297-2251-004

DMS-100 Family

TOPS IWS

Product Description/Technical Specification

IWS 17.1 and up Standard 10.02 June 2003

NORTEL NETWORKS™

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IWSS009 Standard 01.02 release.

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IWSS009 Standard 01.01 release. Initial release of *TOPS IWS Product Description/Technical Specification*. This document replaces the *TOPS IWS Product Description/Technical Specification (Base with OA, PCC, and OIA Applications)*, 297-2251-001, and the *TOPS IWS Product Description/Technical Specification (NTDA Supplement)*, 297-2251-002.

Contents

About this book

This book describes the hardware and software of the TOPS IWS system, which provides directory assistance, intercept services, and operator assistance (toll and assist) capabilities. This book provides a high-level overview of the hardware components, including deployment, site requirements, regulatory, and product integrity information. It also explains how the functionalities on the DMS-200 TOPS switch work with the features of the workstation to provide operator capabilities.

> *Information in this document is subject to change, because Nortel Networks reserves the right to make changes without notice in equipment design or components as engineering or manufacturing methods may warrant.*

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The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01. The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, read the release information in the *DMS-100 Family Guide to Nortel Publications,* 297-1001-001.

References in this document

This book refers to the following TOPS IWS documents:

- *TOPS IWS Base Platform User's Guide,* 297-2251-010
- *TOPS IWS OIA Application Guide,* 297-2251-012
- *TOPS IWS Base HMI Application Guide*, 297-2251-013
- *TOPS IWS RAMP and Provisioning User's Guide,* 297-2251-015
- *IWS Billing Application Guide*, 297-2251-016
- *TOPS IWS NTDA Application Guide,* 297-2251-017
- *TOPS IWS Operator Guide*, 297-2251-304
- *TOPS IWS Enhanced Information Services Application Client Guide,* 297-2251-305
- *TOPS IWS Force Management Guide*, 297-2251-313

This book refers to the following DMS-100 documents. The middle section of the document number for each NTP is *nnnn* because the version of the NTP is determined by the PCL to which it belongs.

- Translations Guide 297-*nnnn*-350
- Feature Description Manual 297-*nnnn*-801
- Log Report Reference Manual 297-*nnnn*-840

This book refers to the following other Nortel Networks documents:

- *TOPS IWS Audio Card Configuration and Diagnostics*, 297-2251-202
- *TOPS Internet Protocol (TOPS-IP) User's Guide*, 297-8403-906
- *TOPS OSSAIN User's Guide*, 297-8403-901
- NT Corporate Standard 1523.01
- SEB 93-03-002, "TOPS Message Switch Provisioning"
- "Technical Report on Hazardous Materials"
- *TOPS LNP User's Guide*, 297-8403-902
- *TOPS MPX Power Distribution and Grounding Guide*, 297-2291-156
- *TOPS AMA Bulletin*, 297-8021-830B
- *Bellcore Format Automatic Message Accounting Reference Guide*, 297-1001-830

This book refers to the following other documents:

- Bellcore Isolated Ground Plans Requirements, TR-EOP-000295
- Bellcore Local Number Portability Capability Specification, GR-2936-CORE
- Bellcore Standard GR-314
- Bellcore TR-NWT-001089, *Electromagnetic Compatibility and Electrical Safety Generic Criteria for Network Communications Equipment* Issue 1, October 1991
- CCITT X.25 1980 specification
- CSA 22.2
- Illinois Commerce Commission (ICC) LNP requirements
- LATA Switching Systems Generic Requirements (LSSGR)
- Network Equipment-Building System (NEBS)
- Operator Service Systems General Requirements (OSSGR)
- UL1459, second edition "Telephone Equipment"
- UL1950, "Standards for Safety for Information Technology Equipment Including Electrical Business Equipment"

- UL1863, “Communications Circuit Accessories”
- 40 C.F.R. 190 Resource Conservation and Recovery Act
- 49 C.F.R. 702-792 Hazardous Materials Transportation Act
- 29 C.F.R. 1910 Occupational Safety and Health Act of 1970

1.0 Introduction to TOPS IWS

The Nortel Networks Traffic Operator Position System Intelligent Workstation System (TOPS IWS) provides an integrated access for multiple applications:

- IWS Billing application
- Nortel Networks Directory Assistance (NTDA)
- Enhanced Information Services Application Client (EISAC)
- Nortel Networks Open Information Access (OIA)
- non-Nortel Networks applications developed through the application programmer's interface (API)

Using TOPS IWS, operators can process toll calls and obtain information for directory assistance (DA) and intercept calls. In addition to these turnkey traditional services, TOPS IWS allows new services to be custom-developed and defined by each operating company. With the EISAC application, operators can have direct access to the internet, opening up a wide range of new possibilities for services. The operator position follows Bellcore's specifications for an Intelligent Workstation Subsystem with an open architecture and a programmable interface for new applications from Nortel Networks, from operating companies, or from other vendors.

1.1 TOPS IWS base platform

The TOPS IWS base platform combines standard PC hardware with software developed by Nortel Networks. It includes original equipment manufacturer (OEM) hardware and software supplied by both Nortel Networks and other vendors to provide a foundation for operator services applications.

The TOPS IWS base platform includes the following elements:

- a Dell GX150 personal computer (PC) that operates at 933 Mhz or 1.0 Ghz and uses peripheral component interface (PCI) architecture
- adapter cards
- a color monitor
- a keyboard designed specifically for TOPS IWS
- a headset jack
- the TOPS IWS base human machine interface (HMI)

The TOPS IWS base software operates with DMS-100/200 TOPS software and an enhanced TOPS Message Switch (ETMS) in conjunction with Open Position Protocol (OPP) software in the Digital Multiplex System (DMS) switch.

1.2 TOPS IWS software architecture

TOPS IWS uses a base of industry-standard commercial software packages, including Microsoft Windows. This base supports both application software from Nortel Networks and independently developed software. The API between the base and the applications allows applications to be developed independently of Nortel Networks. Figure 1 shows the software structure of TOPS IWS.

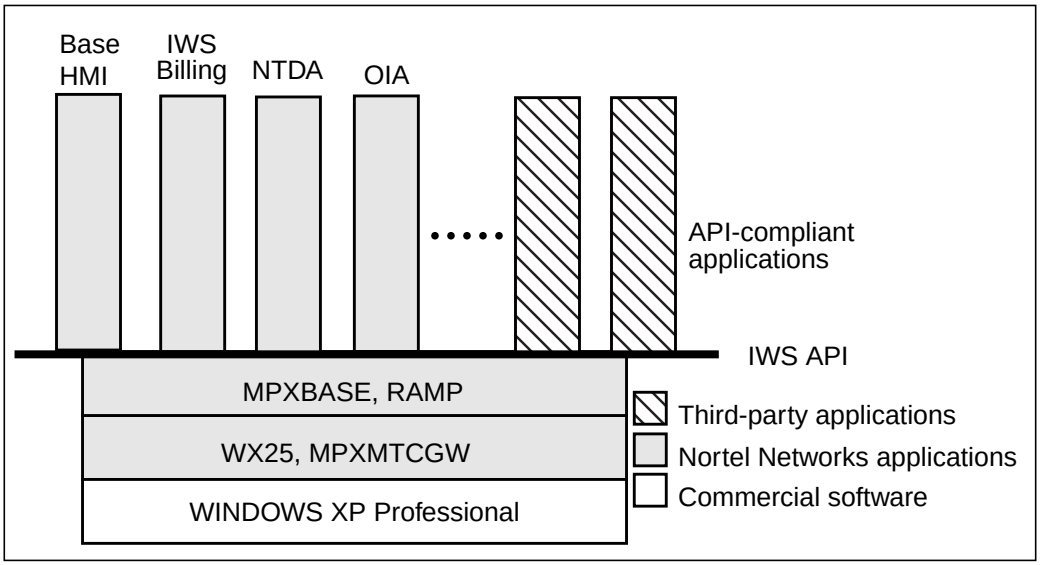

Figure 1. TOPS IWS software architecture

The TOPS IWS system requires enabling software features that reside in the DMS-100/200 or DMS-200 computing module (CM) and in the operator positions. TOPS IWS software operates in a hardware environment that includes a DMS-100/200 or DMS-200 CM and TOPS IWS operator positions.

TOPS IWS positions can be connected to an Ethernet or token ring local area network (LAN) or wide area network (WAN).

1.2.1 System architecture with NTDA

The NTDA application exchanges information with the DMS switch and with one of the NTDA or intercept databases. NTDA sends and receives information to and from the DMS switch through the TOPS IWS base application. NTDA manages the application-level interface with the directory assistance database.

The Nortel Networks Directory One database supports an architecture that provides connectivity with the TOPS IWS LAN through commercial access stack node (ASN) routers. With commercial equipment, system configurations vary. From the perspective of the TOPS IWS LAN, however, all configurations are similar. TOPS IWS positions on the LAN have two database network addresses and two commercial router network addresses to provide redundant connections to the databases. Because these configurations use

commercial routers, they can support other traffic while providing communication between the database and the positions.

1.2.2 System architecture with OIA

Communication between an external database and an operator position requires the use of data links to carry OIA messages to and from operator positions. The path goes from the operator position through the LAN to one of the duplicated DMS gateways, then on through an RS-422 or V.35 connection to channel bank equipment. From the channel bank, the data link is carried through T1 or E1 facilities to the ETMS.

The ETMS connects the OIA permanent virtual circuits (PVC) to T1 or E1 facilities that connect to the external database system. The channel bank converts DS-0 channels to 56 kb/s links at the database site.

In each cluster, two DMS gateway positions terminate the data links and pass OIA message traffic to and from the LAN for all positions in the cluster. Each gateway position terminates on data link. Duplicate gateways provide redundant communications for the cluster.

The path from the position to the ETMS is common with other communications between the operator position and the DMS CM, but the external database messages are carried on separate PVCs.

1.3 Modularity of system configurations

The modularity of system configurations is based on operator position groups, called clusters, and LANs. With the software TOPS Increased Multiplexing (EWSS0005), a cluster can contain up to 20 positions. (Without EWSS0005, cluster size is limited to four positions.)

LANs are supplied based on the total number of operator positions required, divided by the maximum number of operators on each LAN. The maximum number of positions on a LAN is 20. To the extent possible, clusters should be balanced across LANs, with equal numbers of clusters on each LAN.

Duplicating the message data links between DMS gateway positions and the DMS switch provides increased reliability. With duplicated data links, two DMS gateway positions are required in each cluster. Without duplicated data links, only one DMS gateway position is required.

1.3.1 Operators on an ETMS

The maximum number of operators on an enhanced TOPS message switch (ETMS) is 96. Either of the following configurations is acceptable:

- six ETMS DS-1 ports with 16 operator positions on each DS-1 port

- four ETMS DS-1 ports with 20 operator positions on each DS-1 port and a remaining port with 16 positions

Other port configurations are possible with the use of digital switch cross-connects.

1.3.2 Operator positions on a LAN

Each token-ring LAN can be equipped with up to 20 positions (in clusters of 4, 16, or 20), if cable-length restrictions are observed. The recommended number of positions for an Ethernet LAN is 20.

1.3.3 ETMSs on a DMS switch

The maximum number of ETMSs that a DMS-100/200 or DMS-200 can serve is physically limited by the number of network ports available in the DMS switch. DMS real-time capacity also imposes a practical limit. The DMS call-processing capacity operator limits impose a practical limit on the number of ETMSs on each DMS switch. Up to 1,023 operators can be datafilled on each DMS switch; however, real-time considerations determined by the traffic mix impose overall operator serving limits.

