk size for Meridian Mail

1 Determine the number of mailboxes that will be allocated to Meridian IVR.

2 Estimate the total hours of storage required for Meridian IVR prompts for each mailbox.

3 Add the amount of storage required for transaction messaging for each mailbox.

4 If Meridian Mail is used for voice menus or voice processing, this amount must be added to the amount of Meridian Mail storage calculated (see *Site and Installation Planning Guides* (NTP 555-70xx-200).

Ongoing disk management

Operational Measurement reports allow the system administrator to monitor the disk usage and to forecast when additional storage space will be needed. The actual amount of storage used for IVR mailboxes can be examined by means of Meridian Mail administration. This is also the means by which storage can be increased if required.

Performance tips

1 Combine as many prompts together in a PLAY or PDAT cell as the application permits.

2 Play prompts from one voice segment file instead of interspersing prompts that will be played together or back to back across multiple voice segment files.

3 Dedicated channel acquisition improves IVR performance during call start-up on a per call basis resulting in better performance system wide.

Determining the correct number of ACCESS links

The following table describes the ACCESS link capacity limits for shared and dedicated modes. Use this table to calculate the correct number of ACCESS links for your system.

Table 3-7
ACCESS link capacity limits

For one ACCESS link (in the following mode):	Number of Applications (Channels) at 4,800 bps	Number of Applications (Channels) at 9,600 bps	Number of Applications (Channels) at 19,200 bps (MM10)	Number of Applications (Channels) at 38,400 bps(MM10)
Dedicated mode	18	38	76	96
Shared mode	8	18	38	96

Note: The recommended connection procedure is to connect the ACCESS Link to the Voice Nodes and not to connect more then one ACCESS Link to a Node.

Database servers and host sessions

There can be a maximum of 50 SQL servers, and 64 3270 SNA/5250 and 15 VT100 sessions. The numbers of these are dependent on the access time to the database or host. If the total call time is T seconds and, of that, SQL or host access time is a total of t seconds, then one SQL server or one host session can support T/t channels of that application. However, a safety margin should be applied and each server or host session should support only T/2t channels.

For example, say a 64-channel system is used and each call lasts 100 seconds. Say that total host access time for the whole call is 10 seconds; then each 3270 session can support 5 channels. Thus, 64 channels would need 64/5 or 13 sessions.

Memory and CPU requirements

Table 3-8
Scenario table for Memory and CPU requirements

Customer will require the following features	Memory required	CPU required
Scenario 1: - 32 IVR Channels - 2 ACCESS Link	32 Mbyte	75 MHz
Scenario 2: - 16 IVR Channels - 4 Fax port - 1 ACCESS Link	32 Mbyte	75 MHz
Scenario 3: - 24 IVR Channels - 2 ACCESS Link - 3270 SDLC, 9 sessions - UPS Option	32 Mbyte	75 MHz
Scenario 4: - 80 IVR Channels - 4 ACCESS Link	48 Mbyte	75 MHz
Scenario 5: - 64 IVR Channels - 4 ACCESS Link - 4 Fax port	48 Mbyte	75 MHz
Scenario 6: - 48 IVR Channels - 4 ACCESS Link - 4 Fax port - 5250 LLC, 18 sessions - UPS Option	48 Mbyte	75 MHz
Scenario 7: - 96 IVR Channels - 6 ACCESS Link - 8 Fax port - 5250 SDLC, 27 Session - UPS Option	64 Mbyte	100 MHz

Table 3-8
Scenario table for Memory and CPU requirements (Continued)

Customer will require the following features	Memory required	CPU required
Scenario 8: - 96 IVR Channels - 6 ACCESS Link - 8 Fax port - Fully Installed Local Oracle database (Approximation, 10 Mbyte of DRAM usage)	64 Mbyte	100 MHz
Scenario 9: - 96 IVR Channels - 8 ACCESS Link - 8 Fax port - Fully Installed Local Oracle database (Approximation, 10 Mbyte of DRAM usage) - 3270 SDLC, 32 sessions - UPS Options	80 Mbyte	100 MHz

Memory sizing

Memory is an important factor limiting the capacity and feature set of the Meridian IVR 2.0/I system.

This section highlights under what conditions (installing different features) different memory configurations should be determined.

The point system

The “point system” can be used to determine which combination of features and capacity will fit on a particular Meridian IVR 2.0/I system. All calculations are based on total system memory. The value of one “point” is equal to 150 Kbyte.

Caveats:

1: This point system is not intended to accurately predict the free memory for the system, but rather to predict which combinations of features can be installed before exhausting available memory on the system.

2: Values expressed in both Table 3-9 and Table 3-10 are derived from measurements on the Meridian IVR 2.0/I system.

Table 3-9
List of Meridian IVR Processes

	Points					
Process	**32 Mbyte System**	**48 Mbyte System**	**64 Mbyte System**	**80 Mbyte System**	**96 Mbyte System**	**128 Mbyte System**
Total permitted Swapping	48	48	48	48	48	48
Total physical memory	218	328	437	546	655	765
Operating System usage	68	68	68	68	68	68
Total Available Points	**198**	**308**	**465**	**526**	**635**	**745**
Combined IVR Memory usage summary						
IVR & Access	96	96	96	96	96	96
Each IVR channel	2	2	2	2	2	2
Each ACCESS Link	4	4	4	4	4	4
Fax Option	25	25	25	25	25	25
Each Fax port	2	2	2	2	2	2
Host Option 3270 & 5250	15	15	15	15	15	15
Host Option VT100	0	0	0	0	0	0

Table 3-9
List of Meridian IVR Processes (Continued)

	Points					
Process	**32 Mbyte System**	**48 Mbyte System**	**64 Mbyte System**	**80 Mbyte System**	**96 Mbyte System**	**128 Mbyte System**
Each Host session (3270,VT100 and 5250) H= 2 If # of sessions <9 H= 4 If # of sessions <18 H= 6 If # of sessions <27 H= 8 If # of sessions <32	H	H	H	H	H	H
UPS Option	12	12	12	12	12	12
SQL (Local or remote)[a]						
Capacity Factor is designated as P. The value of P is dependent on the number of IVR channels. P=7 If channels <12 P=13 If channels <24 P=17 If channels <48 P=20 If channels <64 P=25 If channels <96	P	P	P	P	P	P

a. To find out about your SQL database memory requirements (that is, Oracle, Informix, Sybase and Ingres) please consult the appropriate vendor documentation. You must determine your requirements in Kilobytes, then divide it by 150 (to get the value in points) after that you can use the value in this table to determine your total memory usage.

The following example illustrates how the point system can be used to determine the correct memory size for an Meridian IVR system.

All calculations are based on the following feature set:

- 32 ports of IVR (all shared channels meaning more than one ACCESS link will be required, 9600 baud Link)
- 2 ACCESS Links
- Fax Option with 4 ports
- UPS option

Use Table 3-9 for determining memory size.

Sample procedure for determining correct memory size

1 Add the core software memory usage for IVR and Fax:

```
96 (IVR) + 25 (Fax) = 121
```

2 Add the channel points for IVR and Fax:

```
2 (per IVR channels) * 32 (required channels) + 4 * 4
(required fax channels) = 88
```

3 Calculate ACCESS Link points: 4 * 2 (ACCESS Links) = 8

4 Check the UPS requirement: 12 points

5 Find the Capacity Factor for your system (in our case since we have 32 IVR channels the factor is: 17

6 Add all of the above calculated points:

```
121 + 88 + 8 + 12 + 17 = 246
```

7 Compare the calculated points with the available points for 32, 64, 96 or 128 Mbyte system memory, in this case we can not use 32 Mbyte system since it does not give us enough memory (Total available memory points is 198) so we have to use next step up memory configuration which is 64 Mbyte of DRAM (417 points).

CPU sizing

This section highlights under which conditions different CPU sizing is recommended.

The same “point system” used for calculating memory requirements can be used to determine which combinations of features and capacity will fit on the Meridian IVR 2.0/I system in terms of CPU load. (See “ The point system” on page 3-24 for clarification, if needed).

Points are based on total system CPU loading (100 points in total). The point system is not intended to accurately predict the CPU load for the system, but rather to predict which combinations of features can be installed before exhausting available CPU cycles on the system.

All values in the table are derived from measurements on the Meridian IVR 2.0/I system. Calculated values over 100 points (Max 110) indicate that a faster CPU is required.

Table 3-10
CPU point requirements

Total Available Points	Points (CPU Loading Factors)	
	For a 75 MHz System	For a 100 MHz System
IVR (Generations & Access)	25	25
Fax Option	15	25
Each Fax port	4	4
Host Option (Core)	18	18
UPS Option	5	5
SQL (Local and remote)	(25 and 15)	(25 and 15)

Table 3-10
CPU point requirements (Continued)

Total Available Points	Points (CPU Loading Factors)	
	For a 75 MHz System	For a 100 MHz System
Capacity Factor: P= 10 If # of IVR channels <12 P= 13 If # of IVR channels <24 P= 18 If # of IVR channels <48 P= 22 If # of IVR channels <64 P= 30 If # of IVR channels <96	P	P
Total Available Points	**100 (Max 110)**	**122 (Max 134)**

The following example illustrates how CPU sizing should be implemented.

All calculations are based on the following feature set:

- 64 ports of IVR (all shared channels meaning three ACCESS link will be required)
- Fax Option with 8 ports
- Host Connectivity (3270 SNA)
- UPS option

Use Table 3-10 for determining CPU size.

Sample procedure for determining correct cpu size

1 Add the CPU Loading point requirement for desired feature set:

```
25 (IVR) + 15 (Fax) + 8 (fax ports) * 2 + 18 (Host
Connectivity) + 5 UPS = 79
```

2 Find the Capacity Factor for 64 IVR channels: 22

3 Add all of the above calculated points: 79 + 22 = 101

In this case faster CPU is not required since we are not exceeding the CPU Loading point (100 with Tolerance of 10 for 75 MHz CPU).

Disk sizing

The hard disk space required for different Meridian IVR 2.0/I options is documented under "Disk usage" on page 4-10. For additional information regarding third party software disk space requirements (for example, Oracle or Informix) please consult the appropriate manufacturer's documentation.

Chapter 4: Configuring your Meridian IVR system

Base system software configuration

The majority of the system is configured for the customer's needs at the time of installation, or during system expansion. Based on the needs of the customer site (database and so on) some parameters may require fine-tuning.

Modifying the UNIX system configuration

The default UNIX system parameters are modified when Meridian IVR is installed. These parameters include maximum number of processes, open files, event queues, regions, and most importantly, stream pipe limits. Any required kernel tuning is done automatically during installation by the software itself. This fine-tuning does not require any human intervention.

ATTENTION!

If you are installing third party software, such as SQL database or 3270 emulation, you will have to follow the vendor's procedures to tune the kernel parameters.

Physical I/O port configuration

The following table illustrates I/O port configuration for the Meridian IVR 2.0/I platform.

Table 4-1
Device name and legends

Legend/Label	Used for	Device Name	Board
COM1	Keylock	tty1a	
		tty1A	
COM2		tty2a	
	Modem (for Remote Support)	tty2A	
Parallel Port	Printer	lp0	
P1 (DigiBoard)	ACCESS Link	ttyi1a	Number 1
	Modem	ttyi1A	
	Printer	pri1a	
	Printer with Modem Control	pri1A	
P2 (DigiBoard)	ACCESS/VT100 or RS-232	ttyi1b	Number 1
	Modem	ttyi1B	
	Printer	pri1b	
	Printer with Modem Control	pri1B	
P3 (DigiBoard)	ACCESS/VT100 or RS-232	ttyi1c	Number 1
	Modem	ttyi1C	
	Printer	pri1c	
	Printer with Modem Control	pri1C	

Table 4-1
Device name and legends (Continued)

Legend/Label	Used for	Device Name	Board
P4 (DigiBoard)	ACCESS/VT100 or RS-232	ttyi1d	Number 1
	Modem	ttyi1D	
	Printer	pri1d	
	Printer with Modem Control	pri1D	
P5 (DigiBoard)	ACCESS/VT100 or RS-232	ttyi1e	Number 1
	Modem	ttyi1E	
	Printer	pri1e	
	Printer with Modem Control	pri1E	
P6 (DigiBoard)	ACCESS/VT100 or RS-232	ttyi1f	Number 1
	Modem	ttyi1F	
	Printer	pri1f	
	Printer with Modem Control	pri1F	
P7 (DigiBoard)	UPS, ACCESS/VT100 or RS-232	ttyi1g	Number 1
	Modem	ttyi1G	
	Printer	pri1g	
	Printer with Modem Control	pri1G	
P8 (DigiBoard)	MM Console	ttyi1h	Number 1
	Modem	ttyi1H	
	Printer	pri1h	
	Printer with Modem Control	pri1H	

Table 4-1
Device name and legends (Continued)

Legend/Label	Used for	Device Name	Board
P1 (DigiBoard)	VT100 or RS-232	ttyi2a	Number 2
	Modem	ttyi2A	
	Printer	pri2a	
	Printer with Modem Control	pri2A	
P2 (DigiBoard)	VT100 or RS-232	ttyi2b	Number 2
	Modem	ttyi2B	
	Printer	pri2b	
	Printer with Modem Control	pri2B	
P3 (DigiBoard)	VT100 or RS-232	ttyi2c	Number 2
	Modem	ttyi2C	
	Printer	pri2c	
	Printer with Modem Control	pri2C	
P4 (DigiBoard)	VT100 or RS-232	ttyi2d	Number 2
	Modem	ttyi2D	
	Printer	pri2d	
	Printer with Modem Control	pri2D	
P5 (DigiBoard)	VT100 or RS-232	ttyi2e	Number 2
	Modem	ttyi2E	
	Printer	pri2e	
	Printer with Modem Control	pri2E	

Table 4-1
Device name and legends (Continued)

Legend/Label	Used for	Device Name	Board
P6 (DigiBoard)	VT100 or RS-232	ttyi2f	Number 2
	Modem	ttyi2F	
	Printer	pri2f	
	Printer with Modem Control	pri2F	
P7 (DigiBoard)	VT100 or RS-232	ttyi2g	Number 2
	Modem	ttyi2G	
	Printer	pri2g	
	Printer with Modem Control	pri2G	
P8 (DigiBoard)	VT100 or RS-232	ttyi2h	Number 2
	Modem	ttyi2H	
	Printer	pri2h	
	Printer with Modem Control	pri2H	

Interrupt requests and system I/O map

Interrupt request

Interrupt requests (IRQs) are used in the Meridian IVR 2.0/I hardware platform (Application Processor). An IRQ is a signal sent to the central processing unit (CPU) to temporarily suspend normal processing and transfer control to an interrupt handling routine. Interrupts may be generated by conditions such as completion of an I/O process, detection of hardware failure, and so on. Table 4-2 illustrates IRQs used for different devices.

