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MITEL MAIL ™
Voice Processing Solutions
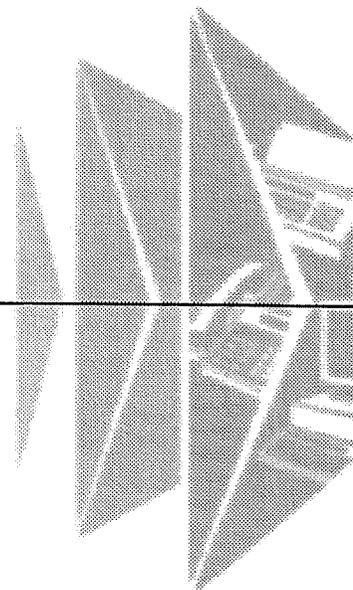
▶ MESA-Forms
Manual

MITEL ®

Documentation Index

This index provides a list of technical practices for MITEL MAIL™ Release 2.0. The documentation set is contained in seven volumes as follows:

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Product Description

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1   Overview

MESA Forms is an optional voice forms feature for VoiceMemo systems that allows callers to leave messages in a way that simulates written information on paper forms. Applications include:

- Order entry
- Questionnaires
- Routine requests for information
- Overflow for busy ACD (Automatic Call Distributor) groups

Callers accessing a MESA Forms application automatically move through a series of prerecorded questions. The system waits for the caller to record an answer before moving on to the next question. System users can then log into a single mailbox and listen to the sequence of answers.

A sample MESA Forms session for ordering forms might go as follows:

MESA Form: *You have reached the city government forms service. Please answer the following questions to have forms mailed to you:*

Please state the name or the type of form.

Caller: I need an application for a small business license.

(After each response the caller can press X or wait for the system to go on to the next prompt.)

MESA Form: *Please state your full name and spell your last name after the tone.*

Caller: Eric Meissner. M-E-I-S-S-N-E-R.

MESA Form: *Please state your mailing address, including zip code, after the tone.*

Caller: 4210 Monterey Road, San Francisco, California, 91010

MESA Form: *Please state a phone number where you can be reached during business hours. Include the area code.*

Caller: Area code 415, 555-1234

MESA Form: *You will receive your forms in the mail within a week. Thank you for calling. Good-bye.*

Inside a MESA Forms Application

A typical MESA Forms application uses three types of VoiceMemo mailboxes:

- A Rotational mailbox that plays an initial greeting and routes the call to one of several template mailboxes

- Template mailboxes with distribution lists that contain Greeting Only mailboxes and that collect the recorded answers to the questions

- Greeting Only mailboxes that contain the "questions" that callers hear

The sample MESA Form on the previous page would have a structure similar to that shown in Figure 1.

Mailbox 100 (Rotational)

You have reached the city governemnt forms service. Please answer the following questions to have forms mailed to you.

Mailbox 200 (Template)

-- No Greeting --

(This mailbox will hold the responses to the questions.)

Distribution List 01 containing: mailbox 201, mailbox 202, mailbox 203, mailbox 204

Mailbox 201 (Greeting Only)

Please state the name or the type of form.

Mailbox 202 (Greeting Only)

Please state your full name and spell your last name after the tone.

Mailbox 203 (Greeting Only)

Please state your mailing address, including zip code after the tone.

Mailbox 204 (Greeting Only)

Please state a phone number where you can be reached during business hours. Include the area code.

Thank you for calling. Good-bye.

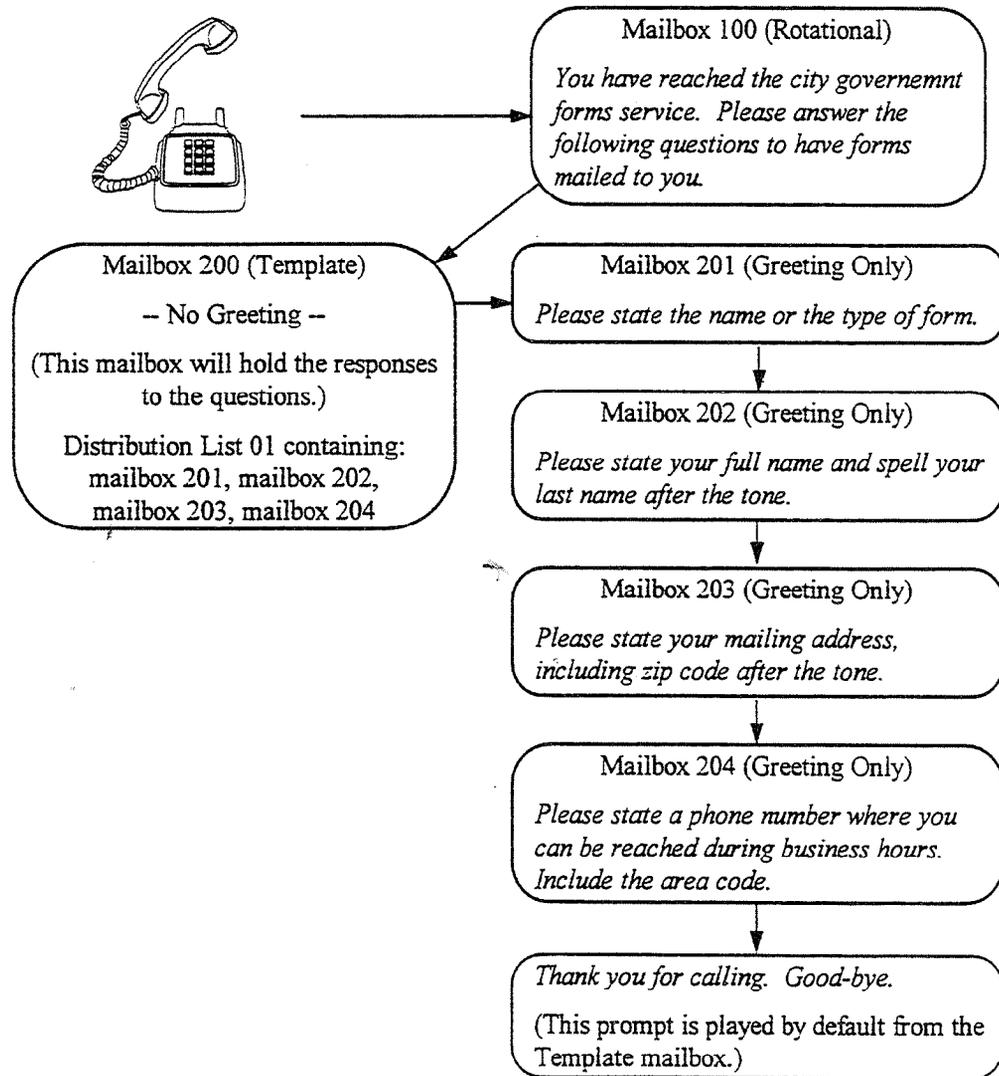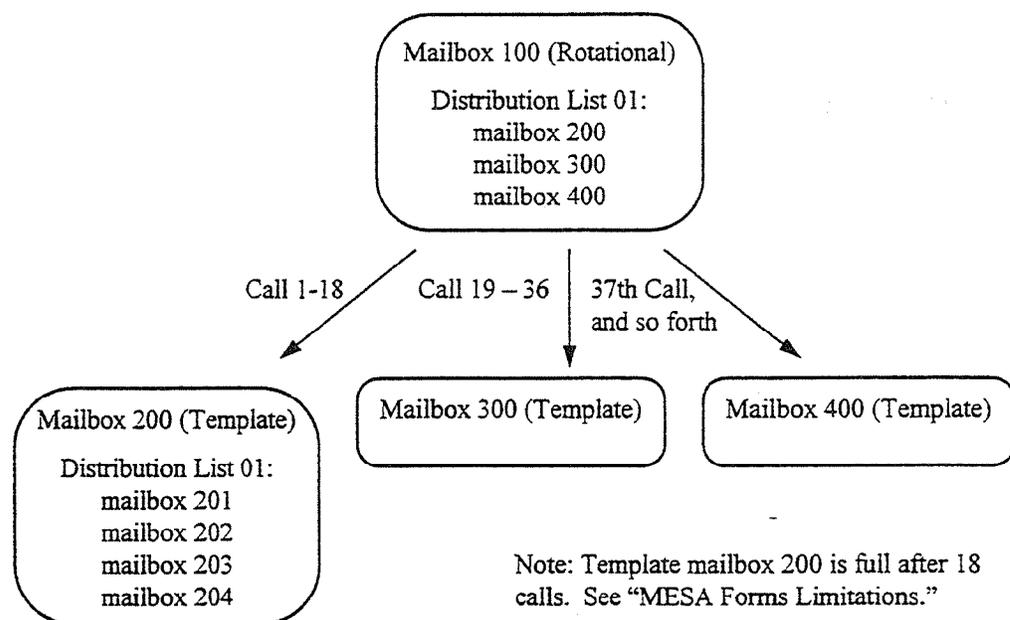(This prompt is played by default from the Template mailbox.)

Figure 1-1   Sample MESA Form Mailbox Configuration

Note that Figure 1-1 is simplified to show only a single Template mailbox. In actual operation, a MESA Forms application needs enough Template mailboxes to hold all caller responses (see "MESA Forms Limitations," below).

Distribution list 01 in the Rotational mailbox must contain all of the Template mailboxes. The first Template mailbox must have a distribution list 01 that contains the Greeting Only mailboxes for the MESA Form. The Rotational mailbox will pass control of each call to the first Template mailbox until that mailbox is full. It then passes calls to the second template mailbox, and so forth. Figure 1-2 shows this aspect of the sample MESA Forms application.

Mailbox 100 (Rotational)

Distribution List 01:
  mailbox 200
  mailbox 300
  mailbox 400

Call 1-18 / Call 19 – 36 / 37th Call, and so forth

Mailbox 200 (Template)

Distribution List 01:
  mailbox 201
  mailbox 202
  mailbox 203
  mailbox 204

Mailbox 300 (Template)

Mailbox 400 (Template)

Note: Template mailbox 200 is full after 18 calls. See "MESA Forms Limitations."

Figure 1-2   Multiple Template Mailboxes

MESA Forms Call Flow

The numbered steps below illustrate the sequence and interaction of the mailboxes in a MESA Forms call.

1. A caller dials a DID number or an extension number that corresponds to the Rotational mailbox.

2. The system plays the greeting recorded in the Rotational mailbox.

3. The Rotational mailbox transfers control of the call to one of the Template mailboxes.

4. The system plays the greeting in the first Greeting Only mailbox defined in distribution list 01 of the first Template mailbox.

5. The system records the caller's response.

6. The system repeats steps 4 and 5 for each Greeting Only mailbox in distribution list 01 of the first Template mailbox.

7. After recording the last caller response, the system plays a standard good-bye message or presents the caller with further options, depending on the FCOS settings of the Template mailbox.

8. At the end of the call, the system deposits all of the responses into the Template mailbox as a single message.

Playback and Transcription

The Rotational mailbox serves as a single point of entry for retrieving all caller responses stored in any of the Template mailboxes. A transcriber can listen to caller responses by logging in to the MESA Forms Rotational mailbox, which retrieves the stored responses from *all* the Template mailboxes in its distribution list 01.

After login, the system prompts the transcriber to select either Unplayed or Saved messages. The number of messages reflects the number of callers that responded to any of the questions. When playing back the messages, the system separates responses to each question with a "bloop" sound. Transcribers can save and replay the messages, and can pause, skip forward, and skip backward during playback.

The system plays back responses in chronological order. Thus, it plays back all responses stored in the first Template mailbox before playing the responses from other Template mailboxes. More than one person can call into the Rotational mailbox at the same time to transcribe messages.

MESA Forms is compatible with the autoplay feature (FCOS bit 52). With this feature enabled, a transcriber can listen to all responses without having to press the P key on the telephone to advance through the messages. (Transcribers must still press K or D to keep or discard the messages.)

Note: To retrieve MESA Forms messages, a transcriber calls the Rotational mailbox, *not* the template mailboxes.

Tree Mailboxes and MESA Forms

Tree mailboxes allow callers to press telephone keys to choose from several options, and can be used either before or after a MESA Forms application.

When a Tree mailbox precedes a MESA Forms Rotational mailbox, callers can select alternatives to filling out the MESA Form, such as transferring to a live attendant or

leaving a message in another mailbox. By setting the Rotational mailbox as the first mailbox in distribution list 01 and including feature bit 120 (Default to First Child of Tree Mailbox) in the Tree mailbox FCOS, callers with rotary dial phones are automatically transferred to the MESA Form where they are prompted with the first question.

If the last mailbox in distribution list 01 of a MESA Forms Template mailbox is a Tree mailbox, callers can select additional options after completing a MESA Form. (The Template mailbox must contains FCOS bit 139.) The Template mailbox plays the greeting of the Tree mailbox, then allows callers to select from the choices listed in the greeting. This way callers can return to a "higher menu" or hold/transfer for live assistance. Again, if the FCOS for the Tree mailbox contains bit 120, callers with rotary phones can be automatically transferred to a specific extension or mailbox.

MESA Forms FCOS Configuration

The VoiceMemo software includes a predefined FCOS for use with MESA Forms, and predefined FCOSs for Rotational and Tree mailboxes. There are also several individual FCOS bits that allow some flexibility in configuring MESA Forms.

MESA Forms FCOS Bits

The FCOS bits that are useful in MESA Forms applications are:

135 **Defines template mailbox**
A mailbox with this feature plays the greetings stored in its child mailboxes, sequentially, and records a response after each greeting.

136 **Don't say "End of Message"**
When set to On for a Template mailbox, the system does not say "End of message" after each message is played or recorded.

138 **Don't say "Message complete"**
When set to On for a Template mailbox, the system does not say "Recording complete" after each message is recorded.

139 **Template: assume last greet mailbox FCOS**
When set to On for a Template mailbox, the Template mailbox assumes the FCOS values of the last mailbox in distribution list 01 after playing the greeting, and call flow is altered accordingly. For example, if the last mailbox is a tree or chain mailbox, the caller can continue to interact with the system after completing the MESA Form.

When bit 139 is set to Off for a Template mailbox, callers always hear, "Thank you for calling, good-bye," after completing the MESA Form.

149 Log into template through rotational mailbox
When set to On for a Rotational mailbox, a transcriber can call into the Rotational mailbox and automatically pick up the messages from all Template (child) mailboxes.

MESA Forms Default FCOSs

Default FCOS 16 contains all of the feature bits necessary for a Template mailbox. Optionally, you can add bit 139 to allow callers to access other options after completing a MESA Form.

Default FCOS 17 is predefined for a standard Rotational mailbox. Add feature bit 149 for Rotational mailboxes that are used in MESA Forms.

Default FCOS 06 contains all of the feature bits necessary for the Greeting Only mailboxes that play the questions to MESA Forms callers.

Default FCOS 15 is predefined to support Tree mailboxes. As an option, you can add feature bit 120 so that callers with rotary phones are automatically moved to the first Template (child) mailbox.

MESA Forms Limitations

A MESA Forms application can generate a lot of responses from callers, and these responses must be transcribed and taken off of the AIP system or they will fill up the available voice storage. The MESA Forms application has some built-in limits to reduce the chances of this happening.

- Each MESA Forms application can have a maximum of 190 Template mailboxes.

- There can be no more than 73 questions (Greeting Only mailboxes) in distribution list 01 of the first Template mailbox. The other Template mailboxes in the MESA Form do not need a copy of the distribution list; the system uses the distribution list in the first Template mailbox.

- Each Template mailbox can store a maximum of 73 responses. Since most MESA Forms consist of several questions, each caller leaves several responses. If a MESA Form has four questions, a single Template mailbox can store responses from 18 callers ($73 \div 4 = 18 + 1$).

- MESA Form Rotational mailboxes automatically rotate on full. You cannot assign the Index or Period type of rotation.

- The system deposits caller responses in the first Template mailbox until it is full, then it rotates to the second Template mailbox, and so on. It cycles through all of the Template mailboxes before again putting responses in the first Template mailbox.

If all Template mailboxes in a MESA Forms application are full, callers hear, "I'm sorry, I cannot deliver your message now. Please try again later."

Task   *Procedure*

MESA Forms

Create a MESA Forms Application .... **GP 520**

Configure a MESA Forms Template Mailbox .... GP 522

Configure a Rotational Mailbox for MESA Forms .... GP 521

Configure a Standard Mailbox .... DP 5052

Configure a Tree Mailbox .... GP 311

Copy a Mailbox Greeting .... DP 5051

Create or Modify a Distribution List for Mailbox Owners .... DP 5025

Customize a Default FCOS .... DP 5008

Customize an FCOS Copy .... DP 5007

Perform an Online Optional Feature Installation .... DP 5402

List of General Procedures

Procedure Number	Title	Date	Release Number
GP 311	Create a Tree Mailbox	December 1, 1993	5.03
GP 520	Create a MESA Forms Application	August 26, 1994	5.03C
GP 521	Configure a Rotational Mailbox for MESA Forms	August 26, 1994	5.03C
GP 522	Configure a MESA Forms Template Mailbox	August 26, 1994	5.03

Configure a Tree Mailbox

This procedure describes how to configure a simple tree mailbox and a nested tree mailbox.

Step	*Reference*

1. Complete a Mailbox Worksheet and a Tree Mailbox Diagram. Blank worksheets are at the back of this manual.

2. Reach the Mailbox Maintenance Menu. Enter the requested information, as described in the following steps, from your completed Mailbox Worksheets. — Menu Map 3

3. Identify the tree mailbox.

   Select: (C) Create New Mailboxes
   Prompt: `Mailbox to create:`
   Response: **Number** of the new mailbox.

   or

   Select: (M) Modify Mailboxes
   Prompt: `Mailbox to modify:`
   Response: **Number** of the existing mailbox.

   > **Note:** Prompts are almost the same for creating a new mailbox and modifying an existing one, except that "New" precedes each prompt when you select Modify Mailboxes.

   To leave an existing parameter setting unchanged, just press Return to go to the next prompt.

4. Set the parameters the same as for a standard mailbox, except for the FCOS. — DP 5052

5. Assign an FCOS designed for a tree mailbox.

   Prompt: `Features class of service:`
   Response: **15** (the default Tree FCOS)

   or

   The **number** of a customized FCOS that contains all the features of a typical tree mailbox.

   • If you want callers who do not enter a digit promptly after the tree mailbox greeting to be routed to the *first* member of the distribution list, include FCOS bit 120 (Default to first child of tree mailbox).

   • If you want these callers to be routed to the *last* child mailbox, include FCOS bit 186 (Default to last child of tree mailbox).

6. After responding to the last mailbox parameter, the system displays the mailbox configuration, then prompts for the next mailbox number. At this point, the parameter settings for the tree mailbox are saved.

Step	*Reference*

7. Configure the first child mailbox (the mailbox that callers should be routed to through the tree mailbox).

   Prompt: `Mailbox to create: or Mailbox to modify:`
   Response: The **number** of the first child mailbox.

8. Set all applicable parameters for the child mailbox the same as for a standard mailbox.

9. Configure all child mailboxes as just described in steps 7 and 8.

10. When all child mailboxes have been configured, return to the Mailbox Maintenance Menu.

    Prompt: `Mailbox to create: or Mailbox to modify:`
    Response: Press Return.

11. Go to the List Maintenance Menu.

    a. Create distribution list 01 for the tree mailbox just configured.   DP 5025

    b. Add the child mailboxes as members of the list.

12. Disable the tutorials in the child mailboxes. (The following procedure disables both the standard tutorial and any site tutorial.)

    Select: (P) Set Passcode/Tutorial
    Prompt: `Set passcode for mailbox:`
    Response: To disable the tutorial in a single mailbox, enter the **number** of the mailbox you want to disable.

    To delete the tutorial in a range of mailboxes, enter the first and last **numbers** of the mailboxes in the range to be disabled, separated by a hyphen. For example, 101-203.

    Prompt: `New passcode:`
    Response: Press Return.

    Prompt: `Tutorial (y/n):`
    Response: **N**

    Prompt: `Clear bad passcode count (y/n):`
    Response: Press Return.

    Prompt: `Set passcode for mailbox:`
    Response: Press Return.

13. Record an appropriate greeting in the tree mailbox and in all child mailboxes.

Step	Reference

((·)) Nested Tree Mailbox

1. Choose the child mailbox that you want to be a tree mailbox.

2. Configure the mailbox through the Mailbox Maintenance Menu as described earlier in this procedure.

3. Go to the List Maintenance Menu.

   a. Create distribution list 01 for the nested tree mailbox just configured.   DP 5025

   b. Add all the child mailboxes related to the nested tree mailbox as members of the list.

4. Record a greeting in the nested tree mailbox and its child mailboxes.

Create a MESA Forms Application

This procedure provides all of the steps necessary to create a MESA Forms application. You must perform some of the steps at the AIP system console and some of the steps over the telephone.

Step	Reference

1. Fill out a MESA Forms diagram to document the greetings and questions that need to be recorded and the maiboxes that will be used. Blank diagram sheets are located at the back of this manual.

2. Define an FCOS to be used for the Rotational mailbox. You can add bit 149 to either:

   - The default FCOS 17 — DP 5008

   or

   - A copy of FCOS 17 — DP 5007

3. If you plan to use a Tree mailbox to offer callers some options before or after they complete the MESA Form, add bit 139 to an FCOS for the Template mailboxes. You can add bit 139 to either:

   - The default FCOS 17 — DP 5008

   or

   - A copy of FCOS 17 — DP 5007

4. Create the Template mailboxes and the Greeting Only mailboxes, and assign the Greeting Only mailboxes as members of distribution list 01 in the first Template mailbox. — GP 522

   Note: You only have to create the Greeting Only mailboxes once, and you only need to add them to distribution list 01 in the first Template mailbox.

5. Create the Rotational mailbox, making sure to assign FCOS 17 (or the FCOS that you modified in step 2). — GP 521

6. Add the Template mailboxes as members of distribution list 01 in the Rotational mailbox. — GP 521

7. If you are using Tree mailboxes either before or after the MESA Form, create the Tree mailboxes. — GP 311

   Note: If a Tree mailbox precedes the MESA Form, you should probably make the Rotational mailbox the first member of distribution list 01 in the Tree mailbox and add bit 120 to the FCOS for the Tree mailbox. With this setup, the VoiceMemo system transfers callers with rotary phones to the MESA Forms application.

Step	*Reference*

8. Record greetings for all of the appropriate mailboxes:

- Record an orientation message as the greeting for the Rotational mailbox. Do not record any greetings for the template mailboxes.

    or

- Record an orientation message as the greeting for one of the Template mailboxes. After you are satisfied with the greeting, you can copy it to all of the other Template mailboxes (see DP 5051).

- Record each question as a greeting for each of the Greeting Only mailboxes. Pay special attention to which question belongs to which mailbox.

- If you are using Tree mailboxes either before or after the MESA Form, record the caller instructions as the greetings for those mailboxes.

This procedure describes how to configure a rotational mailbox for use with MESA Forms, including adding the template mailboxes to distribution list 01.

Step	Reference
1. Complete a Mailbox Worksheet for each mailbox and a Rotational Mailbox Diagram. Blank worksheets are at the back of this manual.	
2. Reach the Mailbox Maintenance Menu. Enter the requested information, as described in the following steps, from your completed worksheet and diagram.	Menu Map 3

3. Identify the rotational mailbox.

Select: (C) Create New Mailboxes
Prompt: `Mailbox to create:`
Response: **Number** of the new mailbox.

or

Select: (M) Modify Mailboxes
Prompt: `Mailbox to modify:`
Response: **Number** of the existing mailbox.

> **Note:** Prompts are almost the same for creating a new mailbox and modifying an existing one, except that "New" precedes a prompt when you select Modify Mailboxes.

To leave an existing parameter setting unchanged, just press Return to go to the next prompt.

4. Set the mailbox parameters the same as for a standard mailbox, except for the FCOS.	DP 5052

5. Assign an FCOS designed for a rotational mailbox.

Prompt: `Features class of service:`
Response: 17 (the default Rotational FCOS)

or

The **number** of a customized FCOS that includes all the applicable bits for a rotational mailbox.

6. After responding to the last mailbox parameter, the system displays the mailbox configuration, then prompts for the next mailbox number. At this point, the parameter settings for the rotational mailbox are saved. Press Return to reach the Mailbox Maintenance Menu.

7. Go to the List Maintenance Menu.

Step	*Reference*

8. Create distribution list 01 for the Template mailbox.

   Select: (C) Create, Modify, or Show Distribution Lists
   Prompt: `Mailbox:`
   Response: **Number** of the Rotational mailbox from step 3.

   Prompt: `Distribution list:`
   Response: **01**

   Prompt: `(S)orted or (U)nsorted list ?`
   Response: **S**

9. If desired, check the list to make sure the members are not already in the list.

   Prompt: `Check for duplicate before add (y/n) [Y]?`
   Response: **Y** if you want the system to check the list,
   N to bypass the check.

10. Add all of the Template mailboxes to the distribution list.

    Prompt: `(A)dd, (D)elete, or (S)how list ?`
    Response: **A** to add a member

    Prompt: `Member:`
    Response: The **mailbox numbers** of the Template mailboxes.

    - You can enter mailbox numbers in any of the formats shown below:

      A single mailbox number, for example 3788
      A continuous range of mailbox numbers, for example 3001-3788
      A series of mailbox numbers, for example 3781,3782,3786,3788

    - You can mix formats of mailbox number entries, so you can specify all the
      mailbox numbers necessary in one attempt. For example, this entry is valid:

      208,222-308,333,334,661

Step	Reference

11. After the system confirms that the member just specified was added, continue adding or complete the activity.

   Prompt: `(A)dd, (D)elete, or (S)how list ?`

   Response: • To add more members to the current list, enter **A** as described in step 10, or enter **D** to delete any mailboxes that should not be in the distribution list.

   • To complete adding or deleting members:

   a. Press Return.

   b. When the system asks if you want to save changes to the distribution list, enter **Y**. The system reports the current members, reflecting members just added or deleted, and your additions and deletions are saved.

This procedure describes how to configure a MESA Forms Template mailbox and the Greeting Only mailboxes that will contain the questions for the MESA Form.

Step	*Reference*
1. Complete a Rotational Mailbox Diagram for each Template Mailbox, and a Mailbox Worksheet for all Template and Greeting Only mailboxes. Blank worksheets are at the back of this manual.	
2. Reach the Mailbox Maintenance Menu. Enter the requested information, as described in the following steps, from your completed worksheet and diagram.	Menu Map 3

3. Identify the Template mailbox.

> *Select:* (C) Create New Mailboxes
> *Prompt:* `Mailbox to create:`
> *Response:* **Number** of the new mailbox.

or

> *Select:* (M) Modify Mailboxes
> *Prompt:* `Mailbox to modify:`
> *Response:* **Number** of the existing mailbox.

> > **Note:** Prompts are almost the same for creating a new mailbox and modifying an existing one, except that "New" precedes a prompt when you select Modify Mailboxes.

> To leave an existing parameter setting unchanged, just press Return to go to the next prompt.

4. Set the mailbox parameters the same as for a standard mailbox, except for the FCOS.	DP 5052

5. Assign an FCOS designed for a template mailbox.

> *Prompt:* `Features class of service:`
> *Response:* **16** (the default Template FCOS)

> > or

> > The **number** of a customized FCOS that includes all the applicable bits for a Template mailbox.

6. After responding to the last mailbox parameter, the system displays the mailbox configuration, then prompts for the next mailbox number to modify or create. At this point, the parameter settings for the template mailbox are saved.

Step	Reference

7. Configure the first child mailbox (the Greeting Only mailbox that will play the first question to callers).

   Prompt: `Mailbox to create: or Mailbox to modify:`
   Response: The **number** of the first child mailbox.

8. Set all applicable parameters for the child mailbox the same as for a standard mailbox, except for the FCOS.   DP 5052

9. Assign an FCOS that makes the child mailbox a greeting-only mailbox.

   Prompt: `Features class of service:`
   Response: **6** (the default Greeting Only FCOS)

   or

   The **number** of a customized FCOS that includes all the applicable bits for a greeting-only mailbox.

10. Configure all remaining child mailboxes as just described.

11. When you have configured all child mailboxes, return to the Mailbox Maintenance Menu.

    Prompt: `Mailbox to create: or Mailbox to modify:`
    Response: Press Return.

12. Go to the List Maintenance Menu.

13. Create distribution list 01 for the Template mailbox.

    Select: (C) Create, Modify, or Show Distribution Lists
    Prompt: `Mailbox:`
    Response: **Number** of the Template mailbox.

    Prompt: `Distribution list:`
    Response: **01**

    Prompt: `(S)orted or (U)nsorted list ?`
    Response: **S**

14. If desired, check the list to make sure the member is not already in the list.

    Prompt: `Check for duplicate before add (y/n) [Y]?`
    Response: **Y** if you want the system to check the list,
    N to bypass the check.

Step	*Reference*

15. Add all of the Greeting Only mailboxes to the distribution list.

   Prompt: (A)dd, (D)elete, or (S)how list ?
   Response: **A** to add a member

   Prompt: Member:
   Response: The **mailbox numbers** of the Greeting Only mailboxes.

   • You can enter mailbox numbers in any of the formats shown below:

   A single mailbox number, for example 3788
   A continuous range of mailbox numbers, for example 3001-3788
   A series of mailbox numbers, for example 3781,3782,3786,3788

   • You can mix formats of mailbox number entries, so you can specify all the mailbox numbers necessary in one attempt. For example, this entry is valid:

   208,222-308,333,334,661

16. After the system confirms that the member just specified was added, continue adding or complete the activity.

   Prompt: (A)dd, (D)elete, or (S)how list ?
   Response: • To add more members to the current list, enter **A** as described in step 15, or enter **D** to delete any mailboxes that should not be in the distribution list.

   • To complete adding or deleting members:

   a. Press Return.

   b. When the system asks if you want to save changes to the distribution list, enter **Y**. The system reports the current members, reflecting members just added or deleted, and your additions and deletions are saved.

Procedure Number	Title	Date	Release Number
DP 5007	Customize an FCOS Copy	December 1, 1993	5.03
DP 5008	Customize a Default FCOS	December 1, 1993	5.03
DP 5025	Create or Modify a Distribution List for Mailbox Owners	December 1, 1993	5.03
DP 5051	Copy a Mailbox Greeting	January 17, 1994	5.03
DP 5052	Configure a Standard Mailbox	January 17, 1994	5.03
DP 5402	Perform an Online Optional Feature Installation	December 1, 1993	5.03

Customize an FCOS Copy

This procedure describes how to customize an FCOS by modifying a copy of an existing FCOS.

Step	Reference

1. Choose the existing FCOS you wish to use as a basis for your customized FCOS.

2. Complete an FCOS Worksheet. Blank worksheets are near the back of this manual.

3. Reach the System Configuration Menu, then go to the Feature Class of Service Menu. Enter the requested information, as described in the following steps, from your completed FCOS Worksheet. *(Reference: Menu Map 11)*

   Note: You can quit at any point in the following steps before you exit the Feature Class of Service Menu. Quitting discards all entries you have made and leaves the FCOS settings the way they were before you reached the Feature Class of Service Menu.

   To quit:

   Make sure the Feature Class of Service Menu is displayed (short form or long form).

   Select: (Q) Quit – Forget Changes
   Prompt: Quit and forget changes? (y/n) =
   Response: **Y** to quit.

4. Number and name the customized FCOS.

   Select: (C) Current FCOS
   Prompt: FCOS to modify =
   Response: A **number** from 18 through 64.

   Select: (N) Name FCOS
   Prompt: Enter FCOS name (0 - 15 chars) =
   Response: Enter a descriptive **name** to accompany the customized FCOS.

5. Make a copy of the existing FCOS.

   Select: (K) Copy FCOS
   Prompt: FCOS to copy (? for help) =
   Response: The **number** of the existing FCOS chosen to be the basis for your customized FCOS. A copy of this FCOS is created and given the number and name you assigned above.

6. Add FCOS bits to the FCOS copy, as desired.

   Select: (A) Add Features
   Prompt: Features to add (? for help) =
   Response: The 1-to-3-digit **numbers** of the FCOS bits to be added.

Step	*Reference*

- You can enter bits in any of the formats shown below:

  A single bit, for example 208
  A range of bits, for example 202-208
  A series of bits, for example, 39,40,207,208

- You can mix types of entries, so you can specify all the bits necessary in one attempt. For example, this entry is valid:

  208,1-7,50,53,55,6

- Do not enter spaces after commas, and do not end the entry with a comma.

7. Delete FCOS bits from the FCOS copy, as desired.

  Select: (D) Delete Features
  Prompt: `Features to delete (? for help) =`
  Response: The 1-to-3-digit **numbers** of the FCOS bits to be deleted. The same rules apply to deleting bits as explained for adding bits.

8. Verify that the information you have entered so far matches your worksheet.

  Select: (S) Show FCOS
  Prompt: `FCOS to show (? for help) =`
  Response: The **number** of the FCOS copy that you specified in step 4.

9. If the information matches your worksheet, customization is completed and you can save it. If the information does not match your worksheet, make the necessary corrections.

10. After verifying that your entries are correct, save the customized FCOS by exiting from the Feature Class of Service Menu.

This procedure describes how to customize an FCOS by modifying one of the default FCOSs supplied by Centigram or by renumbering one of these default FCOSs.

Step	*Reference*

((:)) Modifying a Default FCOS

1. Choose the default FCOS you wish to modify.

2. Complete an FCOS Worksheet. Blank worksheets are near the back of this manual.

3. Reach the System Configuration Menu, then go to the Feature Class of Service Menu. Enter the requested information, as described in the following steps, from your completed FCOS Worksheet.   *Menu Map 11*

   Note: You can quit at any point in the following steps before you exit the Feature Class of Service Menu. Quitting discards all entries you have made and leaves the FCOS settings the way they were before you reached the Feature Class of Service Menu.

   To quit:

   Make sure the Feature Class of Service Menu is displayed (short form or long form).

   Select: (Q) Quit – Forget Changes
   Prompt: Quit and forget changes? (y/n) =
   Response: Y to quit.

4. Specify the default FCOS to modify.

   Select: (C) Current FCOS
   Prompt: FCOS to modify =
   Response: The **number** (1-17) of the default FCOS.

5. Change the name if desired.

   Select: (N) Name FCOS
   Prompt: Enter FCOS name (0 - 15 chars) =
   Response: Enter a descriptive **name** to accompany the modified default FCOS.

6. Add FCOS bits to the default FCOS, as desired.

   Select: (A) Add Features
   Prompt: Features to add (? for help) =
   Response: The 1-to-3-digit **numbers** of the FCOS bits to be added.

   • You can enter bits in any of the formats shown below:

Step   *Reference*

A single bit, for example 208
A range of bits, for example 202-208
A series of bits, for example, 39,40,207,208

- You can mix types of entries, so you can specify all the bits necessary in one attempt. For example, this entry is valid:

  208,1-7,50,53,55,6

- Do not enter spaces after commas, and do not end the entry with a comma.

7. Delete FCOS bits from the default FCOS, as desired.

   Select: (D) Delete Features
   Prompt: `Features to delete (? for help) =`
   Response: The 1-to-3-digit **numbers** of the FCOS bits to be deleted. The same rules apply to deleting bits as explained for adding bits.

8. Verify that the information you have entered so far matches your worksheet.

   Select: (S) Show FCOS
   Prompt: `FCOS to show (? for help) =`
   Response: The **number** of the default FCOS you have been working with.

9. If the information matches your worksheet, customization is completed and you can save it. If the information does not match your worksheet, make the necessary corrections.

10. After verifying that your entries are correct, save the modified default FCOS by exiting from the Feature Class of Service Menu.

((:)) Renumbering a Default FCOS

1. Choose the default FCOS you wish to renumber. (Renumbering a default FCOS does not destroy the original default FCOS; the original default FCOS can be restored through the Use Template FCOS option in the Feature Class of Service Menu.)

2. Complete an FCOS Worksheet. Blank worksheets are near the back of this manual.

3. Reach the System Configuration Menu, then go to the Feature Class of Service Menu. Enter the requested information, as described in the following steps, from your completed FCOS Worksheet.   Menu Map 11

Step   *Reference*

Note: You can quit at any point in the following steps before you exit the
Feature Class of Service Menu. Quitting discards all entries you have
made and leaves the FCOS settings the way they were before you reached
the Feature Class of Service Menu.

To quit:

Make sure the Feature Class of Service Menu is displayed (short form or
long form).

Select: (Q) Quit – Forget Changes
Prompt: Quit and forget changes? (y/n) =
Response: Y to quit.

4. Specify the new number for the FCOS.

   Select: (C) Current FCOS
   Prompt: FCOS to modify =
   Response: The new FCOS **number** (18-20 or 25-64).

5. Assign the chosen default FCOS to this number.

   Select: (U) Use Template FCOS
   Prompt: Overwrite current FCOS with a template (y/n) =
   Response: Y for yes.

   The system displays a list of the default (template) FCOSs.

   Prompt: Choose a number (1-17, 21-24) from the menu:
   Response: The **number** of the default (template) FCOS (1-17 or 21-24) that you
               want to be assigned to the current FCOS number.

   The system displays a confirmation that the default (template) FCOS just
   specified has been renumbered. The default FCOS is now customized.

6. Save the customized FCOS by exiting to the System Configuration Menu.

This procedure shows how to add members or delete members in a single distribution list.

Step	Reference

1. Reach the Mailbox Maintenance Menu, then go to the List Maintenance Menu. *(Reference: Menu Map 3)*

2. Identify the distribution list.

Select: (C) Create, Modify, or Show Distribution Lists
Prompt: `Mailbox:`
Response: **Number** of the mailbox that contains the list you want to add to or delete from.

Prompt: `Distribution list:`
Response: **Number** of the list you want to add to or delete from (1-99). For mailboxes that rotate on full, tree mailboxes, MESA Form mailboxes, and broadcast mailboxes, enter 1. For a name greet mailbox, enter 9.

Prompt: `(S)orted or (U)nsorted list ?`
Response: **U** if the list is in a tree mailbox; otherwise, **S**. Keep in mind that sorting of lists longer than 190 members can be slow.

3. If desired, check the list to make sure the member is or is not already in the list.

Prompt: `Check for duplicate before add (y/n) [Y]?`
Response: **Y** if you want the system to check the list
N to bypass the check.

4. Add or delete the desired member.

Prompt: `(A)dd, (D)elete, or (S)how list ?`
Response: **A** to add a member

or

D to delete a member.

Prompt: `Member:`
Response: The **member** you want to add or delete. All of the following are valid members:

Mailbox number

M and a remote mailbox with a telephone number for AMIS Analog; the remote mailbox and telephone number are separated by a comma (for example, M3788,4283788)

N and a remote mailbox for networking

T and a telephone number for off-system messaging

D and a distribution list number, except in a broadcast mailbox

S and a master distribution list number, except in a broadcast mailbox

Step	*Reference*

- Mailbox numbers can be entered in any of the formats shown below; the other numbers must be entered one at a time:

    A single mailbox number, for example 3788

    A continuous range of mailbox numbers, for example 3001-3788

    A series of mailbox numbers, for example 3781,3782,3786,3788

- You can mix formats of mailbox number entries, so you can specify all the mailbox numbers necessary in one attempt. For example, this entry is valid:

    208,222-308,333,334,661

5. After the system confirms that the member just specified was added or deleted, continue adding or deleting or complete the activity.

    Prompt: (A)dd, (D)elete, or (S)how list ?
    Response: • To add or delete more members from the current list, enter **A** or **D** as described in step 4.

    - To complete adding or deleting members:

        a. Press Return.

        b. When the system asks if you want to save changes to the distribution list, enter **Y**. The system reports the current members, reflecting members just added or deleted, and your additions and deletions are saved.

Copy a Mailbox Greeting

This procedure describes how to copy a mailbox greeting, name, or fax cover page from one mailbox to another. You must perform this procedure at an AIP maintenance console, and after a greeting has been recorded for the source mailbox.

Step	Reference

1. Reach the Main Menu, then go to the Mailbox Maintenance Menu. | Menu Map 3

2. Choose to copy a mailbox greeting.

   Select: (K) Copy/Delete/Enable Mailbox Greetings

   Prompt: COMMAND (Copy, Delete, or Enable ?):
   Response: C

3. Identify the source and destination mailboxes.

   Prompt: Enter mailbox to copy name/greeting from:
   Response: The mailbox **number** of the source mailbox.

   Prompt: Enter mailbox to copy name/greeting to:
   Response: The mailbox **number** of the target mailbox. You can copy the greeting to more than one mailbox by using any of the formats shown below:

   - A single mailbox number, for example 3788
   - A continuous range of mailbox numbers, for example 3001-3788
   - A series of mailbox numbers, for example 3781,3782,3786,3788

   You can mix formats of mailbox number entries, so you can specify all the mailbox numbers necessary in one attempt. For example, this entry is valid:

   208,222-308,333,334,661

4. Identify what is to be copied.

   Prompt: 0   Name
              1-4 Greeting 1-4
              5   Fax Cover Sheet

              COMMAND (Enter source name/greeting number (0-5) [1]):

Step	*Reference*

Response: For a user's mailbox:
   enter 1 for the Personal greeting.

For an administrator's mailbox:
   enter 1 for the Day company greeting,
   enter 2 for the Night company greeting,
   enter 4 for the Alternate greeting.

For an attendant's mailbox:
   enter 1 for the Message of the Day,
   enter 2 for the Site tutorial,
   enter 4 for the Alternate greeting.

For all mailboxes:
   enter 0 for the Name.
   enter 5 for the Fax Cover Sheet.

Prompt: COMMAND (Enter destination name/greeting
number (0-5) [1]): 1
Response: Enter one of the same values as above.

5. The system confirms that the greeting/name has been copied. You can choose to copy more greetings, or press Enter to exit to the Mailbox Maintenance Menu.

This procedure describes how to configure a standard mailbox in VoiceMemo. You can use it either to create a new mailbox or to modify an existing mailbox.

Step	*Reference*

1. Reach the Mailbox Maintenance Menu. Enter the requested information, as described in the following steps, from your completed Mailbox Worksheet. — *Menu Map 3*

2. Identify the mailbox to be created or modified.

   Select: (C) Create New Mailboxes
   Prompt: `Mailbox to create:`
   Response: **Number** of the new mailbox you want to configure.

   or

   Select: (M) Modify Mailboxes
   Prompt: `Mailbox to modify:`
   Response: **Number** of the existing mailbox you want to reconfigure.

   > **Note:** Prompts are almost the same for creating a new mailbox and modifying an existing one, except that "New" precedes each prompt when you select Modify Mailboxes.

   To leave an existing parameter setting unchanged, just press Return to go to the next prompt.

3. Name the mailbox.

   Prompt: `Name:`
   Response: A **name** of up to 31 alphanumeric characters that describe the purpose, membership, ownership, or function of the mailbox.

4. If a department code or alternate code is required for message waiting indication, specify it.

   Prompt: `Department code:`
   Response: The **string** (directory number) which is the alternate code the system transmits after the pre-DN ON string.

   For DTMF-to-PBX message waiting indication, valid characters are:

   0-9
   *
   #

   For RS-232 message waiting indication, any ASCII character is valid.

5. If a prefix (access code) must be dialed before any mailbox-specific dial strings when making outgoing calls, specify it.

Step	*Reference*

    Prompt: Access code:
    Response: A DTMF **string** (1-10 digits)

          or

          A period (.) if no string is needed.

6. If callers are allowed to press # then dial an extension, or if Receptionist II is installed, use the Receptionist Day Treatment and Receptionist Night Treatment parameters.

    Prompt: Receptionist day treatment:
    Response: The **number** of the treatment type (1-16) that contains the #.authorization code,

          or

          Press Return to skip the parameter,

          or

          If Receptionist II is installed in your system and you want Receptionist capabilities other than pressing # to dial an extension, refer to the *Receptionist II Manual* (part number 2700-0844-00) for information about these parameters.

    Prompt: Receptionist night treatment:
    Response: The **number** of the treatment type (1-16) that contains the #.authorization code,

          or

          Press Return to skip the parameter,

          or

          If Receptionist II is installed in your system and you want Receptionist capabilities other than pressing # to dial an extension, refer to the *Receptionist II Manual* (part number 2700-0844-00) for information about these parameters.

7. If this mailbox uses DTMF-to-PBX message waiting indication or if Receptionist II is installed in your system, specify the mailbox's extension number.

    Prompt: Mailbox's extension number:
    Response: Leave blank if the extension number is the same as the mailbox number,

          or

          Enter the PBX extension **number plus dial string codes** from Table 1 at the end of this procedure,

Step   *Reference*

or

A **string** as explained in the *Receptionist II Manual*, if Receptionist II is
installed in your system

8. If Receptionist II is installed in your system, refer to the *Receptionist II Manual* for
    the mailbox's extension pre-dial index; otherwise, press Return to skip over the
    parameter.

9. If an attendant is available to this mailbox, specify the attendant extension number.

    Prompt: `Attendant extension number:`
    Response: The extension **number** of the mailbox attendant that the mailbox owner
                or caller is transferred to after pressing 0,

    or

    Leave blank,

    or

    Refer to the *Receptionist II Manual* for directions if Receptionist II is
    installed in your system.

10. If the attendant extension exceeds 15 digits, or if Receptionist II is installed in your
    system, specify the excess dial string.

    Prompt: `Attendant extension pre-dial index:`
    Response: The dial string **characters** (Table 1) that point to the dial string that the
                system must process before dialing the attendant extension number,

    or

    Leave blank,

    or

    Refer to the *Receptionist II Manual* for directions if Receptionist II is
    installed in your system.

11. Assign an FCOS to this mailbox.

    Prompt: `Features class of service:`
    Response: **Number** (1-64) of the FCOS that governs this mailbox.

12. Assign an LCOS to this mailbox.

    Prompt: `Limits class of service:`
    Response: **Number** (1-64) of the LCOS that governs this mailbox.

13. Assign a GCOS to this mailbox.

    Prompt: `Group class of service:`

Step	*Reference*

Response: **Number** (1-32,000) of the GCOS that governs this mailbox.

14. If MESA-Net is installed in your system, refer to *The MESA-Net Digital Network* document (number 2700-0835-00) for information about the network class of service (NCOS) otherwise, press Return to skip over the parameter.

15. If Enhanced SMDI is installed in your system, refer to the *Enhanced SMDI VoiceMemo Integration Installation User's Manual* (part number 2700-2039-00) for information about the tenant class of service (TCOS) otherwise, press Return to skip over the parameter.

16. If a temporary passcode is required, specify it.

    Prompt: `Enter a temporary passcode:`
    Response: Any **digits** 0 through 9, within the minimum and maximum lengths
             specified in the VoiceMemo application or DID VoiceMemo
             application,

             or

             R to have the system generate a passcode for you (and display it in the
             mailbox configuration report that automatically appears after you
             respond to the last mailbox parameter),

             or

             S to make the passcode the same as the mailbox number,

             or

             Press Return to leave the temporary passcode unchanged.

17. If desired, enable or disable the standard tutorial (also called new user tutorial, user tutorial, and VoiceMemo tutorial). The standard tutorial is set to play be default when a new mailbox is created.