Figure 2 shows the configuration of a stand-alone system.

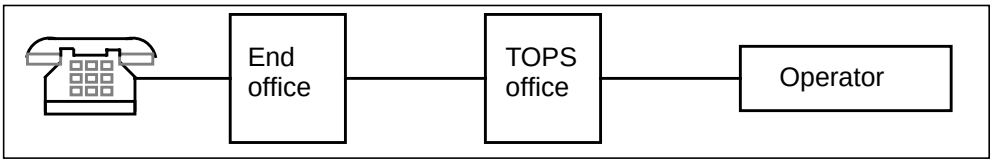

Figure 2. Stand-alone configuration

Figure 3 shows the configuration of a host and remote operating center system.

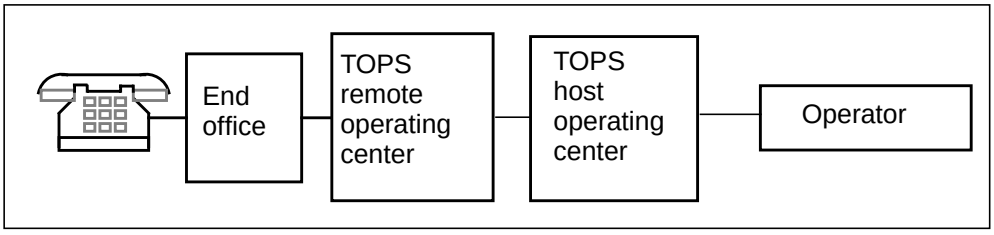

Figure 3. Host and remote configuration

1.4 Creating custom applications

Open, published operating systems and interface protocols make it possible to create applications to interact with TOPS IWS software. The API, a layer of TOPS IWS base software, provides an open interface enabling applications from different vendors to communicate with system software. The API allows operating companies to create new applications or modify vendor applications to fit their own specifications, enabling them to develop new revenue-generating services on their own time schedules.

An optional Software Development Kit (SDK) helps software engineers create their own TOPS IWS-based applications that work on the operator positions and interact with the DMS-200 switch. The SDK includes:

- documentation of protocols and the inner workings of the TOPS IWS software
- software libraries that simplify the process of crafting new programs
- utilities such as a test simulator that allow the programmer to test the application without actually signaling the switch

1.5 TOPS IWS configurations

A force administration system consists of a DMS switch and all the positions it serves. Within that system, a traffic office is a group of related operator positions for which separate administrative data is provided.

An entire work force contained in one location is called a “single-traffic office.” A work force divided into separate groups or teams is called a “multitraffic office.” This section describes the equipment used in each type of office configuration.

There are some functional differences between single-traffic and multitraffic offices. For example, in a multitraffic office, the force supervisor must be able to poll each individual office; this capability is not required in a single-traffic office. Also, in a multitraffic configuration, statistics must be attributed to a given traffic office.

The Queue Management System (QMS) provides a team with a QMS force administration data system (QFADS) teletypewriter (TTY) and a QMS traffic administration data system (QTADS) TTY. For more information about QMS devices, see the chapter about QMS TTY reports and commands in the *TOPS IWS Force Management Guide*, 297-2251-313.

TOPS IWS does not include a force management cathode-ray tube (FMCRT) application. TOPS, however, supports an FMCRT in a TOPS IWS configuration.

1.5.1 Single-traffic office configuration

In a single-traffic office configuration, operators and force administration personnel are all located in the same group or office.

The following equipment is the minimum required for a single-traffic office:

- in-charge (IC) position
- service assistance (SA) positions
- general operator positions
- SADS TTY

With QMS Customer Assistance Service Enhancements (QMSCASE), IC and SA positions are not needed, because administrative capabilities can be specified in the datafill for operators or operator positions.

Up to 126 SA and IC positions can be datafilled for the traffic office. Because the system maximum is 126 SA and IC positions, if 126 are datafilled for one traffic office, no SA or IC positions can be datafilled for any other traffic office. Depending on how heavily the DMS switch is loaded, up to 1023 operator positions can be datafilled in table TOPSPOS (including any IC or SA positions).

1.5.2 Multitraffic office configuration

In a multitraffic office configuration, the operator work force is divided administratively into different groups or offices, which are generally located in different geographical areas. Each individual office is referred to as a traffic office.

The minimal equipment in a multitraffic office is the following:

- FMCRT
- IC position
- SA positions
- operator positions
- QFADS TTY
- QTADS TTY

Other equipment in the multitraffic office includes the QMFADS TTY. With QMSCASE, no IC or SA positions are needed, because their capabilities can be specified in the datafill for operators or operator positions.

A force management center can cover up to 30 traffic offices. Up to 126 SA and IC positions can be datafilled for the traffic office. Because the system maximum is 126 SA and IC positions, if 126 are datafilled for one traffic office, no SA or IC positions can be datafilled for any other traffic office. Depending on how heavily the DMS switch is loaded, up to 1023 operator positions can be datafilled in table TOPSPOS (including any IC or SA positions).

1.6 TOPS IWS position types

TOPS IWS positions are based on personal computers with customized software, keyboards, and interface plug-in cards. There are three types of positions, defined by their system functions. All three types provide the user interface to the operator, connections to the LAN and the operator headsets, and a voice interface to the DMS switch:

- operator position

  Serves one of the following purposes:

  — general operator position

  — in-charge position

  — assistance position

- DMS gateway

  Contains the software functionality and interface card for the data link connecting the position to the ETMS.

- remote access maintenance position (RAMP)

  Serves as a maintenance position. This position type is optional.

1.7 Interfaces

The TOPS IWS system uses the following interfaces:

- Call-control between the host DMS 100/200 switch and the DA or intercept system.
- Listing services data transfer between the Directory One database and access stack node (ASN) routers.
- Digital voice data links between the DMS 100/200 switch and each TOPS IWS position through the ETMS.

  These links provide the operator voice paths, one to each position.

- Message data links between the DMS 100/200 and the designated TOPS IWS DMS gateway positions.

  Data links from the DMS switch are routed by the channel bank to one or two DMS gateway positions in each cluster on the LAN to provide the data communication between the switch and the operator position for a cluster of TOPS IWS positions. DMS gateway positions terminate the data links and pass the message traffic to and from the LAN for all positions in the cluster. Open Position Protocol is used. The TOPS IWS base provides for this functionality.

- Ethernet or token-ring LAN access for all TOPS IWS positions.

  TOPS IWS position-to-position communications use this access. Each communication between an operator position and the directory assistance database or the DMS switch is carried over the LAN to the routers or DMS gateway positions that directly terminate these data links.

- Human-machine interface (HMI) between the TOPS IWS and the operator.

  This interface includes screen displays, keyboard input, and the headset interface for the operator.

1.8 Enhanced TOPS message switch

TOPS IWS requires the ETMS. Figure 4 shows the basic configuration of the TOPS IWS system with a ETMS connection to the DMS switch. The ETMS must be located in a host DMS central office, and the ETMS cable connection to the DMS network must be within 228.7 m (750 ft.). Because T1 or E1 transmission links are used, there is no practical limit on the distance between the ETMS and the TOPS IWS system.

The ETMS converts the messaging protocol of the DMS network to the X.25 protocol used between the ETMS and all connected nodes. The ETMS X.25 protocol complies with the CCITT 1984 (Yellow Book) specifications for PVCs over one or more 56 kb/s DS-0 channels.

As shown in figure 4, the voice and data links from the positions connect to a channel bank, which multiplexes DS-0 channels onto a DS-1 signal channel. The T1 link connects the channel bank to the ETMS, which demultiplexes the DS-0 channels from the DS-1 signal channel. Voice channels are nailed up through an ETMS time switch to the DMS network.

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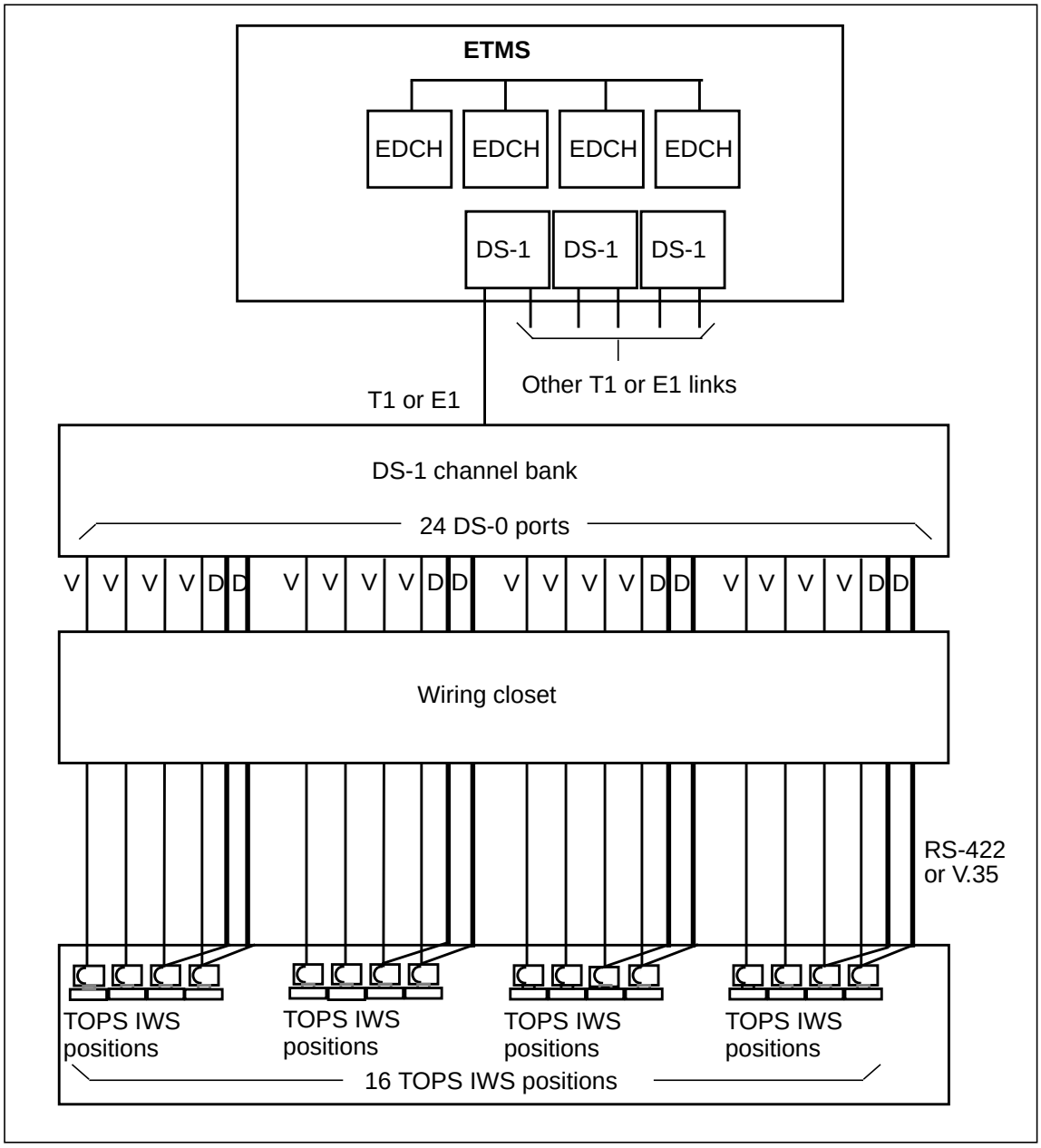

Figure 4. ETMS and TOPS IWS interface

This diagram shows four-position clusters, the maximum size possible without software function TOPS Increased Multiplexing (EWSS0005). With that function, clusters size can be up to 20 positions each.