System I/O Map

The Input/Output Address, or I/O address is the starting memory address through which the CPU exchanges data with peripheral devices such as floppy drives, SCSI devices, COM ports (tty's) and others. It is important to remember that no devices should share the same I/O address in memory. Table 4-2 illustrates the I/O memory allocation of the motherboard and devices for the Meridian IVR 2.0/I hardware platform.

Table 4-2
Interrupt/Memory address and I/O port address list

IRQ	Memory address	I/O port address	Direct memory access channel	Device name
0				Reserved Interval timer
1				Reserved, keyboard buffer full
2				Reserved, cascade interrupt from slave PIC
3		2f2		Onboard Serial Port 2 (COM2) (Modem)
4		3f8		Onboard Serial Port 1 (COM1) (Keylock)
5	D2000			Dialogic Fax Boards (all boards)
6		3f2	2	Onboard Floppy Controller
7		378		Parallel Port Number 1 (LPT1)
8				Real-time clock (RTC)
9				Video Controller
10		f880		PCI Ethernet Controller
10		1a20 DC000	6	ISA Token-Ring Controller (For LAN Connectivity only)
11		fc00		PCI SCSI Adapter Controller
12		60		Onboard PS/2 Mouse port
13				Reserved Math Coprocessor (FPU)

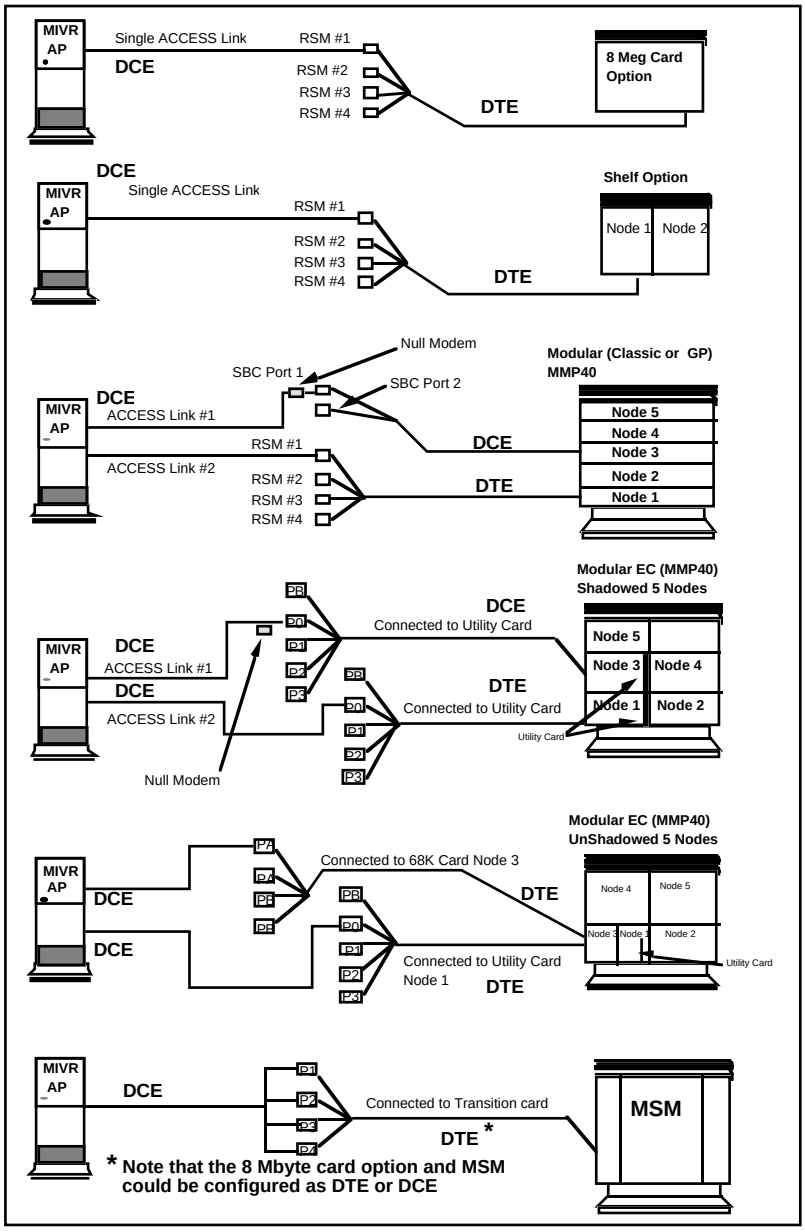
Table 4-2
Interrupt/Memory address and I/O port address list (Continued)

IRQ	Memory address	I/O port address	Direct memory access channel	Device name
14				Used by IDE Controller (can be disabled)
15	DC000	340		Sync/570 RS-232 Host first Board
15		3a20 DE000	5	ISA Token-Ring Controller (For Host Connectivity only)
	D0000	300		PC8e Digiboard (RS-232 board) first Board
	D0000	320		PC8e Digiboard (RS-232 board) second Board

Meridian IVR and MMail configuration

The following configuration diagram (Figure 4-1) illustrates some of the valid Meridian IVR 2.0/I Application Processor and Meridian Mail connectivity configurations.

Figure 4-1
Configuring the AP with MMail (Pre MM10)



Voice and telephony resources configuration

Each Meridian Mail channel corresponds to an Sl-1 agent set on the PBX. Each agent is owned by an ACD DN. There may be ACD DNs without any agents, but they may be forwarded to an ACD DN owning Meridian Mail channels and, thus, get served by Meridian Mail and Meridian IVR.

The channel allocation table

The service to be started up on a channel is defined in the Channel Allocation Table (CAT) on Meridian Mail.

For Meridian IVR

- the service can be defined as ALL if the channels are to be *shared* with Meridian Mail services
- the service can be defined as ACCESS if the channel is to be *dedicated* to Meridian IVR

If the class is ACCESS, it must be given a certain class. This is simply any number (the range is 1 to nnnn).

The voice services directory number table

The voice services directory number table is also known as the VSDN table. If channels are shared, then the service to be started up on that channel depends on the ACD queue on which the call first lands. In shared mode, a number of queues are normally forwarded to the queue owning the channels. The service to be started for an ACD DN is listed in the VSDN table. If shared channels are being used, Meridian IVR ACDN has ACCESS as its service with a specific class. If more than one Meridian IVR ACDN is being used, each should get a unique class.

If dedicated channels are used, an entry must be made in the VSDN table for the DN owning the channels with ACCESS service. The class may be any one from the channels it owns.

Outcalling channels

It is recommended that channels to be used by MIVR for outcalling be configured as dedicated and belonging to a queue on which calls are *never* presented by the switch.

Meridian IVR resources configuration

Channel configuration on Meridian IVR

If dedicated channels are used, then they must be configured as DEDICATED on Meridian IVR with the same unique channel class being used on Meridian Mail. There must be one dedicated channel of the same class on MIVR corresponding to a dedicated channel of the same class on Meridian Mail.

If shared channels are being used, the *same* number of channels must be configured as shared on MIVR. The classes used depend on how many are to be used for the various ACD DNs in the VSDN table.

For example, say that there are 10 shared Meridian Mail channels. There are two ACD DNs in the VSDN table which are to be serviced by those 10 channels. Say ACD DN 1 is of class 1, and ACD DN 2 is of class 2. On Meridian IVR, there must be 10 shared channels. If the traffic for DN1 calls for 4 channels and the traffic for DN2 calls for 6 channels, then 4 of the shared MIVR channels must be configured for class 1 and 6 for class 2.

Mixed mode

A system can have both shared and dedicated channels. These would be both configured separately as noted above, but the classes should be kept separate. For example, if the dedicated channel classes are set as 1 to 10, the shared ACD DN classes must use another range of numbers.

Note the difference between dedicated and shared channels. Dedicated channels each have their own class. This class is also configured on the corresponding MIVR channel. Shared channels do not each have a class on Meridian Mail, but the Meridian IVR ACD DNs which they serve have classes instead. The shared channels on Meridian IVR do have classes and are the same as the class for the ACD DN they will serve.

Disk usage

This section describes the disk usage for the Meridian IVR 2.0/I by showing the disk partitioning and the software usage of the disk.

Disk partitioning

The disk drive used on the Meridian IVR 2.0/I is 1.2 Gbyte. The hard disk has a capacity of 1012 MByte after being formatted.

Prime hard disk drive

The first hard disk in Meridian IVR 2.0/I is divided into fixed-size logical areas or partitions. These partitions are described below:

dos

This partition holds the diagnostic software.

Root volume

This partition holds the bootable operating system and some temporary IVR files. This volume is also used for the Meridian IVR 2.0/I applications: ACCESS software, Meridian IVR interface, Meridian IVR Fax, and third-party software (such as SQL databases).

Swap area

This partition is used by the Operating System, whenever required, during operations.

u volume

This volume is used for different IVR accounts.

Table 4-3
Prime disk partitioning configuration

u	swap	root	dos	Reserved By UNIX System	Reserved by DOS
All values expressed in Mbytes					
688	100	200.5	13.5	7.85	2.5

Note: The total remaining disk space available after all options are installed is 558 Mbytes.

Second hard disk

The second hard disk is used when a large area for fax storage is required or database software and data has occupied so much hard disk space that there is not enough space for the remaining fax data.

Note: The Second hard disk is used only for storing the fax data.

There is only one partition on the second hard disk (sdisk).

How Meridian IVR is configured

Before Meridian IVR can be configured you must gain an understanding of the type and number of channels on the Meridian Mail system you are going to use, the platform on which the Meridian Mail software release will be run on, and the type of switch to be used. The types of MIVR applications and grade of service desired should also be confirmed with the customer. At this point you can begin to configure Meridian IVR.

The following list is a high-level view of what the VAD should do to configure Meridian IVR.

Procedure 4-1
High-level method of configuring MIVR

1 Establish the type of MIVR applications and the type of ports required for each application.

2 Find grade of service (GOS) required for each application.

3 Determine the traffic intensity on the present Meridian Mail system, and anticipated traffic intensity on the proposed MIVR applications.

4 Determine the traffic patterns of the Meridian Mail system and the MIVR applications.

5 Calculate the number of channels and type of channels needed to service these calls. This can be done using Erlang-C traffic capacity tables. (Refer to Appendix G, “Erlang tables,” on page G-1.)

6 Determine whether the channels are to be dedicated or shared with the Meridian Mail system.

7 Determine how many inbound MIVR channels and outbound MIVR channels will be needed for the MIVR applications.

8 Estimate the amount of voice storage needed on top of Meridian Mail requirements.

9 Determine the number of database servers and host sessions needed by the various channels.

10 Determine the number of ACCESS links necessary.

11 Finally, after your system size is determined, plan your MIVR applications by drawing a flowchart for the call paths, to configure the Meridian ACCESS-based applications.

12 Write specification for installer on the reassignment of agents to new ACD queues if necessary, and to update the Channel Allocation Table and the Voice Services Directory Number table if required.

Chapter 5: Planning applications

This chapter contains all of the necessary information for planning a Meridian IVR application.

Notes:

1 The procedures described in this chapter cover only the initial planning of an application. For modification procedures, refer to the *Meridian IVR Application Development Guide* (NTP 555-9001-310).

2 Not all of these procedures apply to every application.

3 The "General procedure for planning an application" on page 5-6 will help you to determine which specific procedures you must perform.

Types of applications

Configuration requirements for Meridian IVR applications vary depending on the needs of the application. There are three categories of Meridian IVR applications:

- incoming call applications (inbound)
- outgoing call applications (outbound)
- administrative applications

The following sections outline the types of applications that can be created and combined within the three basic categories.

Incoming call (inbound) applications

Applications that provide a service to callers who dial in are “inbound” applications. Callers dial from either an internal telephone (an extension on the PBX) or external telephone (a payphone or home telephone) to the service.

Outgoing call (outbound) applications

Applications that call internal or an external telephone numbers are “outbound” applications. The Meridian IVR application requests Meridian Mail to initiate an outgoing call, and provides an IVR service to a customer.