    Prompt: `Tutorial (y/n):`
    Response: Enter **Y** to enable the tutorial or **N** to disable it.

             or

             Press Return for no change.

18. Specify the type of message waiting indication.

    Prompt: `Message waiting type #1:`
    Response: A number from 2 through 22, from Table 2 at the end of this procedure.
             If more than one type of message waiting indication is used, this is the
             primary type.

             or

Step   *Reference*

---

        0 for none.

    Prompt: `Message waiting type #2:`

    Response: Same as for the first message waiting type parameter, but this is the secondary type.

  If message waiting type 5 was specified at the first or second message waiting type parameter, set the mailbox parameters for paging or message delivery, or both.

19. If you need a third type of message waiting indication, specify it.

    Prompt: `Message waiting type #3:`

    Response: Message waiting type **9** or **17**.

20. If a time zone offset is needed, specify it.

    Prompt: `Time zone offset:`

    Response: The **hours** of difference, from -23 through 23, between the mailbox owner's time zone and the VoiceMemo module time zone.

21. If desired, allow the mailbox owner to have review rights or change rights, or both, for the mailbox owner's distribution lists.

    Note: This mailbox parameter alone does not allow change rights; you must also include FCOS bit 74 (Create or modify user distribution list) in the FCOS.

    Prompt: `Lists with review rights:`

    Response: Any of the following entries:

             A for all distribution lists

             A single **list**, for example 2

             A series of **lists**, for example 1,3,4,6,

             A **range of lists**, for example 1-6

             A combination of any of the above entries, for example

                1-5,8,12,50-70,90

    Prompt: `Lists with change rights:`

    Response: Same as just described for review rights.

22. After the last entry, the system displays the mailbox configuration, then prompts for the next mailbox number.

  At this point, the parameter settings are saved and you can continue with mailbox configuration or exit.

Step   *Reference*

Table 1   Access Codes and Dial String Characters

Character	Explanation
0-9, *, #	Keys on a standard pushbutton telephone
A-D	Fourth column DTMF keys
( )	Dial pulse (10 PPS) the digits between the parentheses
+	Pause for one second
T	Go off-hook, wait for dial tone
P	Go off-hook, do not wait for dial tone
E	Go off-hook, wait for dial tone or other steady tone (pager go-ahead or confirmation tone, for example), then do next item in string
F	Switch hook flash and wait for dial tone
S	Switch hook flash, no wait required
H	Hang up (go on-hook)
G	Greet —Wait for a voice or computer tone answer
L	Wait for an answer supervision signal that indicates the receiving phone has gone off-hook, then dial remaining characters after receiving the signal. Valid only with four-wire connections, not with loop start or ground start phone lines.
N	Start a new activity; do not go off-hook
O	Ring once
V	Play three seconds of the message for voice pager

Step   *Reference*

Table 2   Message Waiting Types

Number	Type
0	None
1	Not available
2	AC message lamp
3	DTMF to PBX
4	Fixed RS-232
5	Pager
6	SL-1
7	Program RS-232
8	Tip & Ring RS-232
9	Centrex RS-232
10	Intecom RS-232
11	NEC RS-232
12	Video Dispatch
13	ITT RS-232
14	Citywide SMDI (no longer used)
15	AT&T System 75
16	HIS PMS
17	Unified integrations
18	ROLM
19	Mitel
20	SL-1 Message Waiting
21	Hitachi PMS
22	SL-1 Enhanced Meridian
23	Fujitsu 960

The procedure describes how to install an optional feature with the system online. Be sure the Optional Feature Diskette(s) and the Module Enable Diskette contain the serial number(s) for all disk(s) in the system.

WARNING!

This process causes the system to automatically reboot, resulting in an interruption to call processing. Centigram recommends that you perform this procedure during periods of low call traffic.

Step	Reference
1. Reach the System Maintenance Menu, then go to the System Maintenance Additional Options Menu.	Menu Map 12

2. Select the add optional feature program.

> *Select:* (A) Add Extra Cost Feature(s)
> *Prompt:* WARNING. Adding extra cost features here will result in a complete system shutdown followed by a system restart.
> Enter 'Y' to add extra cost features, 'N' to stop:
> *Response:* Y

3. Install the optional feature.

> *Prompt:* Insert extra cost floppy disk in the floppy drive Enter any key when ready:
> *Response:* Insert diskette, press **Enter**.

4. Following the installation the system prompts for another optional feature to be installed.

> *Prompt:* Do you want to install another extra cost feature?
> *Response:* Y to install another feature and continue from step 3,
> N to exit.

The system automatically shuts down and resets the entire system. The system automatically edits and saves the configuration files, then returns to the VoiceMemo Configuration Offline Menu.

5. Make the necessary system configuration changes, if necessary, per the instructions provided with the optional feature documentation.

Step	*Reference*

6. Exit the VoiceMemo Configuration Offline Menu. The system will perform a system shutdown.

   Prompt: `Wait for message waiting queues to be empty?`
   Response: Y to wait for the queue to clear,
               N to continue immediately with the shutdown.

   The system then completes the shutdown and activates the software, returning to the System Maintenance - Additional Options Menu.

MESA Form Diagram

Rotational Mailbox No._____

FCOS_____   GCOS_____   Index_____

Greeting _____

_____

_____

Distribution List 1 Members
(Template Mailboxes)

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

☐ Greeting recorded

Template Mailbox Numbers _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

FCOS_____   GCOS_____

Distribution List 1 Members (Greeting Only Mailboxes)

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Greeting Only Mailbox No._____

FCOS_____   GCOS_____

Greeting _____

_____

_____

_____

☐ Greeting / question recorded

Rotational Mailbox Diagram

Mailbox No._____

FCOS_____   GCOS_____

Index_____   ☐ Period

Start date_____

Start time_____

List__1_____

Members_____

_____

☐ Greeting recorded

Mailbox No._____

FCOS_____   GCOS_____

Index_____   ☐ Period

Start date_____

Start time_____

List__1_____

Members_____

_____

☐ Greeting / msg recorded

Mailbox No._____

FCOS_____   GCOS_____

Index_____   ☐ Period

Start date_____

Start time_____

List__1_____

Members_____

_____

☐ Greeting / msg recorded

Mailbox No._____

FCOS_____   GCOS_____

Index_____   ☐ Period

Start date_____

Start time_____

List__1_____

Members_____

_____

☐ Greeting / msg recorded

Mailbox Individual Worksheet

Mailbox type:

☐ Standard
Complete Mailbox Worksheet

☐ Tree
Complete Tree Mailbox Diagram

☐ Rotational
Complete Rotational Mailbox Diagram

Create New Mailboxes

Mailbox to create [   ]

Name [   ]

Department code [   ]

Access code [   ]

Receptionist day treatment [   ]

Receptionist night treatment [   ]

Mailbox's extension number [   ]

Mailbox's extension pre-dial index [   ]

Attendant extension number [   ]

Attendant extension pre-dial index [   ]

Features Class of service [   ]

Limits Class of Service [   ]

Group Class of Service [   ]

Network Class of Service [   ]

Tenant Class of Service [   ]

Restriction Class of Service [   ]

Temporary passcode [   ]

Message waiting type #1 [   ]

Message waiting type #2 [   ]

Message waiting type #3 [   ]

For AC message lamp (msg. wait. type 2) only:

AC message waiting lamp address [   ]

For message waiting type 5 only:

Pager access code index [   ]

Pager number [   ]

Post-pager number [   ]

Pager frequency [   ]

Pager interval [   ]

Message delivery? ☐ Yes ☐ No

Suppress pages? ☐ Yes ☐ No

Busy pager attempts [   ]

Busy pager interval [   ]

Pager start time [   ] AM PM

Pager stop time [   ] AM PM

Define additional pager number? ☐ Yes ☐ No

Call placement pager access code index [   ]

Turn off pager/outcall notification? ☐ Yes ☐ No

Time zone offset [   ]

Lists with change rights [   ]

Lists with review rights [   ]

FCOS Worksheet

FCOS

FCOS to modify ☐   FCOS name ☐   FCOS to copy ☐

FCOS Features

1 Greeting   060 062 063 064 065 161 162 224

2 Login   001 016 066 069 081 101 102 103 104 105 106 107 108 109   132 151 152 156 160
165 218 219 225

3 Logout   003 009 170 220

4 Attendant Call   002 098 159

5 Outside Caller   004 002 005 017 041 051 092 098 111 112 113 114 115 116 117 118   119 137 160
176 203 221

6 Prompts   051 082 083 097 098 098 131 133 136 138 140 146 157 159 176 202 208
Language (1) 010 011 012 013 014 099 150 233   Interface (1) 209 210 211

7 Receive Msgs   039 040 041 042 043 044 045 046 047 088 111 112 113 114 115 116 117 118 119
127 173 175 179 185 190 198 199 223

8 Play Msgs   050 006 007 039 046 047 048 049 052 057 058 059 075 076 089 144 145 147 153
204 215 216

9 Answer Msgs   029 019 030 031 038 147 158

10 Keep/Discard Msgs   053 054 055 056 145 227

11 Make Msgs   020 021 022 023 032 034 061 087 092 096 110 126 157 158 171 172 188 191

12 Give Msgs   024 086 018 025 026 027 028 033 035 061 084 085 110 126 157 158 192

13 Msg Address.   018 019 021 023 025 027 030 031 087 095

14 User Options   070 015 071 072 073 074 077 078 093 094 095 124 125 127 130 142 143 148
180 195 196 201

15 User Dist. Lists   032 033 036 044 074 134 222

16 Master Dist. Lists   034 035 045

17 Check In/ Out   008 090 091

18 Super User   121 122 068 120 123 141 147 152 174 178 186 187 189 229 234

19 Msg Wait Ind.   079 080 134 182 183 205 228 234

20 FaxMemo   190 191 192 193 194 195 196 197 198 199 200 203 206 207 230

21 Paging   077 124 168 169 171 172 173 181 188 208 209 210 211 212 213 219

22 VG, E-mail   154 170 184 205 217 220 221 224 225

23 Network/ VForms   135 139 149 166

Tree Mailbox Diagram

Mailbox No._____

FCOS_____

List___1_____

Members_____

_____

☐ Greeting recorded

Digit_____

Mailbox No._____

FCOS_____

List_____

Members_____

_____

☐ Greeting recorded

Digit_____

Mailbox No._____

FCOS_____

List_____

Members_____

_____

☐ Greeting recorded

Digit_____

Mailbox No._____

FCOS_____

List_____

Members_____

_____

☐ Greeting recorded
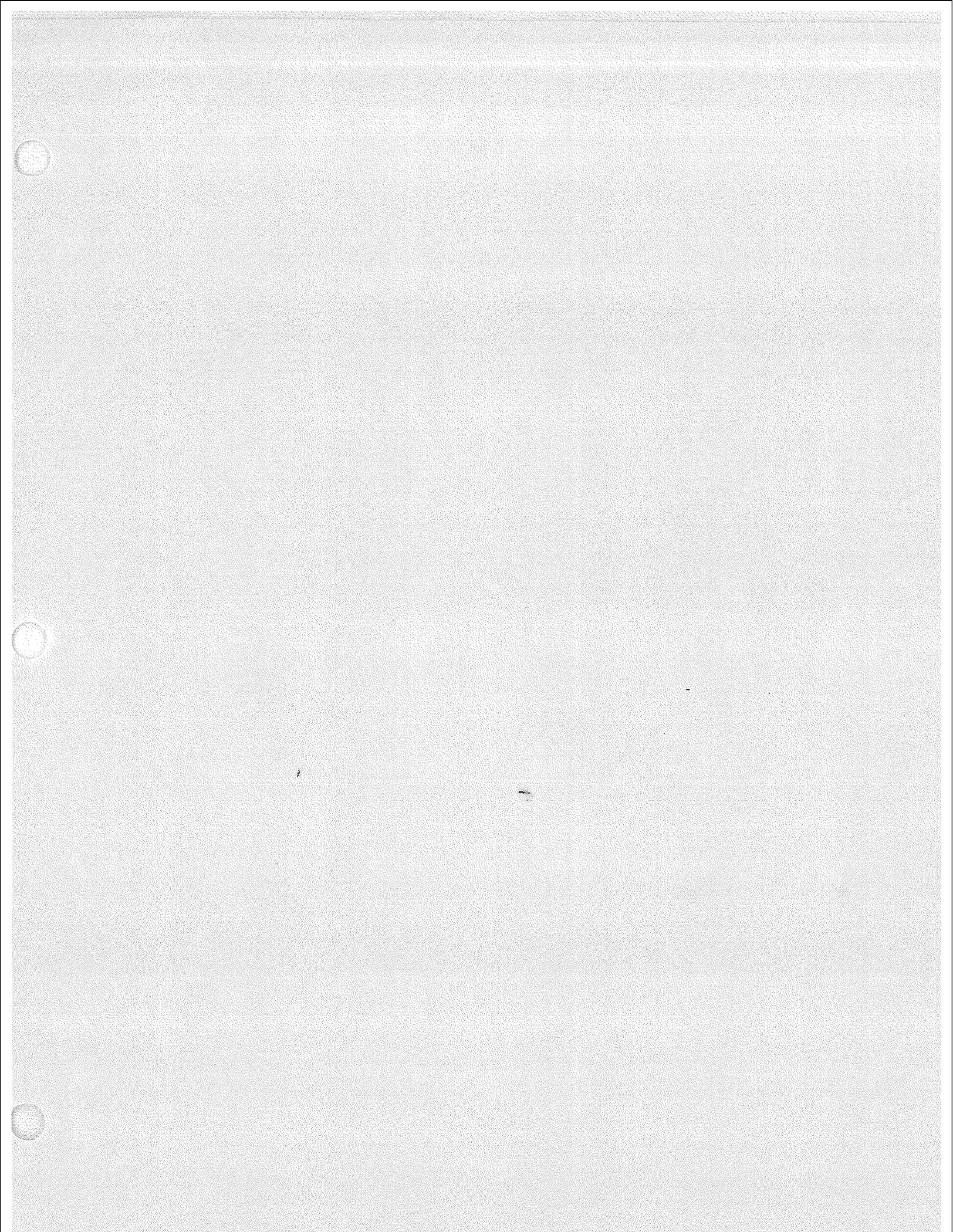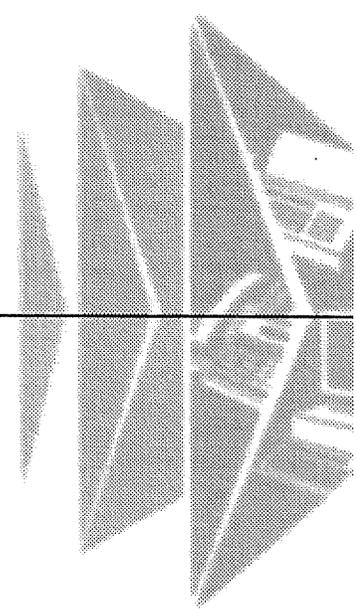
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MITEL MAIL ™

Voice Processing Solutions

▶ MESA-Net
Administrator's
Manual

◈ MITEL ®

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How to Use This Guide

If you want to have a solid understanding of what is involved in administering MESA-Net, read this entire guide.

If you want to read only those parts of the guide that directly apply to you, then first read the section "Overview of MESA-Net Tasks" in Chapter 1. This section summarizes the MESA-Net tasks and points you to the reference material and procedures that describe the tasks. The section also provides a checklist of what arrangements you must make before MESA-Net is installed.

1 Introduction to MESA-Net

MESA-Net is an optional feature for Centigram's Series 6 Communications Server. It allows you to connect Series 6 Servers and 5.x AIP systems together to form a digital network. With MESA-Net, mailbox owners can make voice or fax messages for mailboxes on remote servers in the same manner as they make messages to local mailboxes. For example, a user can log into a VoiceMemo mailbox, make a message for several recipients, some local and some remote, and send that message. Users can also answer messages and forward (give) messages to users on remote nodes. Figure 1-1 shows a simple MESA-Net network.

Simple MESA-Net Topology
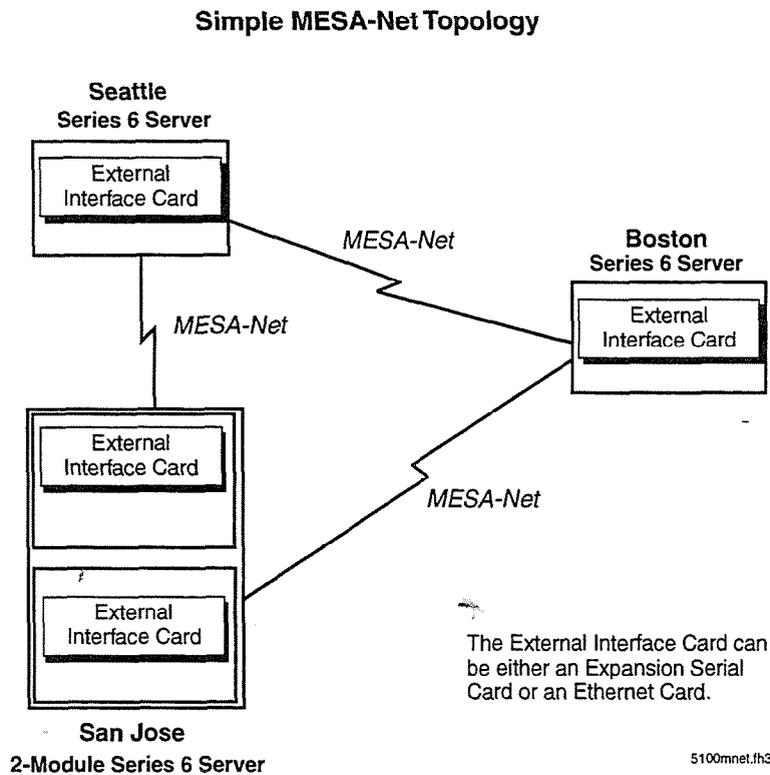
Figure 1-1 Simple MESA-Net Topology

MESA-Net transmits messages in digital form, as opposed to actually playing messages over the phone lines to remote systems. Digital transmission increases throughput and preserves speech quality.

MESA-Net provides two networking options: **MESA-Net Async** and **MESA-Net TCP/IP**. MESA-Net Async uses dial-up or direct connections through serial ports and modems or multiplexers. MESA-Net TCP/IP supports TCP/IP over 10Base-T

1-1

Ethernet. You can use both options in a single network to meet the requirements of each site.

The building blocks of a MESA-Net network are Centigram servers. Each server functions as a **node** on the network. MESA-Net is scaleable so that it can work on all Series 6 server models, providing lower-cost, lower throughput networking on smaller servers and higher throughput messaging on larger servers. Each MESA-Net node is equipped with either serial cards or ethernet cards, and is connected to communications channels such as phone lines or a wide area network.

MESA-Net Async

MESA-Net Async connects Centigram servers together by means of direct connection, modems, and multiplexers (or any combination of these). MESA-Net Async is scaleable to support the varied requirements of different sites and networks.

- For nodes with low network traffic volume, a simple MESA-Net Async installation enables two links. The node can connect to all other MESA-Net Async nodes on the network, but can only connect to two nodes at any given time.

- The Multiple Links (also called Link Enable) optional feature allows a node to simultaneously connect to as many as 16 nodes (32 for Model 640 servers). This feature is useful at centralized hub nodes.

- The Parallel Links optional feature increases throughput by enabling multiple links between two nodes. The additional throughput can significantly speed up message delivery between high-traffic nodes.

- The MESA-Net Async Load Share configuration for Model 640 servers provides fault-tolerance and balanced traffic load. MESA-Net links can be installed in more than one module to share the load, and one module can continue to process network traffic if the others are out of service.

MESA-Net TCP/IP

MESA-Net TCP/IP connects Centigram servers together using 10Base-T Ethernet. MESA-Net TCP/IP can use an existing private network, or it can send messages over a public network. The high bandwidth of Ethernet connections allows for a large volume of network traffic, providing users with network service that is almost indistinguishable from local messaging.

In order to use MESA-Net TCP/IP, a Centigram server also must have the VoiceMemo TCP/IP Interface optional feature installed. This optional feature

provides a single point of configuration for all TCP/IP applications on Centigram servers, such as MESA-Net TCP/IP and OneView.

Combined MESA-Net Async and MESA-Net TCP/IP

You can use both MESA-Net Async and MESA-Net TCP/IP in a MESA-Net network. Connections between any two nodes can be either MESA-Net Async or MESA-Net TCP/IP, but not both. Figure 1-2 shows a network that uses both MESA-Net options.
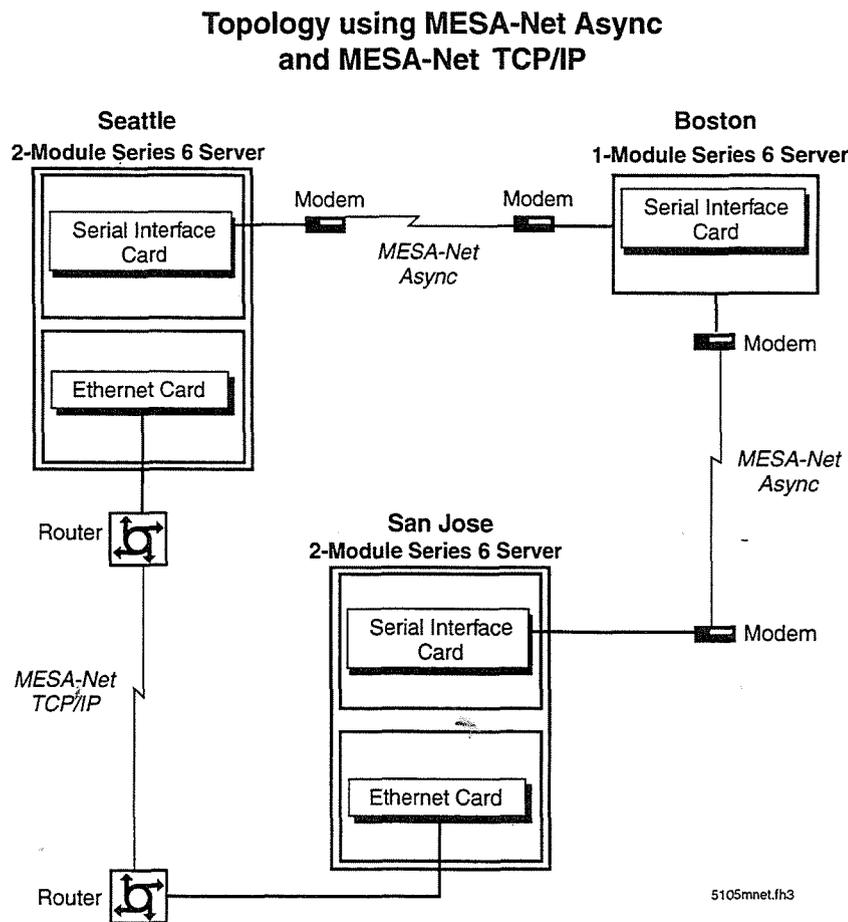
Figure 1-2 Mixed MESA-Net Async and MESA-Net TCP/IP Topology

Terms and Concepts

Terms related to MESA-Net are described in this section. Most of these concepts are discussed in more detail in later chapters.

Network Dialing Plan

The VoiceMemo dialing plan has characters to support network mailboxes. If an N or P precedes a number in a dialing plan position, it means that all mailboxes represented by that position are network mailboxes, and will be processed by the MESA-Net software. See Chapter 6 for more information about the network dialing plan.

Digits Translation Table

The Digits Translation Table determines which messages go to which node. All network messages are compared to this table before being sent to the appropriate node. See Chapter 5 for more information about the digits translation table.

Network Queues

Network messages are stored in local network queues until they are transmitted to remote nodes. Separate queues are kept for urgent and batch (non-urgent) messages to each remote node. Messages are queued until a message threshold is reached and a message delivery time window is open. The local node then initiates a connection with the appropriate remote node. See Chapter 7 for more information about network queues.

Answer and Originate Links for MESA-Net Async

MESA-Net Async uses dedicated ports on serial cards for answer and originate links. As the names imply, an originate link is used to initiate communications with another node on the system, and an answer link is used to accept calls from the originate links of other nodes on the system. You can configure up to 16 links per node (32 in Model 640 servers with the MESA-Net Async Load Share optional feature). MESA-Net Async uses these links to determine how to set up and break down connections between nodes. See Chapter 4 for more information about links.

Hardware Type

Each answer and originate link is assigned a hardware type (device driver) that allows MESA-Net to use different kinds of equipment to establish communications between nodes. Each hardware type contains the name of a hardware communication device and software instructions to set up, establish, and disconnect a telephone call to a remote system.

MESA-Net includes default hardware types for many popular devices, including Hayes-compatible modems. You can also create custom hardware types. You can define up to seven hardware types per system and assign different hardware types to different links. See Chapter 4 for more information about hardware types.

Network Node Table

To initiate a connection to a remote node, the local MESA-Net node must have all of the following information:

- the node number of the remote node
- whether the connection to the remote node is Async or TCP/IP
- the hardware type to use to reach the remote node (MESA-Net Async only)
- the string that must be outdialed to reach that particular node, or the IP address of the node
- whether access to the remote node is enabled or disabled

As described previously, MESA-Net uses the Digits Translation Table to find the node number of the destination node. The Network Node Table matches the node number of each remote node with its corresponding hardware type, outdial string (access code), and access status. See Chapter 5 for more information on the Network Node Table.

Network Class of Service

Network Classes of Service (NCOS) are used to control user privileges such as making or answering messages across the network. See Chapter 8 for more information on Network Class of Service.

Message Flow Through a MESA-Net Network

This section describes how a voice message flows through the MESA-Net network. From the sender's point of view, if Name Broadcast mailboxes are used, there is no difference between sending a message to a local mailbox and sending one to a remote mailbox. (Name Broadcast mailboxes provide name confirmation across the network.) When a user receives a message from a remote mailbox, he or she hears "Remote message from [name]" where [name] is the name of the remote mailbox owner.

Figure 1–3 is an overview of a message traveling from one node to another (San Jose to Boston). In this example, the dialing plan is configured such that mailbox numbers beginning with 8 are network numbers and that node 2 is Boston. In the discussion of the various MESA-Net functions in the following chapters, the inner workings of the network are discussed in more detail.

The following paragraphs explain some of the processing shown in Figure 1–3 in more detail.

1. The user addresses a message to a destination mailbox, records it, and presses X to send the message, just as if it were being sent to a mailbox on the same system.

2. The VoiceMemo software compares the leading digit of the destination mailbox with the dialing plan, where it finds an N or a P, indicating that the destination is a network mailbox.

3. The VoiceMemo software then checks the Network Classes of Service (NCOS) assigned to the sender's mailbox to see if the operation is permitted.

4. The leading digits of the mailbox number are compared with the prefixes stored in the Digits Translation Table, where the number of the destination node is found.

5. The VoiceMemo software checks the Network Node Table to be sure that the destination node is listed, and that access is enabled.

6. The message is put into the message queue that is waiting to be sent to that node.

7. The MESA-Net software checks the queue every thirty seconds to see if one of the queue thresholds has been reached, at which point it checks the Network Node Table for the hardware type, which provides the call setup instruction.

8. The connection is made, and messages are sent to the destination (remote) node.

9. The remote node uses the "digits to absorb" value to convert the mailbox number in the message header to a valid local mailbox by deleting the specified number of leading digits.

10. The remote node checks the size of the message to be sure that it does not exceed the node's network message limit. The remote node also checks the message size against the available space in the user's mailbox.

11. The remote node compares the Group Class of Service (GCOS) of the sending and receiving mailboxes, if the sender's Network Class of Service contains a feature that dictates this check. If the GCOSs match, or if they have even one group in common, the message is sent to the appropriate mailbox.

12. The receiving node converts the message timestamp (the message creation time) to local time and announces the converted time when the recipient plays the message.

San Jose

Series 6 Server. . .
Consults dialing plan
* *discovers that extensions beginning with "8" are network numbers*

Consults Digit Translation Table
* *matching prefix is 8 which indicates node 2 (Boston)*
* *digits to absorb is 2*

Consults Network Node Table
* *discovers that access to Boston is enabled*

Consults list of user privileges (NCOS)
* *discovers make operation allowed over network*

User presses M to make message

Enters extension 82100

User creates message

"Doreen, I'll be arriving in Boston 2:00 tomorrow."

Series 6 Server. . .
Queues message

User hears

"Your message sent"

Series 6 Server. . .
Gathers information about the link
* *Initializes originate port*

Consults Network Node Table
* *discovers the hardware type for Boston*
Establishes connection, sends message

Boston

Series 6 Server. . .
Confirms receipt of message

Consults digits to absorb flag
* *deletes first 2 digits*

Checks Mailbox 100
* *discovers mailbox is valid and not full*

Consults list of user privileges (GCOS)

Message delivered to Mailbox 100

Message Waiting Light
ON

5115flow

Figure 1-3 Sample MESA-Net Call Flow

13. A receipt, which says that the recipient has not played the message, is sent back to the sender. If the sender keeps the receipt, MESA-Net will issue a receipt update during the first communications session established between the nodes after the recipient has played the message. The receipt update announces the time that the message was played, converted to the sender's local time.

14. If the recipient decides to answer the message, or if there is a receipt, the node number and sender's mailbox number attached to the original message identify the destination mailbox on the originating node for return messages. Answers and receipts are not processed through the Digits Translation Table.

Overview of MESA-Net Installation and Configuration Tasks

The table below shows the tasks required to install and configure both MESA-Net Async and MESA-Net TCP/IP. The tasks are marked as being either for MESA-Net TCP/IP, MESA-Net Async, or Both. Use this table as a roadmap to guide you during installation and configuration.

Table 1-1 Overview of MESA-Net Tasks

Task	Reference information documented in...	Step-by-step procedure documented in...
(Both) Complete the pre-installation checklist for MESA-Net installation.	Chapter 1, Introduction	N/A
(TCP/IP) Install the Ethernet card	*VoiceMemo TCP/IP Interface Manual*	CP 2149 and CP 2150 in the *VoiceMemo TCP/IP Interface Manual*
(TCP/IP) Install and configure the VoiceMemo TCP/IP Interface optional feature	*VoiceMemo TCP/IP Interface Manual*	CP 6470 and CP 6471 in the *VoiceMemo TCP/IP Interface Manual*
(TCP/IP) Install the MESA-Net TCP/IP optional feature	Chapter 2 MESA-Net TCP/IP	CP 5402 in Chapter 2
(TCP/IP) Configure the MESA-Net TCP/IP software	Chapter 2: MESA-Net TCP/IP	CP 5718 in Chapter 2
(Async) Install the Serial 16/32 card or Smartcard and connect the cables	Chapter 3 MESA-Net Async	CP 3029, CP 3041 in Chapter 3
(Async) Configure the local communications device	Chapter 3 MESA-Net Async	CP (modem connections)

Table 1-1 Overview of MESA-Net Tasks (cont.)

(Async) Install MESA-Net Async and any additional optional features: • Link Enable • Parallel Links	Chapter 3 MESA-Net Async	CP 5402
(Async) Configure the hardware types	Chapter 4 Configuring MESA-Net Async Hardware and Links	CP 5732, CP 5733, CP 5734
(Async) Configure the links	Chapter 4 Configuring MESA-Net Async Hardware and Links	CP 5712, CP 5715, CP 5716
(Both) Configure the Network Node Table	Chapter 5 Configuring the Network Node Table	CP 5719, CP 5720, CP 5721, CP 5722
(Both) Configure the dialing plan	Chapter 6 Configuring Network Addressing	CP 5002 in the Reference and Configuration Manual
(Both) Configure the Digits Translation Table	Chapter 6 Configuring Network Addressing	CP 5724, CP 5725, CP 5726, CP 5727
(Both) Configure the network queue	Chapter 7 Configuring the Network Queues	CP 5729
(Both) Configure the network class of service	Chapter 8 Configuring the Network Class of Service	CP 5730
(Both) Enable network messaging for user mailboxes	Chapter 9 Configuring Network Mailboxes	
(Both) Try making a message to a remote mailbox to make sure that MESA-Net is up and running.	AIP System User Guide	AIP System User Guide

Pre-Installation Checklist

This section provides a checklist of tasks to do prior to MESA-Net installation and configuration.

> **Note:** Perform as many items on the checklist as possible two weeks before the scheduled MESA-Net installation. On the day of installation, verify that each checklist item has been done.

☐ Perform any tasks that result from the system sizing calculations performed by the sales engineer. For example, to accommodate MESA-Net resource needs, you may need to add another module, move line cards from one module to another, or add a hard drive. If you have any questions about sizing calculations, contact the sales engineer.

☐ Install VoiceMemo 6.0A or later software on the Centigram Series 6 server.

☐ Confirm that the VoiceMemo error log is free of errors. (Warnings or advisory messages are okay.)

☐ Obtain all of the necessary MESA-Net diskettes that have been properly serialized for your Centigram server:

 – MESA-Net Async optional feature
 – MESA-Net TCP/IP optional feature
 – Link Enable optional feature
 – Parallel Links optional feature

☐ If you are going to be using MESA-Net Async, verify that telephones plugged into the MESA-Net modems can get a dial tone, can make long distance calls, and will ring when a call is received.

☐ If you are going to be using MESA-Net TCP/IP, verify that the VoiceMemo TCP/IP Interface optional feature and hardware have been correctly installed and configured, and that a twisted-pair 10Base-T Ethernet connection has been installed near the Series 6 server.

☐ Determine which module and slot in the Centigram server you will install the external interface card in.

☐ Depending on your company spares policy, purchase a spare external interface card (serial card or ethernet card) to avoid extended network down time if the first one fails.

This procedure describes how to set up the following modems for use with MESA-Net Async:

- Telebit 2500 and World Blazer
- AT&T Paradyne 3810/3820
  US Robotics Courier V.34

In order to use the modem, you must also configure hardware types and links as described in Chapter 4.

Step	Reference

1. Physically attach the modem to the Series 6 server, either directly to a serial port or to a serial port option.

2. Reach the Network Reports Menu.   Menu Map 14

3. Check existing hardware types to see if your modem has been configured.

   Select: (H) Hardware Reports
   Prompt: REPORT OUTPUT ROUTING

   ```
   (C) Console (screen)
   (P) Console with pause
   (1) Printer A
   (F) File...
   (A) Append to file...
   (X) Exit (no report)

   If you need help later, type ?.

   COMMAND (C/P/1/F/A/X):
   ```
   Response: **C** to send the report to the console without pausing
   P to send the report to the console, pausing as the screen fills,
   1 to send the report to Printer A*,
   F to send the report to a file on the Series 6 server,
   A to append the report to an existing file on the Series 6 server, or
   X to exit report output options (no report).

   * This option list varies depending on server configuration.

   Prompt: Module number on which to create hardware type (1-4):
   Response: The module **number** where the modem is attached. After you specify a module number, the server displays the report to the output device you select.

4. Check the report to see if a hardware type was defined for your modem. Exit the Network Report menus.

5. If your modem has a hardware type specified, skip to the next step. Otherwise, configure a hardware type.   CP 5732, Ch. 4

Step	*Reference*

6. From the Network Maintenance Menu, reach the Modem Setup Menu. — Menu Map 13

7. Select the letter preceding the modem you want to configure.

Select: (M) Modem Setup Menu
Prompt: Enter Command (A/B/C/D/E/X):
Response: The **letter** corresponding to the modem you are configuring. No further input is necessary. Exit the Modem Setup Menu.

8. If you are configuring the ATT, or the Telebit modem, you are done. If you are configuring the US Robotics, Concord, or Microcom modems, find the section below for your modem and follow the instructions.

(((·))) Configure the US Robotics Modem

9. Set the DIP switches as follows:

SW#:	1	2	3	4	5	6	7	8	9	10
Position:	Up	Up	Down	Up	Down	Up	Up	Down	Up	Up

Turn the modem off and on to initialize the modem settings. You can now use the modem with MESA-Net Async.

Step   *Reference*

((⏺)) Configure the Concord Trellis 296 Modem

9. Set the DIP switches in Bank A as follows:

SW#:	1	2	3	4	5	6	7	8
Position:	Up	Down	Up	Up	Up	Up	Up	Up

Note: MESA-Net requires that switch 5 be set to "Up."

Turn the modem off and on to initialize the modem settings.

10. Program the modem by entering the following commands to it

2   MESA-Net TCP/IP

This chapter explains MESA-Net TCP/IP concepts and describes how to configure MESA-Net TCP/IP. Refer to the end of Chapter 1, Introduction, for an overview of all MESA-Net tasks.

MESA-Net TCP/IP connects Centigram servers together using TCP/IP over 10Base-T Ethernet or an appropriate wide-area network. MESA-Net TCP/IP can use an existing private network, or it can send messages over a public network. The high bandwidth of Ethernet connections allows for a large volume of network traffic.

MESA-Net TCP/IP requires an Ethernet card and the VoiceMemo TCP/IP Interface optional feature. VoiceMemo TCP/IP Interface optional feature If you have not already done so, install the hardware and software and configure the VoiceMemo TCP/IP Interface optional feature by following the instructions in the *VoiceMemo TCP/IP Interface Manual.* The rest of the information in this chapter assumes that you have completed those prerequisite steps.

MESA-Net TCP/IP Hardware

MESA-Net TCP/IP uses an Ethernet card (the EtherTPI-16+T) and twisted-pair Ethernet cable for MESA-Net communications. For complete reference information about the Ethernet card and cable, refer to the *Centigram Series 6 Technical Reference Manual.* For step-by-step instructions on installing the Ethernet Card and on connecting the Centigram server to Ethernet cable, refer to the *VoiceMemo TCP/IP Interface Manual.*

MESA-Net TCP/IP Configuration

MESA-Net TCP/IP uses certain information that is configured in the VoiceMemo TCP/IP Interface optional feature. You must be familiar with this information and you must have configured the VoiceMemo TCP/IP interface before starting to configure MESA-Net TCP/IP. This information, which is described in detail in the *VoiceMemo TCP/IP Interface Manual,* is:

- Module Number and Slot Number where the ethernet card is installed
- The Operation Mode of the card, either primary or secondary
- Whether the card is enabled or disable the Ethernet Card
- Ethernet Card Configuration (either Ethernet 1 or Ethernet 3)
- Domain Name
- Node Name

- Node IP Address
- Subnet Mask
- Physical Network Number
- Broadcast Address
- Gateway IP Address

When you configure MESA-Net TCP/IP, as described in the Procedures section of this chapter, you define the following parameters:

- The module number that contains the ethernet card to use for MESA-Net TCP/IP, and the number of the ethernet card in that module. You can only configure MESA-Net TCP/IP on one module of a multi-module Centigram server.

- The System Node Name, which is used by MESA-Net in reports.

- The System Local Node Number, which is used by MESA-Net to do message routing (see chapter 5 for information on configuring the Network Node Table).

- System Network Message Limit in number of minutes

- The number of Send and Receive Circuits (virtual circuits) to be used by MESA-Net. The number of circuits determines the throughput. You can configure a node with more of one type of circuit than the other, if needed.

Interaction of MESA-Net Async and MESA-Net TCP/IP

As mentioned in Chapter 1, you cannot configure both MESA-Net Async and MESA-Net TCP/IP in the same module of a Centigram Series 6 server. However, you can configure a Model 640 server with MESA-Net Async in one module and MESA-Net TCP/IP in another, and the server can then communicate with remote nodes running either type of MESA-Net.

Only one type of connection, Async or TCP/IP, can exist between any two nodes.

Task   *Procedure*

Configuring MESA-Net TCP/IP

This procedure describes how to configure the low-level MESA-Net TCP/IP parameters.

Step	Reference

1. Install the MESA-Net TCP/IP optional feature.   CP 5402

2. Reach the MESA-Net TCP/IP Menu.   Menu Map 15

3. Select the module on which to configure MESA-Net TCP/IP. The module must contain an ethernet card, and you cannot use the same module for MESA-Net Async.

   Select: (H) Host Number to configure
   Prompt: Host Number to configure = []:
   Response: The module **number (1-4)** on which to configure MESA-Net TCP/IP.

4. Choose the Ethernet card on which to configure MESA-Net TCP/IP.

   Select: (I) Ethernet Card Configuration
   Prompt: Ethernet Card to configure = []:
   Response: The **number** (1-2) of an enabled Ethernet card in the module.

5. Enter the system node name to be used in MESA-Net reports.

   Select: (N) System Node Name (0-15 chars) =
   Prompt: Node Name (0-15 chars) =
   Response: The **name** of the node.

6. Set the maximum length (in minutes) for a network message. The local node will reject messages that exceed this limit.

   Select: (M) System Network message limit (1-99)
   Prompt: Network message limit (1-99) =
   Response: The maximum **number** of minutes (1 to 99) for a network of message.

7. Enter the number of receive circuits.

   Select: (R) Receive Circuits =
   Prompt: Number of TCP/IP receive circuits (2-9) = []?
   Response: The **number** (2-9) of receive circuits to be used by MESA-Net.

8. Enter the number of send circuits.

   Select: (S) Send Circuits =
   Prompt: Number of TCP/IP send circuits (2-9) = []?
   Response: The **number** (2-9) of send circuits to be used by MESA-Net.

Step	Reference

9. Set the local node number, which is used to address and route MESA-Net messages.

   Select: (T) System Local Node Number (1-8191) =
   Prompt: System Local Node Number (1-8191) =
   Response: The **number**, from 1 to 8191, of the local node.

10. Verify your work by looking at the system-wide TCP/IP configuration.

    Select: (U) Show System Wide TCP/IP configuration

11. Exit to the VoiceMemo Configuration Main Menu to save your changes.

The procedure describes how to install an optional feature with the system online. Be sure the Optional Feature Diskette(s) and the Module Enable Diskette contain the serial number(s) for all disk(s) in the system.

Note: The serial number on the OneView Optional Feature diskette must match the serial number of the hard disk on which OneView is being installed. If you receive an error message about an incorrect serial number, contact your support organization.

CAUTION!

If you are loading a revision support disk (RSD), do it after completion of this procedure. Loading the RSD first, could create an incorrect configuration.

Step	*Reference*
1. Reach the System Maintenance Menu, then go to the System Maintenance Additional Options Menu.	Menu Map 12

2. Select the Add Optional Feature(s) program.

   Select: (A) Add Optional Feature(s)
   Prompt: Enter 'Y' to add optional features, 'N' to stop:
   Response: **Y** for Yes.

3. Install the optional feature.

   Prompt: Insert Optional Feature floppy disk in the floppy drive.
   Enter any key when ready:
   Response: Insert the Optional Feature diskette, then press **Enter**.

4. After you have installed the Optional Feature software, the system asks if you want to install another optional feature.

   Prompt: Do you want to install another optional feature?
   Response: **Y** to install another optional feature and continue from step 3,
   N if you are done installing optional features.

   The system automatically edits and saves the configuration files, then returns to the Additional Options Menu.

5. Exit the VoiceMemo Configuration Offline Menu. You see the following prompt:

   Prompt: Wait for message waiting queues to be empty?
   Response: **N** to continue.

Step	Reference
6. The following prompt appears: *Prompt:* Wait for paging queues to be empty? *Response:* **N** to continue.	
7. Exit to the VoiceMemo Configuration - Main Menu, then go to the VoiceMemo Configuration - Offline Menu.	Menu Map 2
8. Duplicate the active configuration. *Select:* (B) Duplicate Active Configuration	
9. Exit to the VoiceMemo Configuration - Main Menu and activate the configuration. *Select:* (A) Activate Configuration	

3 MESA-Net Async

MESA-Net Async connects Centigram servers together by means of direct connection, modems, and multiplexers (or any combination of these). MESA-Net Async is flexible to support the varied requirements of different sites and networks.

- For nodes with low network traffic volume, a simple MESA-Net Async installation enables two links. The node can connect to all other MESA-Net Async nodes on the network (up to the network maximum of 1500 nodes), but only two at any given time. The MESA-Net Async optional feature diskette contains all of the files needed to run basic Mesa-Net Async.

- The Multiple Links optional feature allows a node to simultaneously connect to as many as 16 nodes (32 for Model 640 servers). This feature is useful at centralized hub nodes. Different Link Enable optional feature diskettes (which used to be called the Link Lock diskettes) contains software to enable different numbers of links.

- The Parallel Links optional feature increases throughput by enabling multiple links between two nodes. The additional throughput can significantly speed up message delivery between high-traffic nodes. You enable this feature with the Parallel Links optional feature diskette.

- Model 640 servers with more than one module can provide fault-tolerance and balanced traffic load for MESA-Net Async. By installing the appropriate hardware in multiple modules, you can configure the Model 640 to support more links and balance the traffic load. In addition, one module can continue to process network traffic if the other modules are out of service. You must install a Link Enable diskette to support more than two links.

You install each of these optional features on the Centigram server by following the standard procedure for installing VoiceMemo optional feature software. You then must configure the appropriate answer and originate links on the server.

The rest of this chapter describes MESA-Net Async in greater detail, including information on the following topics:

- hardware options for MESA-Net connectivity
- a simple MESA-Net Async network
- multiple links

- multiple parallel links
- loadsharing

Note: For an overview of the tasks associated with installing and configuring MESA-Net Async, refer to the section "Overview of MESA-Net Tasks" at the end of Chapter 1.

MESA-Net Async Hardware Options

To support MESA-Net Async, you must install one or more expansion serial cards in *each* Series 6 server on the network:

- For the Model 70I, 120I, and 120S, you can use either a 4-port Smartcard or a Serial 16/32 card.
- For the Model 640, you must use the Serial 16/32 Card. If you are using MESA-Net Async Load Share on a Model 640, you can install Serial 16/32 Cards in the two module that will have MESA-Net links.

For complete reference information about the Smartcard, Serial 16/32 Card, and the RS232 cables, refer to the *Centigram Series 6 Technical Reference Manual.* That manual contains information about card and cable configuration, including jumper and switch settings, pin assignments, and common cable configurations.

For step-by-step instructions on installing the Smartcard and the Serial 16/32 Card, refer to the procedures in this chapter.

MESA-Net Async provides four hardware options for connecting Centigram servers together: direct connection, modems, multiplexers (discussed in Appendix B), and digital line adapters (CSU/DSU). A MESA-Net network can support any combination of these hardware options.

Direct Connection

A direct connection is defined as two Centigram servers connected to one another via MESA-Net without using an intermediary communications device, such as a modem.

You can use a direct connection to link servers that are collocated or geographically distant from one another. You can connect two collocated servers by using a 25-pin null modem RS232 cable. You can connect two remote servers by means of modems over a leased analog line, or with a CSU/DSU on a leased digital line. Figure 3-1 shows a MESA-Net Async direct connection.

San Jose Node 1   San Jose Node 2

| Series 6 Server | Originate Link on Expansion Serial Port 2 | Answer Link on Expansion Serial Port 1 | Series 6 Server |

Null Modem Cables

| | Answer Link on Expansion Serial Port 1 | Originate Link on Expansion Serial Port 2 | |
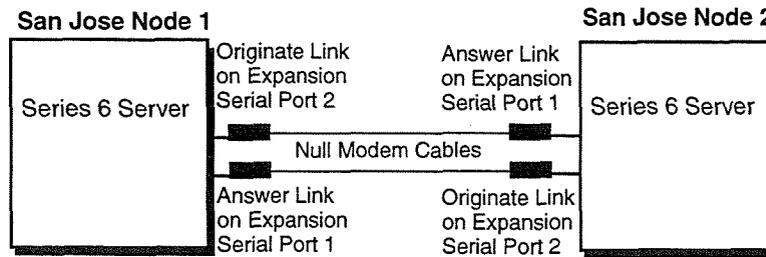
A direct connection between co-located nodes is made by connecting a null modem cable between an Originate Link on each node and an Answer Link on the other node.