2.0 What is new in TOPS IWS

This chapter describes the hardware and software enhancements for each combined IWS and TOPS release. The information begins with the most recent release.

2.1 IWS 17.1

(To be pulled from Base Guide release notes.)

The IWS 17.1 release provides these enhancements:

- **IWS IP Positions**: An IP Position is an IWS operating in an IP (internet protocol) configuration. The IWS configuration that existed prior to IWS Release 17.1 and continues to be supported is now referred to as the TDM configuration. The associated IWS positions is referred to as a TDM positions. The TDM configuration supports both Token Ring and Ethernet, while the IP supports Ethernet only.

  The IP Position configuration requires a different DMS TOPS peripheral, the IP XPM, that replaces the TMS (TOPS Message Switch). The TDM Configuration concept of DMS Gateways no longer applies, and messaging between IWS positions and the DMS no longer go over X.25 links. The DMS Switch now has IP interfaces for messaging with the IWS position. Refer to the TOPS-IP Users Guide, 297-8403-906 for details on the TOPS-IP Switch and IP XPM configurations required to support IWS IP Positions.
- Two new IWS fonts: Bold10FixedFont and Light10FixedFont.
- New Color Sets: The user selects one of the available color sets within the Windows XP Professional theme. 14 color schemes are now available instead of the original seven by using the shift versions of the softkeys. All previous color set selections from pre-IWS 17.1 releases are not transferable. If the craftsperson previously altered the default Nortel Networks color schemes, those alterations must be reset again by modifying the IWS 17.1 theme files as directed in Chapter 5 of the IWS Base Platform User's Guide, 297-2251-010.
- IWS supports receiving a foreign requested directory number from the TOPS switch. Previously IWS could accept only domestic requested numbers.

2.2 IWS 17.0

The IWS 17.0 release provides these enhancements:

- Conversion of IWS platform from Windows 95 to Windows XP Professional.

  The *TOPS IWS Base Platform User's Guide*, 297-2251-010, describes the new installation procedures for Windows XP Professional and IWS 17.0 software.

- New hardware requirements including an Intel Pentium IV or faster, minimum 256MB ECC RAM, minimum 40 GB hard drive, internal CD-Rom, increased minimum RAM, and a mouse. For a complete listing, please refer to TOPS IWS Base Platform User's Guide, 297-2251-010.
- New driver installation procedures for the following:
  - — DMS Gateway cards including the ARTIC and Quadron drivers
  - — IWS audio cards
  - — IWS Keyboard

  The *TOPS IWS Base Platform User's Guide*, 297-2251-010, describes the new installation procedures for these drivers.
- Other installation changes:
  - — Enhanced Information Services Application Client (EISA) is now installed with the other IWS applications. It no longer requires a separate installation.
  - — Windows XP Professional comes with Internet Explorer installed. It is not necessary to install it separately as was required in IWS 13.0 and 15.2.
- There are three platform options for upgrading to IWS 17.0 with Windows XP Professional.
  - — Purchase a new PC from Arrow Electronics
  - — Upgrading an existing PC
  - — Purchase an off-the-shelf PC

  The *TOPS IWS Base Platform User's Guide*, 297-2251-010, describes the upgrade options and requirements for each.
- A new feature, "Short Messaging Service", implements "short messaging" functionality on the IWS by using E-mail messaging capabilities to send short messages (e.g. DA listings) to E-mail servers. This, in turn, can handle the transmission of the messages to various devices.

  This activity is comprised of three messaging features:
  - — The operator can send short messages to Short Message Service Centers (SMSCs) to be forwarded to customer devices, e.g. SMS capable cell phones, some WAP-capable devices, and some pagers;
  - — The operator can send a short text based E-mail message to accessible E-mail clients;
  - — The operator can send a text based listing screen and/or text information (e.g. trouble code) to a Directory One administrative printer.

- A new feature, Dynamic Scripting, enhances IWS scripting capabilities such that various call parameters can be used to drive the IWS script window display. New datafill has been created that contains a large set of script matching rules, which are put in a list. If enhanced scripting is enabled, the IWS starts at the top of the list searching for the first rule that completely matches the current call arrival information, i.e. all fields in the rule must match corresponding call information. Once the IWS finds a complete match, the IWS stops looking through the list of rules and it displays the datafilled script.

2.3 IWSS0152 with TOPS015

The IWSS0152 release provides these enhancements:

- Scripting capabilities have been expanded in the NTDA and IWS Billing applications. In NTDA, the number of keystrokes needed to handle a DA call with the scripting window enabled is reduced. The operator does not have to press the **Start** key before beginning to handle a DA call. In IWS Billing, the scripting window can be displayed without having keyboard focus. The cursor is placed in the appropriate data entry field, ready for the operator to begin call processing. These changes make scripting much more efficient to use.
- It is now possible to specify a default position for the cursor in the NTDA application.
- The message status area, the softkeys, and the NTDA service screen have been enhanced to provide a more three-dimensional appearance.
- IWS supports changing its standard screen resolution through Windows 95. Changing the screen resolution makes it possible to use EISA and some third-party applications more effectively.
- With this release, IWS software is available in CD-ROM format, which provides a much simpler installation process than installing from disks. The IWS CD can be used with an internal CD drive or an external CD-ROM reader.
- A new audible alert tone for supervisory positions is generated through a WAV file in the PC and played through external speakers. This method allows operating company personnel to control the volume at which the tone is played.
- A new registering application, the Enhanced Information Services Application Client, provides an interface between the operator position and the internet
- A new call type for queueing (CT4Q) menu allows operators to transfer calls to up to 2046 different queues

The TOPS015 release provides these enhancements:

- A consolidation of software optionality control (SOC) options
- TOPS interworking with the Supernode Data Manager (SDM) platform

- Increased robustness for global software (MMP and GMP)

The TOPS014 release provides these enhancements:

- TOPS interworking with Succession and Bearer Independent Call Control (BICC)
- SOC consolidation to provide better alignment with operator services functionality in the Internet protocol (IP) and asynchronous transfer mode (ATM) architectures
- XA-Core unblocking of many TOPS features, including operator centralization, QMS, OSSAIN, LNP, and OLNS
- Operator Services Network Capability (OSNC) enhancements

2.4 IWSS013 with TOPS013

The IWSS013 release provides these enhancements:

- Conversion of IWS from 16-bit to 32-bit applications
  - keeps pace with operating system improvements
  - increases potential for integrating many other applications onto the position
  - allows better handling of multiple applications through pre-emptive multitasking
- Inclusion of additional customized IWS character sets for international customers
- Ability to adjust the default volume for operator headsets
- Addition of a Locality-to-Name key to NTDA, which allows the user to copy the location field entry to the Name1 field with a single keystroke. This key action is especially useful for government and business searches.

The TOPS013 release provides these enhancements:

- Introduction of TOPS over Internet protocol (IP)
  - enables MIS reporting using either existing X.25 interface or new QMS MIS IP interface
  - enhances operator centralization to allow IP transport of voice and data
- Development of Operator Services Network Capabilities (OSNC), providing a greater variety of services using ISUP signalling
- Enhancement of OSSAIN to support database-independent directory assistance automation

2.5 IWSS012 with TOPS012

The IWSS012 and TOPS012 releases provide these enhancements:

- Improvements to Operator Services System Advanced Intelligent Network (OSSAIN), including:
  - — a method of applying a trigger profile index for general TOPS calls
  - — a method for service nodes and operator terminals to limit the number of handoffs to service nodes permitted for a given call
  - — the ability, when directory assistance (DA) calls arrive at the DMS switch requiring OSSAIN processing, to record the called number during initial or subsequent presentation to the DA operator, and store it for presentation to the directory assistance database
  - — a datafill option to allow the specialized tone receiver (STR) digit trigger "*" or "#" to be activated for the calling or called parties or both for a call in the talking state.
- Removal of TOPS Automated Call Distribution (ACD) code, which has been manufacture discontinued (MD) and replaced by the Queue Management System (QMS).
- Addition of seconds-based announcements for external real-time rated calls, allowing Automated Coin Toll Service (ACTS) play collection announcements in increments of less than a minute.
- Support for wholesaling, including expansion of Table LATANAME from 31 to 255 entries, and enabling the local exchange carrier (LEC) to screen for billing restrictions based on carrier identification code (CIC), incoming trunk group, or calling account owner service provider (AO SPID).
- Further progress on unbundling scheme related to table OPRTRANS and to Equal Access (EA)
- Software optionality control (SOC) for activating TOPS functionality
- Enhancements for special local routing number services
- API/SDK enhancements
- QMSCASE call alerting, which provides a sonalert when an assistance call is queued for a customer service expert (CSE)
- Operator maximum handoff enforcement to give EBAS parity with AABS functionality
- IWS installation and provisioning enhancements
- Hardware updates in the Release 12 timeframe that provide a turnkey Ethernet LAN configuration as an alternative to token ring

2.6 IWSS011 with TOPS011

The IWSS011 and TOPS011 releases provide the following enhancements:

- Ability to connect specific subscribers directly to a live operator instead of to automated services.

  The *TOPS IWS Operator Guide*, 297-2251-304

  — describes the display that indicates that a call does not receive automated service

  — explains when and how an operator can override the designation

  The *Translations Guide* explains how to specify this Enhanced Services functionality.

- Ability to create a macro that combines a series of keystrokes and to assign that macro to a single key.

  The *TOPS IWS RAMP and Provisioning Guide*, 297-2251-015, describes how to use the keybind utility to assign key macros. The *TOPS IWS Operator Guide*, 297-2251-304, explains how operators use the key macros.

- Support for a dial-up connection for remote RAMP access.

  The *TOPS IWS RAMP and Provisioning Guide*, 297-2251-015, explains remote RAMP access.

- Resetting of headset volume at operator login rather than at position restart.

  The *TOPS IWS Operator Guide*, 297-2251-304, discusses the operator position and login.

- Ability to assign up to 254 trunk group displays, of up to 8 characters each, in DMS table TOPSDISP for the TOPS Operator Services Basic functionality. In IWS table XTGDSPL.TBL, the trunk group field has a range of 1-254, and the trunk group display field has a maximum string length of 8 characters.

  The *Translations Guide* explains how to datafill table TOPSDISP. The *TOPS IWS Base Platform User's Guide*, 297-2251-010, describes table XTGDSPL.

- 15-minute, 30-minute, 6-hour, and 24-hour intervals for QMS reports. Table TQMSOPT specifies that the QFADS and QTADS devices print any or all of these reports.

  The *TOPS IWS Force Management Guide*, 297-2251-313, describes the QMS reports.

  The *Translations Guide* explains how to datafill table TQMSOPT.

- Development of global competitive access to provide the same functions in a global environment that equal access provides in North America.

  The *TOPS IWS Operator Guide*, 297-2251-304, discusses how these functions affect call handling.

- Upgrade to Windows 95 operating system for TOPS IWS. The *TOPS IWS Base Platform User's Guide*, 297-2251-010, explains how to install the TOPS IWS software on a Windows 95 platform.
- Incompatibility of TOPS IWS software with Micro Channel Architecture, commercial software patching, and the Windows 3.1 operating system.

2.7 IWSS010 with TOPS010

The IWSS010 and TOPS010 releases provide the following enhancements:

- An Intel-based platform.

