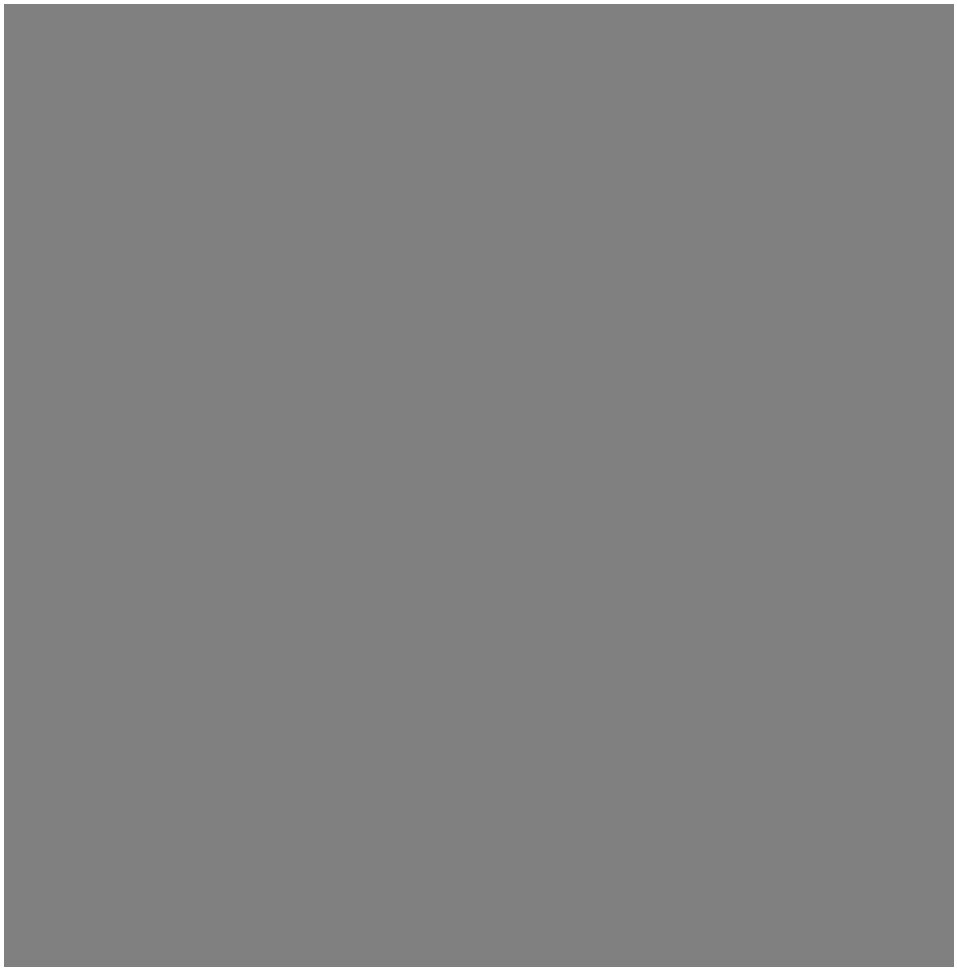
Network operations systems

TOPS
Voice service node

System provisioning and configuration

Release BCS30 03 Status: Standard



northern telecom

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Contents

1. Introduction

The TOPS VSN is an automated call processing vehicle capable of handling collect calls, calling-card calls, and third-party billing calls without the assistance of an operator.

Practice information

This practice deals with engineering considerations relevant to the installation and configuration of a TOPS VSN.

The following topics are discussed in this Practice:

Topic	Description
Provisioning	Specifies datalink, voicelink and processing capacity
	Specifies the number of calls a 24 and 48 channel system can handle
	Provides related provisioning information
	Identifies installation considerations
Packaging	Specifies ordering codes for all TOPS VSN hardware and software
Physical Configuration	Identifies the SRU types needed for a TOPS VSN
	Specifies the location of each SRU
	Specifies the software contents of each SRU for both a 24 and 48 channel system
Measurements	Specifies system intialization times
Test Equipment	Lists equipment required to test a TOPS VSN

Related practices

This practice and the ones listed below help the operating company to provision, configure and install a TOPS VSN:

450-1301-310	System Administrative/ Maintenance Operating Procedures
450-1101-151	DNC Provisioning Guide
450-1101-200	DNC Installation Planning Guide
450-1101-201	DNC Installation Guide for Cabinet Systems
297-2271-451	DMS Customer Data Schema

Change history

This section summarizes the important changes that affect this publication. They are arranged under the heading of the appropriate Batch Change Supplement (BCS) release.