5108mnet

Figure 3-1 MESA-Net Async Direct Connection

There is a procedure at the end of this chapter that describes how to make a MESA-Net Async direct connection.

Dial-up Connection

Most MESA-Net Async connections are made using modems. Currently, Centigram has certified the following modems for use with MESA-Net:

- Telebit T2500/World Blazer modem
- AT&T Paradyne 3810/3820 Plus (V.34)
- US Robotics Courier V.34/V.Everything

Each network serial port requires a modem, so you need at least two modems per Centigram server, one to answer messages and one to originate messages. Figure 3-2 shows a MESA-Net Async modem connection.

Seattle   Boston

| Series 6 Server | Originate Modem | Answer Modem | Series 6 Server |
| | Answer Modem | Originate Modem | |
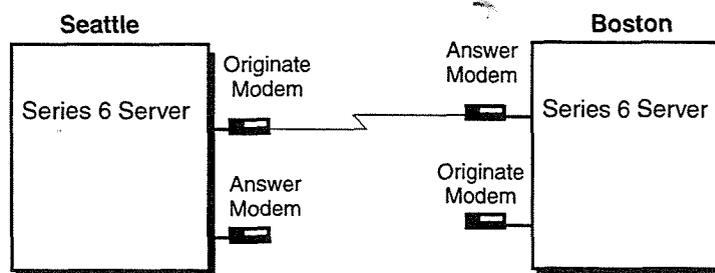
Regardless of which node originates a connection, queued messages are sent both ways.

5118mnet

Figure 3-2 MESA-Net Async Modem Connection

A Simple MESA-Net Async Network examples:

A basic MESA-Net Async node has just two links, with which it can simultaneously be connected to two other nodes via a direct connection or modems. If modems are used, each node must have at least two modems, one for originating calls and one for answering calls. One serial port on each system is configured as the originate link, the other as the answer link, as shown in Figure 3-3.

When the correct conditions are met, the node uses its originate link and modem to call the answer link on another other node and establish a connection. Once a connection is established, both nodes exchange messages intended for mailboxes on the other node. Regardless of which node initiates a connection, the MESA-Net software operates in full-duplex mode, sending messages in both directions.

Seattle

Series 6 Server

Answer Modem   Originate Modem

Boston

Answer Modem

Series 6 Server

Originate Modem

Originate Modem   Answer Modem

Basic MESA-Net Async allows each node to be connected to two other nodes at the same time. Here, Boston called San Jose, and San Jose called Seattle.   5101mnet

Series 6 Server

San Jose
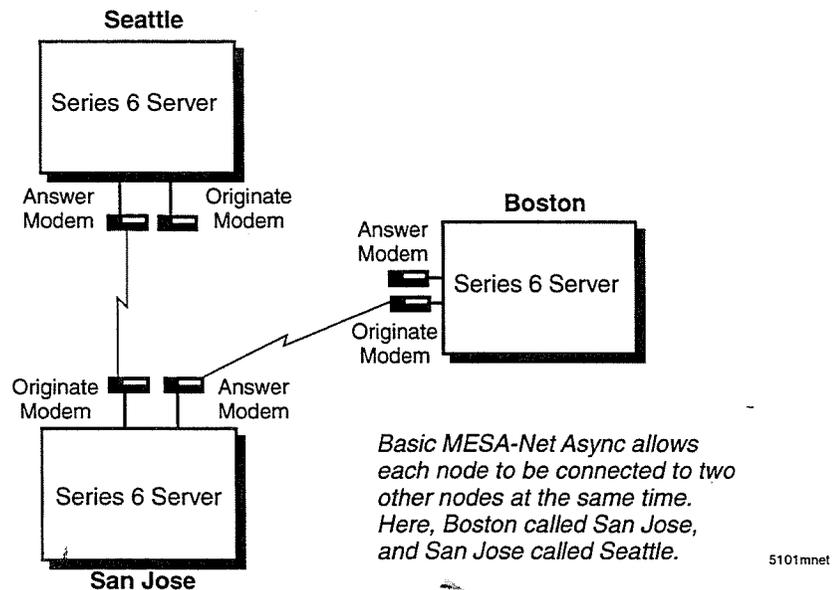
Figure 3-3 A Simple MESA-Net Async Network

Any node can call any other node. Each node initiates network connections based on time of day, the number of messages waiting to be sent, the priority of the messages, or a combination of these factors.

For step-by-step instructions on installing and configuring the MESA-Net Async optional feature, refer to CP 5735, Configure MESA-Net Async.

Multiple Links

The Link Enable optional feature allows a Centigram server to simultaneously connect to more than two other servers, as shown in Figure 3-4. (However, one node cannot originate more than one link to another node unless the Parallel Links

optional feature is installed.) The maximum number of multiple links is 16 (32 in a two modules of a Model 640 server configured for Load Share). Each link requires an additional port on either the Smartcard or the Serial 16/32 card.

With multiple links, an originate link can be configured to make calls to any other node on the network, or it can be dedicated to a single node for high-traffic situations. An answer link can receive calls from any other MESA-Net Async node.
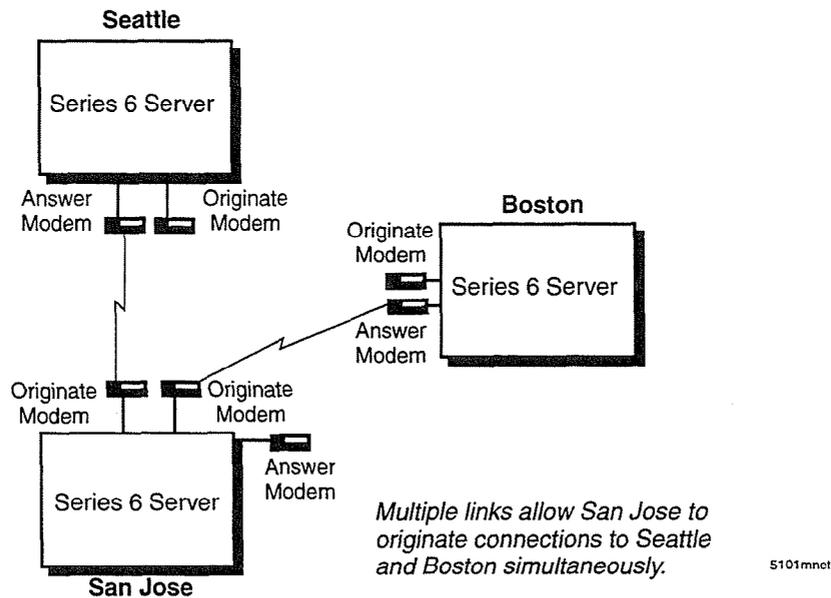
Figure 3-4 MESA-Net Async with Multiple Links

Parallel Links

When two Centigram servers need to exchange a lot of messages, a single link may not be able to carry all of the traffic in a timely manner. The Parallel Links optional feature for 6.0 allows MESA-Net Async servers to have up to 8 links for exchanging messages between any two nodes, as shown in Figure 3-5. These parallel links require additional ports on the Smartcard or Serial 16/32 card. The links can be either dial-up or direct connections.

Parallel links allow more than one link between
two nodes, thereby increasing throughput.
(Other modems on both nodes not shown.)   5103mnet
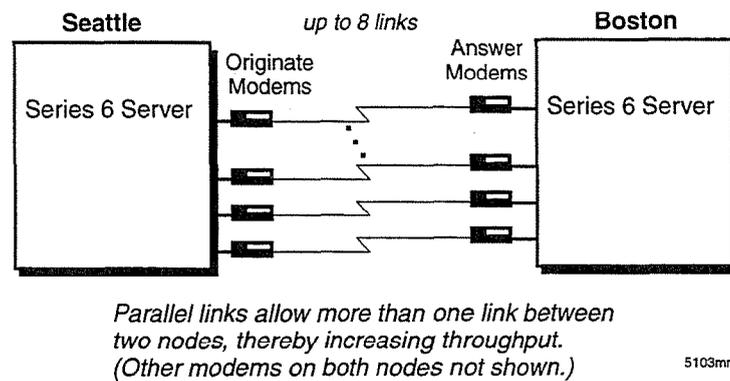
Figure 3-5   MESA-Net Async with Parallel Links

With Parallel Links, the originating node first establishes a single connection to a
remote node and begins transferring messages. Then, as long as there are still
messages to be sent, the originating node establishes additional connections at
specified intervals to increase bandwidth. For example, with an interval (delay) of 10
minutes, the originating node creates a new connection every 10 minutes until the
maximum number of parallel links is reached, or until no more originate links are
available. With a delay of 0, the originating node creates a new connection as soon
as the previous one succeeds.

You can define the maximum number of parallel links and the parallel link delay—
the number of minutes that an existing connection must be open before another link
is established.

Both the originating and answering nodes must have the Parallel Links optional
feature installed, and both servers must have VoiceMemo version 5.03 or later.

For step-by-step instructions on installing and configuring the Parallel Links optional
feature, refer to CP 5711, Configure MESA-Net Async Parallel Links, in Chapter 4.

MESA-Net Async Load Share

VoiceMemo Release 6.0 provides a new feature for MESA-Net Async called Load
Share. Load Sharing allows you to configure links on more than one module in a
Series 6 server Model 640, as shown in Figure 3-6, rather than restricting links to
module 1. Each module is limited to a total of 16 links.

Load sharing has the following advantages:

- There is a built-in fault tolerance mechanism within MESA-Net. For
  example, if MESA-Net is configured in modules 1 and 2, and module 2 is
  taken out of service, network messaging continues in module 1.

- You can distribute MESA-Net processing by offloading some of the links to another module. For example, you can configure two modules with 8 links each rather than configuring 16 links in one module. Load distribution helps alleviate system resource problems (such as prompt slowdowns) that can occur when MESA-Net is competing with integrations or with other applications installed in the same module.

- You can now have a total of 32 MESA-Net links on your Centigram server (16 links for each of two modules). This is particularly significant at large sites that do an extensive amount of messaging and that may need the additional MESA-Net traffic capacity.
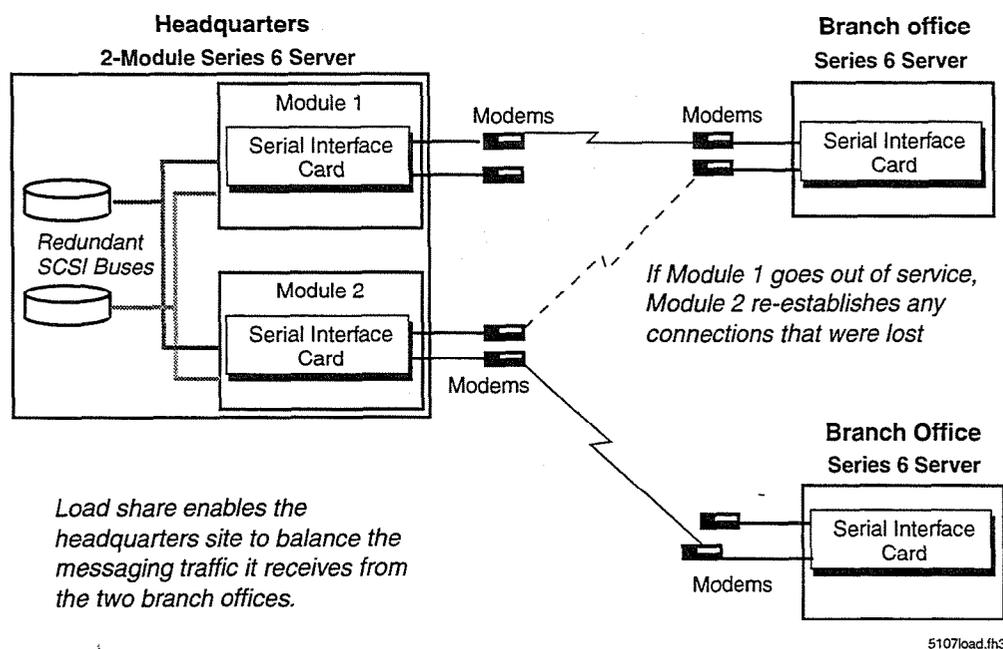
Figure 3-6 MESA-Net Async Load Share

MESA-Net Async Load Share requires the Multiple Links optional feature and a Serial 16/32 card for each module that will connect to the network.

Note: Do not confuse the MESA-Link cards and cables with MESA-Net. MESA-Link cards and cables connect the modules *within* a Model 640 server. MESA-Net connects *between* Centigram servers.

For step-by-step instructions on installing and configuring the MESA-Net Async Load Share optional feature, refer to CP 5710, Configuration of MESA-Net Async Load Share.

Utilizing MESA-Net Scalability

You can combine the different MESA-Net options, such as Parallel Links and Multiple Parallel Links, in your MESA-Net network to meet the requirements of each site and network, as shown in Figure 3-7. By installing the right optional features and hardware at each site, you can correctly size nodes for everything from low-traffic satellite offices to high-traffic network hubs.
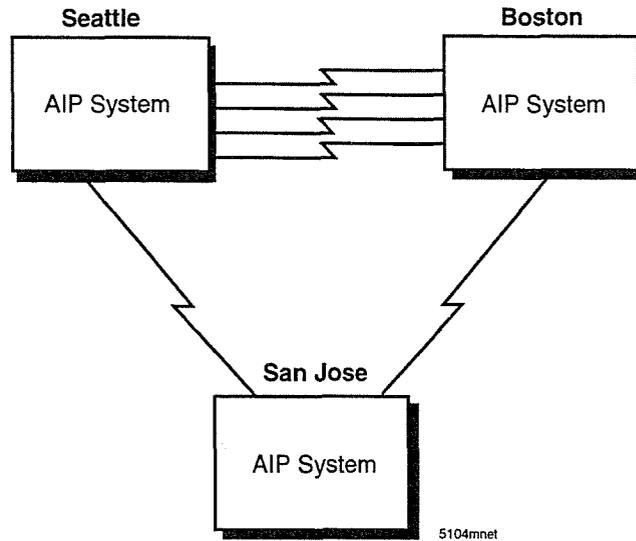
Figure 3-7 MESA-Net Async with Multiple Links and Parallel Links

Task   *Procedure*

MESA-Net Async Installation, Configuration, and Connection

This procedure describes how to install a Serial 16/32 card serial interface in a Series 6 server.

Note: A Serial 16/32 card and a Smartcard cannot be installed in the same server module. However, they can be installed in different modules in a Model 640. Only one Serial 16/32 card can be installed in each server module.

If you are replacing a Smartcard with a Serial 16/32 card, you must move all existing cables and applications that use the Smartcard to the Serial 16/32 card. Be sure to put the cables in the same order on the Serial 16/32 card as they were on the Smartcard; the cable that was connected to Port 1 on the Smartcard must be moved to Port 1 on the Serial 16/32 card.

DANGER!

Disconnect the system from its power source before connecting cables, components, or both.

CAUTION!

Protect your system from ESD damage during handling of all components.

WARNING!

This procedure requires that you shut down the module resulting in an interruption to call processing on the module. Centigram recommends that you perform this procedure during periods of low call traffic.

Step   *Reference*

((⋮)) Observe Precautions

1. Put on a grounded wrist strap attaching the other end to the Series 6 server. Doing so protects the component from electrostatic discharge.

2. Shut down the system and turn off the power, if you have not already done so.

CAUTION!

Removing a component while the power is on can severely damage both the component you are working on and others.

Step	Reference

3. Wait one minute after you turn off the power before you remove any components. The hard disk should stop spinning and be quiet.

4. When removing a component, place it on a non–conductive surface, such as an anti–static bag. Make sure you have the anti–static bags required before you begin.

((:)) Install the Serial 16/32 card Host Adapter

5. Remove the cover on the system. On a Model 640, remove the front panel of the CPU assembly.

6. Using the plastic loops, remove the MVIP cable. You only need to remove it from enough cards so that you can install the Serial 16/32 card.

7. Configure the Serial 16/32 card host adapter. *TR 1908, Tech Ref Manual*

8. Pick up the Serial 16/32 card host adapter with the connector facing away from you.

9. Identify the correct slot in the card cage for the Serial 16/32 card as defined in the Technical Reference.

10. Insert the host adapter into the alignment groove.

11. Slide the host adapter along this groove until the host adapter connector is touching the corresponding connector on the backplane.

12. Be sure that the two connectors are properly aligned, then press firmly on the edge of the host adapter until the connectors are fully seated.

13. Tighten the screw that holds the host adapter in the card cage.

14. Replace the cover on the system. On a Model 640, replace the front panel on the CPU assembly.

((:)) Install the DigiCHANNEL Ports Module(s)

15. Place the DigiCHANNEL ports module(s) next to the Series 6 server on a tabletop or shelf. If you are installing two modules, you can stack them one on top of the other.

If you are installing the Serial 16/32 card in a rack environment, you can place the ports modules on a utility shelf next to the Model 640.

> **WARNING!**
>
> Never connect or disconnect the EBI In or Out Cable when the system power is on.

Step   *Reference*

16. Plug one end of the 12' EBI cable into the Serial 16/32 card host adapter card and the other end into the connector on the DigiCHANNEL ports module labeled "EBI IN." Figure 1 shows the Serial 16/32 card installed in a Model 640.

17. If you are installing two DigiCHANNEL ports modules, plug one end of the 18" cable into the "EBI OUT" connector on the first ports module, and the other end into the "EBI IN" connector on the second ports module.

> **Note:** The DigiCHANNEL ports modules do not need an external power supply when connected to a Series 6 server.
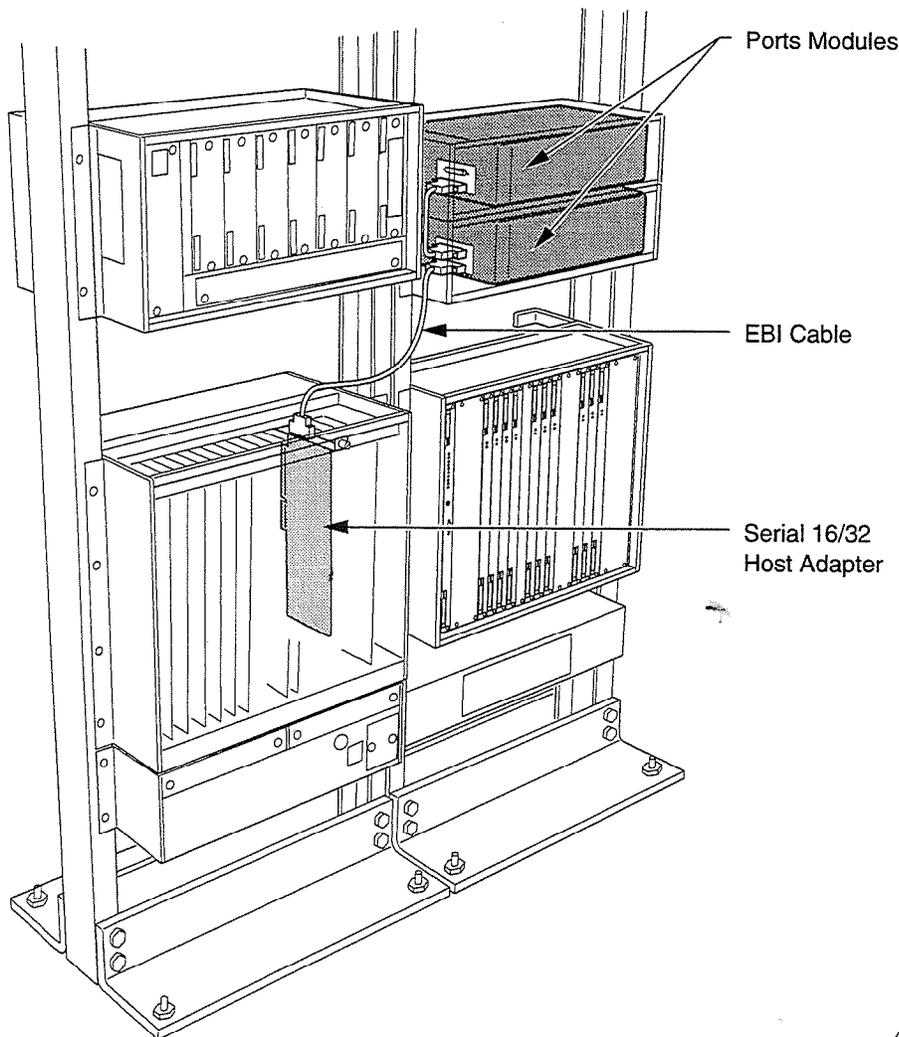
4071vm6

Figure 1 Model 640 Serial 16/32 Card Connections

(((:))) **Configure the VoiceMemo Software**

18. Turn on the system power and wait for the system to initialize.

Step	Reference

19. Reach the Smart Card Table Allocation Menu from the Offline Configuration Menu.

20. Identify the module (host) that contains the Serial 16/32 card.

    Select: (H) Current Host Number
    Prompt: Current Host Number =
    Response: The **number** (1-4) of the module that contains the Serial 16/32 card host adapter card.

21. Set the card type to recognize the Serial 16/32 card.

    Select: (E) Card type [0 - Z80, 1 - RISC]
    Prompt: Smart card type [0 - Z80 1 - XEM RISC] = [0]
    Response: **1**

22. Set the number of serial interface cards in the module.

    Select: (N) Number of cards on this host.
    Prompt: Number of Cards on this Host =
    Response: **1**

23. Set the Serial 16/32 card as the first serial interface card in the module.

    Select: (C) Current Card Number
    Prompt: Current Card Number =
    Response: **1**

24. Set the number of ports on the Serial 16/32 card.

    Select: (P) Number of Ports on this card
    Prompt: Number of Ports on this Card =
    Response: **16** if the Serial 16/32 card host adapter is connected to one ports module,
            32 if it is connected to two ports modules.

    Note: The Serial 16/32 card does not require a software interrupt, and ignores any value that is set.

25. Exit to save your changes to the configuration.

26. Activate the configuration to start the Serial 16/32 card.

27. Assign the Serial 16/32 card ports to applications that require a high-speed serial interface

    Follow the instructions in your optional feature documentation to assign the Serial 16/32 card serial ports just as you would assign ports for a Smartcard. The serial ports on the first DigiCHANNEL ports module are configured as $cti1 - $cti16. The serial ports on the second DigiCHANNEL ports module are $cti17 - $cti32.

This procedure describes how to install a Smartcard serial interface in a Series 6 server.

Note: You cannot install both a Smartcard and a Serial 16/32 card in the same server module. However, you can install them in different modules in the same Model 640 server. You can install a maximum of three Smartcards in any one module.

DANGER!

Disconnect the system from its power source before connecting cables, components, or both.

CAUTION!

Protect your system from ESD damage during handling of all components.

WARNING!

This procedure requires that you shut down the module resulting in an interruption to call processing on the module. Centigram recommends that you perform this procedure during periods of low call traffic.

Step	Reference

Observe Precautions

1. Put on a grounded wrist strap attaching the other end to the tower or rack. Doing so protects the component from electrostatic discharge.

2. Shut down the system and turn off the power, if you have not already done so.

CAUTION!

Removing a component while the power is on can severely damage both the component you are working on and others.

3. Wait one minute after you turn off the power before you remove any components. The hard disk should stop spinning and be quiet.

4. When removing a component, place it on a non–conductive surface, such as an anti–static bag. Make sure you have the anti–static bags required before you begin.

Step	Reference

(((·))) Install the Smartcard

5. Remove the cover on the system. On a Model 640, remove the front panel of the CPU assembly.

6. Using the plastic loops, remove the MVIP cable. You only need to remove it from enough cards so that you can install the Smartcard.

7. Configure the Smartcard.

    Reference: TR 1909, *Tech Ref Manual*

8. Pick up the Smartcard with the connector facing away from you.

9. Identify the correct card cage slot for the Smartcard as defined in the Technical Reference.

10. Insert the Smartcard into the alignment groove.

11. Slide the Smartcard along this groove until its connector is touching the corresponding connector on the backplane.

12. Be sure that the two connectors are properly aligned, then press firmly on the edge of the Smartcard until the connectors are fully seated. Figure 1 shows the Smartcard installed in a Series 6 Server Model 640.

13. Tighten the screw that holds the Smartcard in the card cage.

14. Replace the cover on the system. On a Model 640, replace the front panel on the CPU assembly.

15. If you are installing a two–port Smartcard, connect the 9–to–25 pin cables to the connectors on the card faceplate.

16. If you are installing a four–port or eight–port Smartcard, connect the octopus cable to the connector on the card faceplate.

17. Connect external serial devices, such as PBXs and modems, to the DB–25 connectors. If necessary, use additional cables to connect the devices (total length not to exceed 25 feet). Note the Smartcard connector numbers used for each connection.

Step   *Reference*

Octopus Cable
(4 port shown)
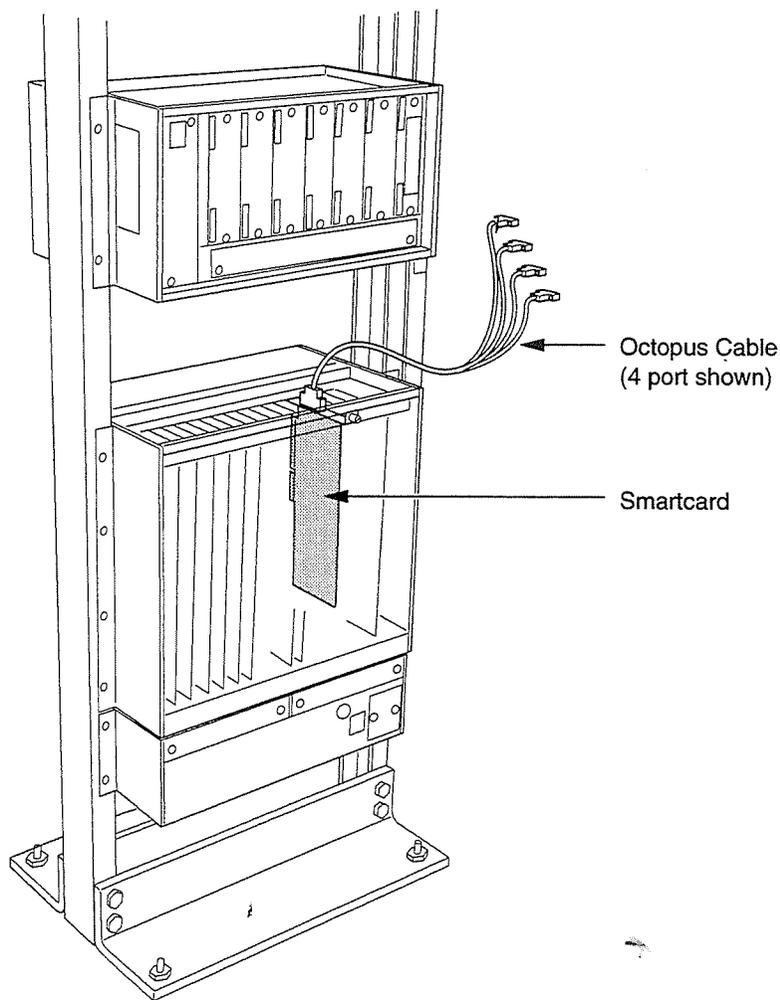
Smartcard

4072vm6

Figure 1   Model 640 Smartcard Connections

(((·))) Configure the VoiceMemo Software

18. Turn on the system power and wait for the system to initialize.

19. Reach the Smart Card Table Allocation Menu from the Offline Configuration Menu.

20. Identify the module (host) that contains the Smartcard.

    Select: (H) Current Host Number
    Prompt: Current Host Number =
    Response: The **number** (1–4) of the module that contains the Smartcard.

Step	*Reference*

21. Set the card type to recognize the Smartcard.

   Select: (E) Card type [0 - Z80, 1 - RISC]
   Prompt: Smart card type [0 - Z80 1 - XEM RISC] = [0]
   Response: **0**

22. Set the number of serial interface cards in the module.

   Select: (N) Number of cards on this host.
   Prompt: Number of Cards on this Host =
   Response: The **number (1–3)** of Smartcards installed in the module identified in
   step 20.

23. Identify the card that you just installed in the module.

   Select: (C) Current Card Number
   Prompt: Current Card Number =
   Response: The **number (1–3)** of the Smartcard just installed.

24. Set the number of ports on the Smartcard.

   Select: (P) Number of Ports on this card
   Prompt: Number of Ports on this Card =
   Response: **2, 4,** or **8,** depending on the card installed.

25. Set the software interrupt for the Smartcard.

   Select: (I) Interrupt Number of Current Card
   Prompt: Interrupt Number for this Card =
   Response: **5** if the Smartcard is installed in slot 10,
   14 if the Smartcard is installed in slot 11,
   15 if the Smartcard is installed in slot 9.

26. Exit to save your changes to the configuration.

27. Activate the configuration to start the Smartcard.

28. Assign the Smartcard ports to applications that require a serial interface.

   The first Smartcard serial port is addressed as $cti1 and the ports are numbered
   sequentially up to the number of ports on the card (such as $cti1–$cti8 on an
   eight-port Smartcard). If there is more than one Smartcard installed in the Series 6
   server, the addressing for the ports on the second and third cards continues the
   sequence from the first card (such as $cti9–$cti16 for a second eight–port
   Smartcard).

   Be sure to program the Smartcard ports that are physically connected to external
   devices; match the logical device name ($cti1–n) to the physical port number (1–n).

Configure MESA-Net Async Load Share

This procedure describes how to configure MESA-Net Async Load Share. You can only enable this feature on a multiple-module Series 6 Server Model 640. Before starting this procedure, you must have installed Serial 16/32 cards in both modules that will carry MESA-Net traffic and configured the serial ports.

Step	Reference
((•)) Distributing Existing Links Onto Other Modules	
1. Install the Link Enable optional feature.	CP 5402, Ch. 2
2. If you are moving existing links to other modules (for fault tolerance or load balancing, delete the links on the current module.	CP 5713
3. Create new links on the appropriate module or modules and set the link parameters.	CP 5712

Configure MESA-Net Async

This procedure describes how to configure basic MESA-Net Async (also called MESA-Net Basic). Before starting this procedure you must have installed a Serial 16/32 card or a Smartcard and configured the serial ports.

Step	Reference

1. Install the MESA-Net Async optional feature. — CP 5402, Ch. 2

2. Reach the MESA-Net Async Network Menu. — Menu Map 15

3. Select the module on which to configure MESA-Net Async. The module must contain an expansion serial card.

   Select: (H) Module Number to configure
   Prompt: Host Number to configure = []:
   Response: The module **number (1-4)** on which to configure MESA-Net Async.

4. Set the number of MESA-Net Async links in the module. You must have enough expansion serial ports installed to support the links.

   Select: (P) Number of links for this module
   Prompt: Number of links for this module =
   Response: The **number** (1-16) links in the module. Note that the maximum number of links on your server may be less than 16, depending on the Link Enable disk that has been installed.

5. If desired, change the link type (answer or originate) of any link.

   Select: (L) Link Number
   Prompt: Enter link number
   Response: The **number** (1-8) of the link you want to change.

   Select: (A) Answer link / Originate link (a/o)
   Prompt: Answer link / Originate link (a/o)
   Response: **a** to make the link an Answer link, or
   o to make the link an Originate link.

6. Set the local node number, which is used to address and route MESA-Net messages.

   Select: (N) Local Node Number (1-8191) =
   Prompt: System Local Node Number (1-8191) =
   Response: The **number**, from 1 to 8191, of the local node.

Step	*Reference*

7. Enter the system node name to be used in MESA-Net reports.

    Select: (S) Node Name (0-15 chars) =
    Prompt: Node Name (0-15 chars) =
    Response: The **name** of the node.

8. Set the limit on the longest network message that the node will accept.

    Select: (M) System Network message limit (1-99)
    Prompt: Network message limit (1-99) =
    Response: The maximum message length (in **minutes**) that the node will accept.

9. Verify your work by looking at the Module/Link/Mode configuration.

    Select: (C) Show Module/Link/Mode Configuration

10. Exit to the VoiceMemo Configuration Main Menu to save your changes.

This procedure describes how to set up a direct connection between MESA-Net Async nodes. You must also configure hardware types and links as described in Chapter 4.

Step	Reference

1. Physically attach a null modem cable to each Series 6 server, either directly to a serial port or to a serial port option.

2. Reach the Network Reports Menu. — *Menu Map 14*

3. Check existing hardware types to see if your modem has been configured.

   Select: (H) Hardware Reports
   Prompt: REPORT OUTPUT ROUTING

   ```
   (C) Console (screen)
   (P) Console with pause
   (1) Printer A
   (F) File...
   (A) Append to file...
   (X) Exit (no report)

   If you need help later, type ?.

   COMMAND (C/P/1/F/A/X):
   ```
   Response: **C** to send the report to the console without pausing
   P to send the report to the console, pausing as the screen fills,
   1 to send the report to Printer A*,
   F to send the report to a file on the Series 6 server,
   A to append the report to an existing file on the Series 6 server, or
   X to exit report output options (no report).

   * This option list varies depending on server configuration.

   Prompt: `Module number on which to create hardware type (1-4):`
   Response: The module **number** where the modem is attached. After you specify a module number, the server displays the report to the output device you select.

4. Check the report to see if a hardware type was defined for a direct connection. Exit the Network Report menus.

5. If your modem does not have a hardware type specified, configure a hardware type for a direct connection. — CP 5732, Ch. 4

4 Configuring MESA-Net Async Hardware and Links

To set up and administer a MESA-Net Async network, you must understand the association between communication devices, hardware types, and links.

Communication Devices are the modems, cables, and other hardware used to actually connect MESA-Net nodes, as discussed in Chapter 2.

Hardware Types define the commands that MESA-Net must use to talk to the communications devices, such as Hayes commands for Hayes-compatible modems. Hardware types are explained in detail in this chapter.

Links are configuration entities that associate hardware types with communication devices on a specific serial ports, thus allowing MESA-Net to use the correct commands with each device. You also set some other communication parameters during link configuration. This chapter explains links in detail and contains procedures for configuring links.

Working With Hardware Types

MESA-Net software uses device drivers to talk to a variety of communication devices, such as modems and direct connections. Each of these device drivers is called a hardware type. Each hardware type defines originate actions, answer actions, disconnect actions, and a line drop signal specification.

- Originate actions are used by originate links to initiate communications channels with other nodes.

- Answer actions are used by answer links to accept calls from another node.

- Disconnect actions are used by both originate and answer links to terminate communications with another node.

- The line drop signal is the signal that the local device monitors to detect when a link goes down.

You assign a hardware type to each link and to each remote node (see the Network Node Access Table in Chapter 5). When the MESA-Net software needs to reach a remote node, it looks up the hardware type assigned to that node and then looks for a link that has the same hardware type, as shown in Figure 4-1.

```
NETWORK NODE ACCESS TABLE          LINK INFORMATION

Node   Name     Hardware Type      HOST   LINK   MODE    HARDWARE
  1    Chicago  ⟨ 2 = Telebit ⟩      1      1     ans     2 = Telebit
  2    Dallas     2 = Telebit        1      2   ⟨ orig    2 = Telebit ⟩
  3    New York   3 = TCP/IP         .
  .                                  .
  .                                  .
  .
```
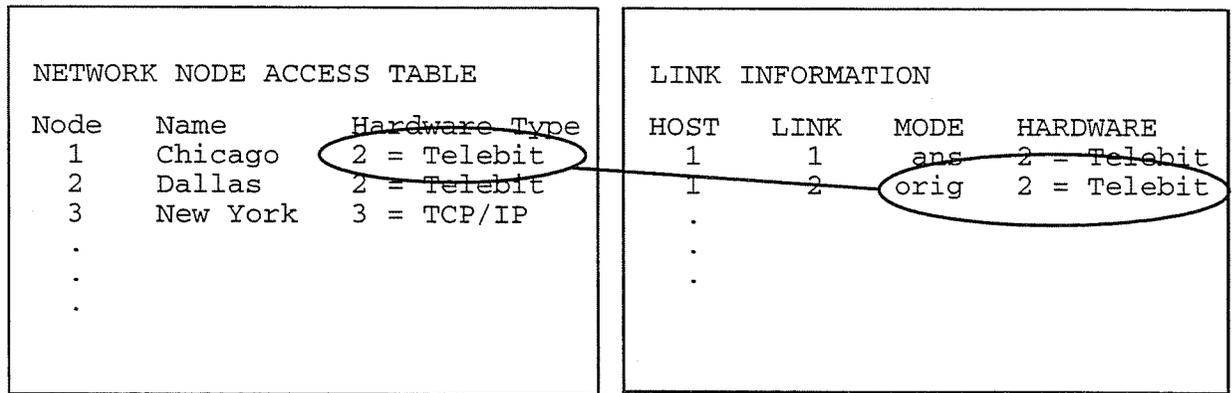
Link 2 will be used to make calls to Chicago, because
it is the first originate link with hardware type 2.

5120mnet

Figure 4-1   Hardware Types, Nodes, and Links

You can assign a hardware type to more than one link, provided that the links have the same type of communication device. The Parallel Links optional feature requires that all links that are used in parallel to reach a remote node have the same hardware type. Because the MESA-Net software associates a hardware type with each remote node and not a specific link, it uses any link that has the right hardware type to reach a node.

If your MESA-Net Async node has two different communications devices connected, you must define two hardware types. (If both devices use the same command sets, you may only need one hardware type.) Figure 4-2 shows a node that uses two different hardware types, one for direct connection to a co-located node and another for dial-up connections to remote nodes.

Seattle

Series 6 Server

Dial-up Connections
through Modems -
Hardware Type 1

Series 6 Server

Series 6 Server

Direct Connections through
Expansion Serial Ports -
Hardware Type 2

San Jose Node 1   **San Jose Node 2**

5119mnet
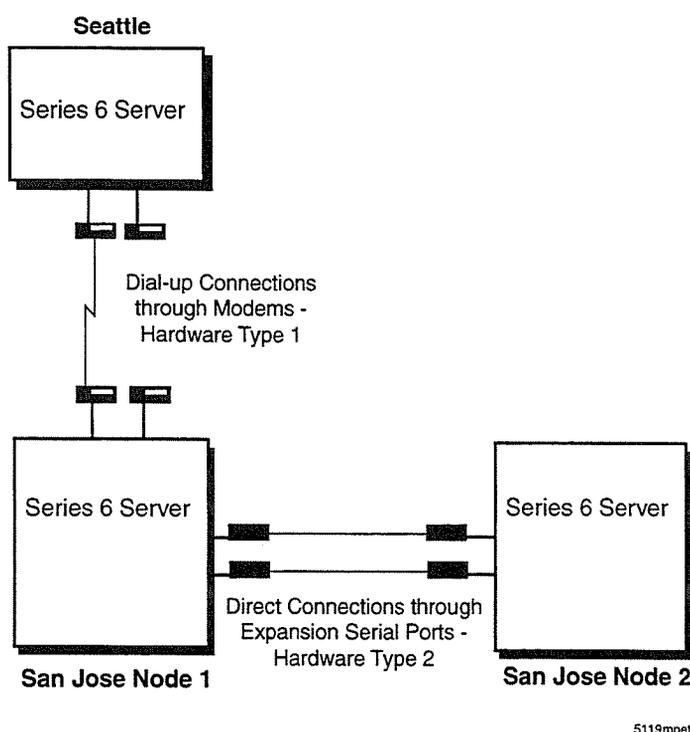
Figure 4-2 Hardware Types for Communications Devices

If your MESA-Net Async network plan includes dedicated links between nodes, you
can use hardware types to make the network configuration easier to administer. You
can create a hardware type to reach each remote node, and use the same hardware
type numbers on every node. For example, you could define hardware type 1 on
each node with the actions required to originate calls to Seattle, hardware type 2 with
the actions required to originate calls to Houston, and so on.

If a MESA-Net Async node uses more than one direct connection, you must use a
different hardware type for each one. If you assigned all of the direct connections to
the same hardware type, the MESA-Net software would always try to use the first
link that has that hardware type to reach all of the nodes, but that link is directly
connected to only one node. Assigning a different hardware type to each direct
connection and assigning each of those hardware types to a specific link provides the
correct connection to each node.

Assigning Default Hardware Types

MESA-Net Async software contains eleven default hardware types that are pre-
programmed to support specific communications devices:

- Concord 296-2 modem
- Concord Dialaccess 296 modem
- Microcom QX/V.32C modem

4-3

- Tellabs 331-D Xplexer
- Direct connection
- Telebit T2500/World Blazer modem
- XyLoGiC AnneX Three
- HT Communications P4004 DSU
- Voicetel NIB
- AT+T Paradyne 3810/3820 Plus (V.34)
- US Robotics Courier V.34

To use one of these default hardware types, you simply assign a device number to the hardware type through the VoiceMemo Hardware Type Menu. You can assign up to seven device numbers on each MESA-Net node, each one associated with a specific communications device to originate and answer calls. For step-by-step instructions on assigning default hardware types, refer to CP 5732 in the procedural part of this chapter.

(Do not get confused between the nine default hardware types and the seven assigned hardware types. The default hardware types are simply device drivers available for use. You choose to use one or more of the default hardware types, or one you modify or create yourself, by assigning it to one of the seven device numbers available on each module.)

Modifying or Creating a Hardware Type

If the communications equipment used at a site requires actions that are similar to one of the default hardware types, you will save time if you modify a default hardware type rather than create a new one. The originate actions, answer actions, disconnect actions, and line drop signals for each of the default hardware types are provided in Appendix A. By comparing the programming of the default hardware types with the programming required for your communications equipment, you can select the best one to start with.

If you do not want to modify an existing hardware type, you can create a new hardware type by defining all of the actions required for MESA-Net Async to work with a certain communications device.

Note: Centigram only supports the use of the communications devices tested by Centigram and listed in this chapter. You may have unpredictable results if you use other hardware.

The worksheet in this chapter is designed to help you gather the information that you need to modify or create a hardware type. Instructions for modifying a default hardware type are described in CP 5733, and instructions for creating a new hardware type are described in CP 5734 in the procedural portion of this chapter.

To modify an existing hardware type or create a new hardware type to work with your communications equipment, you must have the manufacturer's documentation that defines the protocols required for the equipment. You must also be familiar with the commands used by the MESA-Net hardware types, as described in the following sections.

Originate Actions

Originate actions are the steps that an originate link takes to connect with an answer link of another node on the network. Whenever a node originates a call, it performs the originate actions of the hardware type associated with the destination node. The originate actions are usually comprised of modem commands, dial strings, and sleep timeouts.

The originate actions usually include the step, "Send access code," which instructs the originate link to send the dial string (phone number) of the destination node to the modem. This command allows you to use the same hardware type for all nodes that have the same communications equipment. For example, if a network consists of nodes that use the same type of dial-up modem, each link uses the same answer and disconnect actions, and the initial steps used to originate a call are identical. The single variable is the different telephone number to reach each remote node. If "send access code" is programmed as the appropriate step of the originate actions, every node can have the same hardware type; the telephone number of each destination node can be read from the node table when a call is made to that node.

Answer Actions

Answer actions are used only by answer links. Answer actions leave the port assigned to the answer link waiting for the string of characters (usually "connect") from the local device that indicates that another node wants to establish communications. The MESA-Net software then waits for a software message from the originating node. After messages queued for a node have been sent and the systems have disconnected, the answer link performs the answer actions to reset the port to the wait state.

Disconnect Actions

Disconnect Actions are the steps that both the originate link and the answer link use to break off communications with another node. Disconnect actions are constructed using the same commands as originate and answer actions, listed in Table 4-1.

Action	Valid Values	Timeout	Explanation
Set Signal Hi Set Signal Lo	DTR (pin 20) RTS (pin 8)	n/a	Set Signal Hi sets the voltage on either the DTR or RTS pin to +12V. Set Signal Lo sets the voltage on the specified pin to -12V.
Wait Signal Hi Wait Signal Lo	DTR (pin 20) RTS (pin 8) CTS (pin 5) DSR (pin ??) CD (pin ??) RING	0-255 seconds	Waits the specified amount of time to see +12V (Wait Signal Hi) or -12V (Wait Signal Lo) on the specified pin before going on to the next step in the action sequence. If Wait Signal Hi is set to RING, the modem waits to see ringing voltage. If the timeout is exceeded, the link sets DTR and RTS signals lo, then hi, to force a disconnect, and then restart the call actions sequence. If the timeout is set to 0, the link waits indefinitely for the signal.
Sleep	n/a	1-255 seconds	Tells the link to pause for the specified timeout period. This command is usually used to give the local device or the remote node time to respond to the previous action.
Send String	1-15 Alphanumeric characters \r (carriage return) \n (carriage return/line feed) \o Escape	n/a	Tells the MESA-Net software to send a string over the link. When specifying the string to send, you can to create a new string, or reuse any string that you created previously.
Send Access Code	n/a	n/a	This is an originate action only. It instructs the originate link to read the string associated with the destination node from the Network Node table and send it over the link.

Table 4-1   Originate, Answer, and Disconnect Commands

Line Drop Signal

The Line Drop Signal tells the MESA-Net software what pin voltage to monitor to determine if a connection has broken. For example, if the line drop signal is CD (carrier detect), and the signal on pin 8 drops to -12V, the MESA-Net software knows that the link on the remote node has disconnected. The link responds by performing the disconnect actions. If the answer link was involved in the call, it

executes its answer actions after the disconnect actions in order to reset the modem for the next call.

The signals the MESA-Net software can monitor for line drop are:

- DTR (Data Terminal Ready)
- RTS (Request to Send)
- BREAK
- CTS (clear to send)
- DSR (Data Set Ready)
- RI (Ring)
- CD (Carrier Detect)

Select the signal that can be used by the equipment at the site.

Hardware Types Worksheet

Fill in the Hardware Types Worksheet to gather all of the information that you need to modify an existing hardware type or create a new one. The sample worksheet below is filled out as an example. A blank worksheet is at the end of this chapter.

MESA-Net Async
Hardware Types Worksheet

Device Number **1**   Name **Microcom Modem**

Originate Actions

	Command	String	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Sleep		2 seconds
5	Send access code		
6	Sleep		2 seconds
7	Read string	connected	20 seconds
8			
9			
10			
11			
12			
13			
14			

Answer Actions

	Command	String	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Read string	connected	0 seconds
5			

Disconnect Call Actions

	Command	Parameter	Timeout
1	Set signal hi	BREAK	
2	Sleep		2 seconds
3	Set signal lo	BREAK	
4	Send string	QQQ	
5	Sleep		2 seconds
6			

Line Drop Signal (circle one)

DTR   RTS   BREAK   CTS   DSR   RING   (CD)

Figure 4-2 Sample Hardware Types Worksheet

Worksheet Definitions

Device Number: The device number, 1-7, to be assigned to a hardware type. MESA-Net software recognizes a hardware type by its device number. Enter a number that has not previously been assigned to a hardware type.

Name: A descriptive name for the hardware type.