  Section 3.1, "Position-related equipment," in chapter 3.0, "TOPS IWS equipment," describes this platform.
- The following additions to the enhanced calling card in NTOA Plus:

  — automatic personal identification number (PIN) appending

  — automatic display of violated restrictions during a call

  — enhancements to the Special field to more accurately label the information

  The *TOPS IWS NTOA/NTOA Plus Application Guide*, 297-2251-016, describes how to configure NTOA Plus with these additions. The *TOPS IWS Operator Guide,* 297-2251-304, explains how handle call related to enhanced calling cards.
- The ability to edit a validated number in the Special (Spl, Spl3d, SplCC, or SplEC) field of the Call Information window.

  The *TOPS IWS NTOA/NTOA Plus Application Guide*, 297-2251-016, describes how to configure NTOA with this ability. The *TOPS IWS Operator Guide*, 297-2251-304, explains how and when to edit this field.
- Enhancements to the OIA HMI.

  Section 6.5, "OIA," in chapter 6.0, "TOPS IWS applications" provides an overview of OIA. The *TOPS IWS OIA Application Guide*, 297-2251-012, describes these enhancements in detail and explains how to configure the HMI. The *TOPS IWS Operator Guide*, 297-2251-304, explains how to access and use OIA displays.
- The ability to save and edit software distribution configurations and to schedule those distributions from the RAMP.

  Section 11.2, "RAMP," in chapter 11.0, "Maintenance" provides an overview of the RAMP.The *TOPS IWS RAMP and Provisioning User's Guide*, 297-2251-015 describes how to use the RAMP scheduler.
- The ability to use external rating with the estimate of charges feature.

  The *TOPS IWS Operator Guide*, 297-2251-304, describes how to estimate the charges on a call.
- The following Operator Services System Advanced Intelligent Network (OSSAIN) changes:

— enhancing the Queue Management Information System (QMIS) to provide event data about OSSAIN agents and call queues that drive off-board reporting facilities and real-time displays

— allowing the automation of Country Direct calls under the control of OSSAIN Service Nodes and allowing operator backup for those calls

The *OSSAIN User's Guide*, 297-8403-901, describes these features.

- Changing internal aspects of local number portability (LNP) to implement the Bellcore Local Number Portability Capability Specification, GR-2936-CORE.

  The *TOPS IWS Operator Guide*, 297-2251-304, describes how to use LNP. The *TOPS LNP User's Guide*, 297-8403-902, describes the effects of this implementation.

- The following changes to QMS:

  — the ability to provide music and announcements to calls queued for operator services

  — a new CT4Q table, CT4QCLDT, that a local exchange carrier (LEC) can use to separate traffic based on Called Number Type, which can separate national and international traffic

  The *TOPS IWS Operator Guide*, 297-2251-304, describes QMS. The Translations Guide discusses the CT4Q tables.

- For Canadian equal access, the ability of an operating company to display the pre-subscribed carrier of the subscriber to the operator, complete the call on that company's networks, and produce all AMA records.

  The TOPS AMA Bulletin, 297-8021-830B describes this feature.

- The ability to forward the Automatic Number Identification (ANI) digits from the end office to the carrier.

  The *TOPS IWS Operator Guide*, 297-2251-304, describes the use of ANI.

- The ability to recall to an operator for time and charges and to make external database queries at the end of calls on TOPS ISUP and R2 trunks.

  The *TOPS IWS Operator Guide*, 297-2251-304, describes time and charges recalls.

- Support for a G.703 channel bank.

  Section 3.5.1, "Compatible channel banks," in chapter 3.0, "TOPS IWS equipment," describes the channel banks.

- The discontinuance of support of IWS OA. The NTOA/NTOA Plus application replaces the IWS OA application.

2.8 IWSS009.0/TOPS009

The IWSS009.0 and TOPS009 releases provide the following enhancements:

- customizable clock and call timer
- screen captures
- simultaneous display of trunk group and SPID
- patching
- NTOA Plus support for EBAS 1.03
- NTDA development for Directory One (support for D1 2.01 release)
- scripting and OSSAIN enhancements
- unbundling
- carrier Release Line Trunking (RLT)
- Nortel Directory Assistance (NTDA) architecture and application
- a Peripheral Component Interconnect (PCI) audio card (NTNX52CC) that provides:
  - network voice connection
  - analog headset, analog phone, Integrated Services Digital Network (ISDN), E1, and PCI bus interfaces
  - a digital signal processor (DSP) to process audio data
  - enhanced floating-point DSP
  - stereo sound
  - faster sampling rates
  - Flash memory for downloadable code

2.9 IWSS008.0/TOPS008

The IWSS008.0 and TOPS008 releases provide the following enhancements:

- display of violated restrictions from calling card database (CCDB) at call arrival
- GOS Intelligent Node (IN) fallback

2.10 IWSS007.0/TOPS007

The IWSS007.0 and TOPS007 releases provide the following enhancements:

- color-blind support

- application protection from mouse interaction
- GOS internal booked call database
- GOS estimated call charges
- Nortel Networks Operator Assistance (NTOA)/NTOA Plus) applications
- OSSAIN simultaneous interaction
- Local Number Portability (LNP)
- GOS directory number (DN) screening
- branding for TOPS via service provider ID (SPID)

2.11 IWSS006.0/TOPS006

The IWSS006.0 and TOPS006 releases provide the following enhancements:

- Operator Services System Advanced Intelligent Network (OSSAIN) data communications-related functions such as:
  - — datafilling of OSSAIN nodes on the DMS switch
  - — routing of Open Automated Protocol (AOP) messages on the DMS switch
  - — usage monitoring of OSSAIN services
  - — OAP for interfacing between DMS switch and service node for OSSAIN product
  - — base software architecture for OSSAIN call processing
  - — mechanism to allow calls to flow to and from new systems and interact with existing systems (such as OSSAIN functions provided for service nodes and TOPS operators)
  - — implementation for the part of the Operator Services call model that enables TOPS calls to perform OSSAIN trigger processing
  - — OSSAIN routing and queuing
  - — OSSAIN billing
  - — OSSAIN OA&M
  - — OSSAIN 0- automation
- TOPS Authorization code Enhancements, providing greater flexibility of authorization code assignments to a particular DN, with an increase in the number of authorization code assigned to a DN, and the ability to assign non-sequential authorization codes to a DN
- Originating Line Number Screening (OLNS), including
  - — implementation of TOPS layer changes for CCS7 query, response, and error handling; also, support for TOPS layer changes for associated OMs and logs

  - — implementation of TOPS layer call processing changes needed to use restricted billing and carrier information that is returned in OLNS database
  - — CI tool, to launch queries to OLNS database and display results
  - — implementation of code to request an intra-LATA presubscription (ILP) from OLNS database and use it in call processing on 0- intra-LATA competitive calls
- TOPS evolution decoupling
- Queue Management System Customer Assistance Service Enhancements (QMSCASE)
  - — infrastructure
  - — paging and directed assistance
  - — statistics display and query
  - — monitoring
  - — directory assistance
- multi-DA database access
- TOPS debugging tools
- DA/OSSAIN interworking
- TOPS CM compatibility for QMSCASE and OLNS
- Voice Services Node (VSN) 06 robustness
- editing and field display enhancements for OA
- scripting utility provisioning in OA and PCC
- PCC application enhancements
  - — OSSAIN environment enhancements
  - — text-to-operator capability

2.12 IWSS0041/TOPS005

The IWSS0041 and TOPS005 releases provide the following enhancements:

- service allowing an end user in a foreign country to use an access code to reach an operator in a country in which the call is to billed
- ability for calls using pre-OSS7 Integrated Services Digital Network User Part (ISUP) signalling to connect to TOPS environment and receive operator services
- authorization code screening service for intra-LATA 1+calls
- enhanced audiogram delivery services, formerly called Message Delivery Services

2.13 IWSS0041/TOPS004

The IWSS0041 release aligns with the TOPS004 release and provides the following enhancements:

- remote access maintenance position (RAMP) to allow maintenance of IWS positions on a token-ring LAN from a single position on the same local token ring
- enhancements to the Provisioning Utility to provide support for datafilling table and language files
- simplification of assistance requests and paging responses for operators by adding these tasks to the functions menu

2.14 IWSS004/TOPS004

The IWSS004 and TOPS004 releases provide the following enhancements:

- global operator services (GOS) features, including:
  - — Manual toll break-in allows an operator to interrupt a call between two subscribers in an R2 signaling environment.
  - — TOPS IWS capabilities are now supported in the global R2 signaling environment.
  - — A new memo pad capability provides editing and display for memos related to specific calls.
  - — Alternate routing capability enables the operator to complete a call to a foreign country through an alternate route when unable to do so by a direct route.
  - — ASCII characters are now translated internally as needed before being sent to the DMS switch. A choice can be made at installation between the standard MPX fixed font and a new international MPX fixed font, which supports diacritics.
- external real-time rating system interface
- additional editing capabilities in several fields
- new provisioning tool that provides a common user-friendly graphical user interface (GUI) for datafilling the.INI files required by the MPX base and the NT audio card
- new maintenance-busy icon on the base HMI logo window that allows an operator to identify a maintenance-busy position without having to first log in
- enhanced TOPS message switch (ETMS) operator centralization (OC), which expands the remote operator centralization handling capacity of each host from 15 to up to 31 remote OCs that can be supported by each host

2.15 IWSS00293/TOPS003

The IWSS00293 release offers these enhancements:

- IWS base and operator assistance applications re-architecture
  - — support for 20-position clusters
  - — base human-machine interface (HMI) application
  - — application menu
  - — keyboard binding tool
  - — new function menu items
- position hardware independence, with the option of choosing
  - — an integrated turnkey position (with complete hardware, software, and system components)
  - — a modular position (with adapters and keyboard, complete software, and complete system components and the operating company's choice of CPU and monitor)
- a new digital audio card (NTNX51BE) providing
  - — A-law and mu-law support
  - — increased volume control (from +/-5 dB to +/-16 dB)
  - — mute functionality
  - — dual-tone multifrequency (DTMF) generation
- application menu
- support for TOPS003 PCL features

TOPS003 features includes the following:

- Calling card screening notifies the operator that call completion is prevented when one inter-exchange carrier (IEC) calling card is restricted to another IEC.
- The DMS switch allows commercial calling cards for customer billing (up to 23 characters).
- Allowing for an expanded carrier code increases the inter-LATA input/display field from 3 to 4 digits.
- The Automated Room and Authorization Number (ARAN) feature allows institution calls to be automated by AABS. An operator display shows whether the number was collected by AABS or is still required.
- The calling card denial reasons feature displays a text message in the call information window explaining why a calling card was denied.
- New displays are added to indicate pre- and post-pay for time and charges on coin calls.

- The functions menu contains the following new items:
  - DTMF outpulsing
  - split/join CLD
  - quit monitor
  - update ticket number
  - A and B party name
  - split/join operator
  - stop bell
  - international DA
  - fixed duration calls
  - muted notify
  - generate ticket number
  - international DA inward

2.16 BCS35

The first release of TOPS IWS introduced TOPS IWS with the Intelligent Workstation Subsystem (IWS), providing base, operator assistance, directory assistance, and open information access applications.

3.0 TOPS IWS equipment

This chapter provides an overview of the hardware used by the TOPS IWS system: the TOPS IWS position, the wiring closet equipment, the channel bank, and the connecting cables.