BCS30

The presentation of this publication has been changed

The change to the TOPS VSN application made by BCS30 that affects this publication is the addition of the Locality Database PRU

2. Provisioning and engineering guidelines

A TOPS VSN system is engineered by the Northern Telecom to meet operating company requirements. The requirements are based on the calls per hour (CPH), and their average holding time (AHT) for each of the following call types:

- collect
- third party billing
- calling card
- Calls transferred to an operator (time-out calls).

Installation considerations

Complete instructions for installing base DNC equipment are given in 450-1011-201 . Only TOPS VSN-specific installation considerations are discussed in this practice. The following installation considerations are discussed:

- cabinets
- cabling and wiring
- accessibility
- floor loading
- mounting
- grounding
- synchronization

Cabinets

Cabinets are shipped without SRUs. The dimensions of each cabinet is 22 in. deep, 36 in. high and 11 in. across. Seven cabinets are needed for a 48 channnel system; five cabinets are required for a 24 channel system. A seven cabinet system measures 77 in. across; a five cabinet system measures 55 in. across. All cabinets should be appropriately installed and aligned before any SRU hardware is inserted in them.

Cabling and wiring

All cabling for TOPS VSN enters and exits from behind, at the botttom of the cabinet.

Accessibility

All SRUs are inserted into the TOPS VSN cabinets from the front. (Note that SRUs have predefined locations.) All connections are made from behind the cabinets.

Floor loading

There are both 24 channel and 48 channel size facilities available for use in the design of TOPS VSN systems. Because a system design may use either of these sizes, or a combination of the two, the floor loading varies from system to system.

Floor loading for a 24 channel size system is 29.1 lbs/sq ft. This specification is based on the weight of the following equipment:

- five cabinets with a total width of 55 in.
- cabinet depth of 22 in.
- wiring aisle of 3 ft
- maintenance aisle of 3 ft 6 in.

Floor loading for a 48 channel size system is 31 lbs./sq.ft. This specification is based on the following:

- seven cabinets with a total width of 77 in.
- cabinet depth of 22 in.
- wiring aisle of 3 ft
- maintenance aisle of 3 ft 6 in.

Mounting

Cabinets are not mounted to the floor.

Grounding

The grounding rules for a TOPS VSN are consistant with the guidelines described in 297-1001-156. The following rules must be observed:

- Cabinets must be isolated.
- Single point ground reference for dc input is the framework ground (main building ground).
- Internal logic ground reference is the cabinet frame.
- The AC coupled peripheral interface is by way of a twisted pair.

Synchronization

The TOPS VSN is synchronized through T1 interconnections to the DMS. When more than one T1 links is provided between the TOPS VSN and the DMS, one link is designated as primary and the other designated as secondary. Sychronization is ordinarily carried out by the primary link but automatically switches to the secondary link when there is a link failure on the primary link. The primary and secondary link designations are made from the TOPS VSN administrative position.

3. Packaging and compatibility

Compatibility

To operate properly, the version of TOPS VSN covered by this publication has been designed to run with equipment with the following Batch Change Supplement (BCS):

DMS	BCS30
VSN	BCS30

Packaging

When a TOPS VSN is ordered the following hardware components and quantities are delivered. They constitute the minimum requirement unless otherwise indicated. This table lists components common to both 24 and 48 channel systems. Quantities are specified for the 48 channel system in the third column, while quantities for the 24 channel system are specified in the second column.

The NT Product engineering codes (PEC) and associated release levels represent the minimum hardware release for software compatibility and proper operation.

When ordering these components, the customer should contact their Northern Telecom representative.

Note: Please refer to the ECM for the product engineering codes (PEC) of the components of the MISCellaneous Frame.

Hardware

Package Name	Min. Release Level	Quantity 24 Channel	Quantity 48 Channel
NT4G25GA - Appl.Proc. - 68020-10	09	4	5
NT4G16EA - Prime Proc. -68010-XP	ON	1	1
NT4G20JA - SCSI 350 MB Disk	04	1	1
NT4G20LA - SCSI 80 MB/Tape	OA	1	1
NT4G14BA - Lanlink	OC	1	1
NT0M90EB - Base Controller		1	1

NT0M91BA - Keyboard		1	1
NT0M92BA - Monitor		1	1

-continued-

Package Name	Min. Release Level	Quantity 24 Channel	Quantity 48 Channel
NT3M20AA - NT-220 Terminal		1	1
A0302323 - Impact Printer (Log Printer)		1	1
A0302323 - Impact Printer OR AA0328529 - Laser Printer (Report Printer)		1	1
NT4G23BA - Digital Trunk Line SRU	07	2	3
NT4G27BA - Voice Interface SRU	08	5	9
NT4G13AN - -48V DC Option 5 Cab.		1	0
NT4G13AQ - -48V DC Option 7 Cab.		0	1
NT4G50DA - -48V to +32 Converter	06	5	7
NT4G13AQ - Cable Assembly		0	1
NT4G13AP - Cable Assembly		1	0
NT4G13FA - Loft Cabinet		5	7
NT4G42CA - Input Jumper		1	1
MISCellaneous Frame (Note)		1	1

Note: Information concerning the MISC frame is provided by NT.