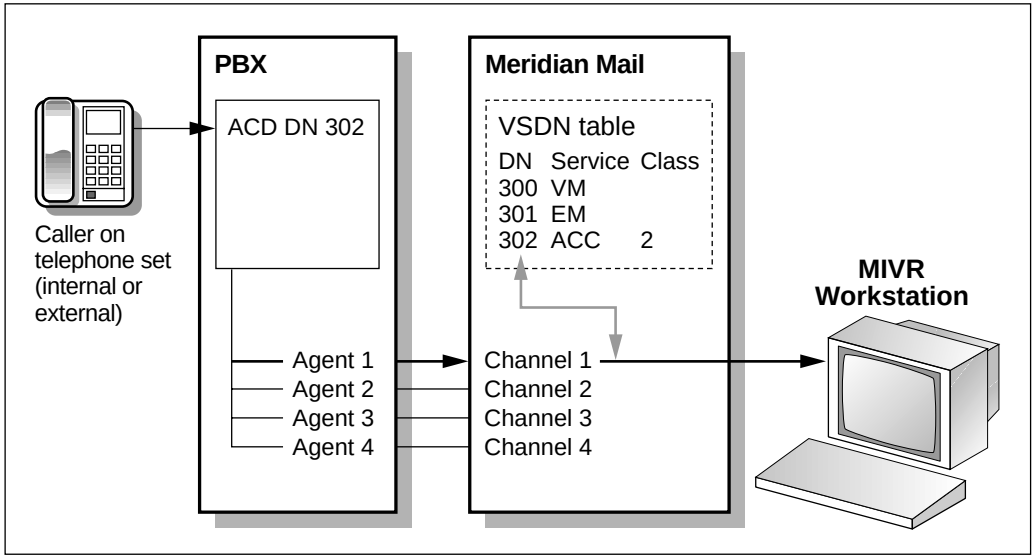
Administrative applications

Applications that do not take incoming calls or place outgoing calls are generally administrative in nature. There is a wide range of possible applications, and a popular example is electronic mail notification. Meridian ACCESS can be used to send summaries of voice messages to a host computer, and can receive notification of text messages (and turn on Message Waiting Indication at a telephone set).

Concepts and planning

To plan and configure a Meridian IVR system, you must understand some basic concepts. Figure 5-1 shows an overview of the concepts which are introduced in this section.

Figure 5-1
Meridian IVR-based application overview



Private branch exchange

The private branch exchange (PBX) provides the telephone interface to Meridian IVR voice services. For Meridian 1 systems, the Automatic Call Distribution **(**ACD**)** feature allows a number of "telephones" connected to the PBX (known as agent positions) to share equally in answering incoming calls. Incoming calls to an ACD Directory Number **(**DN**)** are placed in an ACD queue and presented to the available agents on a "first-in, first-out" basis. Other switches use similar queuing schemes.

In Meridian 1 systems, Meridian Mail uses ACD to receive calls from users who have dialed a voice service telephone number (which is an ACD DN). Calls are distributed to agent positions which correspond to voice channels on Meridian Mail. Inbound applications handle calls that originate outside the PBX. A call arrives on a trunk that terminates on an ACD queue.

Meridian Mail is usually configured so that all incoming calls share all available agents/channels, so that calls are evenly distributed. Shared channel configuration involves one “primary” ACD DN that can direct calls to all configured agents. All other voice services use ACD DNs that do not have agents assigned to them. All incoming calls to those DNs are forwarded to the primary ACD DN (and utilize the agents assigned to that primary DN).

In some cases, however, you may decide to use a dedicated channel configuration in order to have more control over incoming calls. In this case, voice service DNs may have their own agents assigned to them. These agents are dedicated to their own voice service DNs (and any other DNs that are forwarded to a specific voice service DN).

Shared versus dedicated channels

The decision to use a shared or dedicated channel configuration depends on the specific requirements of the application. Often, the application developer will specify which configuration to use. The shared channel method uses channels more efficiently in terms of traffic; however, it generates more Meridian ACCESS link traffic and Meridian Mail system load. The dedicated channel method reduces some application overhead, and is the best method for systems using a single application and no other voice services. Dedicated channels also have a faster prompt response time (time measured from the moment the pound key is pressed until the first prompt is heard).

Note: A combination of shared and dedicated channels may be required to achieve your organizations particular call-handling objectives.

Meridian Mail

Meridian Mail provides all basic voice service capability to the Meridian ACCESS system. It stores all voice recordings and gives callers access to features like voice messaging (which in itself has a long list of available features), voice menus, and announcements. These features can be customized to meet the needs of a wide range of users.

Call processing

Incoming calls to a voice service (such as a Meridian ACCESS-based application) arrive on Meridian Mail channels according to ACD configuration, described under “Private branch exchange” on page 5-3.

Although a call may have been forwarded to another ACD DN and then reassigned to an agent position, it still retains information about the originally dialed DN. Meridian Mail interprets this DN according to the Voice Service DN **(**VSDN**)** table. The VSDN table lists all voice service DNs and type of service information on each DN.

VSDN table

Every voice service has a DN associated with it. When this DN is dialed, the call is passed to Meridian Mail. Meridian Mail starts up the appropriate voice service by looking at the VSDN table entry for that DN.

The VSDN table entry for a Meridian ACCESS-based application contains three pieces of information: the DN, service type (ACCESS), and class. A service type of "ACC" indicates to Meridian Mail that the call should be passed to Meridian ACCESS. Every Meridian ACCESS-based application has a unique class number, the class indicates which application should be run. If the originally dialed DN corresponds to a Meridian IVR-based application, it will start the application for that class number.

Channel Allocation Table

The Channel Allocation Table (CAT) contains entries for each voice channel on Meridian Mail and matches these channels to ACD agents on the PBX. This table enables you to dedicate channels to a particular service on Meridian Mail, or make the channels available to all services.

When channels are dedicated to a service in the CAT, Meridian Mail cannot allocate those channels to any other service. If those particular channels are not dedicated on the PBX (using a separate ACD queue, as described earlier), any service can use the channels on incoming calls; the CAT only controls the resources allocated by Meridian Mail.

Meridian Mail channels

There are three types of channels in Meridian Mail: Multimedia channels, Full Voice channels, and Basic Voice channels. If there is a mix of channels on Meridian Mail, Meridian IVR will only be able to use basic voice channels that are configured as either "ALL" or "ACC" in the CAT.

- A Basic service will only be able to use a Full Voice channel if there are no Basic Voice channels in service.
- A Multimedia channel can only be used if there are no Full and Basic voice channels in service.

Outbound discussion

Outbound voice services must acquire a voice channel before initiating a call. The voice channel allocated is determined by the CAT settings. The voice service may request a dedicated channel, or may use a channel available to all services.

Notes:

1 No dialing restrictions are applied to the outcalling ACCESS voice service. Any dialing restrictions used must be enforced on the Meridian 1.

2 Incoming calls to the outbound voice service by default are blocked by the PBX.

Mailboxes

Most Meridian IVR-based applications require a Meridian Mail account, or mailbox, to store voice files. A single mailbox can be shared by a number of applications, and must be shared if the applications use the same voice files. It may be useful to have different applications use different mailboxes.

Mailboxes can be customized in a number of ways to suit a Meridian IVR-based application. Space requirements for voice files must be taken into account, message waiting indication can be enabled or disabled (if there is no telephone number associated with the mailbox), and message retention information can be modified. ("Sent" messages can be retained or deleted automatically. Also, "read" messages can be retained for a designated period of time.)

General procedure for planning an application

Every Meridian IVR-based application serves a unique function and the configuration requirements can vary widely. Planning for an application is a very important step in the configuration process, and this chapter provides the information required to help you set up your Meridian IVR-based application.

The following points outline all of the major steps involved in planning an application for Meridian IVR. If a step does not apply to your situation, simply proceed to the next step.

Procedure 5-1
Configuring an application

1. Draw a flowchart of your application that includes all of the necessary information for your configuration purposes.

   Specify the following information in your flowchart:

   - every dialed DN (ACD DN)
   - whether each ACD DN has channels assigned to it or is forwarded to another ACD DN (which has channels assigned)
   - appropriate revert DN for each dialed DN

   See “Draw a flowchart” on page 5-10.

2. For each ACD DN, add an ACD queue on the PBX.
3. For applications that require dedicated incoming channels, add or reassign the agents to the new ACD queue.
4. Update the Channel Allocation Table if you are using the dedicated channel method for incoming or outgoing calls.
5. Update the VSDN table to reflect all new DNs and their respective services, class numbers and revert DNs.
6. Add voice mailboxes as necessary.

For detailed directions on configuring an application for Meridian IVR refer to the *Meridian IVR Installation Guide* (NTP 555-9001-210).

More on preconfiguration requirements

“Preconfiguration requirements” on page 1-3 of this document describes the preconfiguration requirements which should be met before configuration takes place. Some of these requirements depend on the nature of the applications that will be used on the Meridian IVR system and are further explained here.

Storage (disk space)

Meridian Mail stores all voice prompts, messages, greetings, and any other recorded voice for Meridian IVR-based applications and other voice services. If you are using other Meridian Mail features, the storage requirements for those must also be taken into account.

When using dedicated channels, the voice prompts should be stored on the node where the channels are dedicated. This will assist in balancing the load on the disks. If a multi–node system is being used, it is possible to place a copy of the prompts on each node. However, this may not be appropriate for applications which regularly update their voice prompts.

The application developer should provide you with information on the storage requirements for each application. For details on determining system size, refer to *Meridian Mail Site and Installation Planning* (NTP 555-70x1-200).

Voice channels

To determine the appropriate number of channels for the system, estimate the traffic requirements for each application. If you are using other Meridian Mail features, the traffic requirements for those must also be taken into account. For more information on determining system size, refer to *Meridian Mail Site and Installation Planning* (NTP 555–70x1–200).

Procedure 5-2
Estimating traffic requirements

The following steps outline how to estimate the traffic requirements for Meridian IVR-based applications:

1 Estimate the average length of a call to or from the application.

This should include post call processing time, which is the time from disconnection of one call until the application is ready to accept the next call. This information should be provided by the developer.

2 Estimate the number of calls for the busiest hour.

3 Multiply the average length by the number of busy-hour calls, this value is called the “total activity” for one application.

4 Repeat steps 1 to 3 for each application.

5 Add the total activity of *each* application to find the total activity for *all* applications.

6 Divide this number by 100 to determine the ccs count (ccs refers to hundreds of call seconds).

Look up the ccs value in the Erlang tables found in Appendix G: Erlang tables, in this guide, to determine the optimum number of voice ports for Meridian IVR-based applications. For a definition of ccs refer to “Centi-call seconds” on page 3-4 of this guide.

Table 5-1
Determining channel capacity Meridian IVR

Capacity of system, expressed in CCS	Optimum number of channels
0 to 54	4
55 to 157	8
158 to 273	12
274 to 522	20
523 to 651	24
652 to 782	28
783 to 915	32
916 to 1049	36
1050 to 1183	40
1184 to 1318	44
1319 to 1455	48
1456 to 1591	52
1592 to 1729	56
1730 to 1866	60
1867 to 2004	64

Application planning

Before you start

The application developer should provide you with the following for each application:

- class number
- mailbox requirements
- channel allocation requirements (does the application call for shared or dedicated channels?)
- number of ACD DNs required

Determine your needs

Once you have a good understanding of how the application works, you should determine the following:

1 Does the application receive incoming calls?

If yes

a Will the calls share channels with other applications or voice services, or do they require dedicated channels?

b If channels are to be dedicated to the application, how many channels/ACD agents are required?

c Is the application a “multi-function” one?

Multi function applications answer calls made to different numbers in different ways and require separate ACD DNs. Separate revert DNs may also be required.

2 Does the application place outgoing calls?

If yes

a Will the calls share channels with other applications or voice services, or do they require dedicated channels?

b Will calls be placed to internal extensions, external numbers or both?

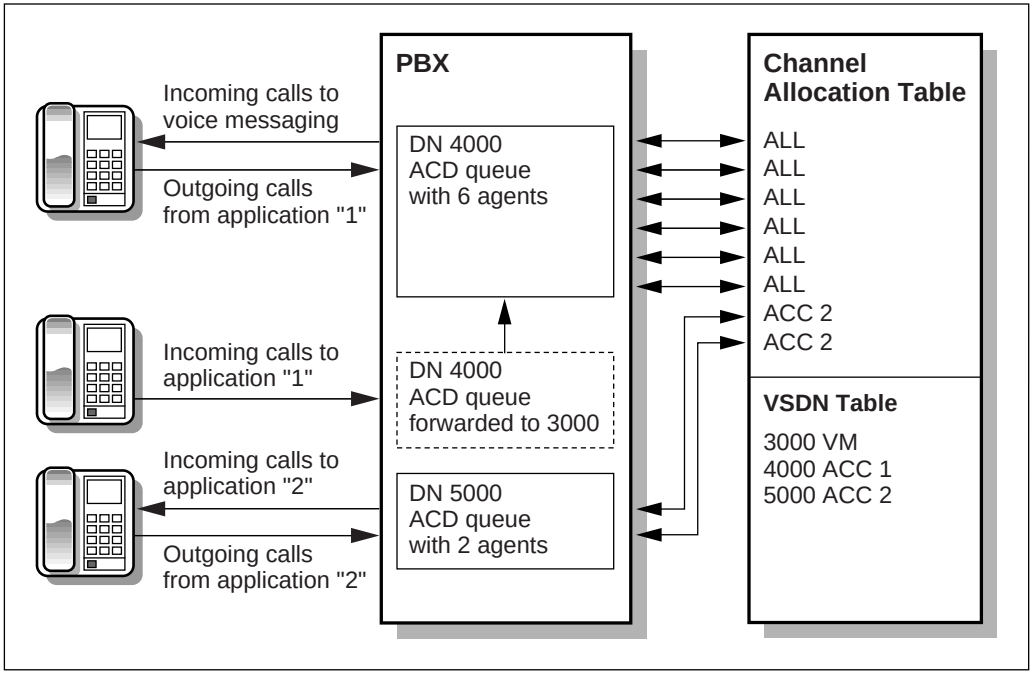
3 Does your Meridian Mail system have to be expanded to accommodate increased traffic or storage requirements?