TOPS IWS no longer supports an integrated turnkey configuration. For new installations, the following equipment is required:

- Intel Pentium IV 1.7 GHz or faster with Intel Chipset
- Minimum 256MB ECC RAM (preferably "fast" RAM) with support for expansion to a minimum of 512MB
- Minimum 40GB hard disk drive (preferably 7200 RPM for faster transfer rates)
- 10/100 Ethernet NIC with RJ45 connector
- Video driver with support for 640x480 resolution and higher
- On-board "SoundBlaster compatible" sound (for "sonalert" and other uses)
- Internal CD-ROM drive, floppy disk drive, and Microsoft-compatible mouse
- PCI adapter card slot capable of accepting the Nortel PCI Audio Card - full PCI card length (13.5 inches), full PCI card height). This implies a large chassis size.
- PCI adapter card slot capable of accepting the ARTIC X.25 adapter card (for Gateway positions)
- PCI adapter card slot capable of accepting the Token Ring adapter card
- Note: In the "worst case" configuration of a TDM Gateway position using token ring, 3 PCI card slots would be required, including one full-height, full-length slot for the audio card.
- Power supply capable of handling a full complement of adapter cards
- USB 2.0 port(s) (preferably located on both front and back of the chassis for configuration flexibility)
- Meets all applicable standards for UL, FCC, etc.

The operating company provides the channel bank, the timing source generator (TSG), the distributing frame, and the headset.

3.1 Position-related equipment

TOPS IWS positions can be configured in three ways:

- as a general operator position
- as a DMS gateway and general position

- as a remote access maintenance position (RAMP) and general position

Note: In addition to these three configurations, a non-IWS PC can be configured with the RAMP application to act as a RAMP-only position. This PC is *not* considered an IWS position. It cannot be used for IWS call processing. It can, however, be used to monitor IWS positions and to upgrade the IWS base software of an IWS position.

For operator audio connection with subscribers, the patented audio card is a plug-in unit that interfaces the operator position to the DMS-200 switch. On the operator side, it provides an interface for the operator headsets. On the DMS switch side, it provides a digital voice interface that terminates at channel banks and a timing source generator (TSG).

In an Ethernet environment, the DMS gateway base unit includes two separately provisioned plug-in cards: the audio card and the RTIC card. The operator and remote access maintenance position (RAMP) base units include a separately provisioned audio card.

In a token-ring environment, the DMS gateway base unit includes three separately provisioned plug-in cards: the audio card, the RTIC card, and the token-ring card. The operator and remote access maintenance position (RAMP) base units include two separately provisioned plug-in cards: the audio card and the token-ring card.

Refer to the compatibility matrix in the *TOPS IWS Base Platform User's Guide*, 297-2251-010, to determine whether existing hardware is compatible with the current software release.

3.1.1 IWS Platform hardware

Nortel Networks no longer offers a fully integrated “turnkey” IWS hardware and software solution. For future IWS needs, Nortel Networks will continue to sell IWS software. Turnkey positions, Nortel PCI audio cards, custom IWS keyboards, and headset jack assemblies will all be available through Arrow Electronics, Inc. IWS customers should establish a purchasing relationship directly with Arrow.

Only Arrow is authorized to sell Nortel PCI audio cards, custom IWS keyboards, headset jack assemblies, and turnkey IWS positions. In addition, Arrow maintains the IWS Windows XP Professional image with multiple system changes specific to IWS. Therefore, **Nortel strongly recommends purchasing hardware through Arrow.** Although it is possible to buy PCs from another vendor and configure them yourself, you must expect a significant, time-consuming, multi-vendor integration effort to do so.

The personal computers (PCs) shown in Figure 5 support TOPS IWS 17.0 software. As any PC meeting the hardware requirements can be used, the Dell GX150 and the Intel 350 and 600 are used as examples.

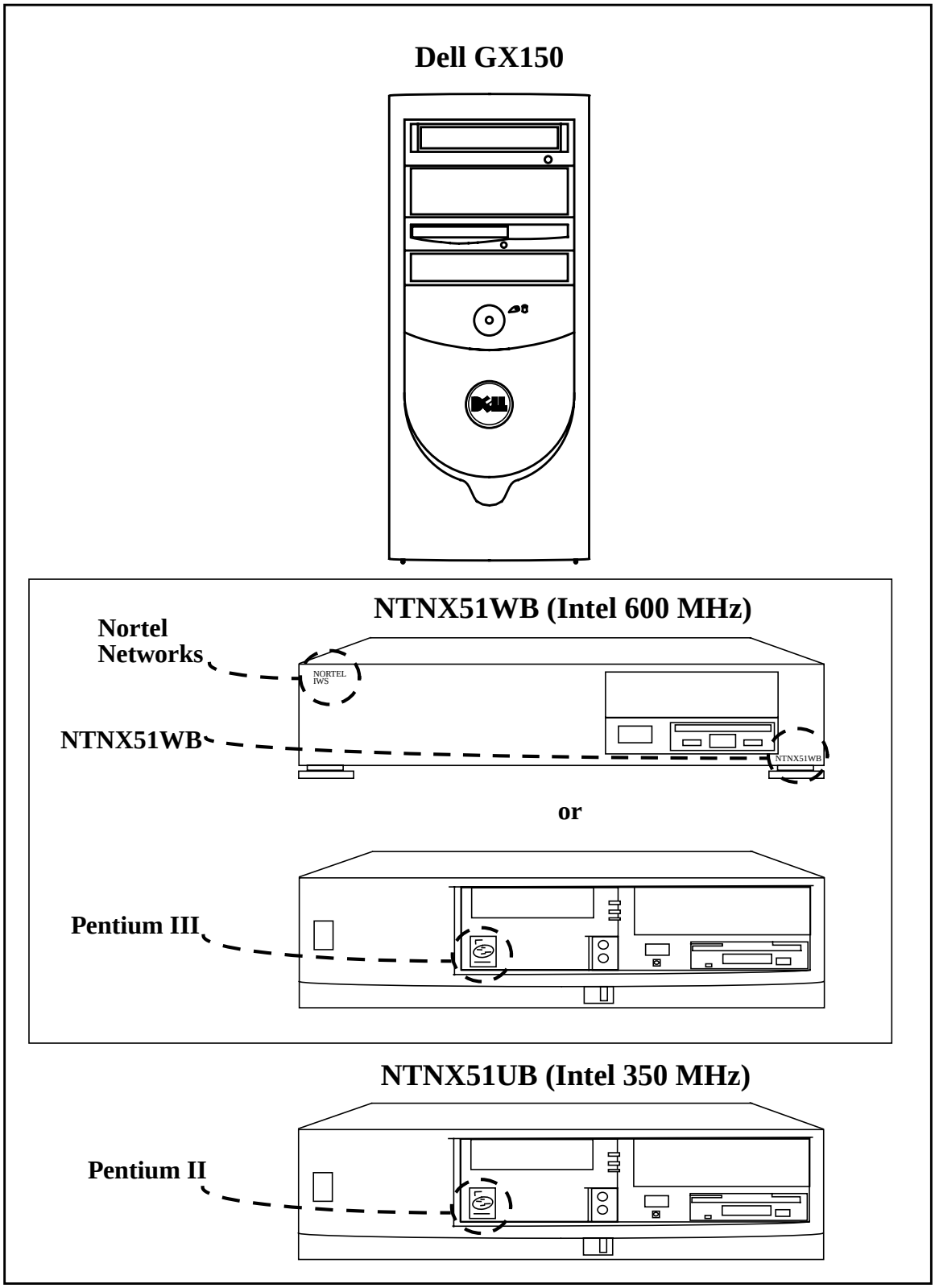

FIGURE 5. Examples of IWS Base Units for IWS Release 17.0

Figures 6 through 11 show the Nortel Networks products for operator position equipment.