Application software

Package Name	Quantity 24 Channel	Quantity 48 Channel
NTG230AA - TOPS VSN Software	1	1

4. Physical configuration

The TOPS VSN can be configured for either 24 or 48 channel operation. Each configuration has three basic hardware components, cabinets, shared resource units (SRUs), and peripherals.

Cabinets

The TOPS VSN houses SRU hardware in cabinets. A 24 channel system requires five cabinets and a 48 channel system requires seven cabinets. Each cabinet has two shelves to accommodate SRUs.

SRUs

Shared resource unit (SRU) hardware consists of replaceable components designed for the TOPS VSN cabinet. They come in four standard sizes and in several different types. All SRUs can in theory occupy any location on any shelf. However, each SRU should be installed in the designated location to ensure proper operation. The types of SRUs required for TOPS VSN are described under the heading "SRU Types".

Peripherals

All peripherals are connected to the TOPS VSN by way of a MISC Frame unit. (The VT220 * terminal is the only exception. It must be plugged into the prime processor on the TOPS VSN for installation purposes.) Terminals and printers are connected to the MISC Frame which house the LAN interface units (LIUs), the alarm interface unit (ALIU) and the modems. The MISC Frame is in turn directly connected to the LANLink using a 25 pair cable.

The logical configuration of these components is illustrated in figure 4-1. The MISC Frame houses the BIX, the LIUs, the ALIU, and all modems.

SRU types

A TOPS VSN configuration requires the following SRUs: -48 to +32 converters, storage units, LANlink, application processors, voice interface units, digital trunk link units, and a primary processor.

Table 4-A describes the characteristics of each type of SRU and the number of slots each occupies.

* VT220 is a trademark of the Digital Corporation.