Originate Actions: Originate actions are the steps that an originate link takes to connect with an answer link of another node on the network. Valid actions are listed in Table 4-1.

Answer Action: The commands that an answer link uses to tell the attached communication device to answer a call.   Valid actions are listed in Table 4-1.

Disconnect Call Action: The commands that both the originate link and the answer link use to break off communications with another node. Valid actions are listed in Table 4-1.

Line Drop Signal: The electrical signal (pin) of the serial connection that the local device monitors to determine if the link is still up.

Creating and Configuring Links

After installing MESA-Net Async, Multiple Links, or Parallel Links and assigning hardware types, you must create and configure the links for your Centigram server (local node). You create and configure the links with the server on line (with the exception of changing the answer or originate link assignments, described in this chapter) by using the Link Type Menu. You must configure the following parameters for your MESA-Net links:

- Communications parameters (determines baud rate, parity, data bits, stop bits, and flow control)

- Failure counts (determines when a communications channel has too many transmission errors)

- Network hardware type (assigns a hardware type by device number)

- Serial port (assigns a dedicated serial port to each link)

- Timeout parameters (determines when to stop communications with another Centigram server)

Note: Many of these parameters have default settings (specified in the following sections). If you want to accept the defaults, the only parameters that you must set are the serial port and the hardware type.

The configuration changes take effect when the first call is made (in the case of originate links) or answered (in the case of answer links).

You can modify the parameter settings or get a report of the current settings at any time, as described in this chapter.

Configuring Communications Parameters

This section provides information on the following communications parameters: baud rate, data bits, stop bits, parity, and flow control. For step-by-step instructions

on configuring these parameters, refer to CP 5712 in the procedural part of this chapter.

Baud Rate

MESA-Net software transmits and receives data at 300 to 57600 baud on each link. Total throughput per system varies by Series 6 server model. For highest throughput, use the Serial 16/32 Card in the Centigram server.

High baud rates minimize transmission costs, but public switched networks may not be able to support high speed transmissions. The communications device will also be limited to a certain maximum baud rate. Configure the link for the highest rate the equipment allows that will still provide error-free transmission.

The default baud rate for MESA-Net Async links is 9600. The recommended rates for the various modems are:

- Concord Trellis 296   9600
- Concord DialAccess 296   9600
- Microcom QX V.32C   9600
- ATT Paradyne   28,800
- US Robotics   28,800
- WorldBlazer   19,200
- Telebit T2500/World Blazer 9600

Hardware types for these devices are pre-programmed into the MESA-Net software.

Data Bits, Stop Bits, and Parity

MESA-Net link default settings are 8 data bits, 1 stop bit, and no parity. The settings must match on both nodes in a MESA-Net session.

Flow Control

MESA-Net links have flow control enabled by default. The nodes use flow control when exchanging messages if one side is processing slower than the other, such as if one side is experiencing a heavy call volume.

Configuring Failure Counts

MESA-Net can tolerate noisy lines and dropped data bits. Every packet of data that is sent between nodes includes checksums. Checksums are unique keys calculated from the message data. When the data is received at the other end of the connection, the same calculation is done, and the result is compared with the transmitted checksum. If the checksums are not identical, a transmission error has occurred. The receiving end increments its receive fail count and sends a message back to the sending node, indicating that there was a transmission error. The sending node increments its send fail count and resends the data.

The send fail count and receive fail count are reset to zero each time an error-free block of data is transmitted. The default limit for send fail count and receive fail count is 7. This means that if there are 7 consecutive errors on a single block of data, the line is too "dirty" for successful communication. The node then executes the disconnect actions of the hardware type associated with the link, which breaks the connection.

The number of times that the system attempts to establish a good connection (Maximum Call Setup Tries) and the time that the system waits before making another attempt (Call Setup Retry Interval) are configured from the Modify Netq Limits Menu. (See Chapter 10, "Configuring the Network Queue," for more information.)

For step-by-step instructions on configuring failure counts, refer to CP 5712 in the procedural part of this chapter.

Configuring the Serial Port

You use the Serial Port Device Type menu to assign one serial port to each link. The menu shows three choices: CTI Smartcard, Serial Port 1, and Serial Port 2. You must select CTI Smartcard; it applies to both Smartcards and Serial 16/32 cards.

For step-by-step instructions on configuring the serial port, refer to CP 5712 in the procedural part of this chapter.

Configuring Timeout Parameters

This section describes the three timeout parameters for MESA-Net links: data receive timeout, resend timeout, and node inactivity timeout. For step-by-step instructions on configuring the timeout parameters, refer to CP 5712 in the procedural part of this chapter.

Data Receive Timeout

When a MESA-Net node answers a call from another node, the modem sends a string to the answer link serial port indicating that a hardware connection has been established. The MESA-Net software of the answering node starts the data receive timer, and waits for a query from the originating node. The originating node then asks for confirmation that a software connection has been established.

The data receive timeout is the maximum time that the answering node allows to elapse between the time it receives the signal from the hardware and the time it receives the query from the originating node. The default value is 60 seconds. If the data receive timeout is exceeded, the answering node executes the disconnect actions specified in the hardware type assigned to its answer link.

Resend Timeout

A sending node expects a confirmation message back from a receiving node every time it sends a packet of data. The sending system does not wait for confirmation of receipt of one packet before sending another packet (which would be too inefficient), but it does expect confirmation messages to be sent in a timely manner. The resend timer tracks the time between confirmation messages.

The resend timer is started immediately after the first packet of data is sent, and is restarted whenever a confirmation message is received. The resend timeout is the maximum time allowed between any two confirmation messages. The default value is 60 seconds.

If the timeout value is reached, the sending system sends a query to the receiving system, asking for verification that the data was received. This query is repeated every 10 seconds until confirmation is received or until some other timeout causes a breakdown of the link.

Node Inactivity Timeout

Both send and receive nodes start an inactivity timer every time they send data or a message to the other node, and reset the timer every time they receives data or a message back from the other node. A node disconnects the call when the inactivity timeout is reached. The default Node Inactivity Timeout is 120 seconds.

Links Worksheet

Fill in the Links Worksheet to gather all of the information that you need to configure MESA-Net Async links. The sample worksheet below is filled out as an example. A blank worksheet is at the end of this chapter.

MESA-Net Async
Links Worksheet

Serial Port
Assignments

Required Parameters

Link Number [1]   Device Number [2]   Serial Port Number [1]

*Comm Setup
Menu*

Communications Parameters

Baud Rate: Parity:

64000	19200	2400	None Mark
57600	(9600)	1200	Even Space
38400	4800	300	Odd

Data Bits: 7 (8)   Stop Bits: (0) 1 2   Flow Control: (Enabled) Disabled

Failure Counts

Send Fail Count [7]   Receive Fail Count [7]
         (1-255)   (1-255)

*Timeout
Parameters Menu*

Communications Parameters

Data Receive Timeout [60] seconds

Resend Timeout [60] seconds

Node Inactivity Timeout [60] seconds

Figure 4-3 Sample Links Worksheet

Changing the Answer or Originate Link Assignment

In the default configuration for MESA-Net, link 1 is an originate link, link 2 is an answer link, link 3 is an originate link, link 4 is an answer link, and so on. If you need to change these default link assignments, see CP 5715 in the procedural part of this chapter.

You may need to change the default link assignments if, for example, a network has a small node that receives far more messages than local users send. In this case, you

can configure both links as answer links. Since MESA-Net operates in full-duplex mode, as other nodes call in, outgoing messages are sent to that node during the same call.

Modifying Link Parameters

Once you have created a link, you can modify any of the parameters by using the Modify Link Menu while the system is processing calls. The changes you make take effect when the next call is made. For step-by-step instructions on modifying a link, see CP 5714 in the procedural part of this chapter.

Inquiring About a Link

You can display network or port information for MESA-Net links by using the Inquire Links option in the Link Type Menu. The network report provides information about the network hardware, the timeout parameters (data receive, resend, and node inactivity), and the failure counts. The report looks similar to the following one:

```
                       NETWORK LINK DATA
                    Mon Jul 10 10:42:04 1995
                       NETWORK           TIMERS            FAILCNTS
HOST   LINK      MODE   HARDWARE     RCV, RSND, INACT    RCV,   SND
1      1         ans                 60    60    60       7     7
1      2         orig                60    60    60       7     7
1      6         orig                60    60    60       7     7
1      9         ans                 60    60    60 -     7     7

2      1         ans                 60    60    60       7     7
2      2         orig                60    60    60       7     7
         No link data to report for Host 3
         No link data to report for Host 4
```

The Network Link Serial Ports report provides information about the communications parameters for each link (baud rate, parity, stop bits, data bits, and flow control) and tells you if the link is an answer or an originate link. This report looks similar to the following one:

```
                     NETWORK LINK SERIAL PORTS
                      Mon Jul 10 10:42:04 1995
HOST   LINK   PORT   BAUD    PARITY   STOPBITS   DATABITS   FLOWCONTROL
1      1      ans    9600    none        1          8       enabled
1      2      orig   9600    none                   8       enabled
1      3      ans    9600    none        1          8       enabled
1      4      orig   9600    none        1          8       enabled

2      1      ans    9600    none        1          8       enabled
2      2      orig   9600    none        1          8       enabled
        No link data to report for Host 3
        No link data to report for Host 4
```

For step-by-step instructions on inquiring about a link, see CP 5716 in the procedural part of this chapter.

MESA-Net Async
Hardware Types Worksheet

Device Number [　　] Name [　　　　　　　]

Originate Actions

	Command	String	Timeout
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Answer Actions

	Command	String	Timeout
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Disconnect Call Actions

	Command	Parameter	Timeout
1			
2			
3			
4			
5			
6			
7			

Line Drop Signal (circle one)

DTR   RTS   BREAK   CTS   DSR   RING   CD

MESA-Net Async
Links Worksheet

Required Parameters

Link Number ☐   Device Number ☐   Serial Port Number ☐

Communications Parameters

Baud Rate: Parity:

64000	19200	2400
57600	9600	1200
38400	4800	300

None   Mark
Even   Space
Odd

Data Bits: 7 8   Stop Bits: 0 1 2   Flow Control: Enabled   Disabled

Failure Counts

Send Fail Count ☐   Receive Fail Count ☐
(1-255)   (1-255)

Communications Parameters

Data Receive Timeout ☐ seconds

Resend Timeout ☐ seconds

Node Inactivity Timeout ☐ seconds

MESA-Net Async Hardware Types and Links Task List

Task   *Procedure*

Creating and Modifying MESA-Net Async Hardware Types

Creating and Configuring MESA-Net Links

This procedure describes how to configure parallel links on the Centigram server that originates the MESA-Net sessions between two nodes. With parallel links enabled, MESA-Net establishes a new connection each time the current connection or connections have been open for a set number of minutes. The answering node also must have the parallel links optional feature installed and have enough answer links to carry all of the sessions simultaneously.

Note: You can make these changes to your active configuration with the system online and processing calls.

Step	Reference
1. Install the Parallel Links optional feature.	CP 5402, Ch. 2
2. Reach the Network Maintenance Menu, then go to the Network Node Access Table Maintenance Menu.	Menu Map 13

3. Select to modify a node entry.

    Select: (M) Modify a node entry
    Prompt: `Node number`
    Response: The number of the remote node for which you want to enable parallel links.

4. Press Enter to move through the succeeding prompts without changing any settings until you see the Parallel Link Delay prompt.

5. Set the length of time that the existing connection or connections must be open before a parallel connection is established.

    Prompt: `Parallel link delay [15]`
    Response: The **number of minutes** a link must be open before a new link is established. If you enter 0, a new link is created as soon as the previous link succeeds.

6. Set the maximum number of parallel links that can be open between the local node and the remote node.

    Prompt: `Maximum parallel links [1]:`
    Response: The **number**, 1-8, of parallel links that the node can establish with another node. Do not exceed the number of physical links that both nodes can support.

7. Repeat steps 3 through 6 for any other nodes for which you want to enable parallel links.

This procedure describes how to create MESA-Net Async links on your Centigram Series 6 Communication Server and configure each link for the following parameters:

- Communication parameters (baud rate, parity, data bits, stop bits, flow control)
- Failure counts (determines when a communications channel has too many transmission errors)
- Network hardware type (assigns a hardware type to work with the communications device)
- Serial port (assigns a dedicated serial port to each link)
- Timeout parameters (determines when to stop communications with another Centigram server)

You create and configure links one at a time.

Note: You do not need to configure links for MESA-Net TCP/IP.

Step	Reference
1. Reach the Link Type Menu from the Network Maintenance Menu.	Menu Map 13

2. Identify the link that you want to create

   Select: (C) Create a link
   Prompt: `Module number on which to create link (1-4):`
   Response: The **number** of the module, 1-4, on which you are creating a link.

   Prompt: `Link number to create (1-16):`
   Response: The **number** of the link, 1-16, you are creating. For basic MESA-Net Async, you can only choose 1 or 2. If you have installed a Link Enable diskette, you can enter a number up to the maximum allowed by that diskette.

The system then takes you to the Create Link Menu. Use this menu to set the parameters for the link you just created, as described in the following sections of this procedure.

((⊙)) Configure the Network Hardware Type

3. Reach the Create Link Menu.

4. Set the network hardware type.

   Select: (H) Network Hardware type
   Prompt: `Enter hardware device number from 1 to 7:`
   Response: Enter the number of the device (1 to 7) that is associated with the link. You must have already defined the device in the Hardware Type menu (see CP 5732).

Step   *Reference*

((·)) **Configure the Serial Port**

5. Select P to reach the Serial Port Device Type Menu

6. Assign a port to the link you have created.

    Prompt: `1/2/3/X:`
    Response: 1 for ports on Serial 16/32 cards and Smartcards

    Prompt: `Enter cti card port number (1-32):`
    Response: The number (1-32) of the port on the Serial 16/32 card or Smartcard.

    If you want to use the default values for communication parameters, timeout
    parameters, and failure counts, you have finished configuring this link. Either
    return to step 2 to configure another link, or exit to the Network Maintenance
    Menu to save your changes. If you want to change the default settings, continue
    with step 7.

((·)) **Configure the Communication Parameters**

7. From the Create Link Menu, reach the Comm Setup Menu to configure the   Menu Map 13
    communication parameters.

    Note: The communication parameters *must* match on both ends of a
             MESA-Net connection. Set the link parameters on the local node to
             match the parameters of the links that will connect to that node.

8. Assign a baud rate for the link you have created. The default is 9600.

    Select: (B) Baud rate
    Prompt: `BAUD RATES`
              `(0)  64000`
              `(1)  57600`
              `(2)  38400`
              `(4)  19200`
              `(4)  9600`
              `(5)  4800`
              `(6)  2400`
              `(7)  1200`
              `(8)  300`
    Response: The **number (0-8)** that represents the desired baud rate for the
              communications equipment connected to the link.

Step	Reference

9. Set the parity required for the link. The default is no parity.

    Select: (P) Parity
    Prompt: `PARITY`
                   `(N) None`
                   `(O) Odd`
                   `(E) Even`
                   `(M) Mark`
                   `(S) Space`
    Response: The **letter (N, O, E, M, or S)** that represents the parity for the link you have created.

10. Configure the data bits for the link. The default is 8.

    Select: (D) Data bits
    Prompt: `Number of data bits [8]:`
    Response: The **number of data bits** (7 or 8) for the link you have created.

11. Configure the stop bits for the link. The default is 1.

    Select: (S) Stop bits
    Prompt: `Number of stop bits [1]:`
    Response: The **number of stop bits** (0, 1, or 2) for the link you have created.

12. Configure the flow control for the link. The default is flow control enabled. You should leave flow control enabled for all supported hardware.

    Select: (F) Flow control.
    Prompt: `FLOW CONTROL`
                   `(D) Disabled`
                   `(E) Enabled`
    Response: **The letter (D or E)** that represents whether you want flow control enabled or disabled.

(((•))) Configure Failure Counts

13. Set the failure counts parameter. The default value is 7 for both send and receive.

    Select: (F) Failure counts
    Prompt: `Send fail count (1-255)[7]`
    Response: Press Enter to accept the default value or enter a new number for the send fail count (1-255).

    Prompt: `Receive fail count (1-255) [7]`
    Response: Press Enter to accept the default value or enter a new number for the receive fail count (1-255).

Step	*Reference*

((·)) **Configure the Timeout Parameters**

14. Go to the Timeout Parameters Menu.

15. Set the timeout parameters. The default value for each of the timeout parameters is 60 seconds.

   Prompt: R/S/I/X:
   Response: **R** to set the data receive timeout,
              S to set the resend timeout,
              I to set the node inactivity timeout.

              Enter the new timeout value, in seconds, when you are prompted to do so.

16. Exit to the Network Maintenance Menu to save your changes.

Delete MESA-Net Async Links

This procedure describes how to delete MESA-Net Async links. This is necessary if, for example, you are distributing the existing links on your Centigram Series 6 server for load share purposes. In that case, you would first delete the appropriate number of links in one module and recreate the links on a different module.

Step	*Reference*
1. Reach the Delete a Link Menu from the Link Type Menu.	Menu Map 13

((·)) Delete One Link

2. Select to delete one link.

    Select: (O) Delete one link
    Prompt: `Module number on which to delete link (1-4):`
    Response: The **number** of the module in which you are deleting the link.

    Prompt: `Link number to delete (1-16):`
    Response: The **number** of the link, 1-16, that you are deleting. You then see a display of the link's current parameter settings.

    Prompt: `OK to delete (y/n)?`
    Response: **Y** to delete the link.
              N if you do not want to delete the link.

3. Repeat the previous step to delete additional links.

((·)) Delete All Links on a Module

4. Select to delete all links on a module.
    Select: (A) Delete all links
    Prompt: `Module number on which to delete link (1-4):`
    Response: `The number of the module in which you are deleting the links.`
    Prompt: `WARNING: This will delete all network links on all hosts!`
              `Are you sure you want to do this (y/n)?`
    Response: To delete all links at this point, type **y**.
              If you have decided not to delete all links, type **n**. You are then returned to the Delete Link Menu.

This procedure describes how to change the assignment of a MESA-Net Async link from answer to originate or vice-versa.

Note: You perform this procedure offline; you must activate the configuration for the link assignment changes to take effect.

Step	Reference
1. Reach the Basic Network Menu from the Offline Menu.	Menu Map 15
2. Specify the module in which you are configuring links.	

Select: (H) Host number to configure = [ ]
Prompt: Host number to configure = [ ]
Response: **Number** of the module (1-4) to be configured.

3. Specify the number of the link for which you want to change the link assignment.

Select: (L) Link number (1-16) = [ ]
Prompt: Enter link number (1-16)= [ ]
Response: Enter the **number** of the link, 1-16, that you are adding or for which you are changing link assignments.

4. Specify whether the link is an answer link or an originate link.

Select: (A) Answer link/Originate link (a/o) = [ ]
Prompt: Answer link/Originate link (a/o) = [ ]
Response: Enter **o** if the link is an originate link, **a** if the link is an answer link.

5. Continue changing link assignments by repeating steps 3 and 4 for each link.

6. Exit to the VoiceMemo Main Menu to save your changes.

7. Activate the configuration for the changes to take effect.

This procedure describes how to review the configuration of your MESA-Net Async links. There are two link reports available:

- The Network Link Data Report, which provides information about the network hardware, the timeout parameters (data receive, resend, and node inactivity), and the failure counts.

- The Network Link Serial Port Report, which provides information about the communication parameters for each link (baud rate, parity, stop bits, data bits, and flow control) and tells you if the link is an answer or an originate link.

Step	*Reference*
1. From the Network Maintenance Menu, go to the Link Type Menu. Then go to the Inquire Link Menu.	Menu Map 13
2. View the Network Link Data Report.	

2. View the Network Link Data Report.

Select: (L) Inquire link (network data)

Prompt: `Module number on which to inquire link (1-4):`

Response: The **number** of the module, 1-4, for which you want to see a network data report.

Prompt: `Link number to inquire (1-32)`

Response: The **number** of the link for which you want to see a network data report.

3. View the Network Link Serial Ports Report.

Select: (P) Inquire link (port data)

Prompt: `Module number on which to inquire link (1-4):`

Response: The **number** of the module, 1-4, for which you want to see a port data report.

Prompt: `Link number to inquire (1-32)`

Response: The **number** of the link for which you want to see a port data report.

This procedure describes how to assign a number designation to a pre-programmed (default) MESA-Net Async hardware type. A hardware type must have a number designation before you can associate it with a link or a node. You can use a maximum of seven different hardware types for each MESA-Net node. Follow this procedure if you are using one of the following default hardware types:

- Concord Trellis 296 modem
- Concord Dialaccess 296 modem
- Microcom QX/V.32C modem
- Direct connection
- Telebit T2500/World Blazer modems

- ATT Paradyne 3800 series
- US Robotics V.34 Courier
- XyLoGiC AnneX Three
- HT Communications P4004 DSU
- AT&T Paradyne 3810/3820 Plus (V.34)

Step	Reference
1. Reach the Hardware Type Menu.	Menu Map 13

2. Select to create a hardware type.

    Select: (C) Create a hardware type
    Prompt: `Module number on which to create hardware type (1-4):`
    Response: The **number** of the module, 1-4, on which you are assigning the hardware type.

3. Assign a number to the hardware type.

    Prompt: `Device number to create (1-7):`
    Response: Enter a **number**, from 1-7, that you want to assign to the hardware type. Typically, you start with number 1 for the first device and then increment the number assignment for additional devices.

4. Choose one of the pre-programmed hardware types.

    Prompt: `Select a default hardware type? (y/n)[n]?`
    Response: Enter **y** to see the list of default hardware types.

    Prompt:
```
DEFAULT HARDWARE TYPES
(A) Concord 296-2 modem
(B) Concord DialAccess 296 modem
(C) Microcom QX/V.32C modem
(D) Tellabs 331-D Xplexer
(E) Direct connection
(F) Telebit modem
(G) Xylogic AnneX Three
(H) ATT Paradyne 3800 series modems
(I) USR Robotic V.34 Courier modem
(X) Exit
```
    Response: The **letter** preceding the default hardware that you want to use.

The system displays the pre-programmed actions for the device you chose.

5. Exit to the Network Maintenance Menu to save your changes.

Doc. Rev. A

This procedure describes how to modify an assigned MESA-Net Async hardware type. Use this procedure if the communications equipment used at the site requires actions (originate, answer, disconnect, and line drop signal) that are similar to one of the following default hardware types:

- Concord Trellis 296 modem
- Concord Dialaccess 296 modem
- Microcom QX/V.32C modem
- Direct connection
- Telebit T2500/World Blazer modems

- ATT Paradyne 3800 series
- US Robotics V.34 Courier
- XyLoGiC AnneX Three
- HT Communications P4004 DSU
- AT&T Paradyne 3810/3820 Plus (V.34)

See Appendix A for a description of the originate, answer, disconnect, and line drop signal actions for each of these default hardware types.

Step	*Reference*
1. Reach the Hardware Type Menu.	Menu Map 13
2. If you have not already assigned a device number to the pre-programmed (default) hardware type that you want to modify, do so now.	CP 5732
3. Select the assigned hardware type that you want to modify.	

Select: (M) Modify a hardware type
Prompt: `Module number on which to modify hardware type:`
Response: The **number** of the module, 1-4, that is using the hardware type that you want to modify.

Prompt: `Device number to modify (1-7):`
Response: The **number**, 1-7, of the hardware type that you want to modify.

The system displays the Modify Hardware Type menu.

4. If desired, change the name of the hardware type.

Select: (N) Name
Prompt: `Enter name for device:`
Response: A **name** (1-16 characters) for the device that will use this hardware type.

Step	Reference

5. As required, change the Originate Call, Answer Call, and Disconnect Call actions.

    Select: (A) Actions

    Prompt: `ACTION TYPES`
               `(O) Originate call`
               `(A) Answer call`
               `(D) Disconnect call`
               `(S) Show actions`
               `(X) Exit`

    Response: **O** to change the Originate call actions,
                   A to change the Answer call actions,
                   D to change the disconnect call actions.

The system displays the command sequence of the action that you chose, followed by the Modify, Delete, Insert Action Menu.

6. Delete any unnecessary actions.

    Select: (D) Delete action

    Prompt: `Action number:`

    Response: The **number** of the action step that you want to delete, from the previous display.

The system deletes the specified action and displays the changed sequence.

7. As necessary, modify (replace) any existing actions.

    Select: (M) Modify action

    Prompt: `Action number:`

    Response: The **number** of the action step that you want to modify, from the previous display.

Step   *Reference*

The system displays the possible actions.

Prompt: (H) Set signal hi
           (L) Set signal lo
           (W) Wait signal hi
           (V) Wait signal lo
           (P) Sleep
           (C) Send access code
           (S) Send string
           (R) Read string
           (Y) Wait string
           (F) Flush device
           (D) Display actions
           (X) Exit

Response: The **letter** of the action that you want to use in place of the previous action.

Most of the action selections will prompt you for more information, such as the signal to set or wait for, or the number of seconds to sleep, or the string to send/read. Select your choices from the menus to define the actions.

8. If desired, insert a new action after an existing action.

Select: (I) Insert action

Prompt: Action number to insert after:

Response: The **number** of the existing action that comes just before where you want to add a new action. You cannot add a new action before the first action.

Step	Reference

The system displays the possible actions.

Prompt: (H) Set signal hi
           (L) Set signal lo
           (W) Wait signal hi
           (V) Wait signal lo
           (P) Sleep
           (C) Send access code
           (S) Send string
           (R) Read string
           (Y) Wait string
           (F) Flush device
           (D) Display actions
           (X) Exit

Response: The **letter** of the action that you want to add to the command sequence.

Most of the action selections will prompt you for more information, such as the signal to set or wait for, or the number of seconds to sleep, or the string to send/read. Select your choices from the menus to define the actions.

9. If desired, change the Line Drop Signal.

Select: (D) Line Drop Signal
Prompt: SIGNAL TO SET/WAIT FOR

          (1) DTR   (data terminal ready)
          (2) RTS   (request to send)
          (3) BREAK
          (4) CTS   (clear to send)
          (5) DSR   (data set ready)
          (6) RI   (ring)
          (7) CD   (carrier detect)

Response: The **number** that corresponds to the serial communications signal that indicates a broken connection.

10. Verify the settings in the modified hardware type.

Select: (S) Show device

The system displays the actions in the hardware type that you just modified. Review the display to make sure that it is correct. If necessary, repeat any of the above steps to make changes.

11. Exit to the Hardware Type Menu to save your changes.

This procedure describes how to create a completely new hardware type. This is not the same as assigning a number designation to a pre-programmed (default) hardware type, which is described in CP 5732.

Prior to starting this procedure, you must have the documentation for the communication device that will use this hardware type so that you know what actions are required to originate and answer calls. See Chapter 4 for detailed explanations of the components of a hardware type.

Step	Reference
1. Reach the Hardware Type Menu.	Menu Map 13
2. Select to create a hardware type.	

    Select: (C) Create a hardware type
    Prompt: `Module number on which to create hardware type (1-4):`
    Response: Enter the **number** of the module, 1-4, on which you are assigning the hardware type.

3. Assign a number to the hardware type.

    Prompt: `Device number to create (1-7):`
    Response: Enter a **number**, from 1-7, that you want to assign to the hardware type. Typically, you start with number 1 for the first device and then increment the number assignment for additional devices.

4. Choose not to use one of the pre-programmed hardware types.

    Prompt: `Select a default hardware type? (y/n)[n]?`
    Response: Enter **n** to create a new hardware type.

The system displays the Create Hardware Type menu.

5. Give the new hardware type a name.

    Select: (N) Name
    Prompt: `Enter name for device:`
    Response: A **name** (1-16 characters) for the device that will use this hardware type.

6. Define the actions for the hardware type.

    Select: (A) Actions
    Prompt: `Action Types menu`

Step	Reference

7. Define the originate actions.

    Select: (O) Originate call
    Prompt: ORIGINATE CALL

```
(H) Set signal hi
(L) Set signal lo
(W) Wait signal hi
(V) Wait signal lo
(P) Sleep
(C) Send access code
(S) Send string
(R) Read string
(Y) Wait string
(F) Flush device
(D) Display actions
(X) Exit
```

    Response: The **letters** of the actions that are required to originate a connection using this hardware type, one at a time.

              Most of the action selections will prompt you for more information, such as the signal to set or wait for, or the number of seconds to sleep, or the string to send/read. Select your choices from the menus to define the originate actions.

8. Exit back to the Action Types menu when you have defined all of the originate call actions.

9. Repeat steps 7 and 8 to define the Answer Call and Disconnect Call actions.

10. Exit back to the Create Hardware Type Menu.

11. Set the Line Drop Signal.

    Select: (D) Line Drop Signal
    Prompt: SIGNAL TO SET/WAIT FOR

```
(1) DTR     (data terminal ready)
(2) RTS     (request to send)
(3) BREAK
(4) CTS     (clear to send)
(5) DSR     (data set ready)
(6) RI      (ring)
(7) CD      (carrier detect)
```

    Response: The **number** that corresponds to the serial communications signal that indicates a broken connection.

Step	Reference

12. Verify the settings in the new hardware type.

    Select: (S) Show Types

The system displays the actions in the hardware type that you just created. Review the display to make sure that it is correct. If necessary, repeat any of the above steps to make changes.

13. Exit to the Hardware Type Menu to save your changes.

5 Configuring the Network Node Table

The Network Node Table stores information that is essential for the local node to communicate with other nodes on the network. The table contains one entry for each node on the network, and that entry contains information such as the remote node number and its phone number or IP address. This chapter provides detailed information about the fields in the Network Node Table and how they are used by MESA-Net Async and MESA-Net TCP/IP.

It is very important that you plan out your MESA-Net network before configuring the Network Node Table on each node. You must know the node number and phone number or IP address of each remote node, plus other information, before you can create an entry for the node. Be sure to completely fill in a section of a Network Node Table Configuration Worksheet for each remote node and one for the local node before starting to create entries in the table. (You should create an entry for the local node in the table as a reference, but set it to have access disabled.)

Network Node Table Configuration Worksheet

You configure the Network Node Table using the Network Node Access Table Maintenance Menu, which is a submenu of the Network Maintenance Menu. The fields in the Network Node Table Configuration Worksheet correspond to the information you must enter when you create a new node entry. The fields are described below the sample worksheet. A blank worksheet for you to copy and use is at the end of this chapter.

MESA-Net
Network Node Table Worksheet

Node Entry

Node Number [3]   Node Name [San Jose]

TCP/IP Connection Y (N)   IP Address [ ]

Hardware Type [2]   String (access code) [4082941192]

Parallel Link Delay [10]   Maximum Links [4]

Analog AMIS Connection Y (N)   Access (Y) N

Figure 5-1 Sample Network Node Table Configuration Worksheet

Worksheet Definitions

Node Number: The number of the node for this entry. Each MESA-Net node on the network must be represented by a unique number. You can use numbers from 1 to 8191, but the maximum number of nodes is 1500.

Node Name: A descriptive name for the node (e.g. New York, Chicago) of up to 13 alphanumeric characters, including capitals and spaces. The node name is not required; MESA-Net software recognizes nodes by their numbers.

Analog AMIS Connection: For all MESA-Net nodes, circle N. The AMIS Analog Networking optional feature also uses the node table for administered connections (where the message sender does not have to enter the node phone number), and you may want to include those connections in your planning.

TCP/IP Connection: Circle Y for all remote nodes that the local node accesses using MESA-Net TCP/IP.

IP Address: The IP address of the remote node, if it uses MESA-Net TCP/IP.

String: In MESA-Net Async, the string is the access code (usually the phone number) that is dialed by the local node to make a connection to the remote node. The string can be up to 16 alphanumeric characters in length.

The "Send Access Code" originate action in the Hardware Type causes the local node to dial this string. The examples later in this chapter demonstrate how to formulate the string that is necessary to reach a remote node.

Hardware Type: The device number, 1-7, of the Hardware Type that MESA-Net Async software must use to communicate with the node.

For MESA-Net TCP/IP nodes, the hardware type is always ETHERNET. There is no hardware type for AMIS nodes, since AMIS connections are made from a phone port.

Access: Circle Y (accessed enabled) for all nodes except the local node. If necessary, you can set access to N to suspend access to a node without deleting the node from the Network Node Table.

When users try to make messages to a disabled node, they are informed that the destination is "not a valid remote mailbox number." When you disable access to a node that already has messages queued, the MESA-Net software holds the messages until the Message Waiting Threshold is reached, and then sends receipts to all senders, informing them that their messages could not be delivered. Once receipts are sent, the messages are purged from the queue.

Parallel Link Delay: (Requires the Parallel Links optional feature) Specify the number of minutes that an existing connection must be open before another link is established. Set this to 0 to have the originating node create a new connection as soon as the previous one succeeds.

Maximum Links: (Requires the Parallel Links optional feature) Specify the maximum number of links to be used to communicate to the remote node.

Sample Network Node Table Configurations

This section presents Network Node Tables for two sample networks. The first example shows the Network Node Table for a MESA-Net Async network. The second example shows a combination MESA-Net Async and MESA-Net TCP/IP network.

Example 1: MESA-Net Async Network using Modems

Figure 5-1 shows a network in which all nodes use identical modems for communications.
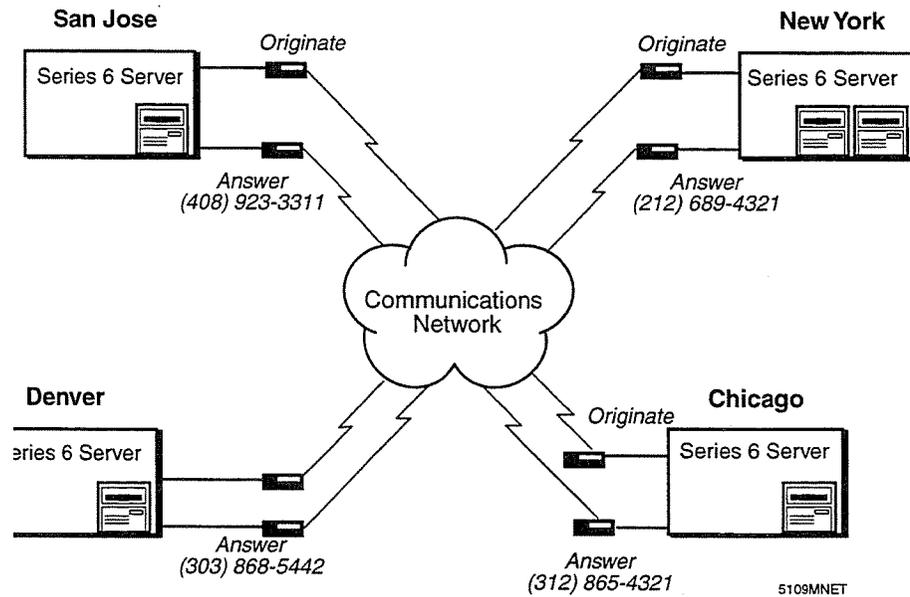
Figure 5-1 Sample MESA-Net Async Modem Network

The Network Node Table entries for San Jose are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
2	Chicago	ASYNC	3128654321	2 = CONCORD	Y	15	1
4	New York	ASYNC	21268943217	2 = CONCORD	Y	15	2
6	Denver	ASYNC	3038685442	2 = CONCORD	Y	15	1

The Network Node Table entries for Chicago are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
1	San Jose	ASYNC	4089233311	2 = CONCORD	Y	15	2
4	New York	ASYNC	21268943217	2 = CONCORD	Y	15	1
6	Denver	ASYNC	3038685442	2 = CONCORD	Y	15	1

The Network Node Table entries for Denver are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
1	San Jose	ASYNC	4089233311	2 = CONCORD	Y	15	1
2	Chicago	ASYNC	3128654321	2 = CONCORD	Y	15	1
4	New York	ASYNC	21268943217	2 = CONCORD	Y	15	1

The Network Node Table entries for New York are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
1	San Jose	ASYNC	4089233311	2 = CONCORD	Y	15	1

```
2  Chicago   ASYNC   3128654321   2 = CONCORD      Y        15          1
6  Denver    ASYNC   3038685442   2 = CONCORD      Y        15          1
```

Example 2: MESA-Net Async and MESA-Net TCP/IP Network

Figure 5-2 shows a network in which some of the nodes are connected using MESA-Net Async over modems and some are connected using MESA-Net TCP/IP over Ethernet.
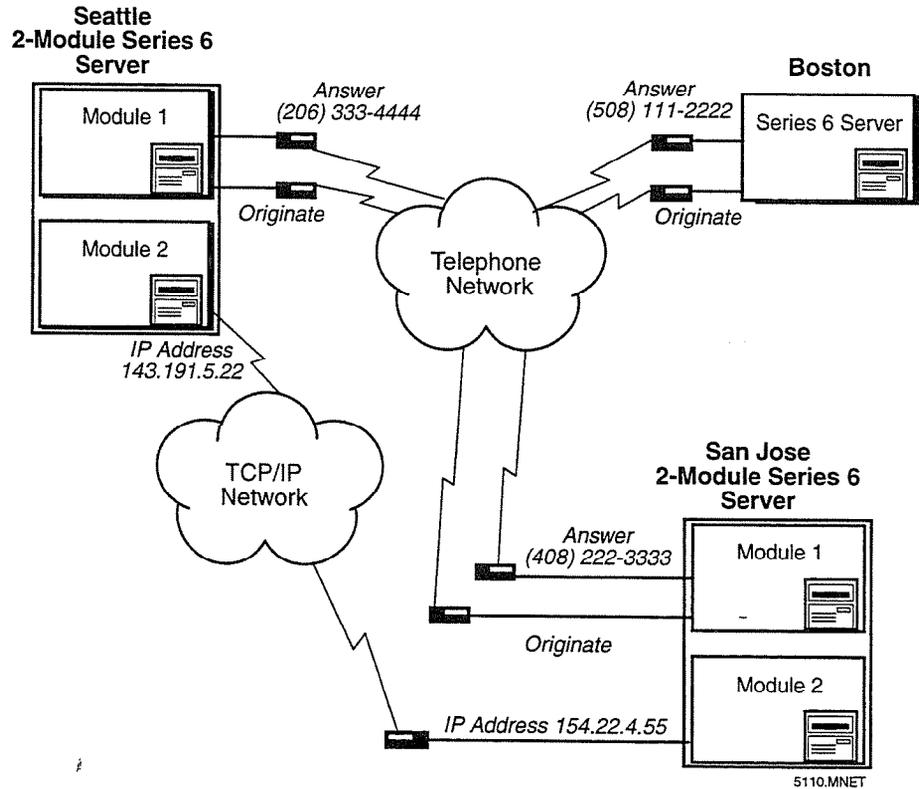
Figure 5-2 Sample Modem and Ethernet Network

The Network Node Table entries for San Jose are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
2	Boston	ASYNC	5081112222	2 = CONCORD	Y	15	1
3	Seattle	TCP/IP	143.191.5.22	0 = ETHERNET	Y	15	2

The Network Node Table entries for Boston are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
1	San Jose	ASYNC	4082223333	2 = CONCORD	Y	15	1
3	Seattle	ASYNC	6131112222	2 = CONCORD	Y	15	1

The Network Node Table entries for Seattle are:

NODE	NAME	PROTO	STRING	HARDWARE	ACCESS	PARALLEL DELAY	LINKS MAX
1	San Jose	TCP/IP	143.191.4.21	0 = ETHERNET	Y	15	2
2	Boston	ASYNC	5081112222	2 = CONCORD	Y	15	1

Using Hayes Protocols in Access Codes

All supported modems use the Hayes protocol. When a Hayes-compatible modem is using a dial-up telephone line, MESA-Net software must send the string "ATDT" before sending the phone number, to instruct the modem "use tone dialing to outdial the following characters." The phone number must be followed by the ASCII character for a carriage return, to indicate that the string of outdial characters has ended.

The ATDT string and the carriage return do not appear in the Network Node Tables shown in Examples 1 and 2 because they are incorporated into the default Concord DialAccess 296 hardware type (and in the default hardware types for all other supported modems). When using a Hayes-compatible modem for which there is no default hardware type, be sure to program these steps into either the hardware type or the Network Node Table access code string.

When the modem is connected to a PBX line, the Network Node table string must contain the access code (usually 9) for an outside trunk, plus a suitable pause to give the PBX time to make the connection. Hayes protocol uses a comma to indicate a 2 second pause; at least a 4 second pause is recommended. In Example 2, if San Jose were calling New York through a PBX, the Network Node Table string would be "9,,13128654321."

MESA-Net
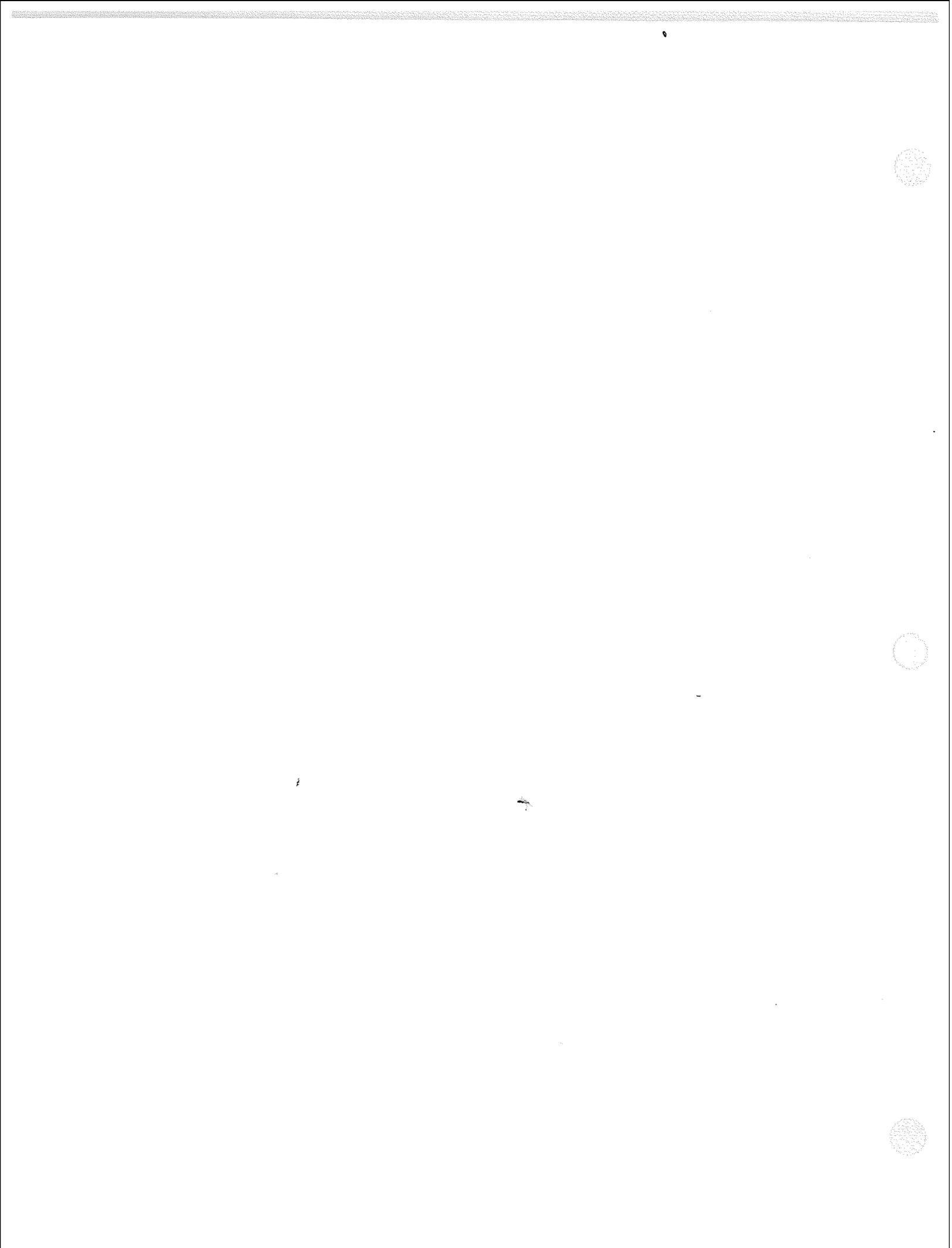# Network Node Table Worksheet

Node Entry

Node Number ☐   Node Name [   ]

TCP/IP Connection   Y   N   IP Address [   ]

Hardware Type ☐   String
                                  (access code) [   ]

Parallel Link Delay ☐   Maximum Links ☐

Analog AMIS Connection   Y   N   Access   Y   N

Node Entry

Node Number ☐   Node Name [   ]

TCP/IP Connection   Y   N   IP Address [   ]

Hardware Type ☐   String
                                  (access code) [   ]

Parallel Link Delay ☐   Maximum Links ☐

Analog AMIS Connection   Y   N   Access   Y   N

Node Entry

Node Number ☐   Node Name [   ]

TCP/IP Connection   Y   N   IP Address [   ]

Hardware Type ☐   String
                                  (access code) [   ]

Parallel Link Delay ☐   Maximum Links ☐

Analog AMIS Connection   Y   N   Access   Y   N

Task   *Procedure*

MESA-Net Network Node Table

Create a New Network Node Table Entry

Use this procedure to create a new entry in the Network Node Table for both MESA-Net Async and MESA-Net TCP/IP.

Step	Reference

1. Fill out a Network Node Access Table worksheet.

2. Reach the Network Node Access Table Maintenance menu. **Menu Map 13**

3. Identify the node number for which you want to create an entry.

   Select: (C) Create new node entry
   Prompt: Node number:
   Response: The **number** of the new node entry. This number can be from 1 to 8191.

4. Enter the name of the node, for example, *San Jose.*

   Prompt: Node name:
   Response: The **name** of the new node. This name can be up to 12 alphanumeric characters, including spaces.

5. For all MESA-Net nodes, indicate that this is not an AMIS Analog connection.

   Prompt: Analog AMIS Connection (Y/N):
   Response: **N** if you are not defining an AMIS Analog connection.

6. Specify whether this is a MESA-Net TCP/IP connection.

   Prompt: TCP/IP Connection (Y/N):
   Response: **Y** if the node can be accessed using MESA-Net TCP/IP
                N if the node cannot be accessed using MESA-Net TCP/IP.

7. If you answered yes to the TCP/IP connection prompt in Step 5, enter the IP address.

   Prompt: IP Address:
   Response: **IP address** of the new node

Step	Reference

8. If you answered N to the TCP/IP connection prompt in Step 5, enter the string for the new node.

   Prompt: `String:`

   Response: The **string of alphanumeric characters** required to access the new node. (This is usually the phone number of the answer modem on the node.) This string can be up to 16 alphanumeric characters. If required, use **\r** for CR (carriage return) and **\n** for CR/LF.

9. Specify whether the new node can be accessed by local node.

   Prompt: `Access (Y/N):`

   Response: **Y** for almost all remote nodes.

   N for the local node, and any remote nodes that you do not want accessed from the local node.

10. If you have installed the Parallel Links optional feature, set the length of time that the existing connection or connections must be open before a parallel connection is established.

    Prompt: `Parallel link delay [15]`

    Response: The **number of minutes** a link must be open before a new link is established. If you enter 0, a new link is created as soon as the previous link succeeds.