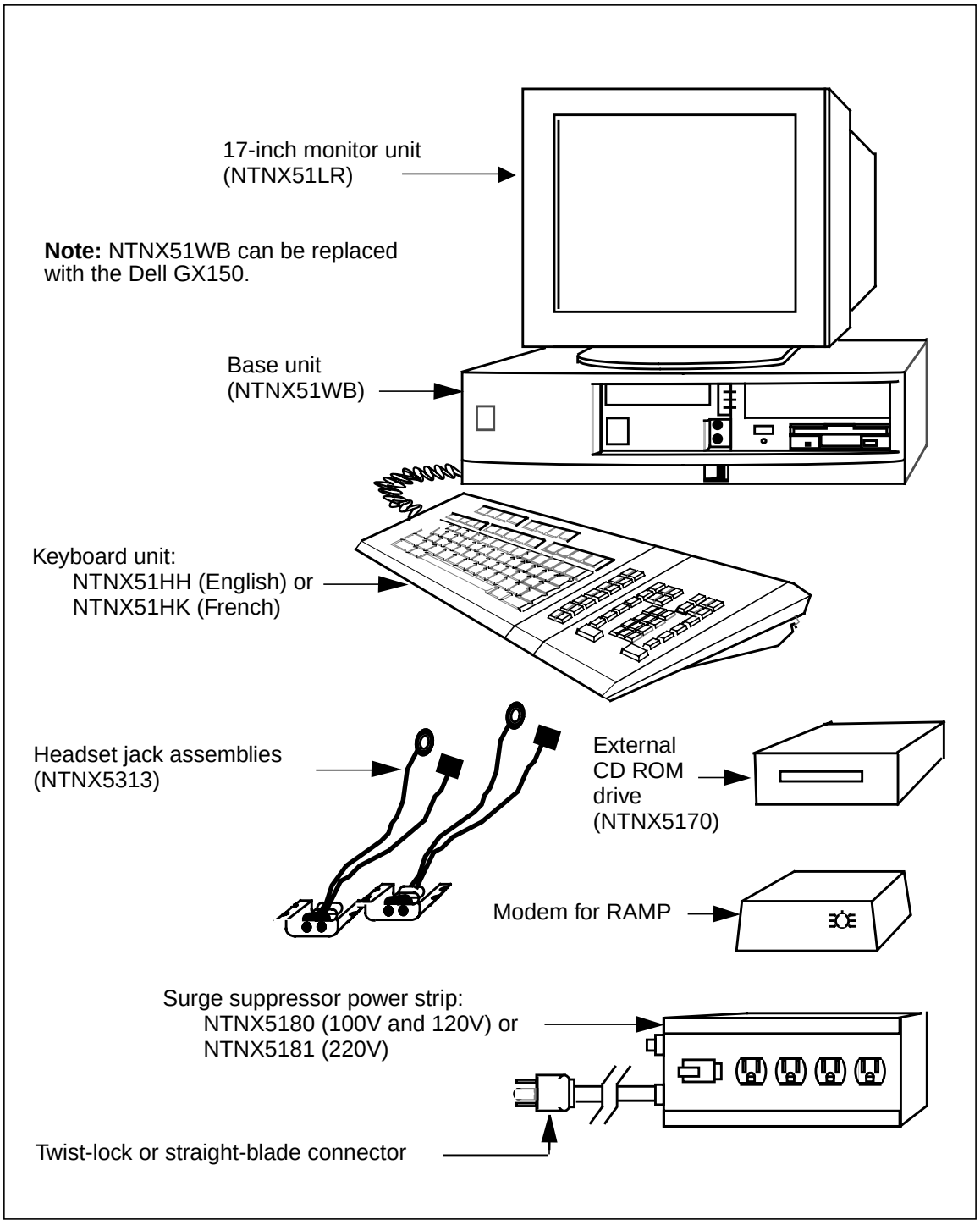

Figure 6. Operator position equipment

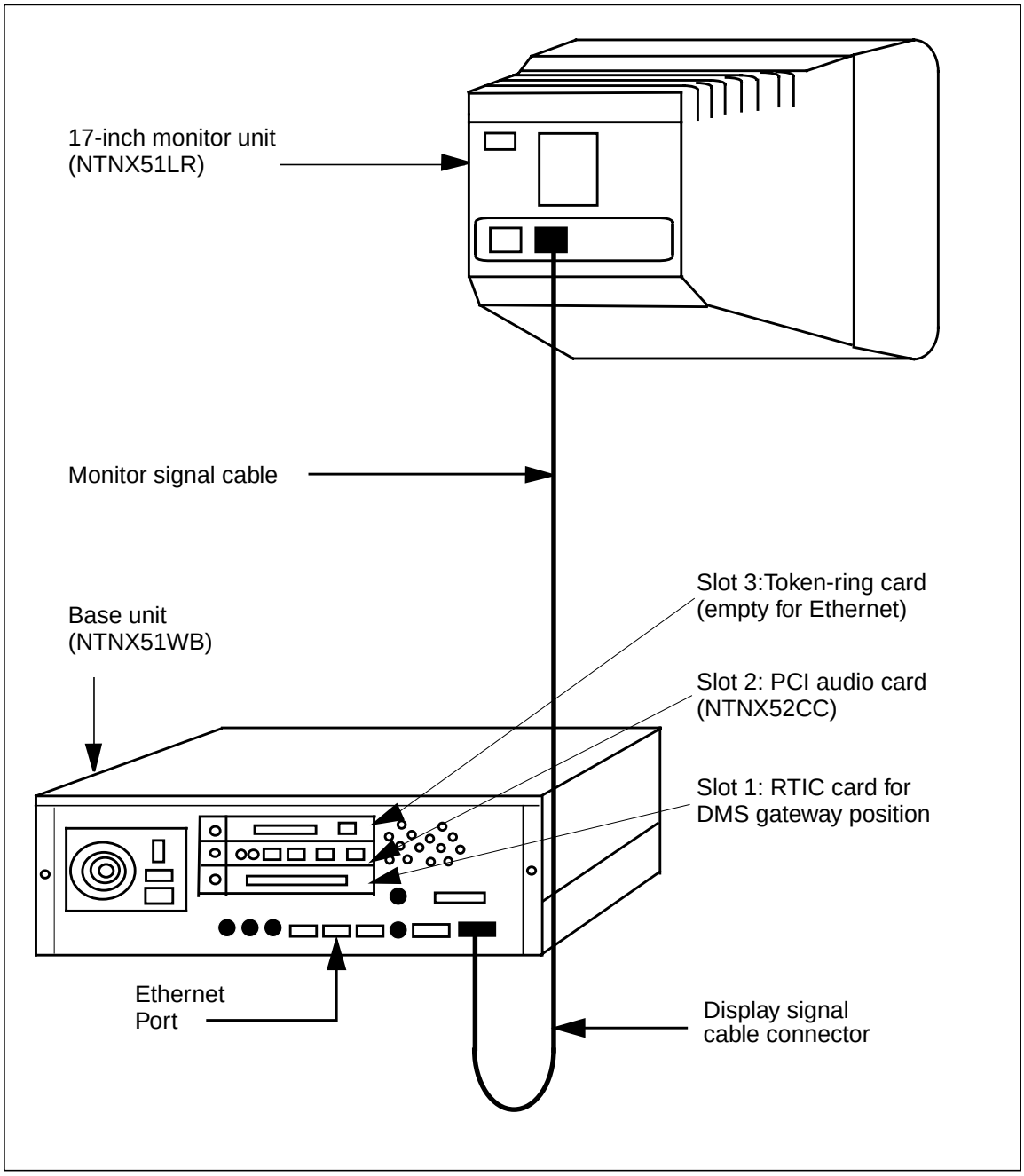

Figure 7. Monitor cable connection to base unit for NTNX51WB

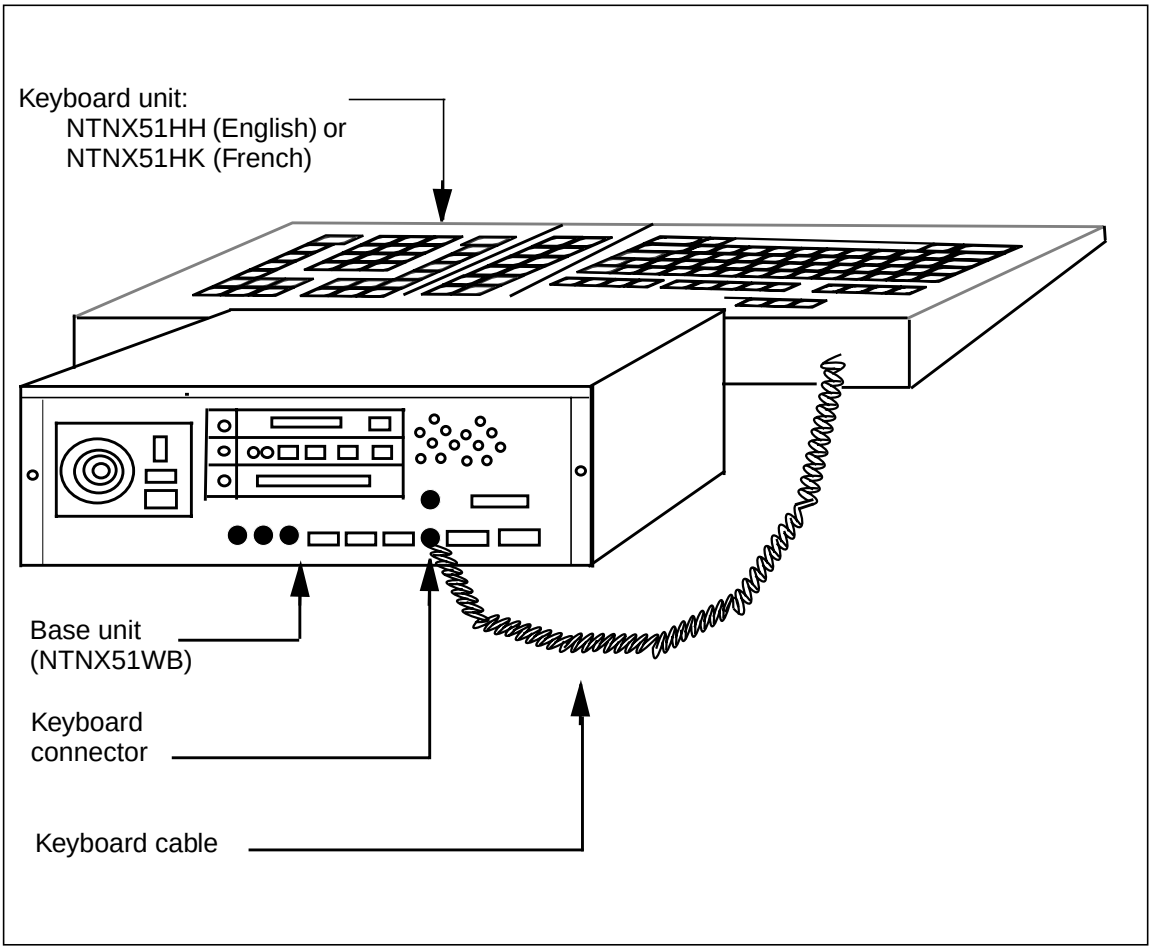

Figure 8. Keyboard cable connection to base unit for NTNX51WB

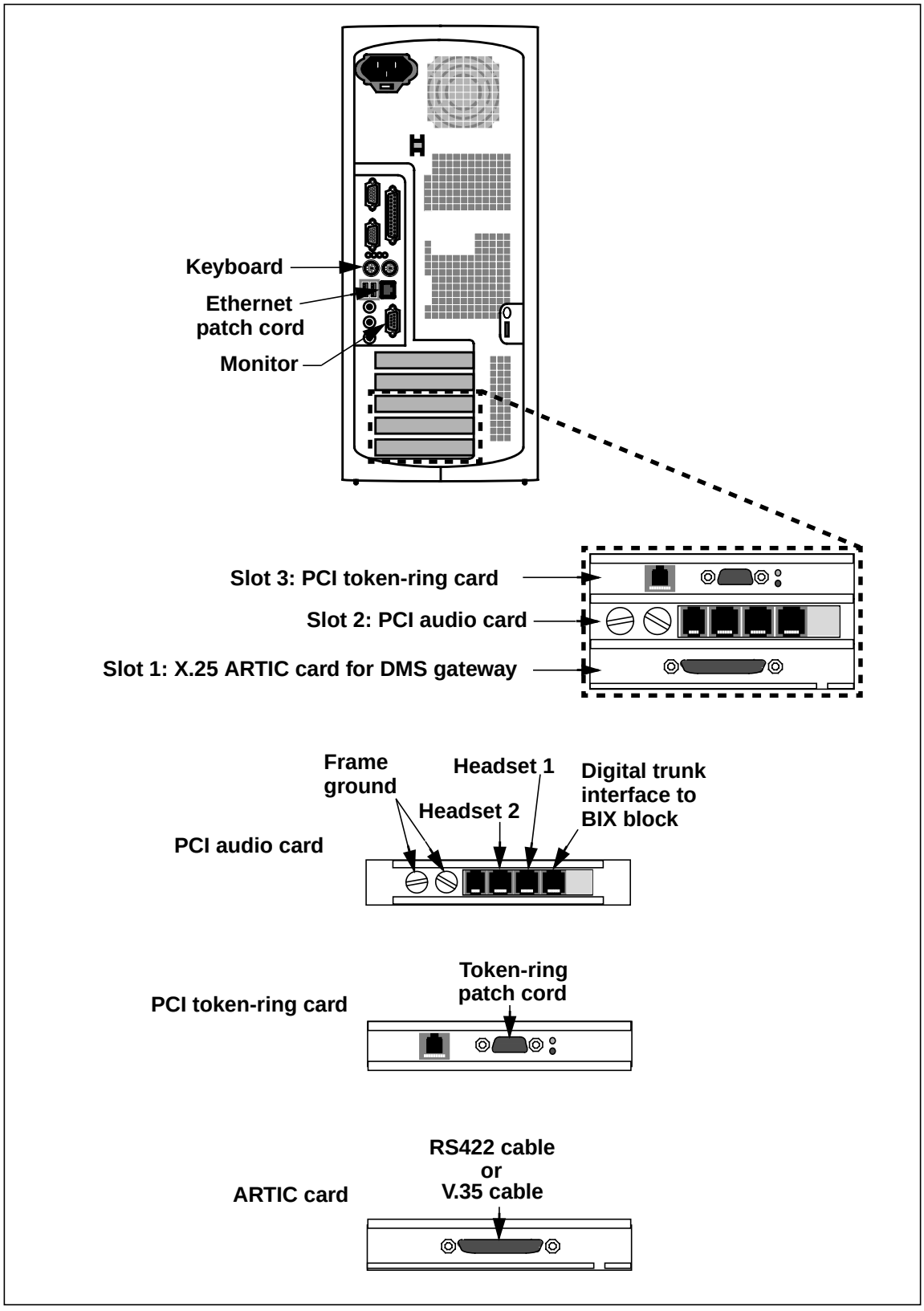

Figure 9. Base unit circuit cards for Dell GX150

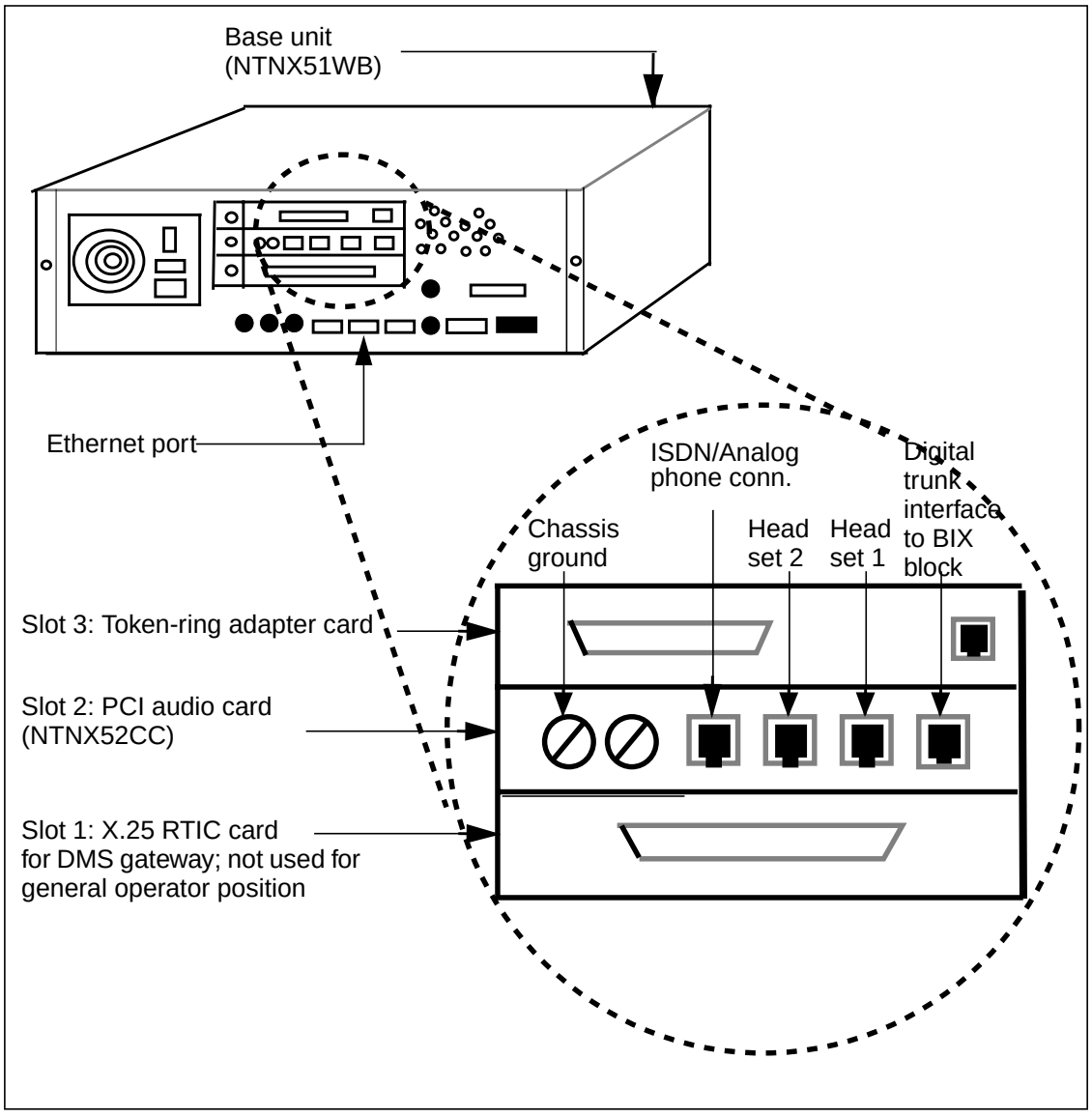

Figure 10. Base unit circuit cards for NTNX51WB

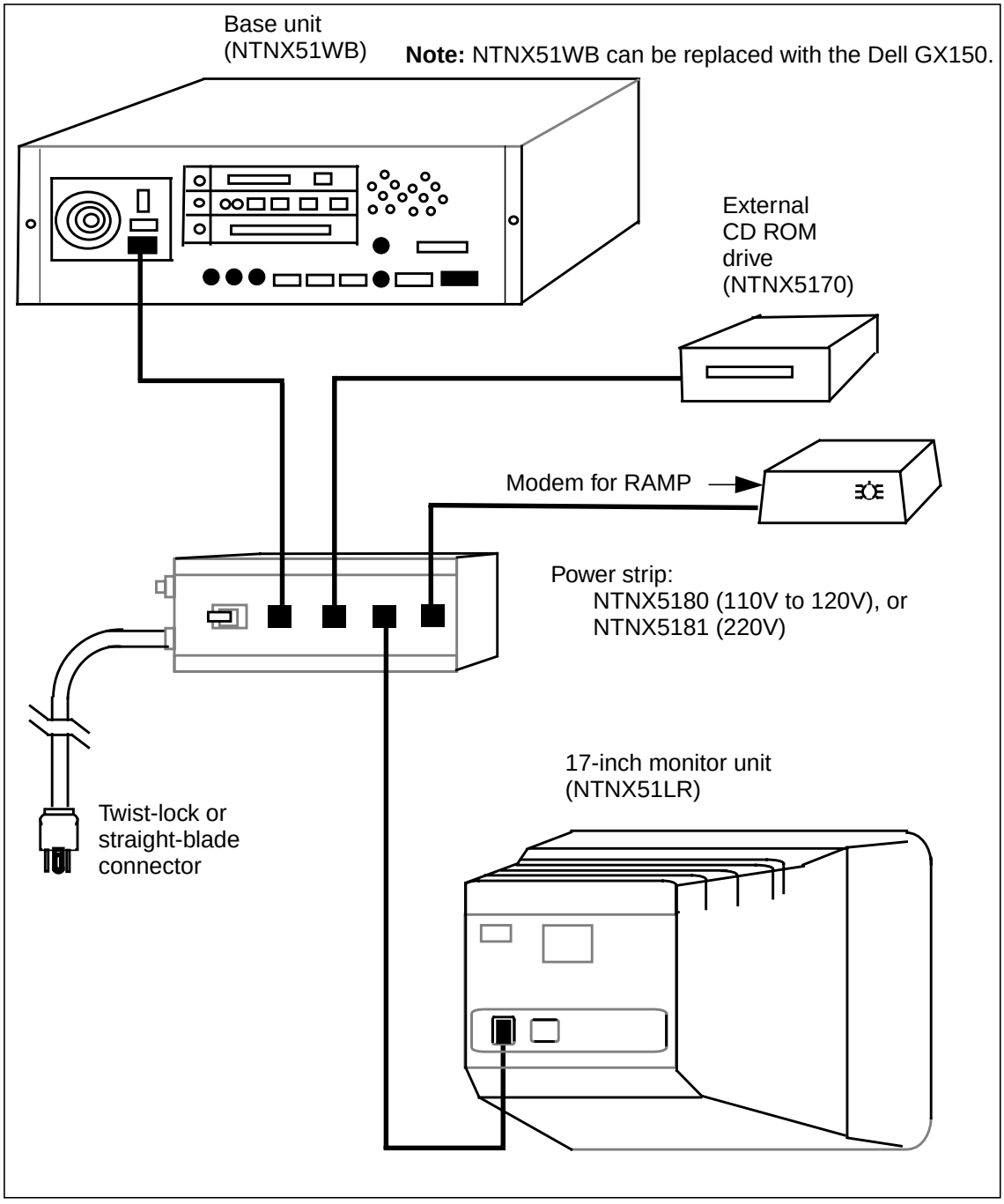

Figure 11. Operator position power

3.1.2 Operator position clusters

TOPS IWS positions are arranged in groups or clusters of 16 or 20 positions each. (The software TOPS Increased Multiplexing, EWSS0005, is required for clusters of 16 or 20. Without EWSS0005, clusters can contain no more than four positions.) In an Ethernet environment, the clusters are connected to an Ethernet hub. In a token-ring LAN, the clusters are connected to multistation access units (MAU).

Position software is separately provisionable. Depending on the provisioning of software loads and circuit cards, a position can become a DMS gateway, a general operator position, or a RAMP. Each position type can also provide different functions, depending on how the position software is provisioned.

- The DMS gateway position has a message data path to the DMS switch. Data received from the switch is shared with the other operator positions within the cluster.
- Like the DMS gateway, the general operator position has voice paths to the DMS network.
- The RAMP is the maintenance position.

The three types of positions can be spared by a single position type, using the separately provisionable plug-in circuit cards in quantities as required.

> ***Note:*** Positions configured as database gateway positions are used only with IBM DA. With Directory One, access stack node (ASN) routers are used instead.

Operator positions can be located on a different floor from the TOPS IWS equipment frame. However, the cabling length cannot exceed 100 m (328 ft.) to the wiring closet equipment frame for Ethernet, or 365.76 m (1200 ft.) for token ring.

3.1.3 General operator position

The general operator position communicates with the DMS switch across the Ethernet or token-ring LAN using one of the pair of DMS gateway positions in the same cluster. It communicates with the directory assistance database through the Ethernet or token-ring LAN to one of a pair of ASN routers.

In an Ethernet environment, the general operator position is equipped with a plug-in audio adapter card.

In a token-ring environment, the general operator position is equipped with a token-ring network card in addition to the audio card.

3.1.4 DMS gateway position