Figure 4-1
The logical configuration of a seven tower TOPS VSN

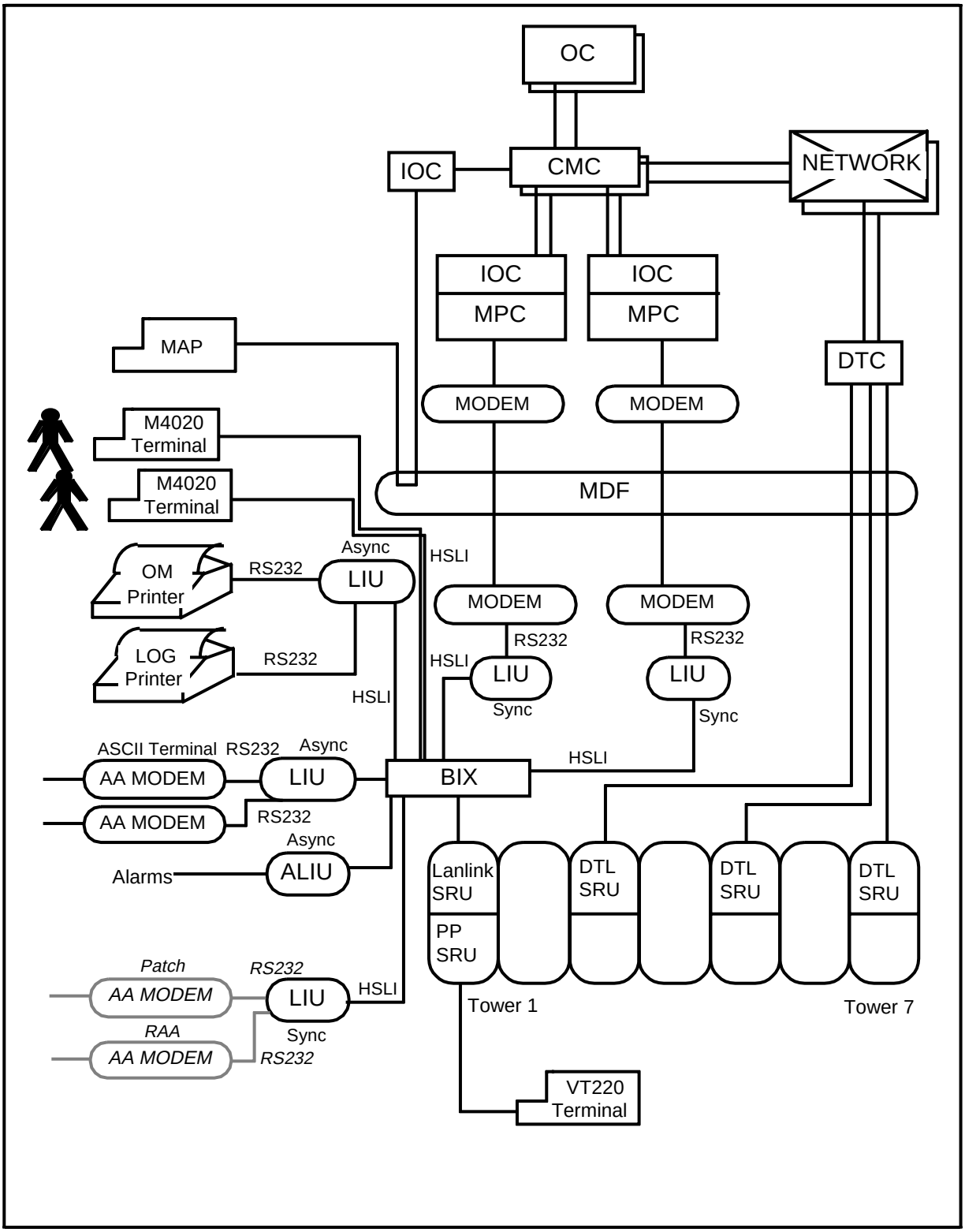

Table 4-A
SRU types required for TOPS VSN

TYPE	No. of SLOTS	CHARACTERISTICS
Cabinet Power converter -48 V	2	Converts -48V to +32 V used by the system. A power converter SRU must be configured for each cabinet. (Ordinarily one power converter is configured in each cabinet. Two converters may be configured in a single cabinet in order to free a two slot space in an anjoining cabinet.)
Storage units - 80Mb	2	Provides disk (80 Mb) and tape (150 Mb) storage facilities. (Disk size is for unformatted state.)
Storage units - 350Mb	8	Provides disk (350 Mb) storage facilities. (Size is for disk in unformatted state.)
Application processors - 10 Mb	4	Contains base and application software programs known as program resource units (PRUs).
Voice interface	4	Contains voice processing hardware and software. Delivers messages to and records messages from the subscriber. Performs speech recognition.
Digital trunk link units (T1)	4	Provides a T1 voice link between a DMS switch and TOPS VSN.
Primary processor	4	Provides operational control over other SRUs.
Lanlink	2	Provides 12 lines for connection to the MISC frame which in turn provides physical connections to peripheral devices.

24 channel configuration

Figure 4-2 illustrates the configuration for a 24 channel system with N+1 redundancy. Tables 4-B, 4-C and 4-D list the SRU, RRU and PRU configuration requirements of a 24 channel system.