11. If you have installed the Parallel Links optional feature, set the maximum number of parallel links that can be open between the local node and the remote node.

    Prompt: `Maximum parallel links [1]:`

    Response: The **number**, 1-8, of parallel links that the node can establish with another node. Do not exceed the number of physical links that both nodes can support.

    MESA-Net displays a message that the entry for the node has been created.

12. Repeat steps 3 through 11 to create more node entries, or press Enter to indicate that you have finished creating node entries.

13. List the Network Node Table on screen to check your work.

    Select: (L) List the node table

Delete a Network Node Table Entry

Use this procedure to delete nodes from the Network Node Table.

Step	*Reference*
1. Reach the Network Node Access Table Maintenance menu.	Menu Map 13
2. Delete a node from the Network Node Table.	

    Select: (D) Delete node entry
    Prompt: Node number:
    Response: The **number or a range of numbers** of the node or nodes to delete.

    Prompt: Node = *number* Name = *node name*
            Delete (y/n)
    Response: **y** to delete the node(s), or **n** to cancel the delete operation.

3. Press Enter to return to the Network Node Access Table Maintenance Menu.

Use this procedure to display all or part of the Network Node Table.

Step	Reference
1. Reach the Network Node Access Table Maintenance menu.	Menu Map 13

((⊙)) View a Single Entry or Range of Entries

2. Request information about a node.

Select: (I) Inquire about node entry
Prompt: Node number:
Response: The **number** or **a range of numbers** of the node or nodes for which you want information.

The server presents a display similar to the following.

```
                          NETWORK NODE TABLE
                       Tue Dec  5 22:02:59 1995


   NODE NAME            PROTO   STRING        HARDWARE      ACCESS   PARALLEL LINKS
                                                                     DELAY    MAX
       33 Chicago       BASIC   1223456789    1 = CONCORD     Y        15      1


          1 Node found
```

3. Press Enter to finish inquiring, or enter another node number.

((⊙)) View The Entire Network Node Table

4. Select to view the entire table.

Select: (L) List the node table

The server presents a display similar to the following.

```
                        NODE ACCESS TABLE REPORT
                       Tue Dec  5 21:58:11 1995


   NODE NAME            PROTO   STRING        HARDWARE       ACCESS   PARALLEL LINKS
                                                                      DELAY    MAX
       33 Chicago       BASIC   1223456789    1 = CONCORD      Y        15      1
      105 Seattle       TCP     123.1.23.45   0 = ETHERNET     Y
      234 Gorman        AAMIS   17196875734                    Y


          3 Nodes found
```

Modify a Network Node Table Entry

Use this procedure to modify an entry in the Network Node Table. When prompted for a new value, you can press Enter to retain the current settings of any parameter.

Step	Reference
1. Reach the Network Node Access Table Maintenance menu.	Menu Map 13

2. Identify the node that you want to modify.

> *Select:* (M) Modify a node entry
> *Prompt:* Node number:
> *Response:* The **number** of the node entry you want to modify. This number can be from 1 to 8191.

3. Enter the new name of the node..

> *Prompt:* Node name:
> *Response:* The new **name** of the node. This name can be up to 12 alphanumeric characters, including spaces. Press **Enter** to keep the current name.

4. For all MESA-Net entries, specify that this is not an AMIS connection.

> *Prompt:* Analog AMIS Connection (Y/N):
> *Response:* **N**.

5. Specify whether this is a MESA-Net TCP/IP connection.

> *Prompt:* TCP/IP Connection (Y/N):
> *Response:* **Y** if the node can be accessed using MESA-Net TCP/IP
> **N** if the node cannot be accessed using MESA-Net TCP/IP.

6. If you answered Y to the TCP/IP connection prompt, enter the IP address..

> *Prompt:* IP Address:
> *Response:* New **IP address** of the node

7. If you answered N to the TCP/IP connection prompt, enter the dial string for the node.

> *Prompt:* String:
> *Response:* The **string of alphanumeric characters** required to access the node. This string can be up to 16 alphanumeric characters. If required, use \r for CR (carriage return) and \n for CR/LF.

Step   *Reference*

8. Specify whether the node can be accessed by local node.

    Prompt: Access (Y/N):
    Response: **Y** for almost all remote nodes.
                N for the local node, and any remote nodes that you do not want
                accessed from the local node.

9. If you have installed the Parallel Links optional feature, set the length of time that
    the existing connection or connections must be open before a parallel connection is
    established.

    Prompt: Parallel link delay [15]
    Response: The **number of minutes** a link must be open before a new link is
                established. If you enter 0, a new link is created as soon as the previous
                link succeeds.

10. If you have installed the Parallel Links optional feature, set the maximum number of
    parallel links that can be open between the local node and the remote node.

    Prompt: Maximum parallel links [1]:
    Response: The **number**, 1-8, of parallel links that the node can establish with
                another node. Do not exceed the number of physical links that both
                nodes can support.

11. Repeat steps 2 through 10 to modify more node entries, or press Enter to indicate
   that you have finished modifyingnode entries.

12. List the Network Node Table on screen to check your work.

    Select: (L) List the node table

6   Configuring Network Addressing

When a user addresses a message, the VoiceMemo software must be able to identify the address as either a local mailbox or a remote mailbox. If it is a remote mailbox, the VoiceMemo software must be able to identify the correct remote node and the correct mailbox on that node.

The Dialing Plan identifies the message address as either a local mailbox or a remote mailbox. The Digits Translation Table determines the correct node of the remote mailbox and how to derive the mailbox number from the address entered. Figure 6-1 shows how these two filters work together.
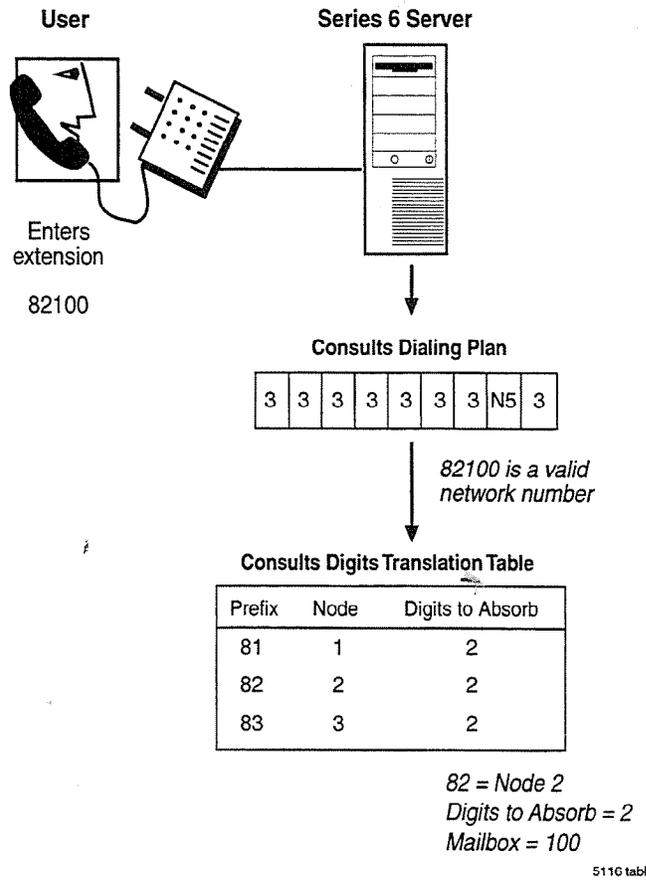
Figure 6-1   Example of MESA-Net Using the Dialing Plan and Digits Translation Table

Planning Network Addressing

You MESA-Net network will be much easier to maintain and expand if you carefully plan you network addressing in advance. You must consider any existing switch extension numbering and VoiceMemo dialing plans, and then create dialing plans on all nodes that allow easy access to all other nodes.

Use the Planning Network Addressing Worksheet to gather the information that you need to create a network addressing scheme that meets your present and future needs. Study the sample worksheet and descriptions below, and then copy the blank worksheet at the end of this chapter and fill in the information for your network. Be sure to include an entry for your local node.

MESA-Net
Planning Network Addressing Worksheet

Figure 6-1 Sample Planning Network Addressing Worksheet

Worksheet Definitions

Node Number: The number of the node for this entry. Each MESA-Net node on the network must be represented by a unique number. You can use numbers from 1 to 8191, but the maximum number of nodes is 1500.

Node Name: The name or location of the node.

Mailboxes Start With: Circle the numbers that are used at the node as the first digit in user mailboxes. For example, if mailboxes at a node are in the 3000 and 4000 range, circle 3 and 4.

Length of Mailbox Numbers: For each number that you circled, write in the number of digits in mailboxes that start with that number. If mailboxes have variable lengths, write V.

The Digits Translation Table

The Digits Translation Table is the "sorting machine" or "routing table" for network messages. When a user addresses a message to a remote mailbox, MESA-Net compares the mailbox address to the prefixes listed in the Digits Translation Table. The Digits Translation Table tells where the message is going, and how many digits the remote node must delete ("absorb") to find the destination mailbox.

The following excerpt from a Digits Translation Table indicates that any mailbox addresses that begin with 21 or 22 are to be routed to node 2 (Chicago), and any addresses that begin with 23 are to be routed to node 8 (Dallas). In addition, the remote nodes must strip off two digits (the prefix) to find the destination mailbox number.

Prefix	Node Number	Node Name	Digits To Absorb
21	2	Chicago	2
22	2	Chicago	2
23	8	Dallas	2

Centigram recommends that the table be the same in each node. You can enter your local node number in this table. If some nodes are not allowed to communicate with certain remote nodes, then use the GCOS feature to properly segregate those communities of interest. (See the *VoiceMemo Reference and Configuration Manual* for more information on GCOS.)

Node Prefixes

All network messages are routed by the node prefixes in the Digits Translation Table. Node prefixes are the leading digits of network mailbox numbers that are unique to a node. In the sample Digits Translation Table above, the prefix 23 uniquely identifies node 8; only network addresses at node 8 begin with the digits 23

The length of an individual prefix depends on whether you are using access codes (see below) and whether mailboxes on two or more nodes share the first, second, third, fourth, etc. digits. Each prefix consists of a number of shared leading digits, plus one digit that is found only in the mailboxes of a single node.

Example:

The San Jose node has the following dialing plan:

```
4,N4,N4,N4,4,4,4,4,4
```

This means that the remote mailbox numbers that San Jose can access begin with 2, 3, or 4, and consist of four digits.

The Chicago node (Node 2) uses mailbox numbers 2000 to 2999, and 3000 to 3250

The New York node (Node 4) uses mailbox numbers 3260 to 3999, and 4000 to 4499

The Dallas node (Node 6) uses mailboxes 4500 to 4999

Because none of the nodes have overlapping mailbox numbers, the digits to absorb count is 0 for all prefixes. The San Jose Digits Translation Table would look like this:

Prefix	Node Number	Node Name	Digits To Absorb
2	2	Chicago	0
30	2	Chicago	0
31	2	Chicago	0
320	2	Chicago	0
321	2	Chicago	0
322	2	Chicago	0
323	2	Chicago	0
324	2	Chicago	0
325	2	Chicago	0
326	4	New York	0
327	4	New York	0
328	4	New York	0
329	4	New York	0
33	4	New York	0
34	4	New York	0
35	4	New York	0
36	4	New York	0
37	4	New York	0
38	4	New York	0
39	4	New York	0
40	4	New York	0
41	4	New York	0
42	4	New York	0
43	4	New York	0
44	4	New York	0
45	6	Dallas	0
46	6	Dallas	0
47	6	Dallas	0
48	6	Dallas	0
49	6	Dallas	0

If a message is made for remote mailbox 3267, MESA-Net checks the table, sees that prefix 326 matches this mailbox, adds a flag to the message that tells the remote node to absorb no leading digits from the incoming mailbox number, then adds the message to the queue for node 4.

Note the variation in the number of digits needed to make a prefix unique to a node. Chicago is the only node using mailboxes that begin with 2, so that prefix only needs to be one digit. Chicago and New York both uses mailboxes in the 3200 series, so these prefixes must be taken out to the third digit to be unique.

Another thing that is noteworthy about this dialing plan is that no remote mailbox numbers overlap, either with each other or with local San Jose mailboxes. New York, Chicago, and Dallas could use mailbox numbers that begin with 1, 5, 6, 7, 8,

and 9, but users on the San Jose system cannot send messages to these mailboxes through MESA-Net. The digits to absorb feature can be used to add flexibility to the dialing plan.

Digits To Absorb

You assign a Digits To Absorb number to each prefix in the Digits Translation Table. The number of digits can be from 0 to 10. After MESA-Net matches the destination mailbox number to a prefix, it attaches the corresponding Digits To Absorb count to the message. The remote node deletes the specified number of leading digits to convert the network mailbox number to a local mailbox number. You must configure each node to send Digits To Absorb counts that allow remote nodes to translate network mailbox numbers to valid local mailbox numbers.

Digits to Absorb and Local Mailboxes

If local mailbox numbers match a dialing plan position that contains an N, then there must be a prefix entry in the Digits Translation Table that has the local node number.

If every node on the network uses the same dialing plan, all mailboxes must be the same length. For example, if every node on a network uses the dialing plan *N7,N7,N7,N7,N7,N7,N7,N7,N7*, users on every node are permitted to make messages for local or remote mailboxes that have 7 digit numbers only. Since MESA-Net does not absorb digits from local mailboxes, all local mailboxes on every system must be 7 digits; therefore, no digit absorption is possible throughout the network. The following section shows a way to formulate a network-wide dialing plan to avoid this limitation.

Using the Digits to Absorb Feature to Create "Access Codes"

The digits to absorb feature can simplify Digit Translation Table configuration by allowing each node administrator to formulate "access codes" for the other nodes on the system. A user enters the access code for the node before entering the mailbox number of the recipient when making a message for a remote mailbox. For example, if the access code for Boston is 82 and the mailbox you want to reach is 100, you would enter 82100.

You can implement this feature with the either N or the P character in the dialing plan. With the N implementation, users will enter just the access code and mailbox. With the P implementation, users will enter a "network" access code digit, identifying that a network message is being made, then a "node" access code, identifying the destination node, then the destination mailbox number.

The access codes are prefixes in the Digits Translation Table; the associated digits to absorb count tells the remote node to delete the access code to obtain the local mailbox number. Problems with mailbox number overlap between remote nodes are

avoided, since the "real" mailbox number (the local mailbox number on the remote node) is obtained after the message is sent.

Using the Digits to Absorb Feature to Create Same-Length Mailbox Numbers

If you want users to always enter the same number of digits for all network addresses, you can use the Node Prefixes and the Digits to Absorb feature in the Digits Translation Table to "pad out" the mailbox numbers for nodes that use shorter extensions. For example, if node 2 uses 3-digit extensions and node 6 uses 4-digit extensions, you can create prefixes for node 2 that are one digit longer than the prefixes for node 6. You also set the Digits to Absorb count for node 2 to be one digit greater than the Digits to Absorb for node 6. The sample Digits Translation Table below shows this kind of configuration.

```
            Node      Node       Digits To
   Prefix   Number    Name       Absorb
   211      2         Chicago    3
   22       6         Dallas     2
```

Creating a Network Dialing Plan

When you initially configure MESA-Net software on your Centigram server, you must set the dialing plans so that users can send network messages. You must set the dialing plan of every line group (VoiceMemo, Receptionist II, and so on) from which users will be allowed to send network messages. If any line group has more than one application, such as Receptionist II and an integration, remember to change all of the dialing plans. Do not change PBX dialing plans for Enhanced SMDI line groups.

If the dialing plan for a particular application is not changed, a user who calls in on the line group dedicated to that application will be unable to make messages for remote mailboxes. For example, Message Delivery uses the dialing plan specified for the Pager Application. When Message Delivery calls a user at a pre-programmed telephone number because there is an unplayed message in the mailbox, the user enters the mailbox passcode and is logged into the mailbox.

If the Pager Application dialing plan is not changed to match the Network Dialing Plan, the user will be unable to make messages to remote mailboxes. To communicate with remote mailboxes, the user must call the standard VoiceMemo number, where he or she will log in under the VoiceMemo application

When you configure the dialing plans for MESA-Net messaging, you must choose to use a network prefix digit, direct network addressing digits, or a star-prefix dialing plan.

Using a Network Prefix Digit

A network prefix dialing plan uses one number to indicate that the mailbox address that follows is a network address. For example, if 9 is the network prefix digit, users must press 9 and then the network mailbox address to send network messages.

You specify a network prefix digit in the dialing plan with the letter P, followed by the number of allowable digits in a network mailbox address (*including* the prefix digit). For example, if 9 is the network prefix digit and network mailbox addresses have 6 digits, the dialing plan might look like

```
0,0,0,4,4,4,0,0,P7
```

Notice that the P is in the 9s position, and it allows for seven digits: the network prefix digit plus a six-digit network mailbox address. The system strips off the prefix digit before comparing the mailbox address to the Digits Translation Table. In other words, if a user addresses a message to 9234567, the system compares 234567 against the Digit Translation Table.

In this example, if the sender attempts to address a message by pressing 9 and five digits (or any number other than six), the system says that the address is not valid. Local mailbox numbers cannot begin with the same digit as the prefix digit.

The P character can make dialing plans very flexible, especially when adding MESA-Net to a Centigram server that has an established mailbox dialing plan. For example, if both the local node and remote nodes have mailboxes that begin with 6 and 7, the administrator can tell users to press 9 plus the mailbox number to make a message for a remote mailbox. The 6 and 7 positions in the dialing plan can still be used by local mailboxes, and the previously unused dialing plan position 9 is reserved for remote mailboxes. The system handles the mailbox 678123 differently than 9678123.

Using Variable-Length Network Addresses

It is not uncommon for different nodes on a network to have mailboxes that do not have the same number of digits. For example, node 1 may have 4-digit mailboxes and node 2 may have 5-digit mailboxes. There are two ways to accommodate this situation in network addressing.

If you want users to always enter the same number of digits for all network addresses, you can use the Digits to Absorb feature in the Digits Translation Table to "pad out" the shorter mailbox numbers. See the section on the Digits Translation Table for more information on this technique.

The other alternative is to use the P and V characters together in the dialing plan. (The V character indicates a variable-length mailbox number; see the *VoiceMemo Reference and Configuration Manual* for more information on the V character.) This

combination allows users to address messages by entering a network prefix digit followed by the minimum number of digits required to uniquely identify a remote node and mailbox. For example, if node 3 uses 5-digit mailbox numbers and node 4 uses 4-digit mailbox numbers, the following dialing plan on node 1 would allow addressing to mailboxes on both nodes:

```
0,0,0,4,4,4,0,0,PV
```

If the prefixes in the Digits Translation Table matched the node numbers, then a user could address a message to mailbox 44564 on node 3 by entering 9344564, and to mailbox 3445 on node 4 by entering 943445.

Addressing by Area Code and Phone Number

You can also use the P character to allow addressing messages by area code and phone number. This type of dialing plan is useful when users have DID or Centrex-type service and callers are used to reaching them by dialing 7 or 10 digits (without going through an operator). It can alleviate conflicts between telephone/mailbox numbers on different nodes that share the same telephone number prefix (the first three digits of a seven digit telephone number).

For example, two nodes may have telephone numbers that begin with 257. A dialing plan with P11 in the 1s position would allow users to address network messages by entering 1 + the area code + the mailbox number, just as though they were dialing long-distance calls. The P in the dialing plan means that the 1 is dropped. The Digits Translation Table is configured to match the area codes and route messages to the correct remote nodes. When a message reaches a remote node, the three area code digits are deleted, and the message is delivered to the local seven digit mailbox number.

Using Direct Network Addressing Digits

If you do not want to use a prefix digit for network addressing, or if you want to use fully integrated local and remote mailbox numbers, you can use direct network addressing digits. The N character in a dialing plan position indicates that mailbox addresses that begin with that digit are network mailboxes, and should be processed by the MESA-Net software. The N is always followed by the number of valid digits in the network mailbox address. For example, the following dialing plan indicates that addresses that start with 7 or 8 are 6-digit network addresses.

```
0,0,0,4,4,4,N6,N6,0
```

In this example, when a message is addressed to a mailbox number that begins with 7 or 8, the MESA-Net software finds the destination node by comparing the leading digits of the mailbox number with the prefixes stored in the Digits Translation Table. Those prefixes would start with 7 or 8; the first digit is not stripped off when you use the N character.

Note that local mailbox numbers can also begin with 7 or 8, but they must have 6 digits, and the Digits Translation Table must contain prefixes that match the local mailboxes with the local node number. If the node number in the table matches the local node number, the message is sent immediately to the local mailbox (local messages sent through a network dialing plan are not queued). Senders do not need a Network Class of Service to send local messages, even though the dialing plan position indicates a network mailbox destination. Billing and statistics are the same as for local messages sent through a conventional dialing plan.

You can use this strategy is to create a same-length dialing plan for every node on the network, such as *N7,N7,N7,N7,N7,N7,N7,N7,N7*. This means that every time a message is made for a mailbox, the address is checked against the Digits Translation Table to find the destination node. The main advantage of this type of dialing plan is that a user enters the same number of digits to reach a mailbox on any node.

Creating a Uniform Network Dialing Plan

You can use a uniform dialing plan if the mailbox numbers on each node have unique ranges (for example, mailbox numbers on node 2 are in the range of 3000 to 3500 and no other nodes have mailbox numbers in that range). The advantage of a uniform dialing plan is that users can simply dial the mailbox number to access remote mailboxes. The disadvantage is that you must take local mailboxes into account in the Digits Translation Table. Mailbox number distribution takes careful planning, since local mailbox numbers cannot conflict with mailbox numbers on any remote node. You can resolve conflicts by adding *access codes* to remote mailbox numbers, then using the digits to absorb feature to tell the receiving system to delete the access code to find the true mailbox number. The digits to absorb feature is described earlier in this chapter.

Using a Star Prefix Dialing Plan

Centigram Series 6 servers that do not have any open positions in the dialing plan may need to use a star prefix dialing plan for network addressing. The star prefix dialing plan provides the functionality of both the N and P characters, although the functions have different names. If the P function were assigned to the 9 position in a star prefix dialing plan, a user would press 9* and then the network mailbox address to send a network message.

See the *VoiceMemo Reference and Configuration Manual* for more information on star prefix dialing plans.

# Using Broadcast Mailboxes for Transparent Network Messaging

Transparent network messaging means that there is no difference to the user between sending a message to a remote mailbox and sending a message to a local mailbox.

The user does not enter a network prefix when addressing a message, and the user hears the name confirmation of the mailbox owner.

You can use broadcast mailboxes to achieve this transparency. A message broadcast mailbox automatically sends any messages that it receives to the mailboxes in its first distribution list. A name broadcast mailbox automatically sends the owner's recorded name to the mailboxes in its distribution list number 9, to be used as the recorded name for those mailboxes. You enable these features in the FCOS of the broadcast mailboxes. See the *VoiceMemo Reference and Configuration Manual* for more information on broadcast mailboxes.

For complete network transparency, every user on every node must have a mailbox on every node. A user's mailbox on the local node has name broadcast enabled, so that the user's recorded name is broadcast to that user's mailboxes on all other nodes. The user's mailboxes on remote nodes all have message broadcast enabled, so that all messages made for that user are broadcast to the local node. Figure 6-2 shows this type of configuration.

5121mnet
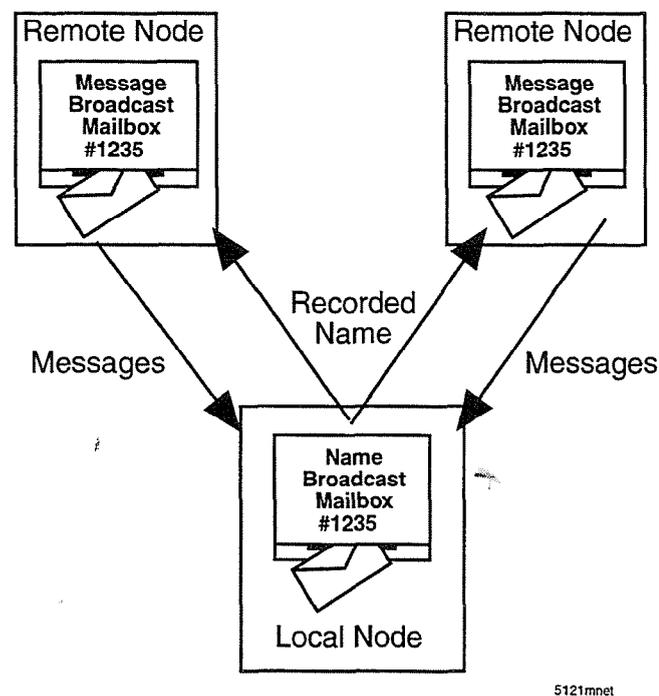
Figure 6-2   Name and Message Broadcast Mailboxes

Users always address messages to mailboxes on their local node. Because the recipient mailbox is local, the sender hears the mailbox name confirmation. If the mailbox is configured as a broadcast mailbox for a user on a remote node, the mailbox forwards the message over the network to the local node of the recipient.

Note: Broadcast mailboxes put an extra burden on system administrators. You must still configure the Digits Translation Table to provide the routing required for network messages. In addition, mailbox adds, moves and changes must be coordinated across the network, and the distribution lists in the broadcast mailboxes must be kept current. See Chapter 9 for information on adding remote mailbox addresses to distribution lists.

Network Addressing Examples

The following examples illustrate various ways of configuring network addressing to meet the needs of different networks.

Example 1: Adding Simple Access Codes

A network consists of four nodes: San Jose (Node 1), Chicago (Node 2), New York (Node 4) and Dallas (Node 6). Before the MESA-Net optional feature was installed, the San Jose node had three digit local mailboxes that began with digits 3 through 8. If the administrator wants to retain this structure, she can use dialing plan position 9 for remote mailboxes. The following changes makes this possible:

- The old San Jose dialing plan of *0,0,3,3,3,3,3,3,0* is changed to *0,0,3,3,3,3,3,3,N5*.
- The access codes for all remote nodes begin with 9
- Each prefix has a digits to absorb count of 2
- The Digits Translation Table for San Jose looks like this:

Prefix	Node Number	Node Name	Digits To Absorb
92	2	Chicago	2
94	4	New York	2
96	6	Dallas	2

The access code length depends on how many number combinations are needed to cover all the nodes on the system, but the codes should not be so long that it is a chore for users to send remote messages. In the example above, the access codes can be up to 8 digits, since mailbox numbers can be up to 11 digits, but it is unreasonable to expect system users to remember 8 digit access codes and 3 digit mailbox numbers. A very large network would require more positions for remote nodes to make this scheme workable.

This method is useful for Series 6 servers like the one in the example, where MESA-Net software is installed on an established system that has a pool of users who have memorized many mailbox numbers and do not want them to change. It is also practical for Series 6 servers on which both MESA-Net and Receptionist II are

installed. Mailbox numbers can match Receptionist II extension numbers without regard to the extension/mailbox structures of other nodes.

Example 2: Access Codes and Variable Length Remote Mailbox Numbers

Suppose one has the network shown below. The Chicago node (Node 2) has four digit mailboxes that start with 3, the New York node (Node 4) has six digit mailboxes starting with 4 or 5, and the Dallas node (Node 6) has three digit mailboxes that start with 5. Optimally, all these mailboxes must be served by the same dialing plan position. The access codes for all remote nodes can still begin with 9, as that digit is not part of any existing dialing scheme. Let's analyze each node individually...
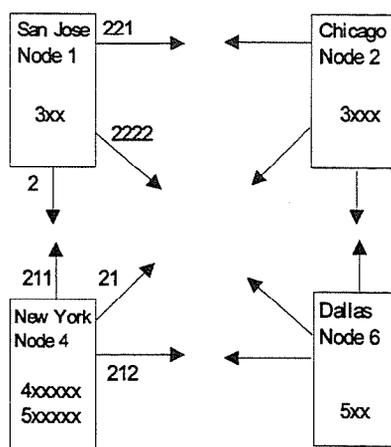
San Jose

Users on the San Jose node would like to enter the same number of digits to send messages to mailboxes on any of these three remote nodes, even though the destination mailbox numbers have different lengths. A digits absorbed count for each prefix is suddenly very useful. Since New York remote mailboxes already have six digits, the administrator decides that users will only need to enter a one digit access code (i.e. 9) to reach New York. The digits to absorb count for the New York node is 1. The prefixes listed for New York in the Digits Translation Table must include at least the first digit of all possible valid mailbox numbers on the node, to make all mailboxes accessible, and to make all prefixes unique. The dialing plan in San Jose is changed to 0,0,3,0,0,0,0,0,N7 to accommodate the New York node. Local mailboxes are unaffected by the change.

To access the four-digit mailboxes on the Chicago node, the Digits Translation Table must have three digit prefixes (access codes) to conform with the seven-digit network dialing plan (three digit access code plus a four digit extension equals seven digits). The digits to absorb count is also 3 for all Chicago prefixes.

The Dallas node uses three-digit mailboxes, so it needs a four digit access code to conform with the dialing plan. The digits to absorb count is 4 for all Dallas prefixes.

San Jose Digit Translation Table

Prefix	Node Number	Node Name	Digits To Absorb
221	2	Chicago	3
2222	6	Dallas	4
24	4	New York	1
25	4	New York	1

New York, Chicago, and Dallas

The administrators for the New York, Chicago, and Dallas nodes all decide that users on their Centigram servers will address network messages with a prefix digit, a node access code, and variable length mailbox numbers. This eases their planning and maintenance burden.

All three sites use 9 as the network prefix digit, so the dialing plan for New York is

0,0,0,6,6,0,0,0,PV

The Digit Translation Tables for all three nodes look follow the same pattern. The table for New York is shown below.

Prefix	Node Number	Node Name	Digits To Absorb
1	1	San Jose	1
2	2	Chicago	1
6	6	Dallas	1

When a user in New York wants to address a message to mailbox 325 in San Jose, he enters 91325. The New York node recognizes the address as a network address and strips off the 9 because of the P character in the dialing plan. It then compares the remaining digits with the prefixes in the Digits Translation Table and finds that the message is for San Jose. When the San Jose node receives the message, it strips of one digit and delivers the message to mailbox 325.

MESA-Net
Planning Network Addressing Worksheet

Node Entry

Node Number [ ]

Node Name [ ]

Mailboxes Start With   1   2   3   4   5   6   7   8   9

Length of Mailbox Numbers   _ _ _ _ _ _ _ _ _ _

Node Entry

Node Number [ ]

Node Name [ ]

Mailboxes Start With   1   2   3   4   5   6   7   8   9

Length of Mailbox Numbers   _ _ _ _ _ _ _ _ _ _

Node Entry

Node Number [ ]

Node Name [ ]

Mailboxes Start With   1   2   3   4   5   6   7   8   9

Length of Mailbox Numbers   _ _ _ _ _ _ _ _ _ _

Node Entry

Node Number [ ]

Node Name [ ]

Mailboxes Start With   1   2   3   4   5   6   7   8   9

Length of Mailbox Numbers   _ _ _ _ _ _ _ _ _ _

Task *Procedure*

MESA-Net Digits Translation Table

Use this procedure to create a new entry in the Digits Translation Table. Each entry associates a dialed prefix with a node, and sets the number of digits for the remote node to absorb from the network mailbox number.

Step	Reference
1. Reach the Digits Translation Table Maintenance menu.	Menu Map 13

2. Enter the node number of the new entry.

    Select: (C) Create new prefix/node pairs
    Prompt: Node number:
    Response: The **number** of the node entry. This number can be from 1 to 8191.

3. Enter the number of digits to absorb from the network mailbox number.

    Prompt: Absorb digits:
    Response: The **number** of digits to absorb at the remote node. This number can be from 0 to 12.

4. Enter a dialed prefix that indicates a message for the node in step 2.

    Prompt: Prefix (CR to end):
    Response: The prefix **number**. This can be a number from 1 to 99,999,999,999.

5. Repeat step 4 to associate additional prefixes with the node, or press Enter to stop entering prefixes.

6. Repeat steps 2 through 5 to create entries for additional nodes. Press Enter when you have finished creating entries for all nodes.

This procedure describes how to delete prefix/node pairs from the Digits Translation Table.

Step	Reference
1. Reach the Digits Translation Table Maintenance menu.	Menu Map 13
2. Enter the prefix to delete.	

> *Select:*   (D) Delete prefix/node pairs
> *Prompt:*   `Prefix(es) to delete:`
> *Response:* A valid prefix **number**. Enter a single number or a range of numbers using a hyphen. You cannot enter numbers separated by commas.

3. If you entered a single prefix in Step 2, the system displays the prefix, node and absorb number for the prefix to be deleted.

> *Prompt:*   `Delete (y/n) [N]:`
> *Response:* **Y** to delete, **N** to retain.

4. If you entered a range of prefixes in Step 2, the system displays the prefixes

> *Prompt:*   `WARNING: If you really want to delete these prefixes enter "delete"`
> *Response:* Enter the word "delete" to delete, press Enter to retain.

5. The system confirms deletion or retention.

View the Digits Translation Table

Use this procedure to see an online display of information about prefix/node pairs in the Digits Translation Table.

Step	Reference

1. Reach the Digits Translation Table Maintenance menu.   Menu Map 13

((·)) View a Single Entry or Range of Entries

2. Request information about a prefix/node pair.

   Select: (I) Inquire about prefix/node pairs
   Prompt: Prefix(es) to display:
   Response: A valid prefix **number**. Enter a single number or a range of numbers using a hyphen. You cannot enter numbers separated by commas.

   The server presents a display similar to the following.

   ```
                 PREFIX/NODE INQUIRE
              Tue Dec  5 23:20:17 1995


      Prefix        Node      Absorb Cnt
      44            33          2

        1 Prefix found
   ```

((·)) View The Entire Digits Translation Table

3. Select to view the entire table.

   Select: (L) List the dta table

   The server presents a display similar to the following.

   ```
   PREFIX/NODE PAIR REPORT
                         Tue Dec  5 23:20:53 1995


         Prefix        Node      Absorb Cnt
         2             1           0
         44            23          2
         45            33          2

         3 Prefixes found
   ```

Use this procedure to change the node number and number of digits to absorb associated with a prefix in the Digits Translation Table.

Step	Reference
1. Reach the Digits Translation Table Maintenance menu.	Menu Map 13

2. Enter the prefix for which you want to change the node number.

> *Select:* (M) Modify the node number for a prefix
> *Prompt:* `Prefix(es) to modify:`
> *Response:* A valid prefix **number**. Enter a single number or a range of numbers using a hyphen. You cannot enter numbers separated by commas.

3. Enter the new node number for the prefix.

> *Prompt:* `New node number:`
> *Response:* A valid node **number**.

4. Enter the number of digits to absorb associated with the prefix/node pair.

> *Prompt:* `Absorb Cnt:`
> *Response:* **Number** of digits to absorb. This number can be from 0 to12.

5. If you entered a single prefix in Step 2, the system displays the prefix, node and absorb number for the prefix to be modified.

> *Prompt:* `Modify (y/n) [N]:`
> *Response:* **Y** to modify, **N** to leave unchanged.

6. The system confirms modification or or lack of modification.

7   Configuring the Network Queues

You can control when a local MESA-Net node originates connections with remote nodes by configuring the network queues. You can set the different parameters that control when a queue is ready to send, such as time of day and number of messages waiting in a queue. You can also set the number of times that the local node tries to connect to a remote node once it determines that it is time to send the messages.

You can use the network queue parameters to help control toll charges with dial-up MESA-Net connections. If all of your connections are TCP/IP or Async direct connections, you probably want to set the queues to send messages immediately.

There are some basic functions of MESA-Net queues that you should understand before configuring the queue parameters:

- Messages addressed to remote nodes are stored in separate queues; there is an urgent message queue and a batch message queue for each node.

- The queues are checked every 30 seconds to find out if it is ready to send.

- The parameters that you set for queues apply to all nodes, but each queue is monitored separately. When the urgent queue for remote node 2 is full, the local node originates a connection to that node; it does not originate connections to any other nodes until their queues are full.

- Each node only originates connections when it needs to *send* messages. However, once a connection is established between two nodes, any messages queued for the originating node on the answering node are also sent, so messages go both ways. (If a node makes a connection to send only urgent messages, the answering node is only allowed to send messages from its urgent queue.)

After you have set the queue parameters, you should closely monitor the network queue statistics to ensure that the thresholds are set at realistic values. The cost of sending a network queue must be balanced against the need to receive messages in a timely manner and the need to clear network queue storage space. The storage aspect is particularly important when controlling costs; network message delivery that is triggered by reaching the message block use threshold will probably occur when tariffs are highest, since most messages are recorded during normal business hours.

Figure 7-1 shows the hierarchy of the various thresholds. The Time Window overrides the Message Count, Message Waiting Time, and Total Message Minutes

7-1

parameters, but the Time Window is overridden by the Message Blocks Used threshold.

	Message Count	Message Waiting Time	Total Message Minutes	Time Window	Queue	
If the time window is closed, the message queue isn't sent even if a threshold has been reached	■ Full	◨	◨	■ Closed	🗇 Not sent	
If the time window opens, the queue is sent if any threshold has been reached.	■ Full	◨	◨	☐ Open	🗇 Sent	
If the message block use threshold is reached, the queue is sent regardless of other considerations.	◨	◨	◨	■ Closed	🗇 Sent	■ Message block use threshold full
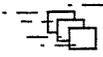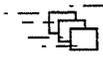
5117 thre

Figure 7-1   Interaction of Network Queue Thresholds

Network Queues Worksheet

The Network Queues Worksheet is designed to help you plan and record the settings of the network queues. The fields on the worksheet match the information that you must supply when configuring the queues. Study the sample worksheet and the definitions that follow, and then copy the blank worksheet at the end of this chapter and fill it in.

MESA-Net
Network Queues

Network Queue Limits

Message Block Use Threshold (80-100%): | 90 |

Maximum Call Setup Tries: | 4 |

Call Setup Retry Interval (minutes): | 10 |

Network Queue Time Windows

Always Open? (Weekdays) Weekends

Weekday Start Time (hour:min am/pm):   Batch _____   Urgent _____

Weekday Stop Time (hour:min am/pm):   Batch _____   Urgent _____

Weekend Start Time (hour:min am/pm):   Batch __9:00__   Urgent __7:00__

Weekend Stop Time (hour:min am/pm):   Batch __4:00__   Urgent __6:00__

Network Queue Thresholds

Message Count Threshold: Batch ___10___ Urgent ___2___

Message Waiting Threshold: Batch ___10___ Urgent ___2___

Total Message Minutes Threshold: Batch ___9___ Urgent ___2___

Worksheet Definitions: Network Queue Thresholds

Network queue thresholds allow you to control when messages are sent to another node. Cost is an important consideration when setting these parameters; the first minute of a call is tariffed higher, so it is more economical to send a group of messages than to send each message separately

You can set different network queue thresholds and time windows for urgent and batch messages. (All messages not specifically marked **urgent** by the sender are considered **batch**.) With this two-tiered system, routine messages are sent at a time when the call is more economical, while more important messages are delivered promptly. (Centigram recommends that you set realistic batch limits or restrict the

assignment of Network Classes of Service that allow the user to send urgent messages over the network to prevent users from marking all remote messages urgent.) The batch queues and remote queues of each remote node are monitored individually by MESA-Net.

Message Count Threshold: The number of messages, names, greetings, and receipt updates that must be waiting in a queue for a certain node before that queue becomes ready to send. This threshold is appropriate for sites where users tend to make frequent, short messages. The default message count threshold for batch messages is 5; for urgent messages, it is 0.

Message Waiting Threshold: The length of time, in minutes, that the oldest message will be kept waiting in the queue before the queue becomes ready to send. If the queue has a very restrictive time window (for example, if batch messages can be sent only between 12:00 am and 5:00 am), set this threshold to a low value to ensure that all network queues are ready to send when the window opens. The default message waiting threshold for batch messages is 10 minutes; for urgent messages, the default is 0 minutes (no waiting).

Total Message Minutes: The number of minutes of speech that must be waiting in a queue for a certain node before that queue becomes ready to send. This threshold is appropriate for systems where system storage tends to be high, but it is not triggered efficiently by frequent, short messages. If the node tends to process a high volume of short messages, the message count threshold is a better choice. The default Total Message Minutes threshold for batch messages is 5 minutes of speech; for urgent messages, the default is 0 minutes of speech.

Worksheet Definitions: Network Queue Time Windows (Start/Stop Times)

The start and stop times create a limited time period during which messages can be sent to remote nodes. This time window overrides all message thresholds; queues that are ready to send will not trigger a call unless the window is open. Conversely, when the time window opens, queues that have not yet met any of the thresholds will not be sent. The time window and thresholds must be carefully set, to ensure that messages do not remain queued for an unacceptable period of time.

You set separate time windows for batch and urgent messages. Within these categories, you set time windows for weekdays and weekends. In the default configuration, network queue time windows for batch and urgent messages are always open.

Always Open: Circle Weekdays or Weekends for either urgent or batch queues if you do not want message sending to be restricted by time of day.

Weekday Start Time: Write in the time of day that you want the local node to start sending messages on weekdays, provided that at least one of the network queue thresholds has been met.

Weekday Stop Time: Write in the time of day that you want the local node to stop sending messages on weekdays.

Weekend Start Time: Write in the time of day that you want the local node to start sending messages on weekends, provided that at least one of the network queue thresholds has been met.

Weekend Stop Time: Write in the time of day that you want the local node to stop sending messages on weekends.

Worksheet Definitions: Network Queue Limits

Network queue limits control network queue storage and determine how often, and at what interval, a node should attempt to send a network queue to another node before the queue is considered "undeliverable."

Message Block Use Threshold: The percentage of total queue storage that must be full to trigger an automatic connection. The Message Block Use Threshold is a "safety valve" that forces the node to empty queues when total network queue storage is almost full.

When the message block use threshold is reached, the system checks the network queues for the node with the greatest number of messages waiting and marks that queue as ready to send. The queue is sent immediately; the message block use threshold overrides all other thresholds, including network queue time windows. The system will continue to send queues until message storage falls below the threshold.

You can set the message block use threshold at any value between 80% and 100%. The default threshold is 80%.

Maximum Call Setup Tries: The maximum number of calls that an originating node will make to try to establish a connection with another node. The default value is 50.

Call Setup Retry Interval: The time, in minutes, between attempts to establish a connection. The default interval is 10 minutes.

An originate link executes the originate actions of the hardware type up to three times in immediate succession when attempting to call another node. These three calls constitute one try; that is, the call setup tries counter is incremented only after all three attempts have failed.

When a first attempt at originating a call fails (the node may be busy communicating with another node on the system, for example), the node waits the amount of time specified by the call setup retry interval before repeating the originating actions. This sequence will continue until communications are established or the maximum call setup tries threshold has been reached.

If all attempts to communicate with the destination node fail, all users who sent messages to that node are notified that these messages could not be delivered.

MESA-Net
Network Queues

Network Queue Limits

Message Block Use Threshold (80-100%): ☐

Maximum Call Setup Tries: ☐

Call Setup Retry Interval (minutes): ☐

Network Queue Time Windows

Always Open?   Weekdays   Weekends

Weekday Start Time (hour:min am/pm): Batch _____   Urgent _____

Weekday Stop Time (hour:min am/pm): Batch _____   Urgent _____

Weekend Start Time (hour:min am/pm): Batch _____   Urgent _____

Weekend Stop Time (hour:min am/pm): Batch _____   Urgent _____

Network Queue Thresholds

Message Count Threshold: Batch _____   Urgent _____

Message Waiting Threshold: Batch _____   Urgent _____

Total Message Minutes Threshold: Batch _____   Urgent _____

Task *Procedure*

MESA-Net Network Queues

Use this procedure to configure the network queue parameters, including message
`thresholds, time windows, and queue limits.

Step	*Reference*
1. Reach the Modify Network Queue Menu.	Menu Map 13

(((·))) **Set Network Queue Message Thresholds**

2. Reach the Message Thresholds menu.

3. Select to modify either the batch queue (B) or the urgent queue (U).

4. If desired, set the threshold parameters to their default values, otherwise proceed to
   step 5.

   Select: (W) Set to Default Values
   Prompt: `Warning:  This command will set the following`
   `BATCH default values:`
   `  Message Count threshold to 3 messages`
   `  Message Waiting Time threshold to 20 minutes`
   `  Total Message Minutes threshold to 5 minutes`
   `  of speech`
   `Reset limits to default values? (Y/N):`
   Response: **Y** to set the limits to the defaults; **N** to leave them unchanged.

5. Set the message count threshold.

   Select: (M) Message Count Threshold
   Prompt: `Message Count Threshold [3]:?`
   Response: The **number** of messages and receipt updates in a queue that, when
   reached, causes the queue to be sent.

6. Set the number of minutes that the oldest message will be kept waiting before the
   queue is sent.

   Select: (S) Message Waiting Threshold (minutes)
   Prompt: `Message Waiting Threshold (minutes) [20]:?`
   Response: The **number** of minutes that a message waits before being sent.

Step *Reference*

7. Set the maximum number of message minutes that can accumulate in a queue
    before the queue is sent.

    Select: (T) Total Message Minutes
    Prompt: `Total Message Minutes [5]:`
    Response: The **number** of minutes that the total messages add up to before the
    queue is sent..

8. Select X to exit.

9. Repeat steps 3 through 8 for the other queue (batch or urgent).

((·)) **Set Network Queue Time Windows**

10. Reach the Network Queue Start/Stop Times menu.

11. Select to modify either the batch queue (B) or the urgent queue (U).

12. If you do not want any time limits on when the local node can originate
    MESA-Net connections during the week, set the weekday window to always open.

    Select: (U) Always Open Weekday Window
    Prompt: `Warning: This will reset the WEEKDAY BATCH start`
    `and stop times so that the window will always be`
    `open to transmit messages:`
    `Start time = 12:00 am,`
    `Stop time = Never`
    `To define specific times when messages can be`
    `transmitted and when messages will only be queued,`
    `set up desired start and stop times using the menu`
    `choices.`
    `Reset times to always open? (Y/N):`
    Response: **Y** to set the window to always open; **N** to leave the times unchanged.

Step   *Reference*

13. If you do not want any time limits on when the local node can originate
    MESA-Net connections on the weekends, set the weekend window to always
    open.

    Select: (V) Always Open Weekend Window
    Prompt: Warning: This will reset the WEEKEND BATCH start
                  and stop times so that the window will always be
                  open to transmit messages:
                  Start time = 12:00 am,
                  Stop time = Never
                  To define specific times when messages can be
                  transmitted and when messages will only be queued,
                  set up desired start and stop times using the menu
                  choices.
                  Reset times to always open? (Y/N):
    Response: **Y** to set the window to always open; **N** to leave the times unchanged.

14. Set the weekday start time.

    Select: (A) Weekday Start Time [12:00 am]
    Prompt: Weekday Start Time [12:00 am]:?
    Response: The **time** that MESA-Net starts sending the network queue on
                  weekdays. The time must between 01 00 am or pm and 12 00 am or
                  pm in the format hh mm am or hh mm pm.