The DMS gateway position performs all the functions of the general operator position and also gives the positions in the cluster a data link to the enhanced TOPS message switch (ETMS) for communication with the DMS switch. The link is connected from the position

to channel-bank equipment supplied by the operating company. The data protocol between the position and the channel bank is RS-422 or V.35. The interface from the channel bank to the DMS switch is a data link using T1 or E1 protocol.

DMS gateway positions should be provisioned in pairs for each cluster, in order to provide redundancy for the link to the DMS switch. In a redundant configuration, a single DMS gateway position is permitted if it is the only position in the cluster. For non-redundant configurations, each cluster must have one DMS gateway position; non-redundant configurations are *not* recommended.

In an Ethernet environment, the DMS gateway position is equipped with two plug-in adapter cards:

- audio card
- X.25 RTIC card (with an RS-422 or V.35 physical interface)

In a token-ring environment, the DMS gateway position is equipped with three plug-in adapter cards:

- audio card
- X.25 RTIC card (with an RS-422 or V.35 physical interface)
- token-ring network card

3.1.5 RAMP

The remote access maintenance position (RAMP) is an operator position equipped with an external modem and the appropriate TOPS IWS software to enable it to perform maintenance. It communicates with the DMS switch through the LAN to one of the pair of DMS gateway positions in the same cluster. Communication with the directory assistance database is carried through the LAN to ASN routers.

In an Ethernet environment, the RAMP, like the general operator position, is equipped with a plug-in audio adapter card.

In a token-ring environment, the RAMP is equipped with a token-ring network card in addition to the audio card.

The RAMP is the only position with which it is possible to use a mouse. Other supplemental RAMP equipment includes an industry-standard (non-IWS) keyboard and a printer. This equipment is customer-supplied.

3.1.6 Audio card

Each position has a plug-in audio card, which provides a voice data link between the operator position and the DMS host. This voice data link is made through channel-bank equipment and through an ETMS peripheral of the DMS switch. The audio card has two operator headset ports (RJ-11 jacks with TOPS MP pin outs) and two grounding lugs for the headsets. In addition, the audio card has a two-wire clock interface to receive clock signals.

The audio card supports low-current headsets as specified in the Operator Service Systems General Requirements (OSSGR) document. It also supports

- A-law to mu-law conversion
- volume adjustment
- mute functionality
- dual-tone multifrequency (DTMF) generation

Figure 12 shows the headset cable connections to the PCI audio card.