Figure 4-2
Physical configuration for a 24 channel TOPS VSN

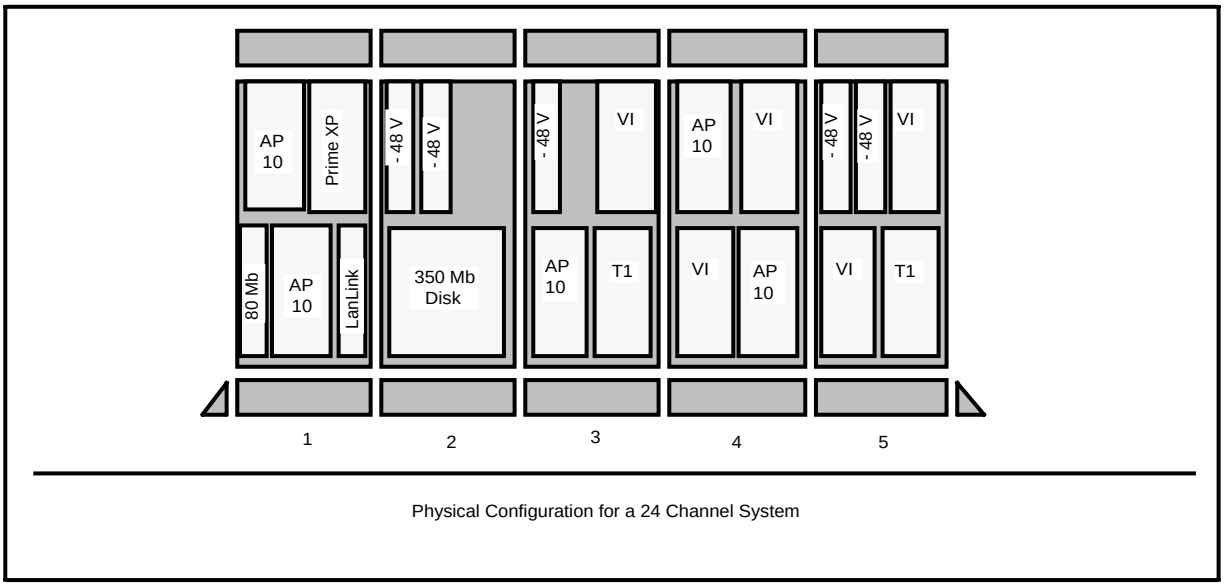

Table 4-B
SRU configuration - 24 channel

Cabinet	Slot	SRU Type
Alternate cabinet and slot locations are given for select SRUs. These are provided in the columns labeled Alt. Cab. and Alt. Slot.		
1	4	Application Processor 68020-10 (DU ± X)
1	6	H. A. Prime Processor (HAPP #1)
1	10	80MB Disk QIC-150 Tape (Storage Unit :LOCAL)
1	14	Application Processor 68020-10 (VSN OA&M)
1	15	LANLink (LANLink #1)
2	2	Cabinet Power Converter (-48 V Power Converter)
2	4	Cabinet Power Converter (-48 V Power Converter)
2	16	Storage 350 M (Storage Unit :VSNFS2)
3	2	Cabinet Power Converter (-48 V Power Converter)
3	8	Voice Interface (VI #1)
3	12	Application Processor 68020-10 (AP N+1)
3	16	Digital Trunk Link (T1 N+1)
4	4	Application Processor 68020-10 (VSN Mtce)
4	8	Voice Interface (VI #2)

-continued-

Table 4-B
SRU configuration - 24 channel (continued)

Cabinet	Slot	SRU Type
4	12	Voice Interface (VI #3)
4	16	Application Processor 68020-10 (VSN App + Voice)
5	2	Cabinet Power Converter (-48 V Power Converter)
5	4	Cabinet Power Converter (-48 V Power Converter)
5	8	Voice Interface (VI #4)
5	12	Voice Interface (VI #5)
5	16	Digital Trunk Link (T1 #1)

Table 4-C
LANLink/RRU configuration for 24 channels

Cabinet	Slot	Device Type	Line	Port
1	15	M4020 Terminal (Main Terminal I/F #1)	1	n/a
1	15	LIU - HDLC /RS-232 (DMS Synch I/F #2)	2	n/a
		LIU Port - LAPB/SDLC L2 (X.25 Datalink Port 2)		2
1	15	LIU - HDLC /RS-232 (DMS Synch I/F #3)	3	n/a
		LIU Port - LAPB/SDLC L2 (X.25 Datalink Port 1)		2
1	15	LIU - Async Personalities (VSN Printers I/F #4)	4	n/a
		Printer Port (PUBLIC_PRINTER)		2
		Printer Port (LOG_PRINTER)		3
1	15	LIU - Async Personalities (Alarms I/F #5)	5	n/a
		LIU Port - APIO (Alarm Unit)		2
1	15	LIU - HDLC / RS-232 (TAS Synch I/F #6)	6	n/a
		LIU Port - LAPB/SDLC L2 (M4020 Access) - future use		2
		LIU Port - LAPB/SDLC L2 (Patch Access) - future use		3
1	15	LIU - ASCII Term Access (ASCII Access I/F #7)	7	n/a
		LIU Port - ATA (ASCII Access-1)		2
		LIU Port - ATA (ASCII Access-2)		3
1	15	M4020 Terminal (Addn Terminal I/F # 12)	12	n/a