15. Set the weekday stop time.

    Select: (D) Weekday Stop Time [Never]
    Prompt: Weekday Stop Time [Never]:?
    Response: The **time** that MESA-Net stops sending the network queue on
                  weekdays. The time must between 01 00 am or pm and 12 00 am or
                  pm in the format hh mm am or hh mm pm.

16. Set the weekend start time.

    Select: (E) Weekend Start Time [12:00 am]
    Prompt: Weekend Start Time [12:00 am]:?
    Response: The **time** that MESA-Net starts sending the network queue on
                  weekends. The time must between 01 00 am or pm and 12 00 am or
                  pm in the format hh mm am or hh mm pm.

Step   *Reference*

17. Set the weekend stop time.

> *Select:*   (I) Weekend Stop Time [Never]
> *Prompt:*   Weekend Stop Time [Never]:?
> *Response:*   The **time** that MESA-Net stops sending the network queue on
>   weekends. The time must between 01 00 am or pm and 12 00 am or
>   pm in the format hh mm am or hh mm pm.

18. Select X to exit.

19. Repeat steps 11 through 18 for the other queue (batch or urgent).

(((·))) Set Network Limits

20. Reach the Network Queue Limits menu.

21. If desired, set the parameters to their default values. Otherwise, proceed to step
      22.

> *Select:*   (W) Set to Default Values
> *Prompt:*   Warning: This command will set the following
>   default values:
>   Message Block Use threshold: 80 percent
>   Maximum Call Setup Tries: 50
>   Call Setup Retry Interval to 10 minutes
>   Maximum Session Length to No Limit.
>   Reset limits to default values (Y/N)?
> *Response:*   **Y** to set the limits to the defaults; **N** to leave them unchanged.

22. Set the message block use threshold

> *Select:*   (T) Message Block Use Threshold (percent)
> *Prompt:*   Message Block Use Threshold (percent)?:
> *Response:*   The **number** that indicates a percentage of buffers used for messages.
>   When this percentage is reached, MESA-Net will send the queue with
>   the greatest number of message. MESA-Net continues to send queues
>   until the message storage falls below the threshold. This number can
>   be from 80 to 100.

Step	*Reference*

23. Set the maximum of times that MESA-Net will try to set up a connection.

> *Select:* (U) Maximum Call Setup Tries
> *Prompt:* Maximum Call Setup Tries?
> *Response:* The **number** that indicates the number of times MESA-Net will try to send a network queue. Each try consists of three call setup attempts.

24. Set the number of seconds that MESA-Net waits before trying to set up a connection after an attempt has failed.

> *Select:* (V) Call Setup Retry Interval (minutes)
> *Prompt:* Call Setup Retry Interval (minutes)?:
> *Response:* The **number** of minutes <<or seconds?>> between attempts to set up a connection to a remote node.

8 Configuring the Network Class of Service

The VoiceMemo software allows you to customize your system to meet the specific needs of your site. You do this through Classes of Service (COS), which is a way of differentiating what privileges and abilities different mailbox owners have.

MESA-Net messaging uses the Network Class of Service (NCOS) to control network privileges. NCOS settings control whether a mailbox owner can send, give, or answer messages over the network. This chapter describes the NCOS features.

Network Class of Service Features

MESA-Net provides twelve different NCOS features. You can combine these features in any way to create an NCOS that provides network privileges for a specific user group. You can configure up to 64 NCOS's. This section explains each NCOS feature and provides you with a worksheet to use for NCOS planning.

001 Enable GCOS check across network

A Group Class of Service (GCOS) must be assigned to every VoiceMemo mailbox. A mailbox cannot make, give, or answer messages to a mailbox outside of its group.

If a mailbox's NCOS includes feature bit 001, the sending node transmits the mailbox's GCOS number with any message that the mailbox sends to a remote mailbox. The receiving node delivers the message if either of two conditions is met:

- The GCOS numbers of the sending and receiving mailboxes are the same.

- The GCOS on the receiving node that has the same number as the GCOS of the sending mailbox allows communication with the recipient mailbox.

If neither condition is true, the remote node rejects the message. The sender receives a receipt saying that "remote mailbox XXX cannot receive messages from your group." (Also see NCOS Feature bit 008 for the circumstances under which receipts are generated.)

> **Note:** The remote node does not receive any information about the sender's Group Class of Service other than the GCOS number. For the GCOS check to work consistently, all GCOS's that are

assigned to mailboxes that have network message privileges must have exactly the same group definitions on all nodes.

If the Network Class of Service does not include feature 001, no GCOS checking will be done, that is. a user can send messages to any remote user, regardless of the recipient's Group Class of Service. (Local node interactions are still controlled by the GCOS.)

002 Allow user to make network messages

This feature allows users, while logged into their mailboxes, to press "M" to Make a message for a mailbox on another MESA-Net node. This feature is required to make both batch and urgent messages for remote mailboxes.

003 Allow user to make urgent network messages

Feature 003 allows a user to request urgent delivery for messages that are made to remote mailboxes. Feature 002 is required for this feature to work.

004 Allow user to give network messages

This feature allows users to press G to Give a message to a mailbox on another MESA-Net node. This feature is required to give both batch and urgent messages to remote mailboxes.

005 Allow user to give urgent network messages

Feature 005 allows a user to request urgent delivery for messages that are given to remote mailboxes. Feature 004 is required for this feature to work.

006 Allow user to answer network messages

This feature allows a user, after playing a message from a mailbox on another MESA-Net node, to press A to answer that message. This feature is required to answer both batch and urgent messages from remote mailboxes.

007 Allow user to answer urgent network messages

This feature allows a user to press A to answer urgent messages from users on remote nodes. Feature 006 is required for this feature to work.

008 Automatic receipts on network messages

This feature causes MESA-Net to generate a receipt every time a remote message is made, given, or answered.

Receipts are generated under most conditions when a message to a remote node cannot be delivered. The only time a user will not be notified that a message to a

remote mailbox was not delivered is if the message was made for more than one mailbox (either through a distribution list or through the "make multiple" feature), and at least one other mailbox on the same node got the message.

Automatic receipts ensure that the sender is always notified of an undeliverable message; however, system users who make many messages often find that the automatic receipts feature is more annoying than helpful. An alternative is to give mailboxes an FCOS that allows the user to request receipts, then instruct the users to request receipts any time messages are made to multiple mailboxes on the same remote node.

009 Say "Remote mailbox" when playing network messages

The feature adds the words "remote message" when the message header is played by the recipient. In other words, network messages are announced in the form of "8:45 am, remote message from Jane Jones."

This feature eliminates potential confusion when received messages seem to be out of order. When a user plays a remote message, the system announces the time that the remote message was recorded, converted to the local time of the recipient, but the message appears in the user's unplayed queue in the order in which it was received. When a remote message is delayed in a queue on the sending node, the time stamp will be out of order with other messages in the unplayed queue, and users may become confused because they do not realize that the message was sent from a remote node. Adding this NCOS feature distinguishes network messages, which may be delayed due to queue thresholds, from local messages.

If senders do not record a name in their mailboxes, remote message introductions announce the sending mailbox number.

010 Allow user to make fax message over the network

This feature allows a user to make a fax message over the network.

011 Allow user to give fax message over the network

This feature allows a user to give a fax message to a mailbox on a remote network.

012 Allow user to answer fax message over the network

This feature allows a user to answer a fax message to a mailbox on a remote network.

Network Messaging to Pre-6.0 AIP Systems

VoiceMemo release 6.0 introduced new hardware and the ability to provide different levels of speech quality by using different compression rates for message storage.

Pre-6.0 hardware and software only support a single compression rate – 18.3 Kbps – and cannot accept messages that were recorded with a different compression rate.

If your MESA-Net network includes AIP systems that have pre-6.0 hardware and software and you want all nodes to be able to exchange messages, you *must* set the compression rate on all 6.0 systems to 18.3 Kbps. You must use this setting for all messages, names, and greetings. You use feature bits in FCOSs to set the compression rates for each type of recording. See the FCOS chapter in the *VoiceMemo Reference and Configuration Manual* for more information.

Configuring Network Classes Of Service

The VoiceMemo software has a single default Network Class of Service, NCOS 1. NCOS 1 has all NCOS features except 001, Enable GCOS check across network and 008, Automatic receipts on network messages.

You can create up to 64 NCOSs, each with a different combination of features, to meet the needs of users on the local node. To create a new NCOS, you simply identify an NCOS number, give it a name, and add or delete NCOS features. You must then assign the NCOS to those mailboxes that you want to have that set of network privileges.

Use the Network Class of Service Worksheet to help plan your NCOSs.

MESA-Net
Network Class of Service Worksheet

NCOS

NCOS Number │ 3 │   NCOS Name   │ Basic Network Service │

Assign to Mailboxes:

_342_ _345_ _346_ _350_ ____ ____ ____ ____ ____ ____

_412_ _418_ ____ ____ ____ ____ ____ ____ ____ ____

____ ____ ____ ____ ____ ____ ____ ____ ____ ____

☐	001	Enable GCOS check across network
X	002	Allow user to make network messages
X	003	Allow user to make urgent network messages
X	004	Allow user to give network messages
X	005	Allow user to give urgent network messages
X	006	Allow user to answer network messages
X	007	Allow user to answer urgent network messages
☐	008	Automatic receipts on network messages
☐	009	Say "Remote message" when playing network messages
☐	010	Allow user to make fax message over the network
☐	011	Allow user to give fax message over the network
☐	012	Allow user to answer fax message over the network

MESA-Net
Network Class of Service Worksheet

NCOS

NCOS Number ☐   NCOS Name ☐

Assign to Mailboxes:

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

☐ 001 Enable GCOS check across network

☐ 002 Allow user to make network messages

☐ 003 Allow user to make urgent network messages

☐ 004 Allow user to give network messages

☐ 005 Allow user to give urgent network messages

☐ 006 Allow user to answer network messages

☐ 007 Allow user to answer urgent network messages

☐ 008 Automatic receipts on network messages

☐ 009 Say "Remote message" when playing network messages

☐ 010 Allow user to make fax message over the network

☐ 011 Allow user to give fax message over the network

☐ 012 Allow user to answer fax message over the network

Task   *Procedure*

NCOS Configuration

Use this procedure to create or modify an NCOS by adding and deleting network messaging features.

Step	Reference

1. Reach the Network Class of Service Menu. (*This choice is not illustrated on this menu map, but it is in the same location as the other Classes of Service.*)   Menu Map 11

2. Select the NCOS that you want to create or modify.

    Select: (C) Current NCOS
    Prompt: NCOS to modify:
    Response: The **number** (1-64) of the NCOS that you want to create or modify.

3. Name the NCOS.

    Select: (N) Name NCOS
    Prompt: Enter NCOS name (0-15 characters):
    Response: A descriptive **name** for the NCOS, possibly one that describes the NCOS user group.

4. If desired, view the network messaging features that you can add to an NCOS.

    Select: (H) Help NCOS
    Prompt:
    ```
    NCOS   DESCRIPTION
    001    Enable GCOS check across network.
    002    Allow user to make network messages.
    003    Allow user to make urgent network msgs.      -
    004    Allow user to give network messages.
    005    Allow user to give urgent network msgs.
    006    Allow user to answer network messages.
    007    Allow user to answer network msgs (urg)
    008    Automatic receipts on network msgs.
    009    Say "Remote message" when playing network msgs.
    010    Allow user to make fax message over the network.
    011    Allow user to give fax message over the network.
    012    Allow user to answer fax msg over the network.
    ```

5. Add features to the NCOS.

    Select: (A) Add Features
    Prompt: Feature to add =
    Response: The **numbers** (1-12) of the NCOS features that you want to add. You can enter an individual feature number, a comma-separated list, or a range, such as 2-4.

6. If desired, delete features from the NCOS.

    Select: (D) Delete Features
    Prompt: Feature to delete =
    Response: The **numbers** (1-12) of the NCOS features that you want to delete. You can enter an individual feature number, a comma-separated list, or a range, such as 2-4.

Step	*Reference*

7. View the NCOS to verify your work.

   Select: (R) Report NCOS
   Prompt: NCOS to report =
   Response: The **number** (1-64) of the NCOS that you just created or modified.

   The system displays the NCOS number and name, and the features enabled for the NCOS users.

8. If necessary, make further changes to the NCOS by adding or deleting features. When finished, exit to the System Configuration Menu to save your work.

9 Configuring Network Mailboxes

This chapter describes MESA-Net mailbox maintenance: creating network mailboxes, adding network mailboxes to distribution lists, and working with broadcast mailboxes over the network. The information here is an addition to the mailbox information in the *VoiceMemo Reference and Configuration Manual.*

Creating Network Mailboxes

There is very little difference between a regular mailbox and a network mailbox. A regular mailbox becomes a network mailbox when you associate it with a network class of service (NCOS) that allows messaging across the network. Network Class of Service is described in Chapter 8 of this manual. Follow the "Create a Mailbox" procedure in the *VoiceMemo Reference and Configuration Manual* to create network mailboxes.

Unless you specify otherwise, all mailboxes are assigned NCOS 1. To make administration easier, you should configure NCOS 1 to match the needs of the largest group of network users.

If you enabled GCOS checking across the network (NCOS feature 001), you must pay special attention to the GCOS that you assign to each mailbox so that the mailbox owner can communicate with the appropriate people.

Modifying Existing Mailboxes for Networking

When you add MESA-Net software to a Series 6 server that is already processing calls, the default NCOS that was assigned to all mailboxes becomes effective. If you want to change mailbox NCOS assignments, follow the "Modify a Mailbox" procedure in the *VoiceMemo Reference and Configuration Manual* to change the NCOS on one mailbox, or a range of mailboxes, if necessary.

Adding Network Mailboxes to Distribution Lists

If you maintain any distribution lists from the console, such as system-level distribution lists, you can add remote mailboxes to those lists. You add remote mailboxes from the console using the same letters as the dialing plan: N and P. When adding members to a distribution list, enter N and a remote mailbox number (just like a user would enter the number when addressing a message), or P and a prefix and mailbox number.

Any remote mailbox entries that you put in distrubution lists must match the dialing plan and Node Access Table configuration.

Broadcasting over the Network

A Broadcast mailbox (mailboxes with FCOS bit 122) functions differently when broadcasting to remote mailboxes:

- FCOS bit 123, which directs the system to announce the broadcast mailbox number/name to the recipient, rather than the sender's mailbox number/name, does not work when the message is sent to a remote node.

- Messages made for a broadcast mailbox are automatically sent to every member of distribution list 01 of that mailbox. Local and remote mailboxes can be included in this distribution list. Distribution lists are limited to 200 members, and each local or remote mailbox in the list counts toward that limit.

- The same system will not perform a "double broadcast," that is, if one of the child mailboxes is also a broadcast mailbox, the message will *not* be sent to the mailboxes in its distribution list 01.

- If a remote broadcast mailbox is included in distribution list 01 of the local broadcast mailbox, the message *will* be broadcast to the remote mailbox's distribution list 01, since each broadcast is done by a different system.

Message Queues and the Mailbox Message Count

The mailbox Limits Class of Service limits the number of messages that can be stored in a mailbox. The absolute maximum number of messages allowed is 73 (note that attachments to a message count toward this total). Network messages that are queued but have not been sent count toward this limit, and so do message receipts. You must take these additional demands on mailbox message storage into account when programming network queue configurations and when assigning Limits Classes of Service to network mailboxes.

10 Network Billing and Reports

This chapter describes two similar areas of MESA-Net administration: mailbox billing for network messaging and system reports on MESA-Net programming and activity.

Network Billing

This section describes the mailbox billing counters and the parts of the standard billing report that reflect MESA-Net usage. Refer to the *VoiceMemo Reference and Configuration Manual* for instruction on adjusting billing rates and running the billing report.

Network Message Counters

Network message counters tally the number of messages sent by a mailbox to remote nodes. Different counters measure the total number of network messages sent, the number of nodes to which a message is sent, number of remote recipients to which a message is sent, and the number of network messages received by the mailbox during the billing period. Separate totals are kept for urgent and batch messages that meet each of these criteria.

Network messages sent

This counter keeps track of the total number of batch messages recorded for remote mailboxes during the billing period. A "Give + comments" message is counted as one message, as is an original message that has an answer or answers attached.

Messages are billed on a "per message" basis, *not* a "per recipient" basis; when a batch message is made to a distribution list, or by using the "make multiple" feature, it counts as one network message sent.

Network urgent messages sent

This counter keeps track of the total number of urgent messages sent to remote nodes by the mailbox during the billing period. A "Give + comments" message is counted as one message, as is an original message that has an answer or answers attached.

Messages are billed on a "per message" basis, *not* a "per recipient" basis; when an urgent message is made to a distribution list, or by using the "make multiple" feature, it counts as one urgent network message sent.

Number of network nodes sent to

The Make Multiple and Broadcast features permit users to send a single message to more than one node. This counter allows the administrator to charge separately for each node to which a batch message is sent, since each destination node requires a separate transmission. The number of recipient mailboxes on each node does not matter. For example, a single message that is broadcast to five mailboxes on three different nodes increments this counter by 3.

A "Give + comments" message is equivalent to the single message in the previous paragraph, as is a "Give + message with an answer or answers attached."

Number of network nodes sent urgent to

The Make Multiple and Broadcast features enable users to send a single message to more than one node. This counter allows the administrator to charge separately for each node to which an urgent message is sent, since each destination node requires a separate transmission. The number of recipient mailboxes on each node does not matter. For example, a single message that is marked urgent, then sent to five mailboxes on three different nodes increments this counter by three.

Number of network recipients sent to

The Make Multiple and Broadcast features permit users to send a single message to more than one remote mailbox. This counter allows the administrator to charge separately for each remote mailbox to which a batch message is sent. The number of nodes is irrelevant. For example, if a single batch message is sent to five mailboxes on three different nodes, this counter is incremented by 5.

Number of network recipients sent urgent to

The Make Multiple and Broadcast features enable users to send a single message to more than one remote mailbox. This counter allows the administrator to charge separately for each For example, a single message that is marked urgent, then sent to five mailboxes on three different nodes increments this counter by 5.

Network messages received

This counter keeps track of the number of batch messages received from remote nodes by the mailbox during the billing period. A "Give + comments" message is counted as one message, as is an original message that has an answer or answers attached.

Network urgent messages received

This counter keeps track of the number of urgent messages received from remote nodes by the mailbox during the billing period. A "Give + comments" message is counted as one message, as is a original message that has an answer or answers attached.

Network Message Length Counters

Message length counters keep track of the total amount of recorded speech that fits certain criteria. Every mailbox has these counters, and all counters are incremented in tenths of a minute.

Among the reasons why an administrator would set rates based on message lengths are (1) messages use up disk storage when they wait in the queue, and (2) the longer the message, the longer the transmit time. While the cost of transmitting a single two minute message may not be significantly higher than the cost of transmitting a single one minute message, the cost differences can be substantial when they are multiplied over many messages.

There are separate message length counters for Batch and Urgent messages. Batch messages usually stay in the queue longer than urgent messages, but urgent messages may be transmitted during time periods when transmission charges are highest. Take these factors into account when setting rates.

Message length for network messages sent

The counter tallies the total amount of recorded speech in all batch messages sent to remote nodes by the mailbox during the current billing period.

Message length for network messages sent urgent

The counter tallies the total amount of recorded speech in all urgent messages sent to remote nodes by the mailbox during the current billing period.

Message length for network messages received

This counter totals the amount of recorded speech in all batch messages received from remote nodes during the current billing period.

Message length for urgent network messages received

This counter totals the amount of recorded speech in all urgent messages received from remote nodes during the current billing period.

Message length for number of network nodes sent

MESA-Net multiplies the amount of recorded speech in each batch message by the number of remote nodes to which the mailbox sends the message. The results are recorded by this counter.

Message length for number of network nodes sent urgent

MESA-Net multiplies the amount of recorded speech in each urgent message by the number of remote nodes to which the mailbox sends the message. The results are recorded by this counter. The number of recipients on each node does not count here.

Message length for number of remote recipients sent

MESA-Net multiplies the amount of recorded speech in each batch message by the number of remote mailboxes to which the mailbox sends the message. The results are recorded by this counter. The number of different remote nodes is irrelevant here; two messages for the same remote node are equivalent to one message for two different remote nodes.

Message length for number of remote recipients sent urgent

MESA-Net multiplies the amount of recorded speech in each urgent message by the number of remote mailboxes to which the mailbox sends the message. The results are recorded by this counter. The number of different remote nodes is irrelevant here; two messages for the same remote node are equivalent to one message for two different remote nodes.

Network Billing Report Entries

The billing report includes the charges accrued by network messaging. Some of the network charges are shown in boldface in the this billing report for mailbox 402. When no charges have accumulated for a counter, the entry does not appear on the billing report.

```
MAILBOX:  402          ID: A.G. Bell
  GROUP:  GCOS 1         FCOS 1:   UNLIMITED base rate
  $ 5.00
  $  .40        40      user messages received
  $ 2.30        23      caller messages received
  $  .00         0      call placements sent
  $  .00         0      future deliveries sent
  $ 2.60        13      urgent messages sent
  $  .00         0      tas messages received
  $ 1.20        24      number of receipts requested
  $ 4.10        41      greetings played
  $ 3.50        72      times logged in
  $ 9.60       9.6      user connect time
  $ 1.70       3.4      caller connect time
  $  .00         0      call placement time
  $ 1.80        .09     disk usage
  $ 5.40        18      messages sent to nodes
  $ 6.00         6      urgent messages sent to nodes
  $ 3.21      32.1      .1 minutes sent network urgent
  $ 5.84     116.8      .1 minutes sent over network
  $ 1.40        14      messages received from nodes
  $  .50         1      urgent messages received
  $ 2.36      94.5      .1 minutes rcvd over network
  $ 1.26       6.3      .1 minutes rcvd network urgent
  Total Charges = $ 58.17
```

MESA-Net Configuration Reports

Centigram Series 6 servers can provide reports on all aspects of MESA-Net configuration, both for MESA-Net Async and MESA-Net TCP/IP.

When you complete MESA-Net programming for the first time, or when you update the configuration, print the reports showing the configuration. Confirm the changes and communicate them to the customer, then leave a copy on site for technicians servicing MESA-Net in the future.

The available reports are:

- Digits Translation Report
- Node Table Report
- Network Queues
- Link Report
- Hardware Report
- Network Transport Query
- Network Link Query
- TCP Network Status

Every time that you request one of these reports you are given the option to view these reports on the system console or your terminal connection, send them to a specific serial port, or put the information in a file.

The Digits Translation Report

This report displays each node prefix and associated node number that has been programmed into the Digits Translation Table. The Digits Translation report has the following format:

```
                    >>> Denver VoiceMemo <<<
                    PREFIX/NODE PAIR REPORT
                    Mon Dec 4, 1995   6:09 pm
        Prefix          Node          Absorb Cnt
           1             2                0
           2             2                0
           3             2                0
           4             1                0
           5             1                0
           6             1                0
           7             3                0
           8             4                0
        8 Prefixes found
```

The Node Access Table Report

The Network Node Table stores the access string and hardware type of each remote node on the system. This information enables the originate link of the local node to establish communications with the other nodes on the system.

The Node Table Report shows the node number, node name, access code (string), hardware type and access status (enabled or disabled) for every node that was entered into the Network Node Table.

```
                    >>> Denver VoiceMemo <<<
                    NODE ACCESS TABLE REPORT
                    Mon Dec 4, 1995  6:09 pm
        NODE NAME      STRING     HARDWARE TYPE      ACCESS    PARALLEL LINKS
                                                               DELAY    MAX
           1 Lassen   202/10\r  1 = TELLABS            Y        15       1
           2 Shasta   202/11\r  1 = TELLABS            Y        15       1
           3 San Jose 201/10\r  1 = TELLABS            Y        15       1
        3 Nodes found
```

The Network Data Link Report

You can call up two different link reports: a Network Link Data Report and a Network Link Serial Port Report. The Network Link Data report shows the link mode (answer or originate), the timeout parameter settings, the fail counts, and the answer link hardware type. The report is given in the following form:

```
                    >>> Denver VoiceMemo <<<
                    NETWORK LINK DATA
                    Mon Dec 4, 1995  6:12 pm

                    NETWORK                     TIMERS          FAILCNTS
        LINK  MODE  HARDWARE           RCV, RSND, INACT       RCV,  SND
          1   orig  1 = TELLABS         60   60    60          7    7
          2   ans   1 = TELLABS         60   60    60          7    7
```

Reading the Network Data Link Report

The heading shows the site name, the report name, and the date and time that the report was run.

LINK - the link number

MODE - the link is either answer (ans) or originate (orig)

NETWORK HARDWARE - This column shows the hardware type associated with the link.

TIMERS - The three columns listed under Timers show the settings for the timeout parameters:

RCV - the Data receive timeout, expressed in seconds

RSND - the Resend timeout, in seconds

INACT - the Node inactivity timeout, in seconds

FAILCNTS - The two columns listed under FAILCNTS show the fail count settings:

RCV - the Receive fail count

SND - the Send fail count

The Network Link Serial Port Report

The Network Link Serial Port report is the second link report. The report is given in the following form:

```
                        >>> Denver VoiceMemo <<<
                        NETWORK LINK SERIAL PORTS
                        Mon Dec 4, 1995   6:18 pm
        LINK   PORT   BAUD   PARITY   STOPBITS   DATABITS  FLOWCONTROL
         1     cti1   19200  none     1          8         enabled
         2     cti2   19200  none     1          8         enabled
```

Reading the Network Data Link Serial Report

The heading shows the site name, the report name, and the date and time that the report was run.

LINK - the link number

PORT - the port assigned to each link. "cti1" and "cti2" are ports on the expansion serial card.

BAUD, PARITY, STOPBITS, DATABITS - the communications setup for each port.

Network Queue Parameters Report

The Network Queue Menu, accessed from the reports menu, has two entries, Report Queue Parameters and Dump. "Dump" is a utility that is used only by service personnel. The Queue Parameters report shows the current network queue configuration. The report for the default configuration is as follows:

	Batch		**Urgent**	
Weekday start time (hh:mm)	12:00	am	12:00	am
Weekday stop time (hh:mm)	Never		Never	
Weekend start time (hh:mm)	12:00	am	12:00	am
Weekend stop time (hh:mm)	Never		Never	
Message count threshold	1		1	
Waiting time threshold (minutes)	0		0	
Total message minutes threshold	0		0	
Limits				
Message blk use threshold (percent)	80			
Max call setup tries	6			
Call retry interval (minutes)	1			

The Hardware Report

The Hardware Report shows all currently configured hardware types, and their associated originate, answer, and disconnect actions, and line drop signals. Default hardware types do not appear in this report unless they have been assigned a hardware type number.

This report is useful to leave on site to help debug communication device problems, or in the site log.

```
                          >>> Denver VoiceMemo <<<
                          NETWORK LINK HARDWARE
                          Mon Dec 4, 1995  6:42 pm


    DEVICE 1 TELLABS      ORIGINATE ACTIONS
         ACTION                  PARAMETER          TIMEOUT
         1) Send string          \r
         2) Sleep                                   3 seconds
         3) Flush device
         4) Sleep                                   2 seconds
         5) Send access code
         6) Sleep                                   2 seconds
         7) Read string          connected          20 seconds

    DEVICE 1 TELLABS      ANSWER ACTIONS
         ACTION                  PARAMETER          TIMEOUT
         1) Send string          \r
         2) Sleep                                   3 seconds
         3) Flush device
         4) Read string          connected          0 seconds
```

```
DEVICE 1 TELLABS     DISCONNECT ACTIONS
          ACTION                  PARAMETER           TIMEOUT
          1) Set signal lo        DTR
          2) Set signal lo        RTS
          3) Sleep                                    5 seconds
          4) Set signal hi        RTS
          5) Set signal hi        DTR
          6) Sleep                                    2 seconds
DEVICE 1 TELLABS     LINE DROP SIGNAL = CD
DEVICE 1 TELLABS     DIRECT LINK HARDWARE TYPE = 1 TELLABS
```

Other Configuration Reports

It is always a good idea to print out a few other system reports, such as the NCOS table and the Smartcard Table.

Real-time MESA-Net Reports

Several reports are invaluable when debugging MESA-Net delivery problems.

Network Queue Report

The Network Queue Report is an essential MESA-Net report. It lists all current messages in the network queue. Each remote node is displayed separately, and batch and urgent deliveries are separated.

```
BATCH QUEUE:
URGENT QUEUE:
```

Network Link Query

```
                    >>> Denver VoiceMemo <<<
                        LINK STATUS REPORT
                      Mon Dec 4, 1995   6:32 pm
Link  Enb CTI Snd_F Timer Send_In RCV_In Type  State      S_State  CS_STATE
 1    YES YES NO    NO    IN      OUT    ORIG  HALTED     ISTRT    CONNECT
 2    YES YES NO    YES   IN      OUT    ANSW  CALL-SETUP ISTRT    WAIT_MSG
```

Link Node Dump

```
                    >>> Denver VoiceMemo <<<
                        LINK NODE REPORT
                      Mon Dec 4, 1995   6:34 pm
Link  Enabled   State Node  Timer firstq     lastq Snd_TID   Rcv_TID
 1    YES  IDLE   0    NO    0     0      0246       014a
 2    YES  IDLE   0    NO    0     0      014b       014c
```

Network Statistics Reports

Two statistics reports give comprehensive pictures of network usage. These reports are available from the Network Usage Report Menu, which is a sub-menu of the Statistics Menu (*not* the Network Reports menu).

The Network Usage Report

The Network Usage Report gives 15 minute "snapshots" of network message activity for a specified reporting period. This reporting period can be any hour, or range of hours, from the current day or the previous 6 days.

```
                              >>> Denver VoiceMemo <<<
                           NETWORK USAGE 15min REPORT
                           Mon Dec 4, 1995   7:58 pm
12/04/95   8hr-17hr         --- minutes interval ---
MESSAGE DAY=01 HOUR=08      00-14      15-29      30-44      45-59    AVERAGE
BATCH IN QUEUE               0          0          0          0          0
URG IN QUEUE                 0          0          0          0          0
BATCH MAX LENGTH             0          0          0          0          -
URG MAX LENGTH               0          0          0          0          -
BATCH LATENCY H:M:S       0:00:00    0:00:00    0:00:00    0:00:00      -
URG LATENCY               0:00:00    0:00:00    0:00:00    0:00:00      -
BATCH DELIVERED              0          0          0          0          0
URG DELIVERED                0          0          0          0          0
TOTAL UNDELIVERED            0          0          0          0          0
BATCH RECEIVED               0          0          0          0          0
URG RECEIVED                 0          0          0          0          0
```

Reading the Network Usage Report

The report heading shows the node name, the report name, the date and the time that the report was run.

The first line of the report shows the date and time interval during which the data were gathered.

A hyphen (-) in any column means the system was not processing messages during the report period (there was a power failure, or the system was taken offline for maintenance, for example). A zero in any column means the system was operable, but there was no activity.

MESSAGE DAY = 03, HOUR = 11 indicates that the data displayed immediately below were gathered on Wednesday, during the hour between 11 and 12 am. 00-14 indicates that data in that column were gathered during the first fifteen minutes of the hour; 15-29 refers to the second 15 minutes of the hour, etc.

AVERAGE is the average value of the four 15-minute samples. If a hyphen appears, in place of a numerical value, it means that the data have not yet been gathered. For

example, if the report is run at 3:30 pm, and the report interval is for hours 12-15 (noon to 3 pm) of the same day, the entries for hour 15 (3 to 4 pm) will all be hyphens.

BATCH IN QUEUE is the total number of batch (non-urgent) messages and receipt updates present in the network queue during the time period.

URG IN QUEUE is the total number of urgent messages in the network queue during the time period.

BATCH MAX LENGTH is the total number of minutes of recorded speech in the network batch queue during the time period.

URG MAX LENGTH is the total number of minutes of recorded speech in the urgent network queue during the time period.

BATCH LATENCY is the maximum number of seconds that a message remained in the batch network queue during the time period.

URG LATENCY is the maximum number of seconds that a message remained in the urgent network queue during the time period.

BATCH DELIVERED is the total number of batch messages that were delivered to their destination nodes during the time period. (Receipt updates do not count here.)

URG DELIVERED is the total number of urgent messages that were delivered to their destination nodes during the time period.

TOTAL UNDELIVERED is the total number of messages (batch and urgent) that were rejected by their destination nodes during the time period. (Receipt updates do not count here.)

The Network Usage Summary Report

The Network Usage Summary Report gives peak (maximum) and total statistics for network message activity during a specified reporting period. This reporting period can be any hour, or range of hours, from the current day or from the previous 6 days.

```
                        >>> Denver VoiceMemo <<<
                     NETWORK USAGE SUMMARY REPORT
                      Mon Dec 4, 1995   8:08 pm
12/04/95   8hr-17hr
Day 1          <------------PEAKS------------><------------TOTALS---------->
NETWORKING:   IN QUEUE    MINUTES    LATENCY  DELIVERED    UNDELIV   RECEIVED
BATCH:               0          0    0:00:00          0          0          0
URGENT:              0          0    0:00:00          0          -          0
```

Reading the Network Usage Summary Report

The report heading shows the node name, the report name, the date and the time that the report was run.

Each section is preceded by the date and time during which the data were gathered.

PEAKS - Statistics are for maximum activity during the reporting period. Although separate statistics are kept for batch and urgent message queues, these statistics are not broken down by destination node; that is, urgent queue statistics refer to urgent messages accumulated for every node on the network.

A hyphen (-) in any column means the system was not processing messages during the report period (there was a power failure, or the system was taken offline for maintenance, for example). A zero in any column means the system was operable, but there was no activity.

BATCH IN QUEUE is the maximum number of batch (non-urgent) messages and receipt updates present in the network queue at any time during the time period.

URGENT IN QUEUE is the maximum number of messages, marked urgent by the sender, that were present in the network queue at any time during the time period.

BATCH MINUTES is the maximum number of minutes of recorded speech from batch messages and receipt updates present in the network queue during the time period.

URGENT MINUTES is the maximum number of minutes of recorded speech from urgent messages present in the network queue during the time period.

BATCH LATENCY is the maximum number of seconds that a single message remained in the batch network queue during the time period.

URGENT LATENCY is the maximum number of seconds that a single urgent message remained in the network queue during the time period.

TOTALS - Data is a summary of activity during the reporting period

BATCH DELIVERED is the total number of batch messages that were delivered to their destination nodes during the time period. (Receipt updates do not count here.)

URGENT DELIVERED is the total number of urgent messages that were delivered to their destination nodes during the time period.

BATCH UNDELIVERED is the total number of batch messages that were rejected by their destination nodes during the time period. (Urgent messages are always delivered.)

BATCH RECEIVED is the total number of batch messages that were received from other nodes during the time period. (Receipt updates do not count here.)

URGENT RECEIVED is the total number of urgent messages that were received from other nodes during the time period.

A Default Hardware Types

This appendix lists all of the actions of the pre-programmed hardware types that come with MESA-Net. You can use this information if you ever need to modify a hardware type.

Concord 296-2 Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	SMC\r	
2	Sleep		3 seconds
3	Send string	ATZ\r	
4	Sleep		5 seconds
5	Send string	ATZ\r	
6	Sleep		2 seconds
7	Send string	ATZ\r	
8	Sleep		2 seconds
9	Flush device		
10	Send string	ATDT	
11	Send access code		
12	Send string	\r	
13	Sleep		3 seconds
14	Flush device		
15	Sleep		7 seconds
16	Read string	CONNECT	20 seconds
17	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	SMC\r	
2	Sleep		5 seconds
3	Send string	ATZ\r	
4	Sleep		2 seconds
5	Send string	ATZ\r	
6	Sleep		2 seconds
7	Send string	AT\r	
8	Sleep		3 seconds
9	Flush device		
10	Read string	RING	0 seconds
11	Sleep		3 seconds
12	Flush device		
13	Read string	CONNECT	20 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		5 seconds
4	Set signal hi	DTR	
5	Set signal hi	RTS	
6	Sleep		2 seconds
7	Send string	ATZ\r	
8	Sleep		5 seconds
9	Send string	SMC\r	
10	Sleep		3 seconds

LINE DROP SIGNAL = CD

Concord DialAccess Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	SMC\r	
2	Sleep		3 seconds
3	Send string	ATZ\r	
4	Sleep		5 seconds
5	Flush device		
6	Send string	ATDT	
7	Send access code		
8	Send string	\r	
9	Flush device		
10	Read string	RING	20 seconds
11	Flush device		
12	Sleep		15 seconds
13	Read string	CONNECT	20 seconds
14	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	SMC\r	
2	Sleep		5 seconds
3	Send string	AT\r	
4	Sleep		3 seconds
5	Flush device		
6	Read string	RING	0 seconds
7	Sleep		3 seconds
8	Flush device		
9	Read string	CONNECT	20 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		5 seconds
4	Set signal hi	DTR	
5	Set signal hi	RTS	
6	Sleep		2 seconds
7	Send string	ATZ\r	
8	Sleep		5 seconds
9	Send string	SMC\r	
10	Sleep		3 seconds

LINE DROP SIGNAL = CD

Microcom Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	AT\r	
2	Sleep		2 seconds
3	Send string	ATZ\r	
4	Sleep		3 seconds
5	Flush device		
6	Sleep		2 seconds
7	Send string	ATDT	
8	Send access code		
9	Send string	\r	
10	Sleep		15 seconds
11	Read string	connect	20 seconds
12	Flush device		
13	Sleep		2 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	AT\r	
2	Sleep		2 seconds
3	Flush device		
4	Sleep		2 seconds
5	Read string	ring	0 seconds
6	Sleep		15 seconds
7	Read string	connect	20 seconds
8	Flush device		

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		5 seconds
4	Set signal hi	DTR	
5	Set signal hi	RTS	
6	Sleep		2 seconds
7	Send string	ATZ\r	
8	Sleep		3 seconds

LINE DROP SIGNAL = CD

TELLABS

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Sleep		2 seconds
5	Send access code		
6	Sleep		2 seconds
7	Read string	connected	20 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Read string	connected	0 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal hi	BREAK	
2	Sleep		2 seconds
3	Set signal lo	BREAK	
4	Send string	QQQ	
5	Sleep		2 seconds

LINE DROP SIGNAL = CD

Direct Connect

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	hello	
2	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Flush device		
2	Sleep		2 seconds
3	Read string	hello	0 seconds

No Disconnect Actions are defined.

LINE DROP SIGNAL = DTR

Telebit Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	+++	
2	Sleep		3 seconds
3	Send string	ATZ\r	
4	Sleep		3 seconds
5	Send string	ATZ\r	
6	Sleep		3 seconds
7	Flush device		
8	Send string	ATDT	
9	Send access code		
10	Send string	\r	
11	Flush device		
12	Sleep		10 seconds
13	Read string	CONNECT	40 seconds
14	Flush device		
15	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	+++	
2	Sleep		3 seconds
3	Send string	ATZ\r	
4	Sleep		3 seconds
5	Send string	ATZ\r	
6	Sleep		3 seconds
7	Flush device		
8	Read string	RING	0 seconds
9	Sleep		3 seconds
10	Flush device		
11	Read string	CONNECT	20 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Sleep		2 seconds
2	Send string	+++	
3	Sleep		3 seconds
4	Send string	ATZ\r	
5	Sleep		5 seconds

LINE DROP SIGNAL = CD

XyLoGiC AnNeX

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Sleep		2 seconds
5	Send string	telnet -t	
6	Send access code		
7	Send string	\r	
8	Sleep		4 seconds
9	Read string	connected	20 seconds
10	Send string	hangup	
11	Flush device		
12	Sleep		2 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Set signal hi	DTR	
2	Sleep		3 seconds
3	Read string	hangup	0 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		10 seconds
4	Set signal hi	RTS	
5	Set signal hi	RTS	

LINE DROP SIGNAL = CD

HT-P4004 DSU

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	hello	
2	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Flush device		
2	Sleep		2 seconds
3	Read string	hello	0 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Sleep		20 seconds
3	Set signal hi	DTR	

LINE DROP SIGNAL = CD

Paradyne V.34 Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	ATH\r	
2	Sleep		5 seconds
3	Send string	ATS0=0\r	
4	Sleep		5 seconds
5	Flush device		
6	Send string	ATDT	
7	Send access code		
8	Send string	\r	
9	Flush device		
10	Sleep		10 seconds
11	Read string	CONNECT	60 seconds
12	Flush device		
13	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	ATH\r	
2	Sleep		5 seconds
3	Send string	ATS0=1\r	
4	Sleep		3 seconds
5	Flush device		
6	Sleep		3 seconds
7	Read string	CONNECT	0 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Sleep		5 seconds
3	Set signal hi	DTR	
4	Sleep		5 seconds
5	Send string	ATH\r	
6	Sleep		5 seconds
7	Send string	ATE0\r	
8	Sleep		3 seconds

LINE DROP SIGNAL = CD

US Robotics Courier V.34 Modem

ORIGINATE ACTIONS

	Action	Parameter	Timeout
1	Send string	ATH\r	
2	Sleep		5 seconds
3	Send string	ATS0=0\r	
4	Sleep		5 seconds
5	Flush device		
6	Send string	ATDT	
7	Send access code		
8	Send string	\r	
9	Flush device		
10	Sleep		10 seconds
11	Read string	CONNECT	60 seconds
12	Flush device		
13	Sleep		5 seconds

ANSWER ACTIONS

	Action	Parameter	Timeout
1	Send string	ATH\r	
2	Sleep		5 seconds
3	Send string	ATS0=1\r	
4	Sleep		3 seconds
5	Flush device		
6	Sleep		3 seconds
7	Read string	CONNECT	0 seconds

DISCONNECT ACTIONS

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Sleep		5 seconds
3	Set signal hi	DTR	
4	Sleep		5 seconds
5	Send string	ATH\r	
6	Sleep		5 seconds
7	Send string	ATE0\r	
8	Sleep		3 seconds

LINE DROP SIGNAL = CD

B   Working with Tellabs Equipment

Prior to the introduction of MESA-Net TCP/IP, MESA-Net Async used Tellabs multiplexing equipment for sites that required high-performance, dedicated digital transmission facilities. Although MESA-Net TCP/IP now provides high-performance connections, the MESA-Net Async optional feature still contains the predefined hardware types required to work with Tellabs equipment. This appendix contains reference information regarding MESA-Net Async and Tellabs equipment, specifically the Tellabs 340 Dataplexer and the 331D Xplexer.

Configuring Tellabs Multiplexer Equipment

You must configure the channel profiles for both Tellabs Dataplexers and Xplexers to work with MESA-Net. The correct settings are:

1)Channel Mode	Asynchronous
2)Channel Code	9600, 8 bits, 1 stop bit, No parity
3)Flow Control	CTS/DTR
4)XON/XOFFChars	Set 1: 11H / 13H
5)ENQ/ACK Pacing	Inactive
6)Modem Controls	DCE Local*
7)Echoplex	None
8)Flush on Break	Inactive
9)Control Privileges	Inactive
10)High Priority	Inactive
11)Slow Packetizing	Inactive
12)Info Messages	Active
C)Copy	
S)Save	

*This parameter is DIM/DOM for Dataplexer channels connected to modems.

Example MESA-Net Async Tellabs Networks

The following pages show example MESA-Net Async networks that use Tellabs equipment, either with or without additional equipment, such as modems.

Example 1: Network using Tellabs Dataplexer/Xplexers

Figure B-1 shows a MESA-Net Async network in which all nodes use Tellabs 330 Dataplexers and 331 Xplexers for communications.

San Jose
Node 1

Tellabs 330 Dataplexer
Tellabs 331 Xplexer

Series 6 Server

Originate
MUX
Answer

Composite Data Link 0 connects Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7

New York
Node 4

Tellabs 331 Xplexer
Tellabs 330 Dataplexer

Series 6 Server

Originate
MUX
Answer

Composite Data Link 1 connects Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7

Communications
Network

Denver
Node 6

Series 6 Server

Originate
MUX
Answer

Composite Data Link 1 connects Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7

Tellabs 330 Dataplexer
Tellabs 331 Xplexer

Chicago
Node 2

Series 6 Server

Originate
MUX
Answer

Tellabs 331 Xplexer
Tellabs 330 Dataplexer

Composite Data Link 0 connects Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7

5112MNET

Figure B-1 Sample Tellabs Network

This Tellabs setup uses the addressing protocol "node number/composite data link.channel." For example, Chicago is node 2, composite data link 0 connects the Xplexer and Dataplexer, and the answer link is at channel 7; therefore the address is 2/0.7. The local node sends data to the answer link channel on the Dataplexer. The Xplexers perform node-to-node routing.

The Network Node Table entries for San Jose are:

Node Number:	2	4	6
Node Name:	Chicago	New York	Denver
String:	2/0.7	4/1.7	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Chicago are:

Node Number:	1	4	6
Node Name:	San Jose	New York	Denver
String:	1/0.7	4/1.7	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Denver are:

Node Number:	1	2	4
Node Name:	San Jose	Chicago	New York
String:	1/0.7	2/0.7	4/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for New York are:

Node Number:	1	2	6
Node Name:	San Jose	Chicago	Denver
String:	1/0.7	2/0.7	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

Example 2: Tellabs Dataplexer/Xplexers and Modems Using Dial-Up Connections

Figure B-2 shows a Tellabs 330 Dataplexer/331 Xplexers network and a node in Long Island that communicates with the network using dial-up lines that are routed through the New York node. All other node-to-node routing is performed by the Xplexers.

San Jose
Node 1

Series 6 Server

Tellabs 330 Dataplexer
Tellabs 331 Xplexer
Tellabs 331 Xplexer
Tellabs 330 Dataplexer

Originate MUX
Answer

*Composite Data Link 0 connects
Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7*

Communications Network

New York
Node 4

Series 6 Server

Answer
Originate MUX

*Composite Data Link 1 connects
Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7
Modems connected at channel 2
and channel 3*

(212) 689-4567

(212) 689-4321

Denver
Node 6

Series 6 Server

Tellabs 330 Dataplexer
Tellabs 331 Xplexer

Answer MUX
Originate

*Composite Data Link 1 connects
Xplexer and Dataplexer
Originate link at channel 6
Answer link at channel 7*

Long Island
Node 3

Series 6 Server

*Originate
(212) 858-5445*

*Answer
(212) 858-4661*

5111MNET

Figure B-2 Sample Tellabs and Modem Network

Hardware Type 4 is a combination of the default hardware types for Tellabs and modems. This hardware type routes all network calls to Long Island through Channel 2 of the New York node's Dataplexer, then over the modem connection.

Hardware Type 5 is also a combination of the default hardware types for Tellabs and modems. This hardware type routes all calls from Long Island over the modem connection to Channel 3 of the New York node's Dataplexer, then through the New York Xplexer to all other nodes.

The programming for Hardware Types 4 and 5 used in this example are shown later in this appendix.