Draw a flowchart

Draw a flowchart, or “map,” of your application. This will help you put all of the components in place. Illustrate the complete path of a call (incoming, outgoing, or both, depending on the application) and leave room at every step for information. Each dialed DN should have PBX information (for example, DN and ACD queue information) and Meridian Mail information (for example, service type, ACCESS application class number, and revert DN) associated with it.

Figure 5-2 illustrates a sample flowchart. If Voice Messaging and other services are already set up, you do not need to describe all of them in detail; include only the information that is relevant to your applications.

Figure 5-2
Sample application flowchart



Appendix A: Sample configurations

This appendix provides sample configuration models for Meridian IVR channel assignment. These sample models are provided as guidelines so the reader can better understand the various configurations.

Shared IVR channel configuration (single application)

Figure A-1 and A-2 illustrate a Meridian Mail system with 12 voice channels, which is connected to a Meridian IVR system with 12 logical channels. The 12 voice channels are configured for ALL services. This allows dynamic use of the channels based on the voice service defined in the Meridian Mail VSDN table for the dialed DN. Calls directed to DN 3600 will be answered by Meridian Mail. Likewise, calls which are directed to DN 3000 will be given the IVR treatment for the running Meridian IVR application assigned to an IVR logical channel bearing a CLASS of 1.

The characteristics of this configuration example include

- Meridian Mail voice channels configured for ALL services
- All voice channels share the same queue
- Acquisition type on the Meridian IVR is *shared* for all logical channels
- There is an equal amount of Meridian Mail voice channels to the Meridian IVR logical channels

There are a number of advantages and limitations associated with this type of configuration.

Advantages

- Maximum efficiency is obtained with regards to Meridian Mail channel utilization.
- This is the simplest configuration to install and test at a customer site.
- Voice prompt modifications are automatically applied on the next call after saving changes.
- Recorded messages in the IVR mailbox are immediately available for the next call after recording.

Limitations

- Incoming Meridian IVR calls may incur excessive delay in queue if all Meridian Mail voice channels are busy due to high Voice Messaging traffic.
- Associating a Meridian Mail voice channel with a Meridian IVR logical channel is difficult due to random logical channel assignments for each incoming IVR call.
- The Meridian Mail system limits configuration to a maximum of 18 shared Meridian IVR logical channels for each 9600 baud ACCESS link.

Please refer to Figure A-9 “8 Dedicated Voice Mail and 12 Shared Channels” on page A-15 for an example of available Meridian Mail voice channels exceeding the amount of Meridian IVR logical channels.

Figure A-1
Single application, shared model configuration: Meridian Mail/Meridian IVR

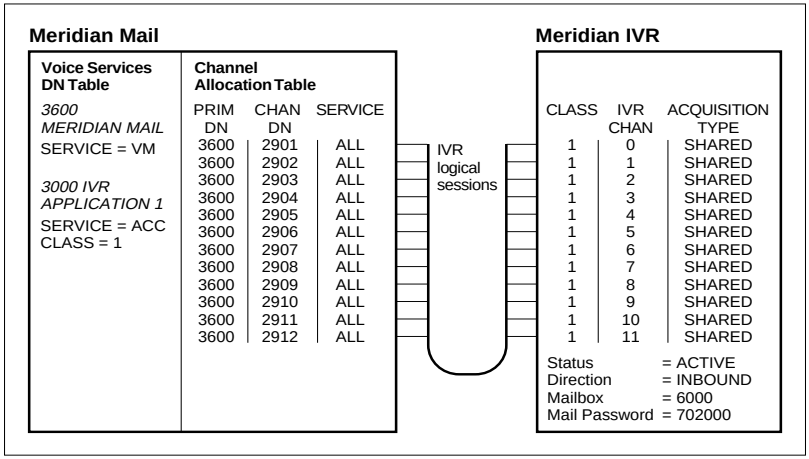
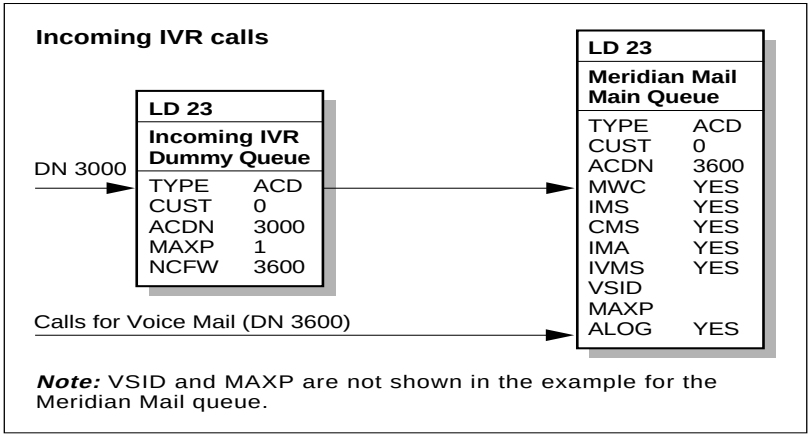


Figure A-2
Single application, shared model configuration: Meridian 1/SL-1 ACD



Shared IVR channel configuration (multiple applications)

Figure A-3 and A-4 illustrate an example of a Meridian Mail system with 12 voice channels, connected to a Meridian IVR with 12 logical channels. The 12 channels are configured for ALL services. This allows dynamic use of the voice channels based on the Meridian Mail VSDN entry for the dialed DN.

Calls directed to DN 3600 will be answered by Meridian Mail. Likewise, calls which are directed to DN 3000 or DN 5000 will be given IVR treatment and assigned the appropriate Meridian IVR application by a selector program (written by the VAD). See Figure A-5 for an example of a selector program which could be used with the configuration example, shown in Figure A-3 and A-4.

The characteristics of this configuration example include

- Meridian Mail voice channels configured for ALL services
- all voice channels share the same queue
- for multiple applications, Meridian IVR logical channels are dynamically allocated to their appropriate running application by utilizing a selector program as shown in Figure A-5. The selector program uses the DIGITS buffer variable in the Meridian IVR to determine which service the caller dialed.
- acquisition type on the Meridian IVR is *shared* for all logical channels

There are a number of advantages and limitations associated with this type of configuration.

Advantages

- Maximum efficiency is obtained with regards to Meridian Mail voice channel utilization.
- Using a selector program, an almost unlimited number of applications can be made available to an incoming call based on the DIGITS buffer content (which contains the originally dialed DN).
- Voice prompt modifications are automatically applied on the next call after saving changes.
- Recorded messages in the IVR mailbox are immediately available for the next call after recording.

Limitations

- Incoming Meridian IVR calls may incur excessive delays in queue if all Meridian Mail voice channels are busy due to high voice messaging traffic.
- Associating a Meridian Mail voice channel to a Meridian IVR logical channel is difficult due to random logical channel assignments for each Meridian IVR call.
- The Meridian Mail system limits this configuration to a maximum of 24 shared Meridian IVR logical channels.

Figure A-3
Multiple applications shared model configuration: Meridian Mail/Meridian IVR

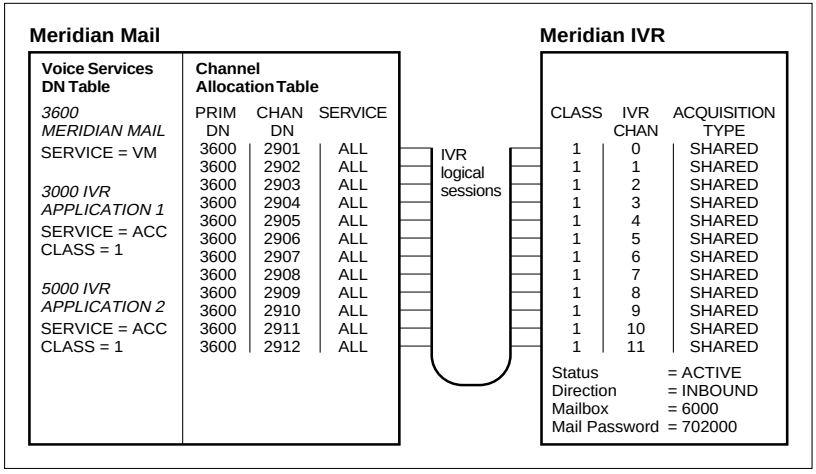


Figure A-4
Multiple applications shared model configuration: Meridian 1/SL-1 ACD

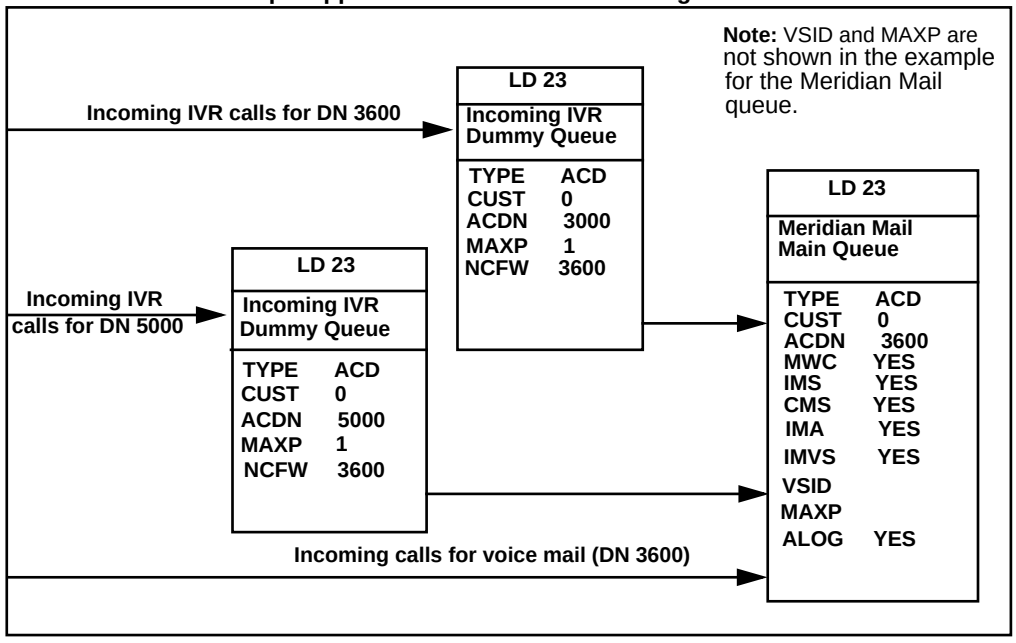
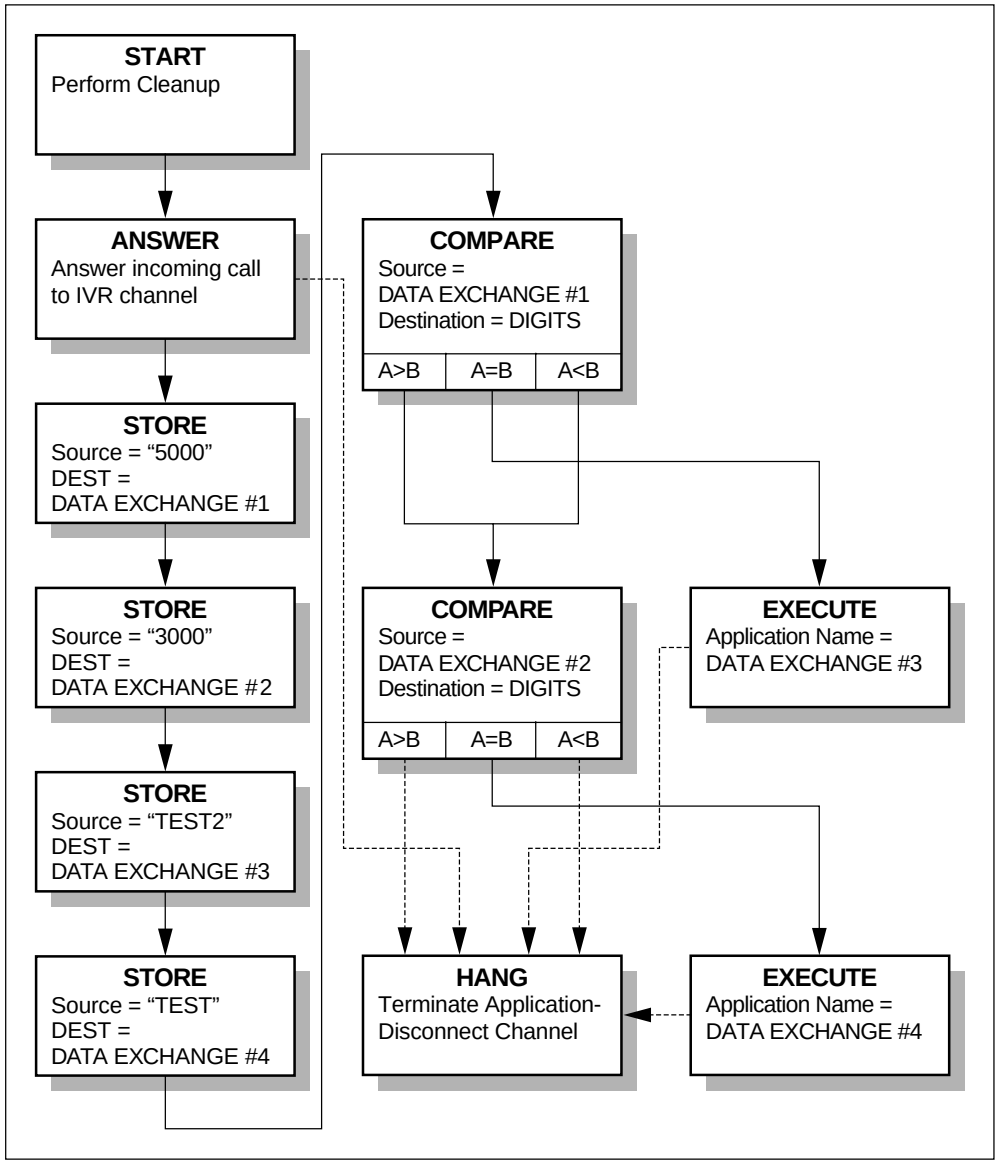


Figure A-5
Sample application selector program for Meridian IVR



Dedicated IVR channel configuration

Figure A-6 illustrates an example of a Meridian Mail system with 12 voice channels, which is connected to a Meridian IVR with six logical channels. There are six channels dedicated to IVR and six channels are to be used exclusively for voice messaging.