Table 4-D
PRU configurations for 24 channels

Cabinet	Slot	Device Type	Alt. Cab.	Alt. Slot
1	6	SCSI Tape Server (Tape # 1)		
1	6	Screen Activities Manager (SAM)		
1	6	Data Connection Manager (DCM)		
1	6	System Admin Services (SAS)		
1	6	File Server - 2 (VSNFS2)		
1	6	Synchronization Manager (SSM)	3	12
1	14	Application Scheduler (Sched)		
1	14	Printer Queue Manager (QMan)		
1	14	Spooler User Interface (SUI)		
1	14	Simple Forms Handler-1 (SFH 1)		
1	14	Job Manager (Job_Mgr)		
1	14	Log Notification Server (Log_Notify)		
1	14	Alarm Subsystem (Alarms)		
1	14	SDM table Editor (SDM Edit)		
1	14	Report Generator (Report)		
1	14	Logger (Log)		
1	14	Log Query (Query)		
1	14	OM Reporter Subsytem (OMRep)		
1	14	Log Printer (Log_Print)		
1	14	VSN Maintenance Notices (VSNNot)	3	12
1	14	OM Collector Subsystem (OMSub)		
3	12	VI Resource Manager (VI-RM)	4	16
3	12	SDM Notification (SDMNot)		
4	4	X.25 Datalink 1 (X.25 Datalink_1)	3	12
4	4	X.25 Datalink 2 (X.25 Datalink_2)	3	12
4	4	VSN Datalink Manager (VSN Datalink Manager)	3	12
4	4	Network Resource Manager (NRM)	3	12
4	4	Host Agent (HAG)	3	12
4	4	T1-Maintenance (T1-Mtce)		
4	4	VI-Maintenance (VI-Mtce)		
4	4	Network Support (Net Sup)	3	12
4	4	Simple Forms Handler-2 (SFH 2)		
4	4	Patch (Patch)		
4	16	ACPE 1 (VA) (ACPE 1)	3	12

-continued-

Table 4-D
PRU configurations for 24 channels (continued)

Cabinet	Slot	Device Type	Alt. Cab.	Alt. Slot
4	16	ACPE_RM (VD) (ACPE-RM)	3	12
4	16	Voice Network Manager (VNM)	3	12
4	16	T1 Resource Manager (T1-RM)	3	12
4	16	X.25 Datalink 3 (RAA Datalink)	3	12
4	16	X SRU Application Agent (XSRU Appl Agent)		
4	16	X SRU Boss (Command Interpreter)		
4	16	Locality Database		
4	16	ASCII Conn. Agent (ACA)	3	12

48 channel configuration

Figure 4-3 illustrates the configuration for a 48 channel system with N+1 redundancy. Tables 4-F, 4-G, and 4-H list the SRU, RRU and PRU configuration requirements of a 48 channel system.