The Network Node Table entries for San Jose are:

Node Number:	3	4	6
Node Name:	Long Island	New York	Denver
String:	8584661	4/1.7	6/1.7
Hardware type:	4	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Denver are:

Node Number:	1	3	4
Node Name:	San Jose	Long Island	New York
String:	1/0.7	8584661	4/1.7
Hardware type:	1	4	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for New York are:

Node Number:	1	3	6
Node Name:	San Jose	Long Island	Denver
String:	1/0.7	8584661	6/1.7
Hardware type:	1	4	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Long Island are:

Node Number:	1	4	6
Node Name:	San Jose	New York	Denver
String:	1/0.7	4/1.7	6/1.7
Hardware type:	5	5	5
Access (Y/N):	Y	Y	Y

Example 3: Tellabs Dataplexer/Xplexers and Modems Using Dedicated Phone Line Connections

The modems in Figure B-2 can also be connected by dedicated analog lines, rather than dial-up lines. With this arrangement, the connections between Long Island and New York modems are always "up." Calls from Long Island to New York are routed from the originate link, through the modems, and through channel 3 of the

Dataplexer directly to the Xplexer without any dialing. Calls from the network to Long Island are routed through the New York Xplexer to channel 2 of the Dataplexer, through the modems, and then to the Long Island answer link. The Long Island node can now use the standard Tellabs hardware type, and Long Island access codes change from telephone numbers to Xplexer/Dataplexer addresses. The node tables shown in Example 2 are amended as follows (changes in italics):

The Network Node Table entries for San Jose are:

Node Number:	3	4	6
Node Name:	Long Island	New York	Denver
String:	*4/1.2*	4/1.7	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Denver are:

Node Number:	1	3	4
Node Name:	San Jose	Long Island	New York
String:	1/0.7	*4/1.2*	4/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for New York are:

Node Number:	1	3	6
Node Name:	San Jose	Long Island	Denver
String:	1/0.7	*4/1.2*	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

The Network Node Table entries for Long Island are:

Node Number:	1	4	6
Node Name:	San Jose	New York	Denver
String:	1/0.7	4/1.7	6/1.7
Hardware type:	1	1	1
Access (Y/N):	Y	Y	Y

Examples of Modifying Hardware Types

This section provides two examples of modifying default hardware types to meet the needs of a particular site. These examples are based on Figure B-2.

Example 4: Hardware Type #4 (To Long Island through New York)

A hardware type that routes all network calls to Long Island through Channel 2 of the New York node's Dataplexer, then over the modem connection, must be created to allow other nodes to call the Long Island answer link. The originate actions of this hardware type, which we will call Hardware Type 4, are a combination of the Tellabs and Concord Dialaccess 296 Modem default hardware types.

The answer and disconnect actions in Hardware Type 4 will be used by all nodes other than Long Island. Answer and disconnect actions are dependent on the local device, and since all other nodes on this network have Tellabs equipment, the answer and disconnect actions for this hardware type are identical to the Tellabs protocol. In fact, the Tellabs default hardware type will be modified to create Hardware Type 4.

The action strings for the new hardware type are shown below. Tellabs originate actions are in italics. Since all calls to Long Island from other network nodes must be routed through channel 2 of the New York Dataplexer, the "send access code" step in the default Tellabs originate actions is modified to "send string." The string is the address 4/1.2, meaning "Node 4 (New York)/composite link 1.Dataplexer channel 2."

After the call reaches channel 2 of the New York node, it is passed on to the Concord Dialaccess 296 modem, which must dial up the modem that is connected to the answer link of the Long Island node. To allow the originating node to direct the New York modem to perform these steps, the originate actions of the Concord Dialaccess 296 modem default hardware type (shown in boldface) are appended to the end of the Tellabs instructions.

When the "send access code" step is performed, the originating system instructs the New York modem to outdial the telephone number of the modem attached to the Long Island answer link. The telephone number can be hard-coded as a string, rather than as an access code, but the "read access code" step allows the network to use this hardware type to communicate with other satellite systems through the New York node, if necessary.

Originate Actions

	Action	Parameter	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Sleep		2 seconds
5	Send string	4/1.2	
6	Sleep		2 seconds
7	Read string	connected	20 seconds
8	Send string	SMC\r	
9	Sleep		3 seconds
10	Send string	ATZ\r	
11	Sleep		5 seconds
12	Flush device		
13	Send string	ATDT	
14	Send access code	(from Network Node Table)	
15	Send string	\r	
16	Flush device		
17	Read string	RING	
18	Flush device		
19	Sleep		15 seconds
20	Read string	CONNECT	20 seconds
21	Sleep		5 seconds

Answer Actions

	Action	Parameter	Timeout
1	Send string	\r	
2	Sleep		3 seconds
3	Flush device		
4	Read string	connected	0 seconds

Disconnect Actions

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		5 seconds
4	Set signal hi	DTR	2 seconds
5	Set signal hi	RTS	
6	Sleep		2 seconds

Line Drop Signal

CD (Carrier Detect)

Example 5: Hardware Type #5 (From Long Island)

The originate actions of Hardware Type 5 are also a combination of the Tellabs and Concord Dialaccess 296 modems originate actions. This hardware type routes all calls from Long Island over the modem connection to Channel 3 of the New York node's Dataplexer, then through the New York Xplexer to all other nodes.

The answer and originate actions will be used by the Concord Dialaccess 296 Modem at the Long Island node; it is easiest to modify the Concord Dialaccess 296 Modem hardware type to create Hardware Type 5.

The action strings for the new hardware type are shown below. Concord Dialaccess 296 modem originate actions are in italics. Since all calls from Long Island to other network nodes must be routed through channel 3 of the New York Dataplexer, the "send access code" step in the default Concord Dialaccess 296 modem originate actions is modified to "send string," and the string is the telephone number of the modem attached to channel 3.

After the call reaches channel 3 of the New York node, it is passed on to the Xplexer, which routes the call to the destination node on the network. To direct the New York Xplexer to perform these steps, the originate actions of the Tellabs default hardware type (shown in boldface) are appended to the end of the Concord Dialaccess 296 modem instructions. When the "send access code" step is performed, the Long Island node will send the address of the destination node to the New York Xplexer, which will perform all the necessary switching.

Originate Actions

	Action	Parameter	Timeout
1	*Send string*	*SMC\r*	
2	*Sleep*		*3 seconds*
3	*Send string*	*ATZ\r*	
4	*Sleep*		*5 seconds*
5	*Flush device*		
6	*Send string*	*ATDT*	
7	*Send string*	*6894321*	
8	*Send string*	*\r*	
9	*Flush device*		
10	*Read string*	*RING*	*20 seconds*
11	*Flush device*		
12	*Sleep*		*15 seconds*
13	*Read string*	*CONNECT*	*20 seconds*
14	*Sleep*		*5 seconds*
15	Send string	\r	
16	Sleep		3 seconds
17	Flush device		
18	Sleep		2 seconds
19	Send access code	(from Network Node Table)	15 seconds
20	Sleep		2 seconds
21	Read string	connected	20 seconds

Answer Actions

	Action	Parameter	Timeout
1	Send string	SMC\r	
2	Sleep		5 seconds
3	Send string	AT\r	
4	Sleep		3 seconds
5	Flush device		
6	Read string	RING	0 seconds
7	Sleep		3 seconds
8	Flush device		
9	Read string	CONNECT	20 seconds

Disconnect Actions

	Action	Parameter	Timeout
1	Set signal lo	DTR	
2	Set signal lo	RTS	
3	Sleep		5 seconds
4	Set signal hi	DTR	2 seconds
5	Set signal hi	RTS	
6	Sleep		2 seconds
7	Send string	ATZ\r	
8	Sleep		5 seconds
9	Send string	SMC\r	
10	Sleep		3 seconds

Line Drop Signal

CD (Carrier Detect)

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Configuration

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REPRODUCTION

PROPRIETARY TERMS

NOTICE

VoiceMemo Release 5.03 provides enhanced connectivity features for MESA-Net digital networking, including up to 8 full-duplex links per system and the ability to have multiple simultaneous (parallel) links between sites. Each of these features, especially when combined, can provide dramatic increases in throughput over the network.

Specific hardware configurations are required to carry the volume of data that must be processed by VoiceMemo at high-traffic MESA-Net sites. If you do not configure your system according to the guidelines below, you may experience congested links, disconnects, and other throughput problems.

- No more than 8 links total in a VoiceMemo system.

- No more than 4 MESA-Net links per CTI card. You can configure additional serial connections (integrations, etc.) on the card, but you must not have more than 4 MESA-Net links per CTI card.

- Only one MESA-Net baud rate per CTI card. Other serial connections on the card can run at different baud rates, but all MESA-Net links on a single CTI card must be at the same baud rate.

- Only 2 parallel links per CTI card. Parallel links are defined as more than one link between two systems. If you need to configure more than two links between a given pair of systems, you must use additional CTI cards. A VoiceMemo system can support a maximum of 3 CTI cards, so the maximum number of links between any two systems is 6. Note that you can configure a 4-port CTI card with two links to site A (parallel links), one link to site B, and another link to site C.

Centigram will make a new 8-port board available by the end of the year. This board will be capable of running MESA-Net links, including parallel links, on all ports.

WARNING!

You *must* have installed Revision Support Disk 1 or greater for VoiceMemo 5.03A *before* installing MESA-Net. The VoiceMemo system will not run if you install MESA-Net without installing RSD 1.
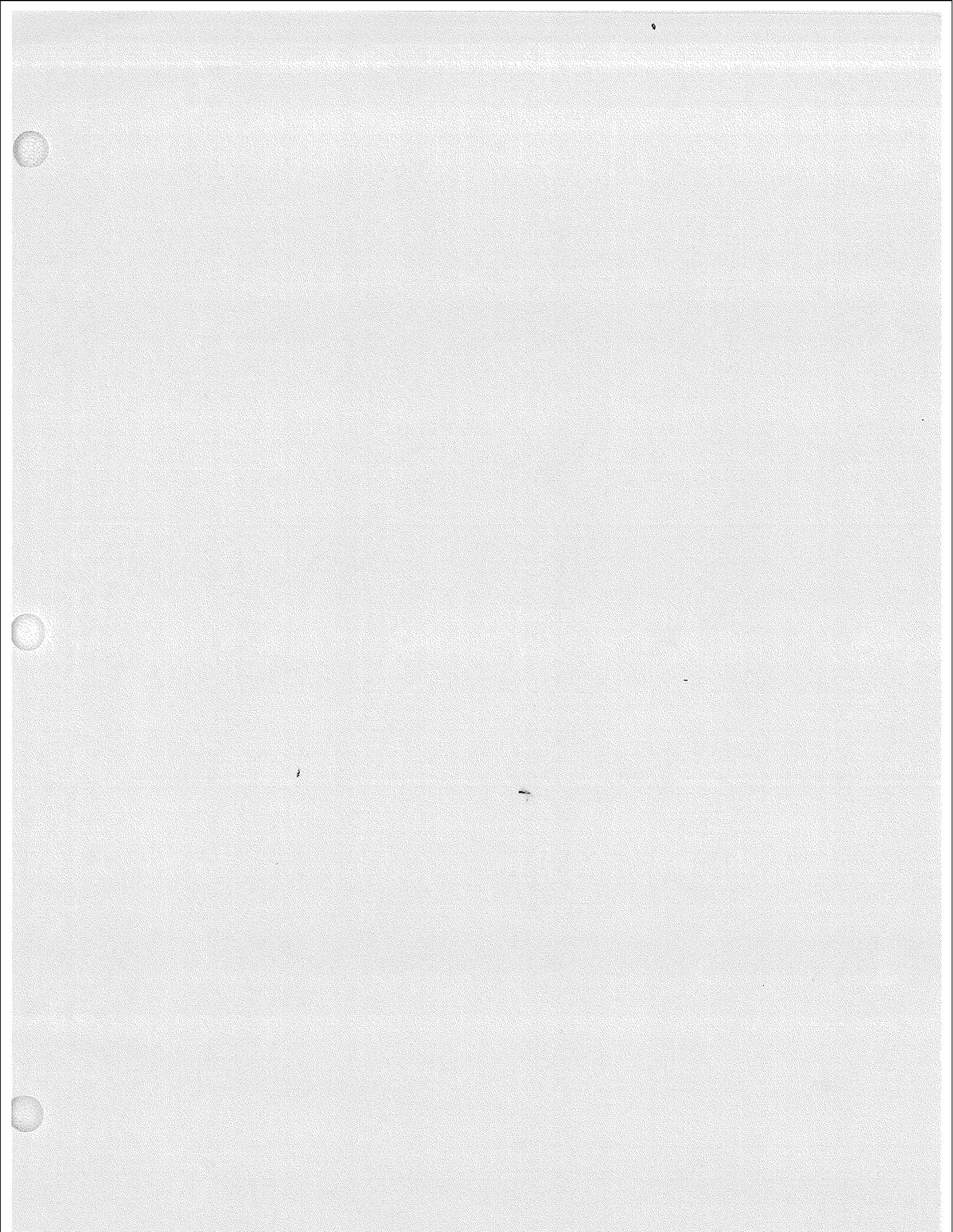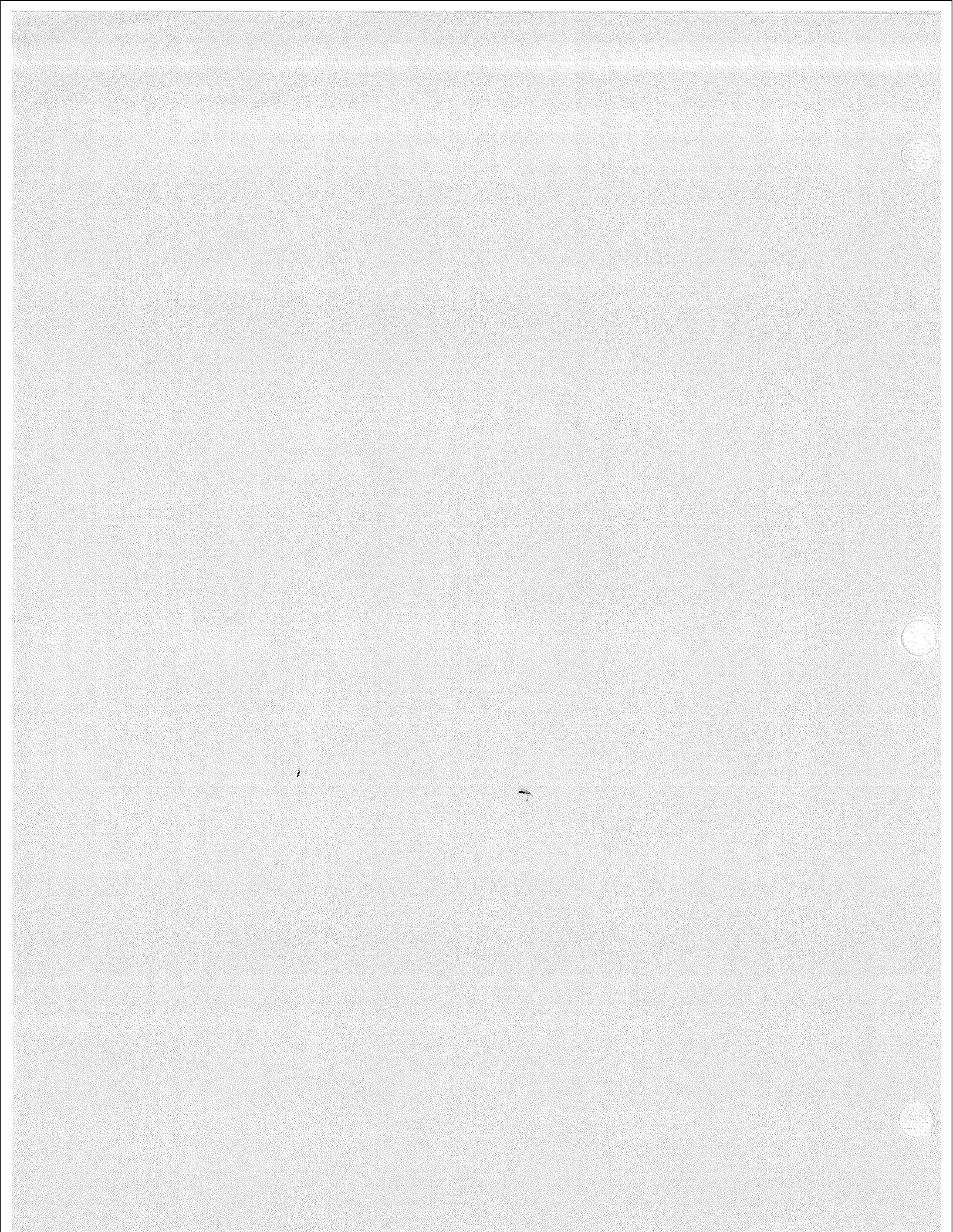
Issue 1 Release 2.0 January 1996

MITEL MAIL ™

Voice Processing Solutions

▶ Unified TCP/IP
Manual

MITEL ®

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About This Manual

This manual describes how to install and configure the Unified TCP/IP harrdware and software in any of the Centigram Series 6 Communications Servers:

- Model 640
- Model 120
- Model 70

Who Should Read This Manual

This manual is intended for technicians and administrators who are responsible for installing and configuring Unified TCP/IP on the Centigram Series 6 server.

How to Use This Manual

This manual contains detailed reference information, a list of tasks that you can perform, a collection of procedures for performing the tasks, and reader aids such as menu maps.

Reference Chapters

Use the material in Chapters 1 through 4 for detailed inquiry into the installation and configuration of Unified TCP/IP in a Centigram Series 6 Communications Server. These chapters discuss how components are related, elaborates on concepts, give operational details, and contain all necessary tables and figures about configuration. Use the *Centigram Series 6 Installation and Service Manual* appropriate for your platform for an actual server installation and the *VoiceMemo Reference and Configuration Manual* for VoiceMemo software configuration.

Task Lists

Task lists follow Reference chapters that include procedures. Use the task list, starting with a principal task (shown in **boldface**), to install and configure Unified TCP/IP. Each task listed is described in more detail in a procedure. The task list is alphabetized, which helps most readers find the desired task (and procedure) quickly. No particular sequence of tasks is implied. The following example shows how a task list is organized:

Task List

Page 1 of 1
VoiceMemo Release 6.0A and later

General Topic

Task *Procedure*

Principal Task

Message Delivery

Specific Tasks

Message Delivery Configuration...CP 3337

Allow Mailbox Owners to Control Message Delivery...........................CP 3339

Allow Receipt of Urgent Pages or Urgent Message Delivery Only........CP 3344

GP 265
DP 3142
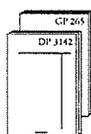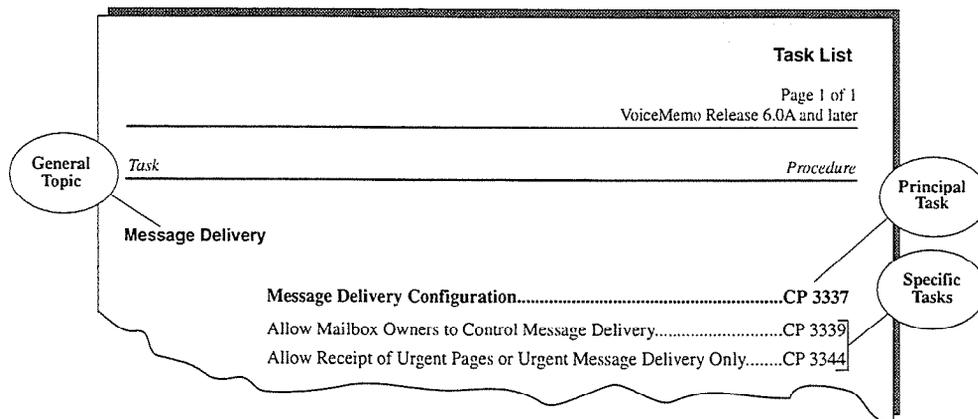
Procedures

Procedures follow the task list in the Reference chapter. Follow the steps in Centigram Procedures (CPs) to accomplish the desired tasks. Readers familiar with a Centigram Series 6 server can use the CPs as a checklist if desired, while readers new to a Centigram Series 6 server can use CPs for step-by-step instructions.

A reference column in each CP contains pointers, when necessary, to supplemental information such as another procedure, another manual, a technical reference, or a menu map.

Each CP is numbered for document identification and referencing; numbering does not indicate a sequence of performance. A numerical list of all CPs in this manual is also provided. It gives each CP's title, Chapter number, and which other procedures either call it or are called by it.
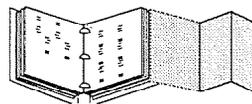
Menu Maps and Other Navigation Aids

Most of the documents in the new Centigram Series 6 document library have menu maps. You can refer to these document navigation aids at any point to help you reach a menu. In this manual, you will also find a glossary of Centigram, telecommunications, and telephony terms that pertain to TCP/IP. And don't overlook the index; it is the fastest way to find all references to a specific topic.

Worksheets
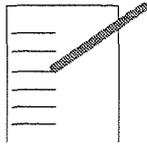
You will find blank worksheets in the back of this manual. Instructions for completing the worksheets are in the Reference chapters. Many of the CPs assume you have completed the appropriate worksheet.

Conventions Used in This Manual

The procedures in this manual use the following conventions to describe how you enter Unified TCP/IP configuration information and how information is displayed on the Centigram Series 6 server console:

Press **Enter**
Press the **Enter** key. For example, "Press **Enter** if the current number is correct." On some keyboards, this key is labeled "Return" or has a return arrow (↵) on it.

Enter
Type the text shown, then press the **Enter** key. For example, "Enter the line **number** (1-24)" means type a number from 1 through 24, and then press the **Enter** key.

bold
Words or characters in bold type indicate either a value to be entered by you exactly as shown or, when used to indicate a variable entry, describe the type of value to be supplied by you. See example above.

What you select from
a displayed menu

A displayed prompt
for information

Select: (G) Current Group
Prompt: Enter a group number =
Response: **Number** of the line group (1-24) to be used for the application.

What you enter in
response to the prompt
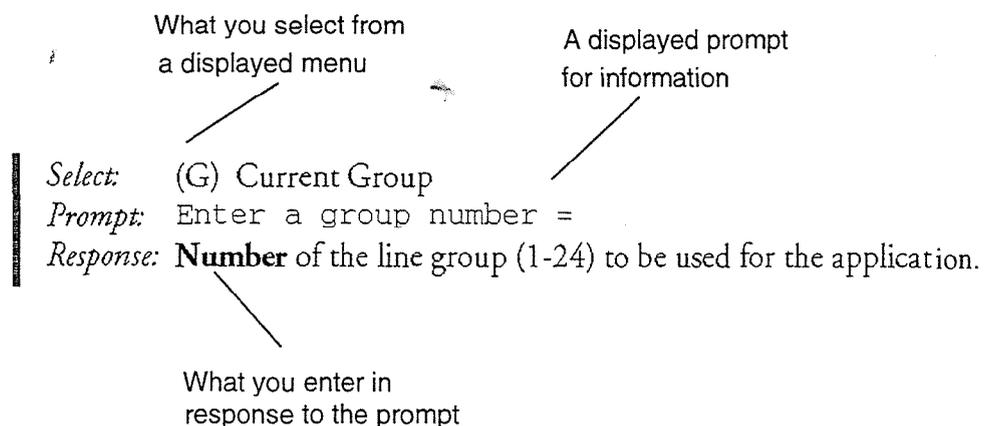
Note: Unless otherwise stated, press **Enter** after each response you enter.

Reader Advisories

Reader advisories used in this manual are shown below.

Note: Information especially useful in relation to this procedure.

CAUTION!

Information that helps you prevent equipment or software damage.

CAUTION!

Information that helps you avoid electrostatic discharge (ESD) damage to the equipment.

WARNING!

Information that helps you prevent an interruption to telecommunications traffic.

WARNING!

A hazard that can cause you personal injury.

DANGER!

Warns of a condition that could severely injure or kill you.

Before You Start

This manual assumes that you are familiar with using a console and keyboard. This section describes how to use the Centigram Series 6 server effectively.

Console Tips and Techniques

The tips and techniques offered in the following paragraphs can make configuration entry sessions at the Centigram Series 6 server maintenance console more productive.

Viewing Menus

- When you finish entering a value for a parameter, the server displays an abbreviated form of the current menu, called the "short menu." To view the complete current menu when a short menu is displayed, just press **Enter**.

- To return to the Main Menu from any VoiceMemo application configuration menu, press **X** (Exit), until the Main Menu appears.

Accepting Defaults

- To accept a default displayed in a *prompt,* just press **Enter**.

- To accept a default displayed in a *menu,* no action is necessary.

Avoiding Automatic Exit

CAUTION!

The Centigram Series 6 server "times out" after 15 minutes. This means that if you do not enter anything at the console for 15 minutes, the server automatically exits from the current program. When this happens, all work that has not been saved on the disk is lost.

To avoid being timed out and losing your work, follow these steps:

1. When you need time to think, write down the name of the current menu.

2. Exit to the (server) Main Menu.

3. When you want to continue your work, enter the appropriate menu options to regain your place.

If you find that the Centigram Series 6 server has timed out, follow the steps below. If your screen is blank, press any key to reactivate the screen and then continue with these steps.

1. Press any key to start the login sequence.

2. Enter your user ID and password (if requested).

3. Starting from the Main Menu, enter menu options to proceed to the menu from which the server timed out.

4. Reenter data as needed to regain lost work.

Quitting an Entry Session

At any point during entry of offline or online parameters, you can quit. Quitting discards all parameter entries you have made and leaves the VoiceMemo application configuration the way it was before you started entering parameters.

To quit from the VoiceMemo Configuration Offline or Online Menu:

Select: (Q) Quit -- Forget Changes
Prompt: Quit and forget changes? (y/n) =
Response: **Y** to return to the VoiceMemo Configuration Main Menu.

Shortcut Commands

You can use the **Ctrl** (Control) key or the **/** (slash) key while simultaneously pressing another key to execute shortcut commands at an Centigram Series 6 server maintenance console.

To do this...	Type...
Activate a timed-out console.	any key
From the offline or online menus, or FCOS, LCOS, GCOS menus, return to the VoiceMemo Configuration Menu and save any entries.	**/X**
From the offline or online menus, or FCOS, LCOS, GCOS menus, return to the VoiceMemo Configuration Menu without saving any entries.	**/Q Y**
Stop scrolling a displayed report.	**Ctrl-S**
Resume scrolling a displayed report.	**Ctrl-Q**
Return to the VoiceMemo application when a # or $ prompt is displayed.	**Ctrl-D** *or type* **exit**

1 Introduction to Unified TCP/IP

This manual describes the Unified TCP/IP optional feature for the Series 6 Communications Server using VoiceMemo software. The Unified TCP/IP option allows you to connect the server to an Ethernet TCP/IP network using an Ethernet card and TCP/IP software. Each server module can support two Ethernet cards.

Product Dependencies

Unified TCP/IP requires VoiceMemo software release 6.0A or later.

Two other Centigram products are dependent on the Unified TCP/IP application in order to function. Unified TCP/IP is required to implement both the OneView 1.1 optional feature and the MESA-Net TCP/IP optional feature for VoiceMemo Release 6.0. Use this manual for Unified TCP/IP hardware and software installation and configuration. Refer to the respective manuals for these products once you have the Unified TCP/IP application working.

Existing Networks

One use of Unified TCP/IP is to connect your server onto an existing corporate network. Figure 1-1 shows how the Series 6 server is incorporated into an existing Ethernet network.
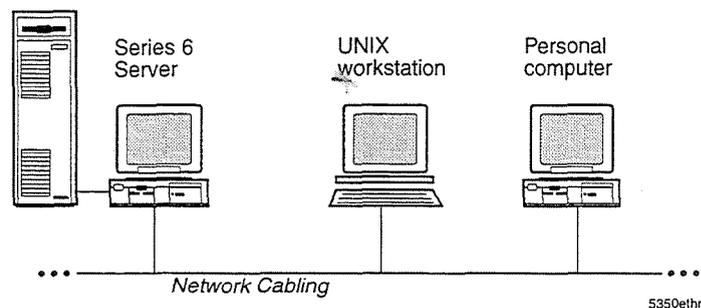
Figure 1-1   The Series 6 Server on an Ethernet Network

TCP/IP Protocol

TCP/IP stands for Transmission Control Protocol/Internet Protocol. It is a suite of communications protocols used to link computers over many types of networks, including Ethernet networks. Its features include:

- Open standards, independent of vendor, hardware, and operating systems

- Wide support and usage

- Integration in many different network types

- Common addressing method so a device can be recognized by any other device

- Standardized application protocols for user services

The protocol stack has four layers: Network Interface (physical network access), Internet (routing across internetworks), Transport (connectivity between data source and destination), and Application (user programs and utilities).

For more information on TCP/IP, refer to Chapter 2. Refer to Chapter 4 for information specific to the QNX 4.2 TCP/IP implementation and the Series 6 server.

Ethernet Networks

Ethernet is a type of Local Area Network (LAN) with various data transmission speeds including ten megabits per second. Devices on the network communicate using thick coaxial, thin coaxial, or twisted pair cable or wire. Communications at ten megabits per second are covered by the 10Base5, 10Base2 and 10Base-T standards respectively. If a data packet is sent by one device and it collides with another message, the Ethernet protocol dictates that each message is discarded, and then both are sent again after a random delay.

Hardware

The Ethernet card used in the Unified TCP/IP option is made by Alta. Refer to Chapter 3 for information about the hardware options and how to install the Unified TCP/IP hardware.

Software

You configure the Unified TCP/IP option by installing the software and following the instructions in the procedures. Refer to Chapter 4 for information about Unified TCP/IP installation and configuration.

Class Bits

Bits in the first octet identify address classes – the first bit identifies Class A, the first two bits identify Class B, and the first three bits identify Class C. Table 2-2 shows the class bits for address classes A, B, and C. Examine the figures in the table to see how the use of class bits affects the number of usable network numbers.

Table 2-2   Class Bits and Network Numbers

Class	Class Bit
A	0
B	10
C	110

Network Bits

Class A uses the first octet for network numbers. Numbers 1 to 126 are the usable network numbers. All addresses from 127.0.0.0 through 127.255.255.255 are reserved for local software loopback tests. Class B uses octets one and two for network numbers. Usable network numbers are 128.1 through 191.254. The number 255 is reserved for broadcasts. Class C uses octets one, two, and three for network numbers. Usable network numbers are 192.0.1 through 223.255.254. Table 2-3 shows the relationship between classes and the network bits.

Table 2-3   Network Bits

Class	Network. Bits	First Usable Network #	Last Usable Network #
A	7	1	126
B	14	128.1	191.254
C	21	192.0.1	223.255.254

Host Bits

The rest of the IP address identifies the host. Table 2-4 shows the classes of IP format addresses, expressed in bits. The illustration column shows the IP address format, in bits, where n is the network portion of the address and *h* (italicized) is the host portion.

Table 2-4   IP Address Format (Bits)

Class	First Bits	Network Address Length	Host Address Length	Illustration
A	0	7	24	0nnnnnnn*hhhhhhhhhhhhhhhhhhhhhhhh*
B	10	14	16	10nnnnnnnnnnnnnn*hhhhhhhhhhhhhhhh*
C	110	21	8	110nnnnnnnnnnnnnnnnnnnnn*hhhhhhhh*

Table 2-5 shows the same information as the above table, presented in octet format. As in the previous table, the host portion of the address is in italics.

Table 2-5   IP Address Format (Octets)

Class	First Octet (decimal)	Network Octets	Host Octets	Example (decimal)
A	< 128	1	3	26.*104.0.19*
B	128 - 191	2	2	128.66.*12.1*
C	192 - 223	3	1	192.178.16.*1*

Reserved Addresses

Certain addresses are reserved, which means they are not available as host address IDs. An example is addresses with a first octet above 223. Another is the Class A addresses 0 and 127; 0 is the default route, which is used to simplify routing information. 127 is the loopback address, which allows the local host to be addressed as if it were a remote host. You use these addresses when configuring any host.

In all address classes, host numbers 0 and 255 are reserved. When all host bits are 0, the address identifies the network. These addresses, such as 128.66.0.0, are used in routing table listings. If all host bits are 1, the address is a broadcast address and sends datagrams to all hosts on one network (for example, 128.66.255.255).

> **Note:** . IP addresses are assigned to a network interface, not a computer system. Some devices have more than one IP address because they are connected to more than one network.

Subnet Addressing

Organizations are often assigned one Class B network number by the Internet Advisory Board. If the organization needs multiple network numbers to distinguish among its servers, the network administrator uses subnet addresses to refer to the multiple networks. Subnet addressing is a mechanism whereby address bits that would otherwise be part of the host number are designated as part of the network number.

In a class B address, its format is **nnnnnnnn.nnnnnnnn.hhhhhhhh.hhhhhhhh**, where n stands for a bit in the network number and h stands for a bit in the host number. To increase the amount of available network numbers, host bits from the third octet are used as network bits, which, for each bit borrowed, doubles the number of usable network numbers and halves the number of host numbers. The format becomes, for example, **nnnnnnnn.nnnnnnnn.nnhhhhhh.hhhhhhhh**. Borrowing bits from the host portion is accomplished using a subnet mask.

Subnet Mask

To create a subnet, you apply a bit mask, known as the subnet mask, to the IP address. If a bit is on (1) in the mask, the equivalent bit in the address is treated as a network address bit, whether or not it was a network bit originally. If the bit is off (0), then the equivalent address bit belongs to the host address.

The subnet mask is a 32-bit number with a similar format as the IP address. Default subnet masks are 255.0.0.0 for class A, 255.255.0.0 for class B, and 255.255.255.0 for class C. Expressed in binary form, the network mask for class B is 11111111.11111111.00000000.00000000. Theoretically, in order to provide for two subnetworks with 32,768 hosts per subnetwork, you could use the network mask 255.255.128.0. However, because of restrictions on the use of some subnet values, you need to use the subnet mask 255.255.192.0 (the third octet is 11000000) to obtain two subnetworks, 01 and 10. The remaining six bits from the third octet, plus the entire fourth octet, are used for up to 16,384 host addresses. (Network 00 identifies the network and 11 is for broadcast.)

Subnet masks can be expressed in bit or decimal format. While decimal format is easier to read, remember that network address portions can cross the octet boundaries, and using the decimal masks might be confusing in such cases.

Ask your network administrator if any subnet masks are used on your network.

Routing

Routing is the process of sending a message to either a destination host (if it is on the same network) or a router or a gateway (if the host is on another network). Routing is based on the network portion of the IP address. If the destination network is on the local network, the subnet mask is applied.

Address Resolution

ARP, Address Resolution Protocol, translates IP addresses to Ethernet addresses. It maintains a table of both sets of addresses, which is built dynamically.

Data Delivery

As data moves up and down the TCP/IP layers, each layer must be able to handle it. Data is combined as it moves from applications to transport protocols, and then to the Internet Protocol. Many sources of data are combined, and then must be separated when they arrive at the destination network or host. IP uses protocol numbers to identify transport protocols, and the transport protocols in turn use port numbers to identify applications.

Protocols

Some protocols are reserved for specific services, such as standard network protocols (for example, **ftp** and **telnet**). They are defined in the file **/etc/protocols**. Figure 2-2 shows a sample **protocols** file.

Note: This chapter has several examples of files used with TCP/IP, which are provided for your understanding. You cannot access these files on the Series 6 server. Contact your Centigram representative should you need to change any TCP/IP files on the server.

```
# /etc/protocols
#
# format is:
#
# protocol number     aliases
#
ip          0         IP       # internet protocol, pseudo protocol
icmp        4         ICMP     # internet control message protocol
tcp         6         TCP      # transmission control protocol
udp         16        UDP      # user datagram protocol
```

Figure 2-2   Sample /etc/protocols File

Port Numbers

Port numbers below 256 are reserved for specific services (for example, **ftp** and **telnet**). Port numbers from 256 to 1024 are reserved for UNIX-specific services, (for example, **rlogin**). These numbers must be unique within a specific transport protocol. The combination of protocol and port number identifies a process to send the data to. Port numbers are defined in the file **/etc/services**. Figure 2-3 shows a sample **services** file.

```
# /etc/services

# format is:
# service   port/protocol      aliases
#
# Network services
#
ftpdata    20/tcp     ftpd
ftp        21/tcp
telnet     23/tcp     telnetd -d
smtp       25/tcp
bootps     67/udp     bootpd
bootpc     68/udp     bootp
tftp       69/udp     tftpd
snmp       161/udp    snmpd
echo       7/tcp
echo       7/udp
discard    9/tcp      sink null
discard    9/udp      sink null
daytime    13/tcp
daytime    13/udp
chargen    19/tcp     ttytstsource
chargen    19/udp     ttytstsource
time       37/tcp     timserver
time       37/udp     timserver
finger 79/tcp
domain     53/tcp     nameserver      #name-domain server
domain     53/udp     nameserver
nb_nmsrv   137/udp    netbios nameserver           -
nb_sssrv   139/tcp    netbios session server
nb_dgsrv   138/udp    netbios datagram server
#
# UNIX specific services
#            /
exec       512/tcp
login      513/tcp    rlogin rlogind
shell      514/tcp    rsh rshd cmd
who        513/udp    rwho rwhod who
ntalk      518/udp
route      520/udp    router routed
           1000/tcp   qnxserver
```

Figure 2-3   Sample /etc/services File

Sockets

As mentioned above, certain port numbers are standardized for specific services. Other port numbers can be dynamically allocated, and are assigned to processes as needed. The system keeps track of these port numbers and ensures that one number is not assigned to two processes. These dynamically assigned ports allow services to support multiple users.

If two users are accessing the TELNET service, for example, the system would give each of them a different dynamically assigned port number for the source port, and the default port of 23 for the destination. The pair of port numbers, both source and destination, identifies a network connection. The combination of an IP address and a port number is called a socket. A socket identifies a single network process within the Internet. A pair of sockets uniquely identifies a network connection between a receiving and a sending host.

For example, if host 128.66.12.2 connects to host 192.178.16.2 using TELNET, and is assigned port 3382, the socket for the source side of the connection is 128.66.12.2.3382. The destination side socket is 192.178.16.2.23 (defaulting to the TELNET port number). These two sockets are a socket pair, and this identifies the connection. If another user from the same host connects to the same destination with TELNET, the second user would get a different source port number, for example 3610. The socket pair for this user would be 128.66.12.2.3610 and 192.178.16.2.23.

Name Services

It is easier to use names for hosts than IP addresses. Names are easier to remember, and it is easier to notice a mistake in a name. Here are two services that allow you to use alphabetic names instead of numerical IP addresses.

Host Table

The host table associates the addresses and names. You can also designate aliases for hosts in this table. The table is in the file **/etc/hosts**. There is also a file called **/etc/networks**, which can translate between network names and network IP addresses. Figure 2-4 shows a sample **/etc/hosts** file.

```
#
# Table of IP addresses and host names
#
128.66.12.2    mast.sail.com yacht
127.0.0.1      localhost
128.66.12.1    main.sail.com loghost
128.66.12.3    jib.sail.com jib
128.66.12.4    spinnaker.sail.com spinnaker
128.66.5.2     genoa.sail.com genoa
128.66.7.3     boom.sail.com boom
128.66.7.2     halyard.sail.com halyard
```

Figure 2-4   Sample /etc/hosts File

Most large networks use DNS instead of the host table, but it is used for small networks or for all hosts on the local network, in case DNS is not running.

DNS

The Domain Name Service is used in large interconnected networks because it avoids the problems of a large host table. It also eliminates the need to keep updating your table as new hosts are added or changed. DNS is assigned port number 53, and its service is called domain. Do not confuse it with name service, port 42 (this is an older name service).

DNS is a set of distributed name servers which pass information to each other as needed. The naming conventions are hierarchical. At the top level is the root domain, served by a group of name servers called root servers.

There are two top-level domains, geographic and organizational. Geographic domains are assigned by country; each country has a two letter code. Other assignments are made underneath the country code. In the United states, the next level is the two-letter state code. Thus, a valid domain name could be **myhost.sanjose.ca.us**. The highest level of the domain is the last part of the name.

The second type of top-level domain is organizational; assignment is made based on what kind of group is using the host. The top-level domains are listed in Table 2-6.

Table 2-6 Top Level Domains

Domain Name	Used By
COM	Commercial organizations (businesses)
EDU	Educational sites (schools, colleges, universities)
GOV	Government agencies and groups, not including military
MIL	Military organizations
NET	Network support organizations, such as sites that run root servers
ORG	Any organization that is not one of the above (for example, non-profit groups)

Again, the highest level of the domain is the last part of the name. A valid domain name is **whitehouse.gov**; whitehouse is a site on the government domain. In both cases, domain names are written from most specific (for example, host name) to least specific (top-level domain).

2 Overview of TCP/IP

This chapter describes the TCP/IP protocol suite and explains a number of specific concepts. If you are very comfortable working with TCP/IP, you can probably skip this chapter.

TCP/IP protocols were developed for the ARPANET network of computers, administered by the Defense Communications Agency. This network began as an experimental packet switching network and the organizations involved with the project found it useful for their data communications. The TCP/IP protocol suite was adopted as a standard for ARPANET in 1983 and implemented in BSD UNIX, which led to its association with UNIX systems. TCP/IP is now used by most UNIX systems, and many other host computers and peripheral devices can be included in a TCP/IP network.

This chapter is not meant to provide complete coverage of TCP/IP. There are many good books you can refer to for detailed information. One is *TCP/IP Network Administration* by Craig Hunt, published by O'Reilly & Associates.

TCP/IP Protocol Layers

There are four layers in the TCP/IP protocol architecture. Here is a brief explanation of each layer. Figure 2-1 shows the relationship between TCP/IP and the OSI model. This relationship is not a perfect fit, but is helpful if you are already familiar with the OSI model.

Network Access Layer

This is the lowest layer of the architecture, and corresponds to the lowest two layers of the OSI model (Data Link and Physical). The Network Access Layer protocols allow the system to deliver data to other devices in a directly attached network. Functions performed include encapsulation of IP datagrams into transmitted frames, and mapping of IP addresses to physical addresses used by the network. Protocols implemented in this layer include device drivers.

Internet Protocol Layer

The most important protocol in this layer is the Internet Protocol, the IP in TCP/IP. The IP is used to deliver data, as this layer provides routing functions (transferring information from one device to another). IP defines the datagram, the basic unit of transmission. It also defines the Internet addressing scheme. IP is connectionless, which means it does not verify that the receiving system is ready to receive data. This layer corresponds to the Network Layer in the OSI model.

TCP/IP   OSI

Application	Application
	Presentation
	Session
Host-to-Host Transport (TCP)	Transport
Internet Protocol (IP)	Network
Network Access	Data Link
	Physical

5351OSIT
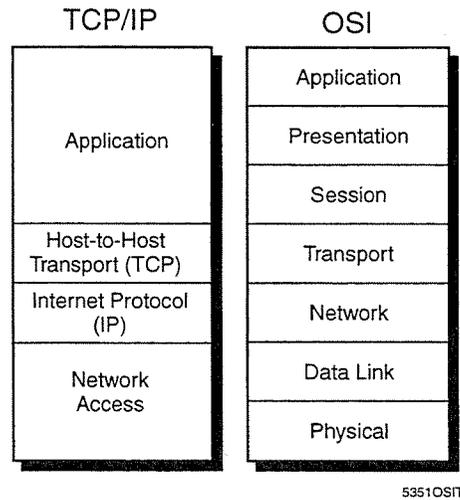
Figure 2-1 TCP/IP and the OSI Model

Transport Layer

The full name for this layer is the Host-to-Host Transport Layer. It uses two protocols: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). TCP provides reliable (connection is made) data delivery service with error detection. UDP provides connectionless datagram delivery service. Applications can use either protocol.

Both protocols deliver data between the Application Layer (see below) and the Internet Layer (see above). TCP corresponds with the Transport Layer in the OSI model.

Application Layer

This layer includes any process using the Transport Layer (see above) protocols for data delivery. There are many application protocols, most of which provide user services. The most widely known are:

- **telnet**, the Network Terminal Protocol, which provides remote login over the network

- **ftp**, the File Transfer Protocol, which provides interactive file transfer

- **SMTP**, the Simple Mail Transfer Protocol, which provides electronic mail

- **DNS**, the Domain Name Service, which maps IP addresses to names assigned to network devices

- **rip**, the Routing Information Protocol, which is used by network devices to exchange routing information

- **NFS**, the Network File System, which allows files to be shared by different hosts on the network. This protocol is *not* supported by the QNX 2 version of TCP/IP.

The Application Layer corresponds to the top three layers in the OSI model (Application, Presentation, and Session).

IP Addresses

You should be familiar with IP addresses, because they are used by the Internet Protocol to send datagrams from one node to another. A datagram includes a destination address, which is a 32-bit IP address.

Address Classes

TCP/IP has 5 address classes – A, B, C, D, and E. Classes A, B, and C are available for government and organizational use. Classes D and E are reserved for special use. This section discusses classes A, B, and C.

Network and Host Numbers

Each address class uses one part of the 32-bit address to identify the network number and another part to identify the host number. The demarcation for host and network numbers for classes A, B, and C is one octet. An octet is eight bits and is usually represented as a decimal number between 0 and 255. A group of four octets comprises an IP address. An example of an IP address is *129.52.111.60*. 129, 52, 111, and 60 are the four octets, each one representing a series of eight bits.

Class A addresses use the first octet for network numbers and the next three for host numbers. Class B addresses use the first two octets for network numbers and the next two for host numbers. Class C addresses use the first three octets for network numbers and the last octet for host numbers. Table 2-1 summarizes this relationship.

Table 2-1   Network and Host Numbers

Class	Network Numbers	Host Numbers
A	First octet	Last three octets
B	First and second octets	Last two octets
C	First, second, and third octets	Last octet

3 Hardware Installation and Configuration

> **WARNING!**
>
> To install, configure and use the Unified TCP/IP option, you *must* have VoiceMemo software version 6.0A or later installed on your server. You also must have the 6.0A hardware, including the 6.0A Ethernet card. Ethernet cards used in 5.x servers are not usable.

This chapter contains reference and background material for the hardware installation and configuration. Refer to the Task List for step-by-step instructions on Unified TCP/IP installation and configuration.

Ethernet Hardware

In order to connect your Series 6 server to an Ethernet network, you need an Ethernet card. The Unified TCP/IP option includes an Ethernet card that you install in a server module. You need at least one Ethernet card per server, and you can install up to two cards per module.

There are three kinds of cabling that can be used in Ethernet networks: thick, thin, and twisted pair. Thick Ethernet uses 0.4 inch diameter, 50-Ohm, double shielded coaxial cable, based on IEEE standard 802.3 10Base 5. Thin Ethernet uses 0.2 inch diameter, 93-Ohm coaxial cable, based on IEEE standard 802.3 10Base 2. Twisted pair Ethernet uses unshielded twisted pair cable (AT&T D-inside wire or IBM Type 3), based on IEEE standard 802.3 10Base-T. The cable is two sets of twisted wire pairs, with a gauge of 22, 24, or 26. All three standards can handle a data rate of at least 10 megabits per second.

The Ethernet card provided with the Unified TCP/IP option has a twisted-pair connector (an RJ-45 connector) for 10Base-T wiring. If you have thin or thick Ethernet cabling, you must purchase a transceiver to interface between your cabling and the Ethernet card's RJ-45 connector. These transceivers are available through many vendors, such as MiLAN and Cabletron.

For complete information on the Ethernet card , refer to the Technical Reference in the *Series 6 Technical Reference Manual.*

Hardware Limitations

The Ethernet card cannot coexist in the same module with the following cards because of interrupt conflicts:

- Smartcard (2, 4, or 8 port serial card)

- PROSE TTS card

Do not include an Ethernet card in the same module as any of the above cards.