The characteristics of this configuration example include the following:

- Voice messaging channels are in their own separate Message Center queue (ACD-DN 3600) with service set for VM in the VSDN table. PBX call routing is arranged to prevent IVR calls from being presented to ACD-DN 3600.
- Meridian IVR channels are in their own dedicated IVR queue (3800) with service set for ACCESS.

  Note: Although a Class Value is required in the VSDN Table, it is replaced by the individual class values in the Channel Allocation Table. In other words, the Class Value for a dedicated logical Meridian IVR channel (which has a service of ACC, and Class Value in the Meridian Mail Channel Allocation Table) overrides the Class value in the VSDN table.

- Each ACCESS channel in Meridian Mail has a unique class, which is the default Meridian IVR configuration.
- Each Meridian IVR logical channel is dedicated to a specific Meridian Mail ACCESS channel using the class value for linkage.
- Meridian Mail channels are labeled 1 to 6; Meridian IVR logical channels are labeled 0 to 5.
- The selector program shown in Figure A-5 may be used if multiple applications are desired on Meridian IVR.

ATTENTION!

The MMTime clock synchronization process, which runs at powerup, and the Meridian IVR Voice Prompt Editor both require one voice channel configured as ALL in the Meridian Mail CAT table.

There are a number of advantages and limitations associated with this type of configuration.

Advantages

- Voice messaging and IVR calls do not compete for channels.
- Associating Meridian Mail channels to Meridian IVR channels is straightforward.
- This configuration provides the highest Grade of Meridian IVR Service (if sufficient channels are allocated to ACCESS).
- With the standard configuration and two (2) 9600 baud ACCESS links, up to 96 voice channels (when using one Application Processor) will be supported.
- Creates less traffic and overhead on the ACCESS link.

Limitations

- There is reduced overall channel usage efficiency between Meridian Mail and Meridian IVR.
- Voice prompt modifications are not automatically applied on the next Meridian IVR call.
- Recorded messages in the IVR mailbox are not immediately available for the next Meridian IVR call.

CAUTION!

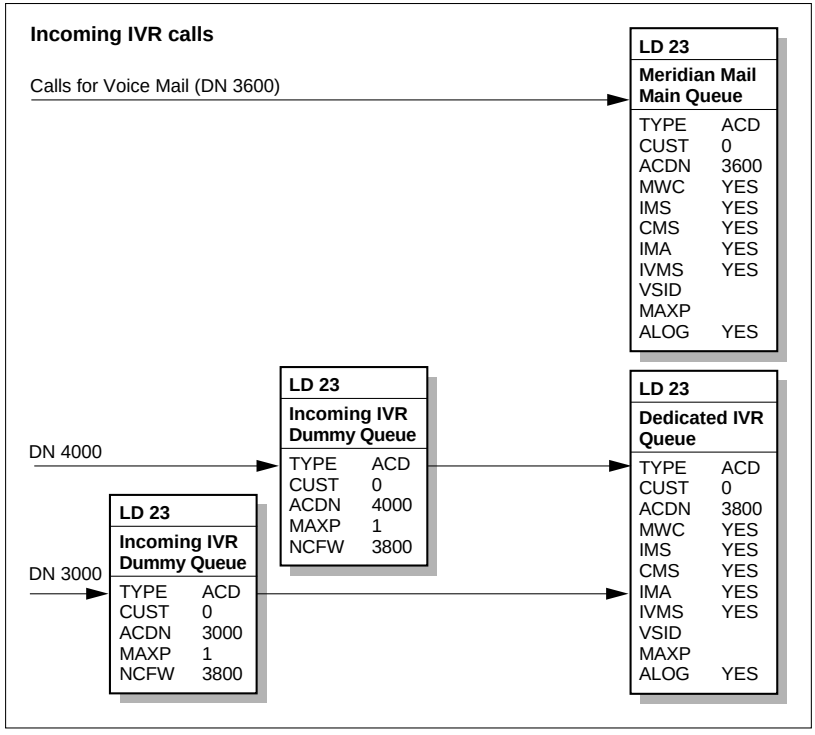
Risk of service degradation

Ensure that only IVR calls terminate onto dedicated channels.

If the switch and Meridian Mail are configured such that a call intended for a Meridian Mail service is presented to an IVR dedicated channel, the Meridian Mail service will be provided at the expense of the IVR channel.

After the call is finished, it can take up to 15 seconds before Meridian IVR will attempt to reacquire the channel and it may take much longer under heavy traffic considerations. Any IVR calls arriving during this time will not receive IVR treatment.

Figure A-6
Dedicated model configuration: Meridian Mail/Meridian IVR



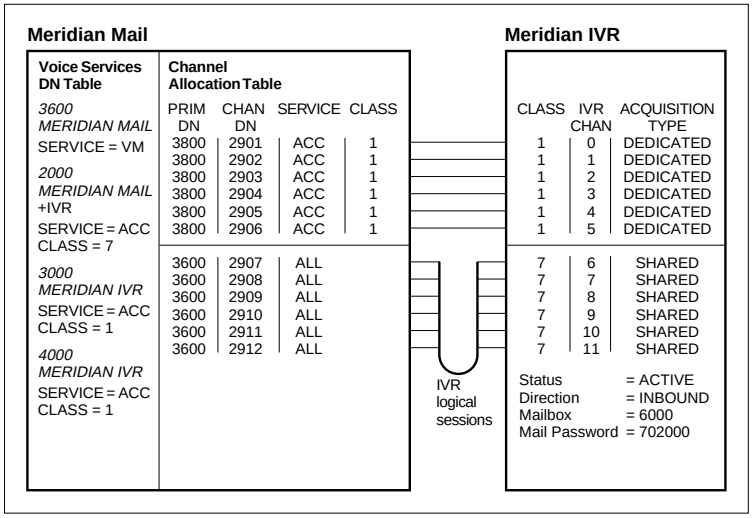
Hybrid Meridian IVR channel configuration

Figure A-7 and A-8 illustrate a Meridian Mail system with 12 voice channels, which is connected to a Meridian IVR system with 12 logical channels. The first six voice channels are configured as dedicated IVR ports. The other six channels are set up in a shared configuration with Voice Mail.

The characteristics of this configuration example include

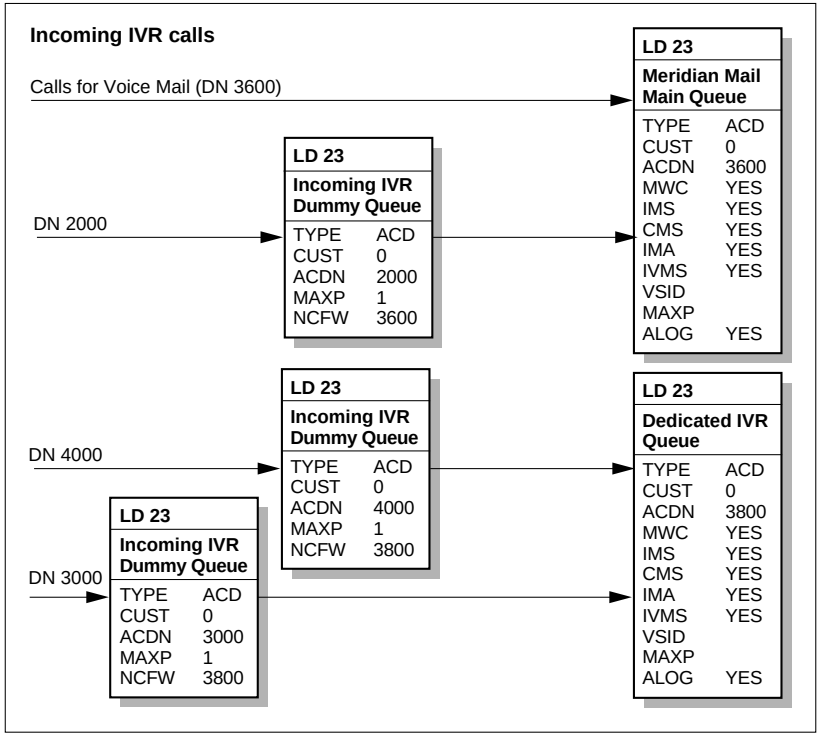
- two separate ACD queues handling IVR calls
- each IVR queue having two incoming call paths (see Figure A-8)

Figure A-7
Hybrid model configuration: Meridian Mail/Meridian IVR



A selector program should be used if multiple applications are to be made available within either of the voice channel queues (DNs 3800, 3600). An example of a selector program is shown in Figure A-5.

Figure A-8
Dedicated model configuration: Meridian 1/SL-1 ACD



Shared configuration: voice channels exceed logical channels

Figure A-10 illustrates a Meridian Mail system with 20 voice channels, which is connected to a Meridian IVR system with 12 logical channels. The 20 voice channels are configured for all services. The voice channels are split into two separate Message Center ACD queues.

The queue to be *shared* with Meridian IVR calls contains an equal amount of channels to the available Meridian IVR logical channel capacity. The remaining voice channels are placed in the ACD queue which will be used exclusively for Voice Mail service.

This configuration allows dynamic use of the voice channels which are being shared with the Meridian IVR system. Calls dialed to DN 3400 will be answered by Meridian Mail Voice Messaging.

When all eight of the ACD 3400 voice channels are busy, voice mail calls will overflow to the shared ACD-DN 3600, with a dialed DN of 3400, which will prompt Meridian Mail Voice Messaging to answer the call. Likewise, calls which are directed to DN 3000 are given IVR treatment.

The characteristics of this configuration example include the following:

- Meridian Mail voice channels are configured for ALL services.
- The shared queue (ACD-DN 3600) is configured with a number of voice channels that is equal to the available logical channels in the Meridian IVR system.
- Acquisition type on the Meridian IVR system is SHARED for all logical channels.
- All of the available voice channels are available for Voice Mail usage.

There are a number of advantages and limitations associated with this type of configuration.

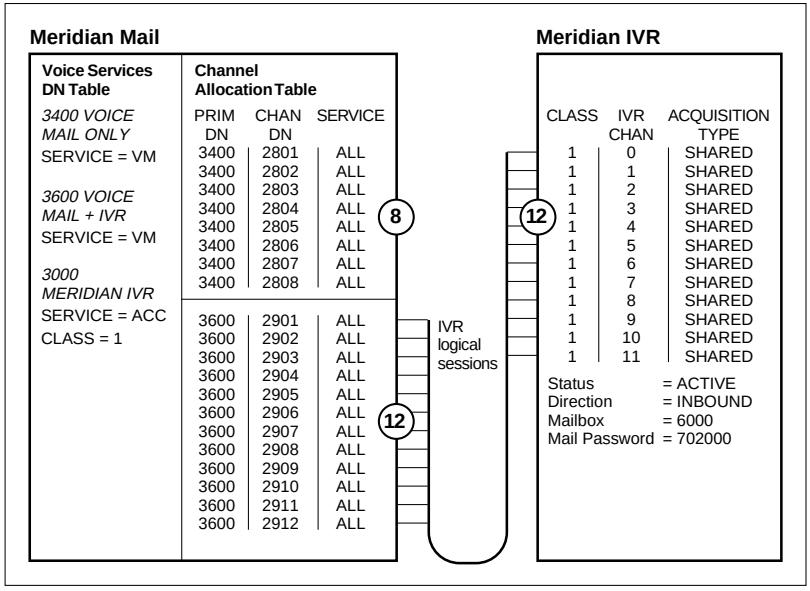
Advantages

- Maximum efficiency is obtained with regards to Meridian Mail channel utilization.
- Voice prompt modifications are automatically applied on the next call after saving changes.
- Recorded messages in the IVR mailbox are immediately available for the next call after recording.