Figure 4-3
Physical configuration for a 48 channel TOPS VSN

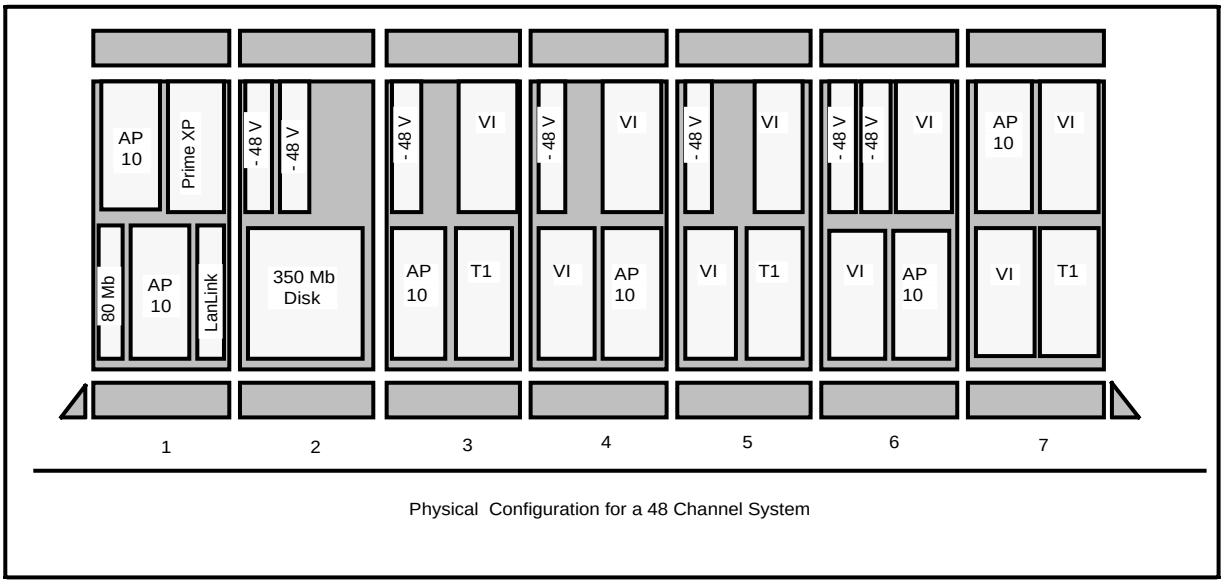

Table 4-E
SRU configuration for 48 channels

Cabinet	Slot	SRU Type
Alternate Cabinet and slot location are given for select SRUs. These are provided in the columns labeled Alt. Cab. and Alt. Slot.		
1	4	Application Processor 68020-10 (DU±X)
1	6	H. A. Prime Processor (HAPP #1)
1	10	80MB Disk QIC-150 Tape (Storage Unit :LOCAL)
1	14	Application Processor 68020-10 (VSN OA&M)
1	15	LANLink (LANLink #1)
2	2	Cabinet Power Converter (-48 V Power Converter)
2	4	Cabinet Power Converter (-48 V Power Converter)
2	16	Storage 350 M (Storage Unit :VSNFS2)
3	2	Cabinet Power Converter (-48 V Power Converter)
3	8	Voice Interface (VI #1)
3	12	Application Processor 68020-10 (AP N+1)
3	16	Digital Trunk Link (T1 N+1)
4	2	Cabinet Power Converter (-48 V Power Converter)
4	8	Voice Interface (VI #2)

-continued-

Table 4-E
SRU configuration for 48 channels (continued)

Cabinet	Slot	SRU Type
4	12	Voice Interface (VI #3)
4	16	Application Processor 68020-10 (VSN App + Voice)
5	2	Cabinet Power Converter (-48 V Power Converter)
5	8	Voice Interface (VI #4)
5	12	Voice Interface (VI #5)
5	16	Digital Trunk Link (T1 #1)
6	2	Cabinet Power Converter (-48 V Power Converter)
6	4	Cabinet Power Converter (-48 V Power Converter)
6	8	Voice Interface (VI #6)
6	12	Voice Interface (VI #7)
6	16	Application Processor 68020-10 (VSN App + Data)
7	4	Application Processor 68020-10 (VSN Mtce)
7	8	Voice Interface (VI #8)
7	12	Voice Interface (VI #9)
7	16	Digital Trunk Link (T1 #2)

Table 4-F
LANLink/RRU configuration for 48 channels

Cabinet	Slot	Device Type	Line	Port
1	15	M4020 Terminal (Main Terminal I/F #1)	1	n/a
1	15	LIU - HDLC /RS-232 (DMS Synch I/F #2)	2	n/a
		LIU Port - LAPB/SDLC L2 (X.25 Datalink Port 2)		2
1	15	LIU - HDLC /RS-232 (DMS Synch I/F #3)	3	n/a
		LIU Port - LAPB/SDLC L2 (X.25 Datalink Port 1)		2
1	15	LIU - Async Personalities (VSN Printers I/F #4)	4	n/a
		Printer Port (PUBLIC_PRINTER)		2
		Printer Port (LOG_PRINTER)		3
1	15	LIU - Async Personalities (Alarms I/F #5)	5	n/a
		LIU Port - APIO (Alarm Unit)		2
1	15	LIU - HDLC / RS-232 (TAS Synch I/F #6)	6	n/a
		LIU Port - LAPB/SDLC L2 (M4020 Access) - future		2
		LIU Port - LAPB/SDLC L2 (Patch Access) - future use		3
1	15	LIU - ASCII Term Access (ASCII Access I/F #7)	7	n/a
		LIU Port - ATA (ASCII Access-1)		2
		LIU Port - ATA (ASCII Access-2)		3
1	15	M4020 Terminal (Addn Terminal I/F #12)	12	n/a

Table 4-G
SRU configurations for 48 channels

Cabinet	Slot	Device Type	Alt. Cab.	Alt. Slot
Alternate cabinet and slot addresses are provided in the columns labeled Alt. Cab. and Alt Slot.				
1	6	SCSI Tape Server (Tape # 1)		
1	6	Screen Activities Manager (SAM)		
1	6	Data Connection Manager (DCM)		
1	6	System Admin Services (SAS)		
1	6	File Server - 2 (VSNFS2)		
1	6	Synchronization Manager (SSM)	3	12
1	14	Application Scheduler (Sched)		
1	14	Printer Queue Manager (QMan)		
1	14	Spooler User Interface (SUI)		
1	14	Simple Forms Handler-1 (SFH 1)		
1	14	Job Manager (Job_Mgr)		
1	14	Log Notification Server (Log-Notify)		
1	14	Alarm Subsystem (Alarms)		
1	14	SDM table Editor (SDM Edit)		
1	14	Report Generator (Report)		
1	14	Logger (Logs)		
1	14	Log Query (Log-Query)		
1	14	OM Reporter Subsystem (OMRep)		
1	14	Log Printer (Log_Print)		
1	14	VSN Maintenance Notices (VSNNot)	3	12
1	14	OM Collector Subsystem (OMSub)		
3	12	VI Resource Manager (VI-RM)	4	16
3	12	SDM Notification (SDMNot)		
4	16	ACPE 1 (VA) (ACPE 1)	3	12
4	16	ACPERM (ACPE-RM)	3	12
4	16	Voice Network Manager (VNM)	3	12
4	16	T1 Resource Manager (T1-RM)	3	12
4	16	XSRU Application Agent (XSRU Appl Agent)		
4	16	XSRU Boss (Command Interpreter)		
6	16	X.25 Datalink (X.25 Datalink_1)	3	12
6	16	X.25 Datalink (X.25 Datalink_2)	3	12
6	16	VSN Datalink Manager (VSN Datalink Manager)	3	12
6	16	Network Resource Manager (NRM)	3	12