Configuring the Hardware

This section shows how you must configure the Ethernet to use the Unified TCP/IP optional feature successfully.

Configuring the Ethernet Card

There are two different ways to configure an Ethernet card with the Unified TCP/IP optional feature. These configurations are designated as either "Ethernet 1" or "Ethernet 3." The Ethernet cards are configured by Centigram and you should check with your sales representative to ensure you have the correct card for your server configuration. Refer to the *Series 6 Technical Reference Manual* for more information on Ethernet card configuration, how they differ, and which to use in your server.

Fault Tolerance

Fault tolerance is configured by installing the Unified TCP/IP option in at least two modules. If one module fails, another module could take over, and all TCP/IP commands server-wide would be directed to the other module. You can also install two Ethernet cards in the same module, provided you configure the cards correctly. Refer to Chapter 4 for more information.

At this time there is no CSO (Continuous System Operation) transfer between Ethernet cards. This capability will be supported in future releases. In addition, neither OneView 1.1 nor MESA-Net TCP/IP are capable of handling the live transfer from one Ethernet card to another.

One Ethernet card can handle all TCP/IP network traffic for a server, including both the OneView and MESA-Net applications. You might need more cards if your server handles a large number of messages.

Task *Procedure*

Unified TCP/IP Hardware Procedures

This procedure describes how to install the Alta EtherTPI-16+T Ethernet card in a Series 6 server for use with the Unified TCP/IP optional feature.

Note: You perform diagnostic and troubleshooting tasks after you install and configure Unified TCP/IP on the server. See CP 6472, "Test Unified TCP/IP Configuration," in Chpater 4, for instructions.

Step	Reference
1. Make sure that you are wearing an electrostatic discharge (ESD) strap.	
2. Do an orderly shutdown of the server (or module in a multi-module system), making certain to turn off the power to the module in which you want to install the Ethernet card.	CP 5700

> ⚠ **CAUTION!**
>
> Do an orderly shutdown of the server and turn off the server module before doing the next steps.

3. Remove the front cover of the CPU assembly.

4. Carefully remove the Ethernet card from its ESD envelope and place the card on an anti-static surface.

5. Ensure that you have the correct card for your system's configuration (Ethernet 1 or Ethernet 3). Refer to the *Series 6 Technical Reference Manual* for further information on card configuration.

6. Insert the card into the appropriate backplane slot and make sure that the card is firmly seated on the backplane connector. Tighten the card's retaining screw.

7. Replace the front cover of the CPU assembly.

8. Restore power to your server (or module in a multi-module system) and allow the system software to start up.
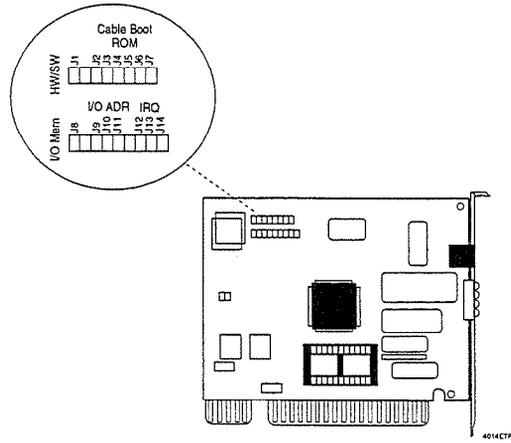
Figure 1   Alta EtherTPI-16+T Ethernet Card

This procedure tells you how to connect the Ethernet card in the Series 6 server to the Ethernet network, using twisted-pair cable.

Note: The network administrator must pull cable to the server and provide you with a network connection before you perform this procedure.

Step   *Reference*

((·)) Connect Ethernet Card to Twisted-Pair Cable

1. Insert the modular plug shown in Figure 1 into the RJ-45 port on the Ethernet card.

Ethernet Card

RJ-45 port

RJ-45 connector

Twisted-pair cable

LEDs

5352ETHC
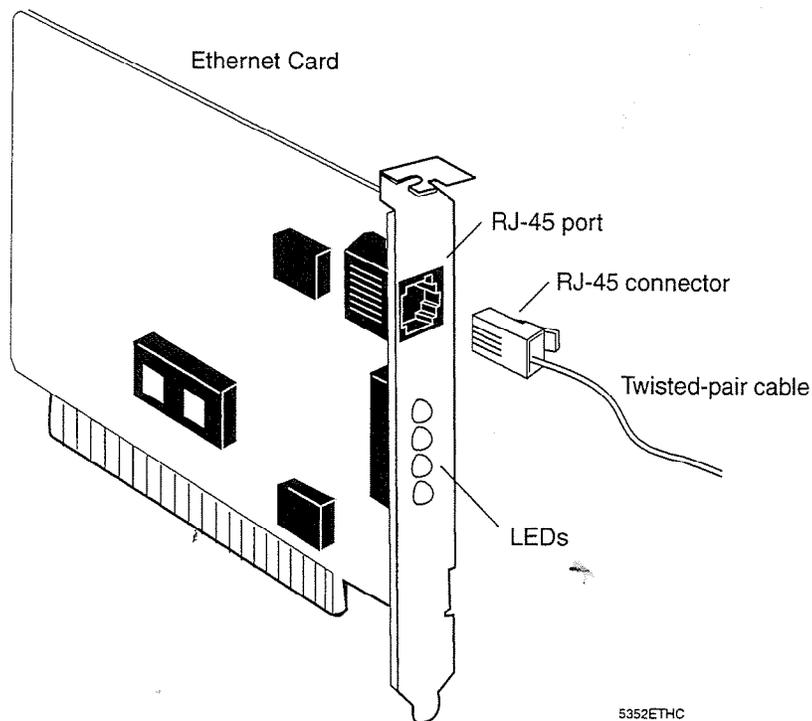
Figure 1   Connecting Ethernet Card to Twisted-Pair Cable

2. Verify the connection by observing the green link integrity LED on the Ethernet card (see Figure 2). When a valid connection exists, the LED on the card and the corresponding LED on the network concentrator are lit. (The network administrator verifies the network connection.)

Doc. Rev. A

Step   *Reference*

Link (green)
Transmit/Receive (red)
Collision (red)
Polarity (red)

4016LEDS
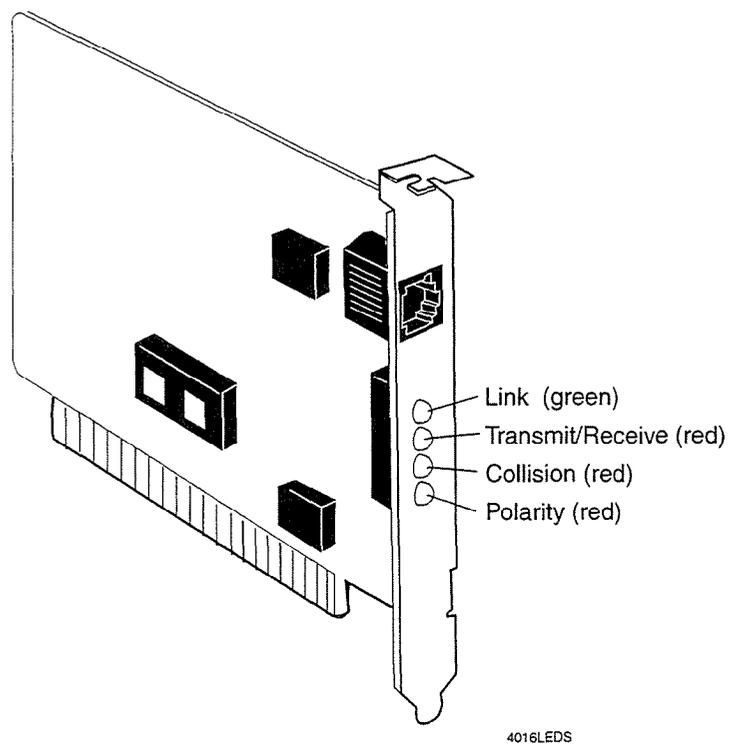
Figure 2   LEDs on Ethernet Card

This procedure describes how to shut down a module or an entire Series 6 server. You should use this procedure before turning off the power to a module, as the shutdown command halts call processing in a clean and orderly fashion.

> **WARNING!**
>
> You should follow the policies of the site to warn users prior to the server shutdown. This process removes the server from call processing. Centigram recommends that you perform this procedure only during periods of low call traffic.

Step	Reference

1. Reach the System Maintenance Menu. — Menu Map 1

2. Execute a shutdown command.

   Select: (S) System Shutdown

   - The server displays the status of each line and the lengths of the message indicator request queues.

   Prompt: WARNING!! This will terminate call processing.
   Type "shutdown" if you really want to do this.
   Response: **shutdown**

3. If you have a multi-module system, specify which modules to shut down.

   Prompt: modules to shutdown:
   Response: **a** for all modules, or the **number** of a specific module (1, 2, 3, or 4). You can select multiple modules by entering the IDs separated by commas (3,4), or a range by using a hyphen (2-4).

   - The server displays the status of each line of the specified modules as "idle," "active," or "stopped," and updates the status every minute until all lines are stopped. The server stops any calls still in progress after five minutes.

4. If you are executing a *server* shutdown, wait for the message waiting queue to clear. If you are executing a *module* shutdown on a multi-module server, do not wait for the message waiting queue to clear.

   Prompt: Wait for message waiting queues to be empty?
   Response: **Y** to wait for the queue to clear, *or*
   N to continue immediately with the shutdown.

5. When the server has taken all lines of the specified modules off-hook, it continues by asking if a verify is to be executed.

   Prompt: Perform Offline System Verification? (Y/N):
   Response: **Y** to execute the verify, *or*
   N to skip verify and continue with the shutdown.

Doc. Rev. A

Step	Reference

6. Specify if changes to the status of each module are to be made.

    Prompt: Enable or Disable Modules?
    Response: **Y** to change the status of modules, *or*
                 N to keep the module status the same and continue at step 11

7. If you answered yes in step 6, a chart with the status of each module is displayed and then the Module Maintenance Menu is displayed.

8. Enable a module, if necessary:

    Select: (E) ENABLE a module
    Prompt: Which Module?
    Response: The **number** of the module.

9. Disable a module, if necessary:

    Select: (D) DISABLE a module
    Prompt: Which Module?
    Response: The **number** of the module. If you are disabling multiple modules, disable the module attached to the console last.

    Prompt: type "disable" to confirm your request:
    Response: **disable**

If you are disabling multiple modules, repeat step 9.
If the status of the module attached to the console was changed to disabled, the balance of this procedure is not seen, due to the module resetting. The console then resets to the Maintenance From Hard Disk Menu.

10. When you are done configuring the modules, exit the menu.

11. The server completes the shutdown.

    Prompt: ****SHUTDOWN COMPLETE****

The System Maintenance Menu is displayed. You can now either reboot the module(s) or remove power to the module(s).

4 Software Installation and Configuration

This chapter covers reference information relating to the Unified TCP/IP software, including installation and configuration. Refer to the Task List for step-by-step instructions on software installation and configuration.

Installing the Unified TCP/IP Software

This section provides an overview on installing the Unified TCP/IP software on your Series 6 server.

> **Note:** For complete step-by-step directions, refer to the procedures at the end of this chapter.

Installing the Unified TCP/IP Optional Feature

You install the Unified TCP/IP software as an optional feature, using the service procedure. You are prompted to insert the Unified TCP/IP optional feature diskettes. After you install the software, you can configure Unified TCP/IP at any point.

Configuring the Unified TCP/IP Application

> **Note:** For complete step-by-step directions, refer to the procedures at the end of this chapter.

To configure the Unified TCP/IP software, you need a list of IP addresses and host names. You also must have already installed the software as described in the above section.

Complete one worksheet per Ethernet card before configuring the application. Refer to Table 4-1 for help with the parameters. You should consult with your network administrator to obtain appropriate IP addresses. Once you have completed your worksheet(s), you can configure the application. Configuration takes place in the Offline Configuration Menu. If you are installing more than one Ethernet card on your server, you must perform the software configuration for each card.

A sample worksheet is shown in Figure 4-1. A blank worksheet, which you can use to make copies, is in the next section after this chapter.

Table 4-1 Configuration Parameters for Unified TCP/IP

Parameter	Description
Domain Name	A name for a series of nodes, attached to the node name to form a complete internet site name. For examples, if the domain name is *centigram.com*, prepending the node name *vm600* creates an internet site name of *vm600.centigram.com*.
Current Module Number	The module number where the Ethernet card is installed, from 1 to 4. The default is 1.
Enable/Disable Current Card	Specify whether the card you are configuring should be Enabled (allowed to operate) or Disabled (not used). If the card is disabled, MESA-Net TCP/IP and OneView 1.1 cannot operate either.
Ethernet Card Configuration	The type of configuration for the Ethernet card, either 1 or 3. This is fully explained in Chapter 3.
Node Name	The unique node name in the domain specified (see Domain Name, above). Valid characters are alphanumeric and the underscore (_) character.
Node IP Address	The IP address of the Ethernet card being configured. It must be a unique ID on the network. IP addresses are in the form $x.y.z.w$, where each letter represents a number between 0 and 255.
Subnet Mask	This subdivides networks into sub-networks, for example, *255.255.255.0* is the default subnet mask for Class B networks. See Chapter 2 for more information.
Network Number	The physical network number. Network numbers 1 and 2 are reserved for MESA-Link and Redundant MESA-Link. Therefore, all Ethernet segments start with network 3, which is the default. The highest allowable number is 9.
Broadcast Address	Refers to all nodes on the TCP/IP network. A broadcast IP address is a network ID with all 0 bits set to 1. For example, *129.32.255.255* is the broadcast address for network *129.32.0.0*.
Operation Mode	Sets the IP address to be the primary (P) or the secondary (S). The primary IP address is used to bind the TCP/IP stack on a module and there can be only one primary IP address per module.
Current Card Slot Number	The slot number where the Ethernet card is installed in the module specified.
Gateway IP Address	The IP address of the Internet gateway (the machine that communicates with the rest of the Internet).
TELNET configuration	Specify whether the card you are configuring should have telnet services Enabled (allowed to operate) or Disabled (not used).

Unified TCP/IP Application Worksheet

Offline Parameters

Card Identification

Current module number: `1`

Card IP address:

Node name .... Domain name

Full card name: `vmemo.centigram.com`

`vmemo`   `centigram.com`

Card and Network Configuration

Enable or Disable current card: ☑ E ☐ D

Card configuration: ☑ 1 ☐ 3

Node name: `vmemo`

Node IP address: `129.3.74.160`

Subnet mask: `255.255.0.0`

Network number: `3`

Broadcast address: `129.3.0.0`

Operation mode: ☑ P ☐ S

Current card slot number: `4`

Gateway IP address: `129.3.75.7`

TELNET configuration: ☐ E ☑ D

Dependent Optional Features

Install MESANet? ☑ yes ☐ no

Install OneView? ☐ yes ☑ no

Figure 4-1   Sample Unified TCP/IP Application Worksheet

Two items are shown on the worksheet that are not covered in Unified TCP/IP configuration, and those are the checkboxes for whether to install MESA-Net or OneView. These appear on the worksheet to remind you that once you have installed and configured Unified TCP/IP, you should install these options if you have them.

Connecting the Server to a Network

Note: For complete step-by-step directions, refer to the procedures at the end of this chapter.

The Ethernet card has an RJ-45 port which allows connection to unshielded twisted-pair (10BaseT) Ethernet wiring. Insert the RJ-45 plug into the RJ-45 port on the Ethernet card. The other end of the wire should be connected to a prewired wall jack or a concentrator or hub on your network.

Verify the connection by powering on both the server and the concentrator or hub. Look for the green Link Integrity LED on the Ethernet card; it should be lit if the connection is good. The corresponding light on the concentrator should also be lit.

If the Polarity LED is lit, then the automatic polarity correction feature is working, and the signal polarity is reversed. (This means the wiring had inverse polarity to begin with.)

The Transmit/Receive LED is lit when the card is transmitting or receiving data across the network. The Collision Detection LED lights when collisions are detected on the network, which is a normal condition.

Refer to Figure 4-2 for an illustration of the LEDs on the Ethernet card.

Link (green)
Transmit/Receive (red)
Collision (red)
Polarity (red)

4016LEDS
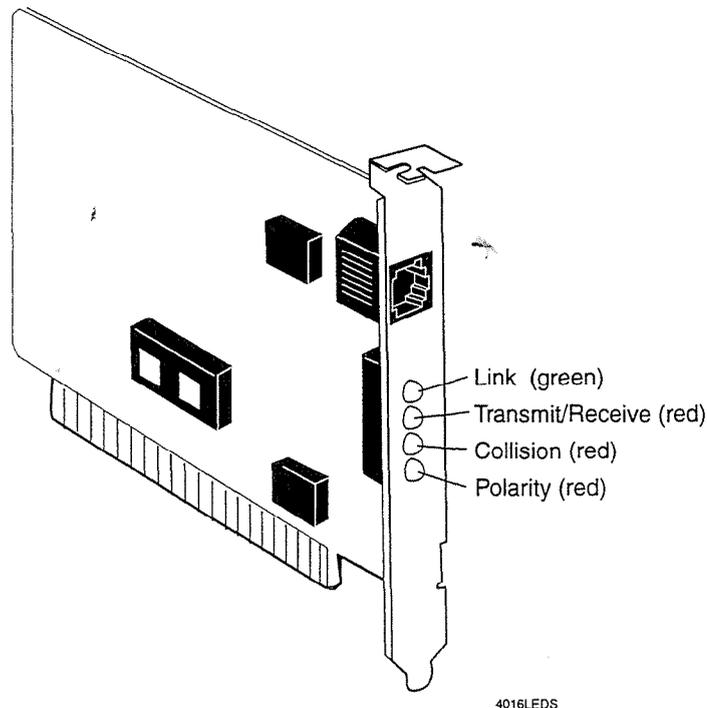
Figure 4-2   Ethernet Card LEDs

Testing the Installation and Configuration

If you cannot communicate over the network, you must check both the hardware and the software for problems.

Testing the Hardware

Check the following for hardware problems:

- Ensure the card is firmly seated in its slot and that it is receiving power.

- Check the wiring connection to both the card and the wall jack or concentrator.

- Check that your card is configured for an RJ-45 connector (jumpers 2 and 3). See Chapter 3 for information on card jumpering.

- Ensure that the wiring is within the range allowed.

- Check that the green Link LED is lit. If it is not lit, check cabling of other computers connected to the same concentrator. If none are lit, verify that the cables and hub are operational.

- Check the red Collision LED. If it is solid red or red most of the time, excessive collisions are occurring on the network. Solid red can also indicate an incorrect cable type configuration; check the jumper settings.

Refer to the *Series 6 Technical Reference Manual* for more information on specifications, wiring, and settings.

Testing the Connection With Ping

If the connection fails but the hardware appears functional, the board may not be configured properly. Contact your customer support representative.

First, **ping** the server IP address from another node on your network. To do this, enter *one* of the following addresses to ping:

- Module's host name

- Module's IP address

If this works (see Figure 4-3), the network is set up correctly. Ping each module in the system to verify that all TCP/IP modules can communicate with each other.

```
Pinging host cgram:  188.15.7.20
ICMP Echo  Reply: TTL 60
ICMP Echo  Reply: TTL 60
ICMP Echo  Reply: TTL 60
ICMP Echo  Reply: TTL 60
Host cgram replied to all 4 of the 4 pings.
```

Figure 4-3   Successful Ping Results

If this succeeds, the software is probably set correctly.

Note: If pinging the module name does not work, ping the module IP address. If the IP address works, there is a problem with name services on your network (**/etc/hosts** has the wrong values or DNS is not working properly).

Task   Procedure

Unified TCP/IP Software Procedures

Install Optional Feature With System Online

The procedure describes how to install an optional feature with the Series 6 server online. Be sure the Optional Feature Diskette(s) and the Module Enable Diskette contain the serial number(s) for all disk(s) in the system.

Note: The serial number on the Optional Feature diskette must match the serial number of the hard disk on which the software is being installed. If you receive an error message about an incorrect serial number, contact your support organization.

CAUTION!

If you are loading a revision support disk (RSD), do it after completion of this procedure. Loading the RSD first, could create an incorrect configuration.

Step	*Reference*
1. Reach the System Maintenance Menu, then go to the System Maintenance Additional Options Menu.	Menu Map 12
2. Select the Add Optional Feature(s) program.	

Select: (A) Add Optional Feature(s)
Prompt: Enter 'Y' to add optional features, 'N' to stop:
Response: **Y** for Yes.

3. Install the optional feature.

Prompt: Insert Optional Feature floppy disk in the floppy drive. *
Enter any key when ready:
Response: Insert the Optional Feature diskette, then press **Enter**.

4. After you have installed the Optional Feature software, the server asks if you want to install another optional feature.

Prompt: Do you want to install another optional feature?
Response: **Y** to install another optional feature and continue from step 3,
N if you are done installing optional features.

The server automatically edits and saves the configuration files, then returns to the Additional Options Menu.

5. Exit the VoiceMemo Configuration Offline Menu. You see the following prompt:

Prompt: Wait for message waiting queues to be empty?
Response: **N** to continue.

Step	Reference

6. The following prompt appears:

   Prompt: Wait for paging queues to be empty?
   Response: **N** to continue.

7. Exit to the VoiceMemo Configuration - Main Menu, then go to the VoiceMemo Configuration - Offline Menu. — Menu Map 2

8. Duplicate the active configuration.

   Select: (B) Duplicate Active Configuration

9. Exit to the VoiceMemo Configuration - Main Menu and activate the configuration.

   Select: (A) Activate Configuration

Unified TCP/IP Optional Feature Installation

This procedure gives an overview of how to install, configure, and test both hardware and software for the Unified TCP/IP Optional Feature. This feature allows you to put your Series 6 server on an Ethernet network and communicate with other nodes attached to the network. It also allows you to use Ethernet communications with the MESA-Net and OneView optional features.

Step	Reference
1. Ensure you have everything you need to install Unified TCP/IP. You should have at least one Ethernet card, the Unified TCP/IP software, and the Unified TCP/IP software manual. You will also need any other manuals referred to in this procedure.	
2. Make a copy of the Unified TCP/IP Application worksheet and fill out one copy per Ethernet card. A blank copy is in the back of the reference section of this manual. Consult with your network administrator for IP addresses, node names, and other network issues.	
3. Install the Ethernet card(s) into the server. If you are new to installing components in your server, refer to the appropriate hardware manuals to familiarize yourself with the server's design (*Series 6 Installation and Service Manual*).	CP 2149, Ch. 3
4. Install the Unified TCP/IP software on your server.	CP 5402
5. Configure the Unified TCP/IP software.	CP 6471
6. Connect the Ethernet card to the network.	CP 2150, Ch. 3
7. Test the hardware and software configuration. If the server responds correctly, you can now communicate between the server and other nodes on the network. If you wish to install the MESA-Net or OneView optional features to work with TCP/IP, install and configure them now. Refer to the appropriate manuals to do so.	CP 6472

This procedure explains how to install the software for the Unified TCP/IP application, and how to properly configure the software to use the application. It assumes that you have already performed the following steps:

- Installed one or more Ethernet cards correctly (CP 2149, Chapter 3)

- Completed one worksheet per Ethernet card (CP 6470)

- Installed the Unified TCP/IP software (CP 5402)

You must perform this procedure once per Ethernet card installed.

Step	Reference
1. Reach the Offline Configuration Menu, then go to the Unified TCP/IP Configuration Menu.	Menu Map 13

2. Refer to your worksheet in specifying the parameters needed to use Unified TCP/IP. First set the domain name for the Ethernet card.

Select: (D) Domain Name = [centigram.com]
Prompt: `Enter the domain name = [centigram.com] ?`
Response: The **domain name** from your worksheet Domain names are usually in the form xxxxxxx.xxx, where the x's represent alphanumeric characters. Refer to Chapter 2 for more information on domain names.

3. Set the module number that the Ethernet card was installed in.

Select: (M) Configure a Module
Prompt: `TCP ETHERNET MENU:`
Select: (C) Current Module Number = [1]
Prompt: `Current Module Number = [1] ?`
Response: The **module number** from your worksheet. Modules are numbered from 1 to 4. The Model 70 and Model 120 servers only have one module, which is number 1.

4. Enable the Ethernet card. This allows the card to operate. If the card is disabled, you cannot use Unified TCP/IP to communicate with other nodes, nor can you use MESA-Net TCP/IP or OneView 1.1.

Select: (D) Enable or Disable Current Card = [Disable]
Prompt: `Enter the status of current Ethernet card,`
`(E)nable or (D)isable = [Disable]`
Response: **E** to enable the Ethernet card , *or*
D to disable the Ethernet card, so it cannot be used.

Step	Reference

5. Specify the Ethernet card configuration type. For more information on card configuration, refer to Chapter 3.

   Select: (E) Ethernet Card Configuration = [1]
   Prompt: `Enter host Ethernet card configuration =  [1] ?`
   Response: The **configuration number** for the Ethernet card. Valid values are 1 and 3.

6. Specify the node name for the Ethernet card.

   Select: (H) Node Name = []
   Prompt: `Enter the node name of the card =  [] ?`
   Response: The **node name** for the Ethernet card. A node name is prepended before the domain name (see Step 2) to form an address. The node name can contain alphanumeric characters and the underscore (_). For more information on node addresses, refer to Chapter 2.

7. Specify the node IP address for the Ethernet card.

   Select: (I) Node IP Address = []
   Prompt: `Enter the local IP address =  [] ?`
   Response: The **IP address** for the Ethernet card. An IP address has the form nnn.nnn.nnn.nnn, where each nnn refers to a number between 0 and 255, and the numbers are separated by periods. Refer to Chapter 2 for more information on IP addresses.

8. Specify the subnet mask for the Ethernet card.

   Select: (M) Subnet Mask = []
   Prompt: `Enter the subnet mask =  [] ?`
   Response: The **subnet mask** for the Ethernet card. A subnet mask is used to show how a subset of the network uses IP addressing. The mask has the form nnn.nnn.nnn.nnn, where each nnn refers to a number between 0 and 255, and the numbers are separated by periods. Refer to Chapter 2 for more information on subnet masks.

9. Specify the network number for the Ethernet card.

   Select: (N) Network Number = []
   Prompt: `Enter the network number of the card =  [] ?`
   Response: The **network number** for the Ethernet card. Valid values are 3 through 9; 3 is the default. If you only have one network for your server, use 3.

Step — Reference

10. Specify the broadcast address for the Ethernet card.

Select: (O) Broadcast Address = []
Prompt: Enter the broadcast address = [] ?
Response: The **broadcast address** for the Ethernet card. This is an IP address used for all nodes on the Ethernet network. An IP address has the form nnn.nnn.nnn.nnn, where each nnn refers to a number between 0 and 255, and the numbers are separated by periods. For more information on broadcast addresses, see Chapter 2.

11. Specify the operation mode for the Ethernet card's IP address (set in Step 7).

Select: (P) Operation Mode (Primary/Secondary) = [Secondary]
Prompt: Do you want to set this IP address as (P)rimary or (S)econdary = [Secondary] ?
Response: **P** to set this address to primary operation mode, *or* **S** to set this address to secondary mode.

The primary IP address is the address used by the TCP/IP utilities to identify themselves on the network. There should be one and only one primary IP address on a module. If you only have one Ethernet card in a module, set it to operate as the primary.

12. Specify the slot number where you installed the Ethernet card.

Select: (S) Current Card Slot Number = [0]
Prompt: Enter the slot number of the card = [0] ?
Response: The **slot number** where the Ethernet card was installed. Refer to Chapter 3 for more information on the valid slots to install Ethernet cards.

13. Specify the gateway IP address for the Ethernet card.

Select: (T) Gateway IP Address = []
Prompt: Enter the Gateway IP address = [] ?
Response: The **gateway IP address** for the network. This is an IP address for a node that communicates with other parts of the network. An IP address has the form nnn.nnn.nnn.nnn, where each nnn refers to a number between 0 and 255, and the numbers are separated by periods. Refer to Chapter 2 for more information on gateway IP addresses.

| *Step* | *Reference* |

14. Enable the Ethernet card. This allows the telnet service to operate.

> *Select:* TELNET Configuration (Enable/Disable) = [Disabled]
> *Prompt:* Do you want TELNET service (E)nabled or
> (D)isabled = [Disabled] ?
> *Response:* **E** to enable the telnet service , *or*
> **D** to disable the telnet service, so module cannot be accessed.

> **Note:** The default condition is to have telnet service disabled.
> You do not need to enable telnet to use the Unified
> TCP/IP application with either the MESA-Net TCP/IP or
> the OneView 1.1 optional features.

15. Review the configuration settings.

> *Select:* (W) Show System Wide TCP/IP configuration
> *Response:* Verify that the screen displays the Unified TCP/IP configuration
> parameters you specified. Figure 1 shows a sample of the output. Most
> items should be self-explanatory. The non-obvious items are:

Parameter	Explanation
Host	Module number
Card	Configuration type (1 or 3)
Mode	(P)rimary or (S)econdary
Slot	Slot Number of module where card was installed
Net	Server Network Number
Port	Starting memory address
IRQ	Interrupt Number
Vendor	Type of card

Step   *Reference*

```
    TCP/IP System Wide Host Configuration
    --------------------------------------

        Domain name: centigram.com

H   C   M   S
o   a   o   l   N
s   r   d   o   e
t   d   e   t   t     IP Address       Host Name      Port  Irq Vendor
------------------------------------------------------------------------
3   1   P   6   3    129.1.250.108      alpha199       0280   10 ALTA #1

Host Card           Gateway Address     Subnet Mask     Broadcast Address
------------------------------------------------------------------------
    3       1           129.2.7.2        255.255.0.0    129.1.255.255
```

Figure 1   Sample Output: Unified TCP/IP Configuration Display

16. Exit the TCP Ethernet Menu.

17. Repeat steps 2 through 16 for any additional Ethernet cards installed in your server.

18. Exit the TCP/IP Network Configuration Menu. Save your configuration settings by exiting the Offline Configuration Menu.

This procedure explains how to test the hardware and software configuration for the Unified TCP/IP application. It assumes that you have already performed the following steps:

- Installed one or more Ethernet cards correctly (CP 2149, Chapter 3)

- Completed one worksheet per Ethernet card (CP 6470)

- Installed the Unified TCP/IP software (CP 5402)

- Configured the Unified TCP/IP software (CP 6471)

You must perform this procedure once per Ethernet card installed.

Step   *Reference*

((·)) Test the Configuration

1. Watch the boot process to see if any errors appear indicating that the Ethernet card is missing or is not seated properly. The messages appear after about one or two minutes. Some of the errors might be:

   ```
   CMN_ERR: 2 8003: LOCATE_8003(): AUTO-DETECT FAILED,
   CAN'T DETERMINE CARD PARAMETERS
   CMN_ERR: 2 8003: ED_INIT(): ETHERNET CARD NOT LOCATED
   NETD: FAILED TO OPEN DRIVER "/DEV/ETH" ()[0])
   ```

   > **CAUTION!**
   >
   > Do an orderly shutdown of the server and turn off the server module before doing the next step.

2. If any of these errors appear, remove the front cover of the CPU assembly and reseat the Ethernet card. If you continue to see these errors, replace the Ethernet card with a new one.

3. Check the Error Log to see if the Ethernet card installation has introduced any errors.

4. Test if the hardware and software were installed properly by using ping. Perform this test from another node on the network and attempt to ping the server. You may need help from your network administrator. Use the IP address of an Ethernet card you configured for the server.

Step	Reference

If the test is successful, you see a message similar to the following one.

```
Pinging host 129.1.11.25
ICMP Echo Reply: TTL 60
ICMP Echo Reply: TTL 60
ICMP Echo Reply: TTL 60
ICMP Echo Reply: TTL 60
Host 129.1.11.25 replied to all 4 of the 4 pings.
```

If the ping test is successful, you can assume that the network connection between the server and the computer you are using is working properly. If the ping test is unsuccessful, you will receive an error message (for example, the message might say that the node is unreachable).

If the test is unsuccessful, check the physical connections between the server and the network, including the Ethernet cards, the cable, and the connectors. If you continue to have problems, consult with the network administrator at the customer site. Refer to Troubleshooting, below.

5. Start a telnet session from another site to the server. Refer to Troubleshooting, below, if telnet does not work properly. Contact your network administrator for information on using telnet.

(( )) Troubleshooting Checklist

1. Ensure the Ethernet card is firmly seated in its slot and that it is receiving power.

2. Check the wiring connection to both the card and the wall jack or concentrator.

3. Check that your card is configured for an RJ-45 connector. Refer to the *Series 6 Technical Reference Manual* for more information on card configuration.

4. Ensure that the wiring is within the range allowed. Refer to the *Series 6 Technical Reference Manual* for more information on wiring standards.

5. Check that the green Link LED is lit. If it is not lit, check cabling of other computers connected to the same concentrator. If none are lit, verify that the cables and hub are operational. See Figure 1.

Step   *Reference*

- Link (green)
- Transmit/Receive (red)
- Collision (red)
- Polarity (red)

4016LEDS
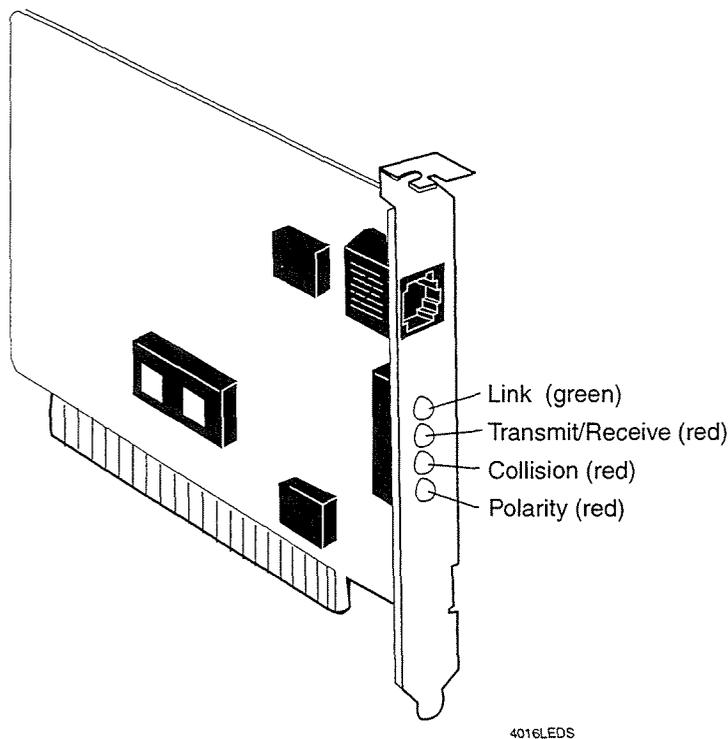
Figure 1   LEDs on the Ethernet Card

6. Check the red Collision LED (Figure 1, above). If it is solid red or red most of the time, excessive collisions are occurring on the network. Solid red can also indicate an incorrect cable type configuration. Refer to the *Series 6 Technical Reference Manual* for more information on card configuration.

7. Reach the TCP/IP Network Configuration Menu.   Menu Map 13

8. Run a System-Wide Configuration Report. You will need this report to perform the next few steps. Refer to any worksheets you completed to check for misconfiguration.

9. Ensure that you installed the Ethernet card(s) in the correct slot for your system, and that you used the correct card configuration(s). Verify all jumper settings. Refer to the *Series 6 Technical Reference Manual* for hardware configuration tables.

10. If you have more than one Ethernet card installed in your server, verify that each has a unique IP address, and that you are using them consistently.

11. Ensure that one, and only one card per module is set as the primary address. (The Mode heading shows if a card is set to Primary or secondary.)

12. Reach the Ethernet Card Menu.   Menu Map 13

Step	*Reference*

13. If you cannot get any response from the server Ethernet card, ensure that the card is enabled. (This is not indicated in the Configuration Report; you must perform this operation in the Ethernet Card Menu to determine the card setting.)

   Select: (D) Enable or Disable Current Card = [Disable]
   Prompt: `Enter the status of current Ethernet card,`
   `(E)nable or (D)isable =  [Disable]`
   Response: **E** to enable the Ethernet card , *or*
   D to disable the Ethernet card, so it cannot be used.

14. If you want to use the telnet utility and it fails, ensure that telnet is enabled on the server. (This is not indicated in the Configuration Report; you must perform this operation in the Ethernet Card Menu to determine the card setting.)

   Select: TELNET Configuration (Enable/Disable) = [Disabled]
   Prompt: `Do you want TELNET service (E)nabled or`
   `(D)isabled =  [Disabled] ?`
   Response: **E** to enable the telnet service , *or*
   D to disable the telnet service, so it cannot be used.

   > **Note:** The default condition is to have telnet service disabled. You do not need to enable telnet to use the Unified TCP/IP application with either the MESA-Net or OneView optional features.

15. Exit the TCP Ethernet Card Menu and the Offline Configuration Menu for this change to take effect.

16. If none of these enable you to use Unified TCP/IP, contact your network administrator to eliminate network problems. Contact your Centigram representative if problems persist.

Worksheet

You can make copies of the blank worksheet on the next page. Use worksheets to configure your Series 6 server for the Unified TCP/IP Application.

Unified TCP/IP Application Worksheet

Card Identification

Current module number [ ]

Card IP address [ ]

Full card name

Node name [ ]

Domain name [ ]

[ ]   [ ]

Card and Network Configuration

Enable or Disable current card   [ ] E   [ ] D

Card configuration   [ ] 1   [ ] 3

Node name [ ]

Node IP address [ ]

Subnet mask [ ]

Network number [ ]

Broadcast address [ ]

Operation mode   [ ] P   [ ] S

Current card slot number [ ]

Gateway IP address [ ]

TELNET configuration   [ ] E   [ ] D

Dependent Optional Features

Install MESANet?   [ ] yes   [ ] no

Install OneView?   [ ] yes   [ ] no

List of Centigram Procedures

Procedure Number	Chapter Number	Title	CPs Called	Called By
CP 2149	3	Install the EtherTPI-16+T Ethernet Card	CP 5700	CP 6470
CP 2150	3	Connect the Server to the Network		CP 6470
CP 5402	4	Install Optional Feature With System Online		CP 6470
CP 5700	3	Shut Down a Server		CP 2149
CP 6470	4	Unified TCP/IP Optional Feature Installation	CP 2149, CP 2150, CP 5402, CP 6471, CP 6472	
CP 6471	4	Configure Unified TCP/IP Software		CP 6470
CP 6472	4	Test Unified TCP/IP Configuration		CP 6470

Glossary

10Base2. An **Ethernet** networking standard, IEEE 802.3, using **Thin Ethernet** cable (**RG-62 coax**) to a maximum distance of 185 meters.

10Base5. An **Ethernet** networking standard, IEEE 802.3, using **coaxial** cable to a maximum distance of 500 meters.

10Base-T. An **Ethernet** networking standard, IEEE 802.3, using **twisted pair** cabling , home run wiring method, and a wiring hub (the latter two are similar to telephone systems). This standard defines connectors, pin assignments, and voltage levels. The cabling can be run up to 100 meters.

ArcNet. (Attached Resource Computer NETwork) A type of **LAN**, used by the **QNX** operating system. It uses a user-modified token-passing protocol and has data transmission of up to 2.5 megabits per second. This network links multiple server modules together. Contrast with **Ethernet** and **Token Ring** networks.

ASCII. (American Standard Code for Information Interchange) Pronounced "ASK-ee." A **binary** code for data that is used in communications, most minicomputers and all personal computers.

ASCII is a 7-**bit** code providing 128 possible character combinations, the first 32 of which are used for printing and transmission control. Since the command storage unit is an 8-bit **byte** (256 combinations) and ASCII uses only 128, the extra bit is used to hold a parity bit or special symbols. For example, the PC uses the additional values for foreign language and graphics symbols.

AUI. (Attachment Unit Interface) A commonly used connector for **thick Ethernet** cable. This is a 15-pin D-type connector, where the pins are arranged in two rows.

Binary. A numeric system with only two digit values, 0 and 1. Computers use binary arithmetic instead of decimal because all numbers can be represented as a series of electrical pulses, 0 (off) or 1 (on).

Bit. A **binary** digit, with a value of either 0 (off) or 1 (on). Computers process information as a series of bits.

BNC. (British National Connector) A commonly used connector for **coaxial cable**. The plug looks like a cylinder with two short pins on the outer edge on opposite sides. After the plug is inserted, the socket is turned, causing the pins to tighten the plug within it.

Byte. A group of **bits** that make up one character, such as the letter "A." Most computers use eight bits per byte, but this value varies depending on the machine. See also **ASCII**.

Coaxial Cable. A high-capacity cable used in communications and video, commonly called coax (pronounced "KOH-ax"). It contains an insulated solid or stranded wire that is surrounded by a solid or braided metallic shield, which is wrapped in an external cover. Teflon coating is optional for fire safety.

Although similar in appearance, there are several types of coaxial cable, each designed with a different width and impedance for a particular purpose (TV, baseband, broadband). Coax provides a much higher bandwidth than **twisted-pair** cable. Also see **RG-58** and **RG-62**.

Datagram. The packet format used by **Internet Protocol**. A packet is a block of data that contains its own delivery information.

DNS. .(**Domain** Name Service) A distributed hierarchical used to resolve **host names** into **IP addresses**. This eliminates the need for each machine to know the exact address of every other machine.

Domain. .A hierarchy used within **host names**, where each domain knows about the ones immediately below it. The higher level the domain, the further the right it appears in the host name.

Ethernet. A type of **LAN**, operating over either **twisted pair** or **coaxial** cable, with a data transmission speed of up to 10 megabits per second. If a message is sent by one device and it collides with another message, the network generates an error and each message is resent after a random pause. Contrast with **Token Ring**. See also **Thick Ethernet** and **Thin Ethernet**.

Ethernet connectivity is available for the Series 6 server using the **Unified TCP/IP** option.

Ftp. (File Transfer Protocol). A service that enables file transfer between two nodes on an Ethernet network or the **Internet**.

Host. A mainframe computer that communicates with a second machine. In most cases the host computer stores a database and the other computer (usually called the remote) accesses it by some form of data connection. In this manual, whatever computer is accessed by the server is called the host. Server **modules** are sometimes referred to as hosts.

Host name. .An alphanumeric equivalent of an **IP address**, which eliminates the need to remember number series. An example is *tcpip.centigram.com.*

Internet. A set of internetworked Ethernet LANs. The term is popularly used to refer to the global network of computers that arose from the DarpaNet experimental network.

IP Address. A numeric. representation of a machine connected to the **Internet** or an Ethernet network. IP Addresses are in the form *n.n.n.n* where each *n* is an **octet**, and is usually expressed as a decimal number between 0 and 255. See also **host name**.

LAN. (Local Area Network) A **network** made up of computers and peripheral devices such as printers, connected to each other by some form of cabling. The length of the cabling is usually limited, so LANs tend to be confined to one building, for example.

MESA-Net. (Modular Expandable System Architecture-NETwork) The linking of multiple Series 6 servers together in an network. With VoiceMemo software release 6.0, MESA-Net now works using **TCP/IP**, requiring the **Unified TCP/IP** application.

Module. A server processor, sometimes called a **host**. You may have up to 4 modules in a server.

Network. A collection of computers that can communicate with each other.

Node. The term for each computer on a **LAN**.

Octet. A group of eight **bits**. Four octets make up an **IP address**.

OneView. A server optional feature that allows a user to access voice and fax messages from an IBM-compatible PC. In VoiceMemo software release 6.0, this feature can run using **TCP/IP**, if the **Unified TCP/IP** application is also installed.

OSI Model. (Open Systems Interconnect) An architectural model for data communications developed by the International Standards Organization (ISO). Also known as the Seven-Layer model because it has seven layers, each representing a data transfer function, in its hierarchy.

Ping. A service that sends a **datagram** from one **node** to another and reports whether this communication was successful. Commonly used to test whether a **node** is correctly installed and configured on a network.

Protocol. A set of rules or standards. In data communications, protocols are sets of rules that allow different types of **networks** to communicate

Protocol stack. A group of protocols arranged in a hierarchy, such as the **OSI Model** or **TCP/IP**.

QNet card. (Also QNXnet card) A network communications card used in an **ArcNet** network. The name comes from the **QNX** operating system, which uses these cards to link multiple processors together. Server modules use these cards in multi-module systems.

QNX. A multitasking real-time operating system used by the Series 6 server.

RJ-45. An eight-pin connector used with **twisted-pair** cable. The plug and socket are modular, similar to those used with telephone jacks.

Rlogin. A service that allows a remote login from one **network node** to another. This service is similar to **telnet** but uses a different port number.

Socket. The combination of an **IP address** and a port number, used when two **nodes** communicate. This combination identifies the **network** process uniquely. *

Subnet. A subnetwork; a **network** within a larger existing network. This is accomplished by changing how the bits in an **IP address** are interpreted between network and **host** addresses.

Subnet Mask. A bit mask that creates a **subnet**. This mask is applied to an **IP address**. On bits (ones) are interpreted as **network** bits, off bits (zeros) are interpreted as **host** bits.

TCP/IP. (Transmission Control Protocol/Internet Protocol) A suite of communications **protocols** that links computers over many types of **networks**, including **Ethernet**. It is a de facto standard in internetworking.

The protocol has four layers, Network Interface (data exchange), Internet (addressing across internetworks), Transport (connectivity between data source and destination) and Application (user programs and utilities).

The server has an Ethernet option that allows TCP/IP communications. See **Unified TCP/IP**.

Telnet. A service that creates a virtual terminal on a **network node**.

Thick Ethernet. A type of Ethernet network using 0.4 inch diameter, 50-Ohm, double shielded **coaxial cable**, based on IEEE standard 802.3 **10Base 5**, with a data rate of 10 megabits per second. Contrast with **Thin Ethernet**, **Twisted Pair Ethernet**.

Thin Ethernet. A form of Ethernet network using 0.2 inch **RG-58 coaxial cable**, based on IEEE standard 802.3 **10Base 2**, with a data rate of 10 megabits per second. Contrast with **Thick Ethernet**, **Twisted Pair Ethernet**.

Token Ring. IBM's proprietary networking protocol, used in non-SNA environments. This is a ring or star-shaped **LAN**, where a device may only send a message if it has a token, a unique data packet. Other devices with messages to send must wait until the token is available. The data transmission rate is either 4 or 16 megabits per second. Contrast with **Ethernet**.

Twisted Pair. A network cable that is similar to telephone wire. This method allows easier network set-up and maintenance, since twisted-pair is much smaller and easier to use than coaxial cable.

Twisted Pair Ethernet. Used in **Ethernet** networks, unshielded **twisted pair** cable (AT&T D-inside wire or IBM Type 3), based on IEEE standard 802.3 **10Base-T**, with a data rate of 10 megabits per second. The cable is two sets of twisted-wire pairs, with a gauge of 22, 24, or 26. Contrast with **Thick Ethernet**, **Thin Ethernet**.

Unified TCP/IP. A **Series 6 server** optional feature that enables communication with other computers on an **Ethernet LAN**, using **TCP/IP**. The product includes an Ethernet card and software.

This feature is required to use the TCP/IP versions of **MESA-Net** and **OneView**.

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