Limitations

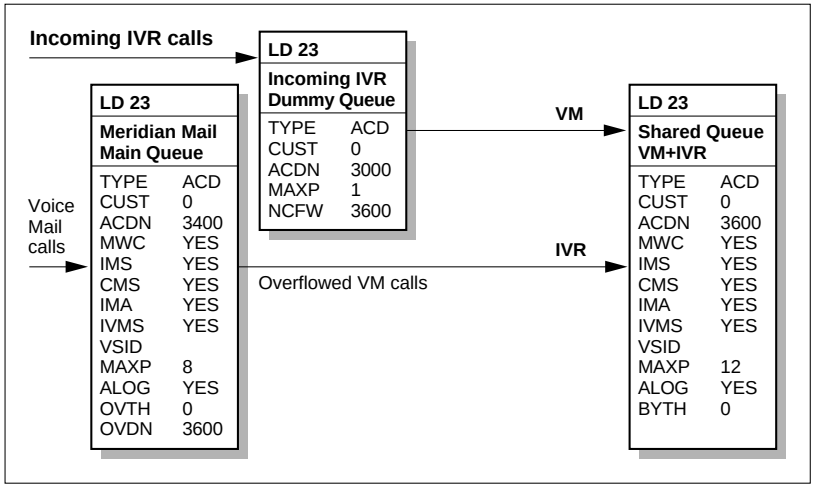
- Incoming Meridian IVR calls may incur excessive delay in queue if all Meridian Mail channels are busy due to high Voice Messaging traffic.
- Associating a Meridian Mail channel to a logical Meridian IVR channel is difficult due to random channel assignments for each incoming Meridian IVR call.
- The Meridian Mail system limits configuration to a maximum of 24 shared Meridian IVR channels.

Figure A-9
8 Dedicated Voice Mail and 12 Shared Channels



A PBX configuration example for this configuration is shown in Figure A-10.

Figure A-10
Configuring 20 Meridian Mail agents with 12 Meridian IVR logical channels



Configuration notes for Meridian Mail Release 9 systems

In Meridian Mail Release 9, the concept of a port has been expanded to embrace the concept of port type and port capability. There are now three different types of ports.

Basic service voice ports Services offered on these types of ports include:

- ACCESS (this includes Meridian IVR)
- Thru-dial Service
- Voice Menu Service (if it does not invoke voice services that require full service ports)
- Announcement Service

Full service voice ports Most Meridian Mail services are offered on full service voice ports. Services include:

- Voice Messaging
- Express Messaging
- Networking services

Full service multimedia ports Multimedia ports are used to provide Fax services.

Notes:

1 Features supported by basic service ports are also supported by full service ports. Full service multimedia ports supports the same services as full service voice, in addition to the multimedia services.

2 When configuring ACD agent queues in the Meridian 1, all ports servicing a particular queue must be of the same kind (having the same capacity and type). For example, a queue cannot be serviced by both full service voice ports and basic service voice ports.

The port type (voice versus multimedia) and capability (basic versus full) determine the features that can be processed through that port.

The remainder of this section discusses how these different port types affect ACCESS and Meridian IVR.

For more information on the different types of ports, see the *Meridian Mail Site and Installation Planning Guide* (NTP 555-70x1-200) and the Voice Administration chapter in the *Meridian Mail Administration Guide* (NTP 555-7001-301 or 302/303).

Single port type

If a Meridian Mail system contains only a single port type (either all basic voice, full service voice, or full service multimedia), the ACCESS service (and Meridian IVR) will continue to function as they have in previous releases of Meridian Mail (namely, releases 7.5 and 8).

Mixed port types

If there are a mixture of port types on your Meridian Mail system, the number of ports available for Meridian IVR is restricted. The restrictions are as follows:

- When Meridian IVR requests acquisition of a voice channel, the system examines ALL channels which are in service.
- Of the channels in service, those with the lowest port capability are considered for use.
- If one of the lowest capability ports is idle, it is provided to Meridian IVR.

Table A-1
Mixed port configuration, all channels in service

Channel Allocation Table							Channel Status
Number	**PRIM DN**	**CHAN DN**	**Type**	**Capability**		**Outbound**	**Port Status**
1	3650	2800	Voice		**Basic**	All	Idle
2	3650	2801	Voice		**Basic**	All	Idle
3	3650	2802	Voice	**Full**		All	Idle
4	3650	2803	Voice	**Full**		All	Idle
5	3650	2804	Voice	**Full**		All	Idle
6	3650	2805	Voice	**Full**		All	Idle
7	3650	2806	Voice	**Full**		All	Idle
8	3650	2807	Voice	**Full**		All	Idle

In Table A-1, the maximum number of ports available for Meridian IVR is two. Meridian IVR in this case cannot be provided on a full service port because basic ports are in service.

Table A-2
Mixed port configuration, basic ports out of service

Channel Allocation Table							Channel Status
Number	**PRIM DN**	**CHAN DN**	**Type**	**Capability**		**Outbound**	**Port Status**
1	3650	2800	Voice		**Basic**	All	Out of service
2	3650	2801	Voice		**Basic**	All	Out of service
3	3650	2802	Voice	**Full**		All	Idle
4	3650	2803	Voice	**Full**		All	Idle
5	3650	2804	Voice	**Full**		All	Idle
6	3650	2805	Voice	**Full**		All	Idle
7	3650	2806	Voice	**Full**		All	Idle
8	3650	2807	Voice	**Full**		All	Idle

In Table A-2, if the basic ports were taken out of service, the maximum number of channels available for Meridian IVR would now be six. This is because the lowest capability port in service is now a full service port and there are six available. Meridian IVR can run on full service ports when there are no basic ports in service.

Meridian IVR configuration notes

General information

1 Meridian IVR logical channels of DEDICATED acquisition type must be associated through Access Class with Meridian Mail voice channels that are not shared with any other Meridian Mail voice services. If the Meridian 1 PBX call routing is such that non-IVR calls intended for a Meridian Mail voice service land on an IVR dedicated channel, the Meridian Mail service is provided at the expense of the IVR channel.

Once the call is finished, it can take up to 15 seconds before IVR attempts to reacquire the lost voice channel, and longer if another call is presented to that channel when Meridian IVR attempts to re-acquire it.

Any IVR calls arriving during this time on this channel are not given IVR treatment.

2 Logical channels of SHARED acquisition type must not be presented with more calls to VSDNs of a given Access Class than there are logical channels assigned to the given Access Class. Meridian 1 PBX call routing must be controlled to ensure that excess calls are not presented. Otherwise new Meridian IVR calls are reverted whenever all the logical channels of the given class are busy.

3 Different Access Class values should not be used to allow several applications to share the same Meridian Mail voice channels based on the Class of the VSDN. Use a selector application instead.

It is impractical to use different Class values to select different applications, because this requires purchasing and configuring more Meridian IVR logical channels than the number of voice channels that are being used simultaneously for Meridian IVR calls.

To illustrate the impracticality, if three applications were to share 8 voice channels, 24 Meridian IVR channels would have to be configured: 8 for each of the 3 applications in order to ensure that a logical channel will always be available when a call is presented with the VSDN and Class that are associated with a particular application.

The recommended configuration is to use the same Class for all VSDNs that share the same Meridian Mail voice channel. The selector application is then assigned a range of logical channels that equals the number of voice channels that are to be shared. The VAD creates a selector application to select the appropriate application based on the

originally-dialed VSDN, which is passed to Meridian IVR and stored in the DIGITS buffer.

4 CCR can be used to control how the Meridian 1 PBX routes calls to Meridian IVR. CCR can queue the same call to up to four ACD queues simultaneously. CCR has the unique capability (GIVE IVR) of presenting a call to Meridian IVR while holding a place for that same call in other ACD queues.

Alternatively, or in conjunction with CCR, Meridian 1 PBX call routing can be controlled through ACD Timed Overflow, Enhanced (Timed) Overflow, Automatic Overflow, Controlled or Automatic Interflow, and Night Call Forward. Other PBX routing capabilities may also be applicable.

Meridian Mail voice channels may be grouped into several Message Center ACD-DNs to allow calls to be routed appropriately. PBX call routing is critical to control or restrict the sharing of Meridian Mail voice channels, and to limit the number of calls presented to VSDNs of a particular Access Class.

5 All logical channels of SHARED acquisition type that have been configured in Meridian IVR must be set to run against the appropriate application. Otherwise, calls are presented repeatedly to the BUSIED OUT logical channels. Such calls are answered and immediately transferred back to the originally-dialed out VSDN. This has the effect of sending the call to the back of the queue, or causing the original CLID to be replaced by the position ID of the Meridian Mail voice channel that answered and transferred the call.

6 The Voice Prompt Editor requires one voice channel configured as ALL in the Channel Allocation Table (CAT).

Configuring an isolated test environment

To configure an isolated test environment in a live system, three things must be controlled in order to separate test traffic from customer traffic:

- Meridian 1 PBX call routing of test traffic to separate Meridian Mail voice channels
- Meridian Mail presentation of test traffic to separate Meridian IVR logical channels
- Meridian IVR logical channel association with a separate mailbox for testing new or changed voice prompts.

1 Assign one or two Meridian Mail voice channels to a separate Message Center ACD-DN to allow an isolated test environment to be established temporarily as needed. In normal operation, when there is no test activity, customer traffic can be routed to the Meridian Mail test channel by CCR or ACD Timed Overflow, and so on. The corresponding Meridian IVR test channel is set to run the existing application when there is no test activity going on.

The test environment can be temporarily isolated when there is a need to test a new or modified application. This can be accomplished most conveniently by removing the Message Center ACD-DN for the test channel from the CCR script, or from the ACD Overflow DN list (OVDN) or target queue table (NACD) for Timed Overflow so that customer traffic is no longer routed to the test channel. The corresponding Meridian IVR test channel is then set to run the new or modified application that is to be tested.

2 The Message Center ACD-DN for the test channel is defined in the Meridian Mail Voice Service DN Table as an Access service. Test traffic can be presented exclusively to the test channel by dialing the Access test DN.

For DEDICATED acquisition type the Meridian Mail test channel is tied to the Meridian IVR test channel, therefore changing the PBX routing also controls the presentation of test calls to the Meridian IVR test channel.

For SHARED acquisition type, the logical channel that is to be used for the isolated test environment must be reconfigured to make its Class the same as the Class of the test DN in the Meridian Mail Voice Service DN Table. Meridian IVR must be restarted for the configuration change to take effect. Therefore, using SHARED acquisition type for the test channel requires interrupting Meridian IVR service on all channels in order to switch the test channel between the normal operating environment and the isolated test environment.

3 Some applications require the specific functional advantages of SHARED acquisition type, namely the immediate availability of new or changed voice prompts, and Meridian IVR access to recorded voice messages on subsequent calls.

In most cases, DEDICATED acquisition type is preferred for test channels that have to be switched frequently between customer traffic without interrupting Meridian IVR service on all channels.

4 For more information, refer to the advisements on Application Development and Testing on a Live System found in the *Meridian IVR Application Development Guide* (NTP 555-9001-310) and *Meridian IVR System Administration* (NTP 555-9001-300).

Interaction with Customer Controlled Routing

Meridian IVR and Customer Controlled Routing (CCR) can work together to provide Meridian IVR treatment to calls routed by CCR, while holding a place for that same call in other ACD queues. The Meridian 1 PBX must be running X11 Release 18 or later.

The CCR script command syntax for the GIVE IVR treatment is

GIVE [INTERRUPTIBLE] IVR <acd dn> [WITH TREATMENT <treatment value>] [WITH PRIORITY (1, 2, 3, 4)]

For example:

GIVE INTERRUPTIBLE IVR 3650 WITH TREATMENT 4000 WITH PRIORITY 2

1 The above CCR command provides IVR treatment, using Meridian Mail voice channels assigned to Message Center ACD-DN 3650 and Treatment DN 4000, to a call that may already be waiting in another ACD queue. If DN 4000 is defined in the Meridian Mail Voice Service DN Table as an Access service, Meridian IVR can handle the call while the caller continues to wait for an agent in the original queue. All Priority 1 calls are given IVR service before this call, which was optionally assigned to Priority 2.

2 In the above example, ACD-DN 3650 is the Message Center ACD-DN that contains the Meridian Mail voice channels that have been defined as IVR agents (it is *not* a dummy ACD-DN). The optional keyword INTERRUPTIBLE means that the Meridian IVR treatment will be interrupted if an agent becomes available in the original queue. The optional WITH TREATMENT 4000 clause specifies the Voice Service DN to be used instead of the default Treatment DN. The optional with priority 2 clause specifies a priority lower than the default Priority 1.

3 For CCR to give IVR service while holding the caller's place in another ACD queue, the Meridian 1 PBX must be configured to specify that the voice channels contained in the Message Center ACD-DN are IVR agents. Load Overlay 23 from the Meridian 1 PBX administration terminal. In the ACD block for the Message Center ACD-DN, respond YES to the IVR prompt. Enter the optional default Treatment DN at the TRDN prompt. The default Treatment DN is used if the optional WITH TREATMENT clause is omitted in the CCR script.

Appendix B: Equipment ordering information

Peripheral equipment for Meridian IVR includes an external modem, printer, monitor, tape and hard drives, keylock, UPS, plus their associated cables and adapters (if required). The following table provides ordering information for these and other Meridian IVR devices.

Note: Printers are not purchased through Nortel.