-continued-

Table 4-G
SRU configurations for 48 channels (continued)

Cabinet	Slot	Device Type	Alt. Cab.	Alt. Slot
6	16	Host Agent (HAG)	3	12
6	16	Locality Database		
7	4	T1-Maintenance (T1-Mtce)		
7	4	VI-Maintenance (VI-Mtce)		
7	4	X.25 Datalink (RAA Datalink)	3	12
7	4	Network Support (Net Sup)	3	12
7	4	ASCII Conn. Agent (ACA)	3	12
7	4	Simple Forms Handler-2 (SFH 2)		
7	4	ACPE 2 (VA) (ACPE 2)	3	12
7	4	Patch (Patch)		

5. Measurements

System initialization times

The SRUs and PRUs need to be taken out of service from time to time in order to replace or make repairs to them. Table 5-A specifies the time required to complete the associated reinstallation tasks.

Table 5-A
System initialization times

Tasks	Minutes	Qualifying Information
TOPS VSN System Initialization	13	from disk
	20-30	from tape (tape is used only when there is a serious problem) - BMS Backup assumed.
Application Processor Initialization	2-3	from disk (actual time is dependant on program size)
Lanlink Initialization	1-2	from disk for each peripheral attached to Lanlink
File Server Initialization	2	from disk
PRU Initialization	1-5	from disk (actual time is dependant on program size) PRU must be taken out of service from SAS before reloading

6. Test equipment

Equipment is required to test the TOPS VSN installation. This test equipment may also be useful in diagnosing problems that occur over time. Table 6-A lists test equipment.

Table 6-A
Test equipment list

Equipment	Purpose
Protocol Analyser and manual	Used to diagnose DMS to VSN communication problems that occur on the data link.
ASCII (VT100) terminal, manual, and RS-232 cable	Used to monitor SRUs (primary processor and application processors) for system messages.
Supply of streaming tapes (DC600A)	Used to capture data from the VSN hard disk, for example, the initial backup of working systems.
T1 test set	Used to diagnose DMS - TOPS VSN communication problems that occur on the T1 voice links. Also used to monitor live traffic to ensure proper operation of the system.

7. Abbreviations

AABS	Automated alternate billing service
ACPE	Application call processing engine
AIU	Alarm interface unit
AP	Application processor (a type of SRU)
BCS	Batch change supplement
BVA	Billing validation authority
CLLI	Common language location identifier
CPH	Calls per hour
DMS	Digital Multiplex Switch
DNC	Dynamic network controller
DTC	Digital trunk controller
DTMF	Dual tone multifrequency
DNC	Data voice system
IOC	Input-output controller
IOP	Input-output processor
LAN	Local area network
LAPB	Link access protocol, balanced
LIDB	Lines information database
LIU	LAN interface unit
MAP	Maintenance and administration position
MCCS	Mechanized calling card service
MLC	MPC number, link number, conversation number
MMI	Man-machine interface
MPC	Multi-protocol converter (1X89)
NOP	Network operations protocol
NOS	Network operations system
NSR	Network Software Release

NTP	Northern telecom practice
OM	Operational measurement
PIN	Personal identification number
PRU	Program resource unit
RM	Resource manager
RRU	Remote resource unit
SAS	System administration service
SCSI	Small computer system interface
SDM	Service data manager
SRU	Shared resource unit
TICS	TOPS interLATA carrier service
TOPS	Traffic operator position system
T1	Line carrier at digital signalling level one (DS-1) also known as Digital trunk link
VI	Voice interface
VSN	Voice service node
1X89	MPC circuit pack code

Network operations systems

TOPS
Voice service node

System provisioning and configuration

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