Table B-1
Detailed Hardware component Description and List

Component	Description	Vendor	OEM part number	NT part number
Altair Motherboard/ Magellan Tower Chassis	It includes Pentium P5-75 and 8-slot (5 EISA, 2 PCI and 1 Combo) with AIC-7870 SCSI and IDE controller, 16 MB DRAM, and six open SIMM sockets), 3.5-inch floppy drive, 525 watt power supply, 256K of Cache and in board Video Driver.	Intel	MG1F75A2M16	A0639230
Altair Motherboard/ Magellan Tower Chassis	It includes Pentium P5-100 and 8-slot (5 EISA, 2 PCI and 1 Combo) with AIC-7870 SCSI and IDE controller, 32 MB DRAM, and four open SIMM sockets), 3.5-inch floppy drive, 525 watt power supply, 256K of Cache and in board Video Driver.	Intel	MG1F100A2M16	A0639231
CPU	100MHz Pentium Processor	Intel		A0639812
DRAM*	16MB 70ns Dynamic RAM	Samsung	KMM5364100A-7	A0639617
	16MB 70 ns Dynamic RAM	T.I.	TM497MBK36Q-70	

Table B-1
Detailed Hardware component Description and List (Continued)

Component	Description	Vendor	OEM part number	NT part number
Video DRAM*	256K * 16 DRAM size	Fujitsu Ltd.	MB814260-70PJ-ER	A0639513
** For the most updated approved and qualified DRAM and VRAM list check with Intel Corp.*				
Secondary Cache Memory	Asynchronous 256 KB	Intel	IDT7MP6189-15	A0639530
SVGA Monitor	17" Non-interlaced .27mmpitch	Viewsonic	17GS	A0638465
	14" Non-interlaced .28mm pitch	Sampo	KM-400	A0651330
Hard Drive	1.2 GB Hard Disk	Quantum	XP31070R	A0639372
Tape	2.5 Gbyte Tape	3Com	QIC-2G	A0622896
Tape drive cleaner	Tape Drive Cleaning Kit	NT		A0629941
Tape drive	2.5 GB Tape Drive	Tandberg	TDC4220	A0622896
Mouse	3 button PS/2 type mouse "MouseMan"	Logitech	911313L100	A0651329
Keyboard	Enhanced 101 key Keyboard	NMB Technology Inc	RT101	A0602548
Modem	14,400 baud external (V.32 bis)	US Robotics	Sportster 14,400 External	A0638645
UPS	Integrated Intellegent UPS	APC	SU-1000	A0637736
Printer	HP Laserjet 4M plus	HP	Laserjet 4M Plus	Not Supplied by NT
	DEC Dot Matrix printer	DEC	DECLA75S	Not Supplied by NT
Audio Interface	Audio Interface Unit (For recording prompts)	NT	NT1R16BB	A0403013
Ethernet Card	PCI Combo Ethernet	ZNYX	ZX312	A0638565
Token Ring Controller Card	ISA Smart 16/4 AT Plus Ringnode Token Ring Card	Madge	52-03	A0639229

Table B-1
Detailed Hardware component Description and List (Continued)

Component	Description	Vendor	OEM part number	NT part number
Serial board	16 bit Intelligent serial communication board (8 ports) with Octa cable (DCE)	DigiBoard	77000037 & 76000020 for cable	A0651349
Host Connectivity boards	EXPRESS High Performance Adapter (RS-232) (3270 with driver Software, SDLC)	Voicetek	HL-3270-HW-S	A0638579
	Madge Smart 16/4 AT Plus Ringnode (Token-Ring)(5250 over Token-Ring)	Voicetek	HL-5250-HW-TR	A0638587
	EXPRESS High Performance Adapter (RS-232) (3270 over Token-Ring)	Voicetek	HL-3270-HW-TR	A0638583
Fax Board	4-ports Fax board	Dialogic	VFX/40E includes (D41/E and Fax/40E)	A0638637
SCO Operating System	SCO Open Desktop Lite	SCO	103-800-000	A0638855
	SCO Development System	SCO	105-800-000	A0638853

Table B-1
Detailed Hardware component Description and List (Continued)

Component	Description	Vendor	OEM part number	NT part number
Cables	Octa DB25 (Male) DCE (for Serial Board)	DigiBoard	76000020	Supplied with the Board
	Bi-Tronics parallel cable for Laser and Dot-Matrix Printer (36-pin male <-> 25 pin male)	HP	C2950A	Not Supplied by NT
	Modem cable (25-Pin male <-> 9-Pin female)	NT	-	A0601464
	RJ-11 cable for Dialogic fax cards	NT	-	A0346862
	EXPRESS High Perf. Adapter (RS-232) The cables are provided when the card is purchased (two 15-Pin male <-> 25-pin male)	Not Applicable	Not Applicable	Not Applicable
	Madge Smart 16/4 AT Plus Ring-Node (Token-Ring)	Not Applicable	Not Applicable	Not Supplied by NT
	UPS: 9 pin female <-> 25 pin male DB25F to DB25F gender changer	NT NT	- -	A0601464 A0351509
	KeyLock Cable (DB9F to DB25F)	NT	NT7D61BB	A0401139
	KeyLock Adapter	Rainbow	-	A0386050
	Modem Eliminator (DB25M to DB25F)	NT	-	A0378652
Spare List for the Application Processor				
Baseboard with RAM and CPU	Altair Baseboard with 16MB RAM and 75MHz Processor	Intel	PB1FN0C0M0B-75 KIT	
Baseboard with RAM and CPU	Altair Baseboard with 16MB RAM and 100MHz Processor	Intel	PB1FN0C0M0B-100 KIT	
Processor Installation Kit	Processor Installation Kit; One Clip, One Adhesive Strip, One Heatsink	Intel	ALTCPUKIT	
RT Clock Chip	RT Clock Chip	DALLAS	DS1587	
Chassis	Chassis Assembly (No Power Supply)	Intel	MG5F-624570	

Table B-1
Detailed Hardware component Description and List (Continued)

Component	Description	Vendor	OEM part number	NT part number
Upper Bezel	Upper Front Bezel	Intel	MG5F-625651	A0646703
Lower Bezel	Lower Front Bezel	Intel	MG5F-625652	A0646702
Foot	Foot	Intel	MG5F-624118	A0646721
BaseBoard	BaseBoard Mounting Panel	Intel	MG5F-624091	
Key Assembly	Key & Lock Assembly	Intel	MG5F-611494	
Key Master	Key & Lock Master	Intel	MG5F-611494M	A0646699
Fan	Fan (100cfm)	Intel	MG5F-629290	A0647317
Rail Clip	Peripheral Rail Clip	Intel	MG5F-628960	A0646722
Mounting Rail	Peripheral Mounting Rail	Intel	MG5F-620322	A0646718
Country Kit	MALT US Country Kit (AC power cord plus related documentation and diskettes)	Intel	MG5F-635528	
Accessory Kit	Accessory Kit (Rails/Clips)	Intel	MG5F-623979	
Power Supply	Power Supply, 525W	Intel	MG5F-617604	
Cable	Cable, Power Supply to Backplane	Intel	MG5F-622732	
Drive Tray	Drive Tray	Intel	MG5F-625634	
Cable	Cable, BaseBoard, Control to BackPlane	Intel	MG5F-624855	
Cable	Cable, Backplane to Upper Bay	Intel	MG5F-624856	
Cable	Cable, Jumper Backplane to 6 Drives	Intel	MG5F-624860	
Floppy Cable	Cable, Baseboard to Floppy Drives Pwr	Intel	MG5F-627199	
LED Panel	Drive LED Panel	Intel	MG5F-626357	A0646715
LCD Cable	Cable, LCD	Intel	MG5F-632397	
I/O Panel	Chassis I/O Panel	Intel	MG5F-625635	
Panel Board	Front Panel Board	Intel	MG5F-631360	
SCSI BackPlane	SCSI BackPlane	Intel	MG5F-631574	

Table B-1
Detailed Hardware component Description and List (Continued)

Component	Description	Vendor	OEM part number	NT part number
Panel Board	Front Panel Board	Intel	MG5F-635025	
Serial Board	I/O Connector Panel	Intel	MG5F-625719	
Riser Board	Riser Board	Intel	MG5F-629183	
SCSI Cable	SCSI Cable, Wide	Intel	MG5F-631039	
Cable	Cable, BaseBoard to Front Panel	Intel	MG5F-624797	
Cable	Cable, BackPlane to Front Panel	Intel	MG5F-624857	
Intrusion Switch	Chassis Intrusion Switch & Cable	Intel	MG5F-625114	
-End-				

Appendix C: System capacity limits

The following tables list the capacity limits defined for Meridian IVR 2.0/I.

Table C-1
ACCESS Link

Number of ACCESS Link	Number of Applications (Channels) at 4 800 bps	Number of Applications (Channels) at 9 600 bps	Number of Applications (Channels) at 19 200 bps (MM10)	Number of Applications (Channels) at 38 400 bps(MM10)
1	18d	38d	76d	96d
1	8s	18s	38s	96s

s= Shared Channels, d=Dedicated Channels

Note: You should connect the ACCESS link to voice nodes. You should not connect more than one ACCESS link to a node. First configure as many ACCESS links as possible, then distribute the channels evenly on the links.

Table C-2
Capacity limits

Item	Software	Maximum
ACCESS Link	ACCESS 2.11	Max 8 links in one AP
MIVR AP		One AP Max 8 ACCESS link
Host connectivity board	3270 SNA over SDLC and Token Ring	64 Sessions Max 1 board in one AP
	X.25	Not Applicable
	3270 over X.25 (QLLC)	Not Applicable
	5250 over SDLC/5250 over Token Ring (LLC)	64 session Max 1 board in one AP/64 session Max 1 board in one AP
VT100 (RS-232, DigiBoard)	MPI	15 sessions or VT100+ACCESS Link+UPS+ MMConsole (always=1) =< 16, Max 8 ports per board Max 2 boards
Dialogic Fax board	Dialogic and Nortel Fax	Max 8 ports, Max 2 boards
SQL database	Informix, Oracle, Sybase and Ingres	50 access at a same time for local or remote databases
SQL name Size		32 character for name size of SQL

Table C-2
Capacity limits

Item	Software	Maximum	
Local Database	Generations	Release 2.0/I	Release 1
		Maximum Database file 20 per system	Maximum database file 12 per system
		Maximum 65000 records per database	Maximum 1000 records per database
		Maximum number of digits in the index is 5	Maximum number of digits in the index is 10
Number of User Functions	Generations	12 user functions on the system	
Number of Processes per User functions	Generations	10 processes (child) per User function (Maximum 120)	

Appendix D: Optional software packages

Table D-1 illustrates the optional software packages for Meridian IVR Release 2.0/I.

Table D-1
Meridian IVR Optional Software Packages

Maintenance Package: — Voice Prompt Editor (VPE) — Local data base editor (DB Editor)
Fax Response software (This includes all the system modification files required by Fax software.)
3270 Emulation software
VT100 Emulation Software
5250 Emulation Software
Ingres SQL Interface
Informix SQL Interface
Oracle SQL Interface
Sybase SQL Interface

Appendix D: Operating performance

Mean time between failure

The following table shows Mean Time Between Failure (MTBF) for base platform hardware (Motherboard and CPU module).

Table D-1
Calculated Mean-Time-Between-Failures

OEM Component	Predicted MTBF	Demonstrated MTBF (hours)
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD

1 The predicted methodology used Intel, vendor or Bellcore failure rates.

2 Demonstrated MTBF values provided are limited by sample size and test time.

3 Demonstrated values are at a confidence limit of 80%.

4 Reliability statistics are shown for informal purposes only.

5 The heat spreader “projected wearout” value is 100,000 hours @ 60°C by the manufacturer and is not included in Pentium processor module MTBF predicted calculations.

Mean time to repair

The Mean Time To Repair (MTTR) is 45 minutes, not including travel time to and from the site where the Meridian IVR is located.

Appendix E: Valid Meridian IVR upgrades and expansions

The following tables shows valid and invalid Meridian IVR upgrade and expansion combinations.

Table E-1
Valid/invalid system upgrades

You Can	You Cannot
Upgrade your system to a higher/lower/current release of Meridian IVR 2.0/I release	Migrate your system from Meridian Release 2.0/I to Meridian Release 1.1
Upgrade your system from any version of a Meridian IVR Run Time system to any version of a Meridian IVR Development system.	Upgrade from any version of a Meridian IVR Development system to any version of a Meridian IVR Run Time system.

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Table E-1
Valid/invalid system expansions

You Can	You Cannot
Increase the number of IVR and fax channels.	Decrease the number of IVR and fax channels.
Add a second hard disk.	Take out the second hard disk.
Install, and if necessary, take out the Ethernet or Token Ring card	

Appendix F: Relational database software

The following Relational Database Management System (RDBMS) releases are used for Meridian IVR Release 2.0/I.

> ***Note:*** All four database options can be installed in a single Meridian IVR system.

Table F-1
RDBMS interface modules

RDBMS	Supported Release
Informix	5.0 (or newer)
Oracle	7.0 (or newer) or 7.1 (or newer)
Ingres	6.4 (or newer)
Sybase	10.0 (or newer)

Appendix G: Erlang tables

Table G-1, Grade of service and traffic formula, summarizes the Grade of Service and the formula used in the traffic calculations. If the traffic model is non-blocking, then the Erlang-C formula would be used. For blocking calculations, the Erlang-B formula would be used.

Table G-1
Grade of service and traffic formula

Port Type	Selection	GOS	Traffic Formula	Refer to:
Voice	ACD/Meridian (8 Meg Card Option)	P.05	Erlang-C	Table G-2, Erlang-C traffic capacity (ccs) at P.05 for ACD (8 meg card option)
Voice	ACD/Meridian Mail	P.05	Erlang-C	Table G-3, Erlang-C traffic capacity (ccs) at P.05 for ACD
Voice	UCD/MSM	P.05	Erlang-C	Table G-4, Erlang-C traffic capacity (ccs) at P.05 for UCD/MSM
Voice	MLHG (DMS-10)	P.02	Erlang-B	Table G-6, Fax GOS for P.05 Erlang-C

Table G-1
Grade of service and traffic formula (Continued)

Port Type	Selection	GOS	Traffic Formula	Refer to:
Fax	Call Back	P.05	Erlang-C	Table G-6, Fax GOS for P.05 Erlang-C
Fax	Same Call	P.02	Erlang-B	Table G-6, Fax GOS for P.05 Erlang-C

The following tables give the traffic intensity which can be supported by a given number of channels for a given average session length or hold time of the port. Where an Erlang-C table is indicated, the calculations are based on a five percent probability of delay of over one 6-second ring cycle. The results in an Erlang-C calculation depend only on the ratio of the tolerable delay to the total hold time. Thus for an average session length of 120 seconds, this ratio would be 0.05. The ratio is indicated by r in the tables.

Table G-2
Erlang-C traffic capacity (ccs) at P.05 for ACD (8 meg card option)

No. of Ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
2	13.5	12.9	12.7	12.5
4	51.5	49.5	48.7	48.3
6	98.7	94.9	93.4	92.7
8	150.5	144.9	142.7	141.6
10	205.3	197.9	194.9	193.3
12	262.2	252.9	249.1	247.2

Table G-3
Erlang-C traffic capacity (ccs) at P.05 for ACD

No. of Ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
4	51.5	49.5	48.7	48.3

Table G-3
Erlang-C traffic capacity (ccs) at P.05 for ACD (Continued)

No. of Ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
8	150.5	144.9	142.7	141.6
12	262.2	252.9	249.1	247.2
16	380.4	367.4	362.0	359.2
20	502.6	486.0	478.9	475.3
24	627.7	607.4	598.7	594.3
28	754.9	731.1	720.8	715.5
32	883.8	856.5	844.5	838.3
36	1014.0	983.2	969.7	962.6
40	1145.4	1111.2	1096.0	1088.1
44	1277.6	1240.1	1223.4	1214.6
48	1410.7	1369.9	1351.6	1342.0
52	1544.5	1500.5	1480.6	1470.1
56	1678.9	1631.7	1610.2	1598.9
60	1813.8	1763.5	1740.5	1728.3
64	1949.2	1895.8	1871.3	1858.2
68	2085.0	2028.7	2002.5	1988.7
72	2221.2	2161.9	2134.3	2119.5
76	2357.8	2295.6	2266.4	2250.8
80	2494.7	2429.6	2398.9	2382.5
84	2631.9	2563.9	2531.8	2514.5
88	2769.4	2698.6	2665.0	2649.9
92	2907.1	2833.6	2798.0	2779.5
96	3045.0	2968.8	2932.2	2912.5

Table G-4
Erlang-C traffic capacity (ccs) at P.05 for UCD/MSM

Number of Ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
4	44.3	42.6	41.9	41.5
8	129.4	124.7	122.7	121.7
12	225.5	217.5	214.2	212.6
16	327.1	316.0	311.3	308.9
20	432.2	417.9	411.9	408.8
24	539.8	522.4	514.9	511.1
28	649.2	628.7	619.9	615.3
32	760.1	736.5	726.3	721.0
36	872.1	845.6	833.9	827.9
40	985.0	955.6	942.6	935.8
44	1098.8	1066.5	1052.1	1044.6
48	1213.2	1178.1	1162.4	1154.1
52	1328.3	1290.4	1273.3	1264.3
56	1443.8	1403.3	1384.8	1375.0
60	1559.9	1516.6	1496.8	1486.3
64	1676.3	1630.4	1609.3	1598.1
68	1793.1	1744.6	1722.2	1710.2
72	1910.3	1859.2	1835.5	1822.8
76	2027.7	1974.2	1949.1	1935.7
80	2145.4	2089.4	2063.1	2049.0
84	2263.4	2205.0	2177.3	2162.5
88	2381.7	2320.8	2291.9	2276.3
92	2500.1	2436.9	2406.7	2290.4

Table G-4
Erlang-C traffic capacity (ccs) at P.05 for UCD/MSM (Continued)

Number of Ports	60s sessions r=0.1	120s sessions r=0.05	180s sessions r=0.03	300s sessions r=0.02
96	2618.7	2553.2	2521.7	2504.7

Table G-5
Erlang-B Traffic capacity (CCS) at P.02 (DMS-10 MLHG)

Channels	4	8	12	16	20	24	28	32
Traffic(CCS)	39	131	238	354	475	599	725	854

Channels	36	40	44	48	52	56	60	64
Traffic(CCS)	39	131	238	354	475	599	725	854

Channels	68	72	76	80	84	88	92	96
Traffic(CCS)	984	2197	2335	2473	2611	2750	2889	3028

Table G-6
Fax GOS for P.05 Erlang-C

Number of Fax Ports	(CCS - P.05)
2	12.7
3	29.1
4	48.7
5	70.3
6	93.4
7	117.6
8	142.7
10	194.9
12	249.1
14	304.9
15	333.3
16	362.0

When the application is running, the fax delivery report can be periodically monitored to see if the actual wait times are within the desired limits.

Tables have been generated for fax session lengths of 234 seconds (3.9 minutes). The tables indicate the traffic which can be handled by a given number of multi-media ports.

Note: An analysis was done for fax session length and number of pages in each fax at the TOR site (for MM9). The average session length was 234 seconds and the average number of pages in each fax was 4.8. These figures were considered a useful starting point for the fax traffic tables.

Table G-7
Fax GOS for P.02 Erlang-B

Number of Fax Ports	Busy Hour Traffic (CCS - P.02)
2	8
3	21.5
4	38.9
5	59.1
6	81.1
7	104.6
8	129.3
10	181.2
12	235.7
14	292.2
15	322.1
16	350.3

Appendix H: Power consumption

Peripherals in shaded areas are not calculated.

Table H-1
Power consumption calculation for MIVR 2.0/I

Board/Peripheral	Current in Amperes				
	+3.3V	+5V	-5V	+12V	-12V
System Baseboard and CPU		10.0 A		0.06A	0.06A
Cooling fan (for two)				0.6A	
3.5-inch floppy drive		0.5A			
1.2 Gbyte SCSI hard drive		0.70A		0.38A	
Second 1.2 Gbyte drive		0.70A		0.38A	
2.5 Gbyte tape drive		1.0A		2.0A	
USRobotics 14 400 Modem		0.7A			
PCI Slot 3 (A): Ethernet Card		2.0A			
PCI Slot 2 (B): Reserved for future use					
PCI Slot 1 (C): CAN NOT USE					
EISA Slot 6: Fax (VFX -40E)		2.5A		0.175 A	0.125 A

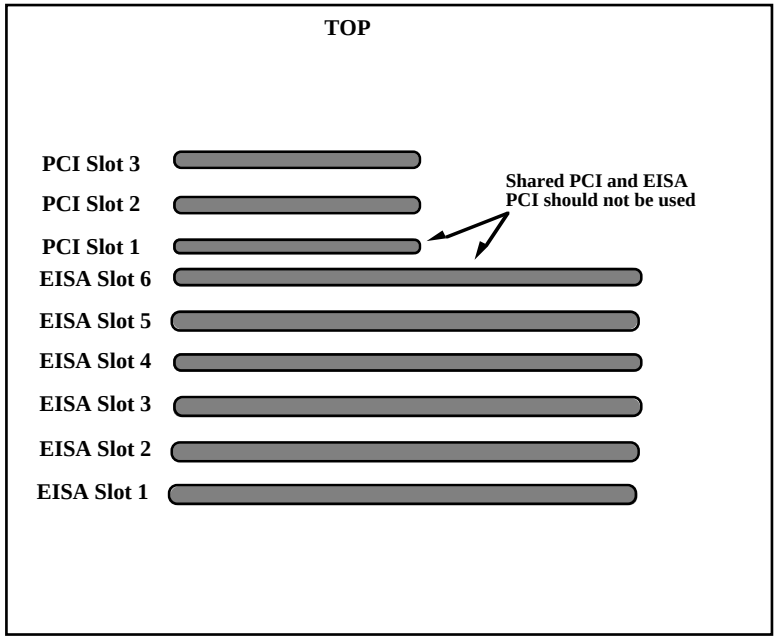
Table H-1
Power consumption calculation for MIVR 2.0/I (Continued)

Board/Peripheral	Current in Amperes				
EISA Slot 5: Fax (VFX-40E)		2.5A		0.175 A	0.125 A
EISA Slot 4: Fax (VFX-40E) (not used)		2.5A		0.175 A	0.125 A
EISA Slot 3: Apertus Host Connectivity board Sync570 (RS-232)		0.75A		0.04A	0.04A
EISA Slot 3: Apertus Host Connectivity (Madge Token-Ring)		1.10A			
EISA Slot 3: LAN or Native Token-Ring (Madge card)		1.10A			
EISA Slot 2: Digiboard (8 serial boards)		1.8A		0.130 A	0.110 A
EISA Slot 2: LAN or Native Token-Ring		1.10A			
EISA Slot 1: Digiboard (8 serial boards)		1.8A		0.130 A	0.110 A
Total Amperes used		24.95		4.07	0.57
Total Available Amperes	**32.0A**	**40.0A**	**0.5A**	**17.0A**	**1.0A**
Watts used		124.8		48.84	6.84
TOTAL Wattage (max should be lower than 524W)		**180.5**			

Note: Peripherals in shaded area are not calculated.

The following diagram illustrates the orientation of the slots on Altserver motherboard:

Figure A-2
Altserver motherboard slots



Glossary

AML
Application module link. This is the name for the CSL or ISDN/AP link.

API
Application programming interface. This is the high-level language software used as components in the development of an application.

Application module link
See AML.

application processor
A computer or workstation running Meridian IVR.

Application programming interface
See API.

asynchronous transmission
Data transmission mode where each character is transmitted independently by using a start bit and stop bit to frame the bits representing the character.

channel
A telephone trunk within a cluster of APs.

DTMF
Dual tone multiple frequency tones, known as touch tones. Applications can collect information from callers by having them press telephone keys to create DTMF tones.

GOS
Grade of service.

host

A networked computer that provides applications and services to other networked computers.

mailbox

A directory that users can access through a voice channel to store and retrieve voice messages and voice prompts. Each mailbox has its own password.

message

A voice recording made by a caller.

Meridian 1

A telephone switch (usually owned by a larger organization or company) that allows efficient routing of calls among all of the telephone sets connected to it. These switches are connected to a public CO (central office) in order to have access to a public telephone network. They can also be connected directly to another Meridian 1, in order to be part of a private telephone network.

Meridian ACCESS

The software interface between the application module running Meridian IVR and Meridian Mail.

Meridian IVR software

A set of integrated programs that allow you to develop and execute IVR applications.

Meridian Mail

A comprehensive voice processing module that manages incoming and outgoing calls and provides user services for performing various voice messaging functions.

Meridian Mail Card Option

A Meridian Mail platform which is packed in a cabinet with the Meridian 1 Option 11 switch.

Meridian Mail GP

A Meridian Mail platform configured to address the non-Meridian 1 switch environment, for example, SL-100 and DMS Centrex.

Meridian Mail Modular Option

A Meridian Mail platform housed in Meridian 1 modular cabinets. The Meridian Mail Modular Option can be used with Meridian 1 systems 21, 21A, 51, 61, 71, and 81. It can also operate as a free-standing configuration.

Meridian Mail Modular Option EC

Enhanced capacity architecture for the Meridian Mail Modular Option platform.

Meridian Mail Options

A Meridian Mail platform housed in a vacant shelf or tier of a Meridian 1 MS, LE, N, NT, XL, XN, XT, ST, or RT. The connection to the Meridian 1 is fully digital.

MLHG

Multi-line hunt group.

MSM

Message Service Module. A Meridian Mail platform for DMS and SL-100 switches.

node

A grouping composed of an application processor connected to one or more APs.

prompt

A voice recording that helps lead a caller through an application.

SMDI

Simplified message desk interface.

session

A connection to a host as defined in the trs.conf file, representing a terminal connection.

SNA

Systems Network Architecture. An IBM protocol that defines how IBM computers (and any other computer that uses the SNA protocol) transmit and receive data. This protocol is also used by many other computer hardware and software manufacturers.

Systems Network Architecture
See SNA.

user function
Customized C code compiled to create a UNIX process. A Meridian IVR application can access an external user function using the USER cell.

user-defined function
An individual C function within a user function. Each user function may have several user-defined functions bundled together. Which user-defined function is processed is determined by the specified function code.

usr
User function process. It is an essential Meridian IVR process that controls customer-written user functions.

VAD
A Value Added Developer who develops Meridian IVR applications.

Value Added Developer
See VAD.

voice channels
See channel.

voice message file
Meridian Mail voice mail messages are voice message files that are addressed and submitted to Meridian Mail for delivery.

voice segment file
A single file containing zero or more (up to 1000) voice segments. A voice segment (typically less than a minute in length) consists of recorded voice, a name, a title, and a text field usually used to store the script of the voice. By using the Voice Prompt Editor, you can create and modify voice segment files, record individual segments, and edit associated text fields. Different segments can be concatenated to form prompts. (Segments can be played using the PLAY, GDAT, PDAT, MENU, or HANG cell.)

VT100 terminal
Terminal type emulated by the VT100 Gateway product.

Meridian IVR

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