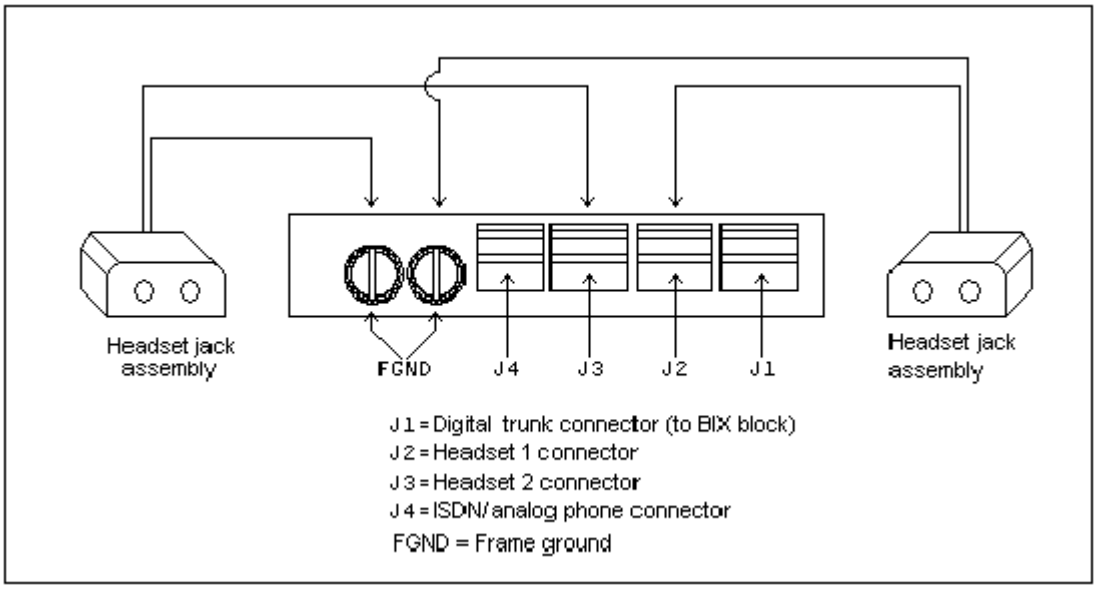

Figure 12. Headset cable connections to PCI audio card - NTNX52CC

Figure 13 shows the headset cable connections to the ISA audio cards. These cards are manufacture discontinued. They cannot be ordered, but they are still supported.

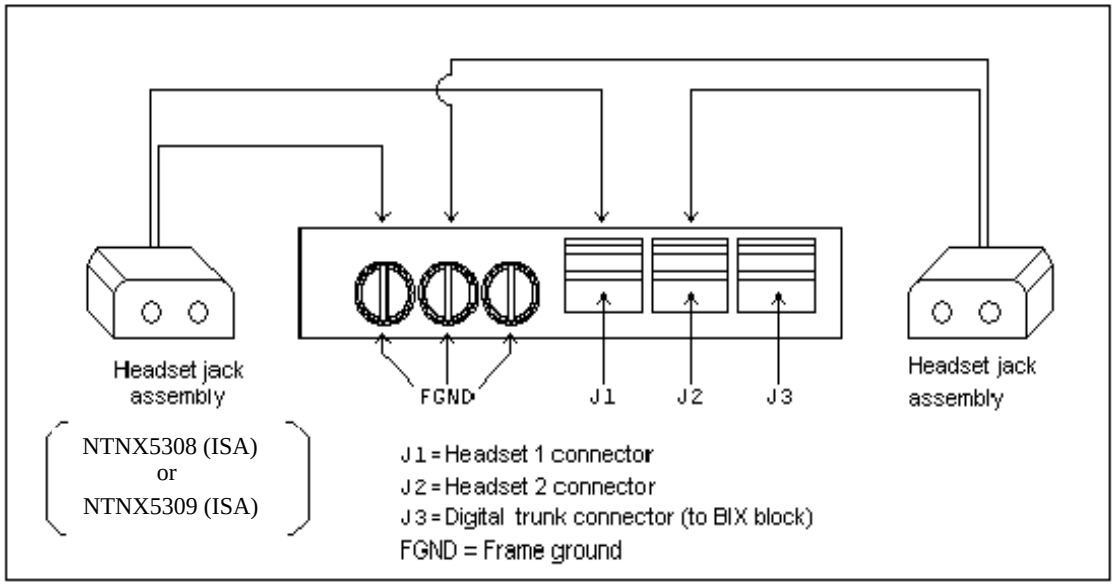

Figure 13. Headset cable connections to the ISA audio card - NTNX52BC

3.1.7 Keyboard

The keys consist of three groups: QWERTY keys, softkeys, and database and cluster keys.The keyboard comes with a default set of general functions, key names for those functions, and locations for those keys. Your company personnel can program other TOPS IWS functions for your company's services and procedures and can define keys for those functions. They can also change the key names and locations for the general functions.

The *TOPS IWS Base HMI Application Guide*, 297-2251-013, provides pictures of the keyboard and describes the functions of the keys. The user-programmable keys have clear plastic keycaps. You can print captions on these keycaps. Permanent TOPS IWS captions are printed on the fixed function keys.

3.1.8 Power strip

Power strips distribute AC power to TOPS IWS operator position equipment. The power cords of the power strips can have a straight-blade or twist-lock connector. Operator equipment connections are made to straight-blade power outlets on the power strips.

3.1.9 Ethernet hub

Ethernet hubs link TOPS IWS positions together into a local area network (LAN). The Ethernet hub specified for the turnkey Ethernet product (NTNX51DA) is the NTAR25BF BayStack 150, 24 port hub.

3.1.10 DSU

The data service unit (DSU) converts message data between T1 or E1 format on its wide area network (WAN) side and either RS-422 or V.35 on its ASN router side. The DSU is typically customer-provided.

3.1.11 Timing source generator

In each operator position, the audio card connects to the voice channel. When DS0-A protocol is used, the audio card requires a customer-supplied timing source generator (TSG) to synchronize the position with the incoming voice data stream. (No TSG is required when the voice data protocol is G.703.)

The recommended Telecom Solutions TSG provides internal redundancy, so that no single-point failure can cause the loss of clock signals. Each timing output card adapter (TOCA) provides ten ports, with each port serving one TOPS IWS position. One hot spare TOCA provides redundancy of the output ports and is automatically switched in to replace a failed output port. Nortel Networks recommends redundant clock input and Stratum 3 clock cards.

The TSG provides composite clock signals. It operates from two office battery power sources. The redundant -48 V DC supply lines are fused on the shelf, then bussed to the rest of the cards in the shelf. Each card contains a DC-to-DC converter that provides DC supply voltages for its on-board electronics.

All alarm indications are bussed from each clock input, Stratum 3 clock, timing output, and matrix control adapter card to the fuse and alarm card, which in turn produces major and minor audible and visual alarms and major and minor LED indications. The fuse and alarm card monitors both its own performance and the power of alarm inputs from the other cards, and it provides the central office and an E2A telemetry-type system with an alarm and status output. The fuse and alarm outputs should be wired by the operating company to a distribution frame, then cross-connected there to DMS switch scan points and picked up as office alarms.

3.2 Position support for software releases

IWS Release 17.0 must be installed on appropriate PCs. Table 1 lists the PCs that support IWS 17.0 software.

Note: Mixing IWS releases in an OSC is supported only during the cutover process. All positions in a LAN must be converted simultaneously.

3.2.1 IWS Hardware Platform and Software Release Compatibility Guide

The following tables provide information on the hardware platforms that are compatible with each supported IWS software release. Table 1 identifies the *minimum* acceptable Nortel-provided IWS hardware supported with each software release when running Nortel-provided IWS applications. Table 2 identifies the *recommended* configurations.

Note: These tables also appear in the "Minimum Supported Hardware Matrix," and the "Recommended Hardware Matrix" in the Nortel Networks customer website at **www.nortelnetworks.com**. Login under the Communities heading. Select the "IWS User" community on the left side of your screen, and select "File Exchange." The matrix is located under "Additional Resources" in a folder labeled "IWS Hardware Compatibility." Click on the file to view it, or follow the instructions to download the file to your desktop.

The minimum configuration refers to functionality and does not imply that real-time performance will be considered acceptable. Minimum configurations provide sufficient processor speed, memory, and so forth, to permit Nortel Networks IWS applications to function properly.

Some degree of real-time "erosion" is to be expected when upgrading switch and IWS software (*especially when upgrading from 16-bit to 32-bit software in IWS13*). Therefore, each customer must assess whether the PC platform provides an acceptable performance level for operator and gateway positions, given their mix of applications and their productivity expectations. If a given PC platform is not deemed by the customer to provide the required performance at operator and gateway positions, an upgrade to a more powerful PC platform will be required, even if that platform is beyond the minimum baseline shown in Table 1

TABLE 1. IWS Hardware and Software Compatibility: Minimum Supported Configuration

Pos Type:	Operator Positions (TDM/IP)			
Manufacturer:	**Intel**		**Dell**	
Nortel Part Number:	NTNX51UB	NTNX51WB	N/A	N/A
Model:	**Juneau**	**Juneau**	**GX150**	**GX260**
RAM:	256 MB	256 MB	256 MB	256 MB
Hard Drive:	5.1 GB	10.1 or 6.4 GB	10, 20, or 40 GB	20 or 40 GB
CPU:	350 MHz	600 MHz	933 MHz or 1.0 GHz P3	1.8 GHz P4
IWS17.1	**Y (TDM only)**	**U***	**Y**	**Y**

	Retirement Date (Unsupported as of)	**TOPS Switch Load Compatibility**
IWS15.2	TBD	TOPS12 and higher
IWS15.2	TBD	SN04 - SN06** (TOPS Succession load)
IWS17.1	TBD	TOPS 14 and higher
IWS17.1	TBD	SN04 - SN07** (TOPS Succession load)

U* Supported with memory upgrade.

** IWS must be upgraded to IWS15.2 prior to loading Succession TOPS load (SN04 or higher) into TOPS Host or OC Remote.

Table 1 identifies the recommended Nortel Networks-provided IWS hardware supported with each software release when running Nortel-provided IWS applications.

Nortel Networks considers the recommended configuration to provide acceptable memory and real-time performance. Since there are no real-time standards for operator positions, however, each customer must assess whether the platform provides an acceptable performance level for operator and gateway positions, given their mix of applications and their expectations. If a given PC platform is not deemed by the customer to provide the required performance at operator and gateway positions, an upgrade to a more powerful PC platform will be required.

TABLE 2. .IWS Hardware and Software Compatibility: Recommended Configurations

Pos Type:	Operator Positions (TDM/IP)
RAM:	256 MB
Hard Drive:	40 GB
CPU:	2.26 GHz P4
USB (IP Only):	2.0

3.3 Wiring closet equipment for Ethernet

In an Ethernet environment, voice signals from the operator positions are cabled to the TOPS IWS wiring closet equipment frame. The equipment frame contains cable connector hardware for links to the LAN, the DMS switch, and the directory assistance database. The wiring closet equipment includes one or more equipment frames dedicated to TOPS IWS LAN, the DMS switch, and the directory assistance database.

The TOPS IWS equipment frame (NTNX51JA) provides for mounting Ethernet hubs, power strips, ASN routers, and insulated displacement connections (IDC), which are known as building internal cross-connect (BIX) blocks. This equipment provides the Ethernet connectivity and voice connections for all TOPS IWS positions in the operator service center. The Ethernet LAN configuration does not use multistation access units (MAU).

There are three types of Ethernet frames:

- new installations, which provide connections for up to 120 positions
- token-ring retrofits, which provide connections for up to 200 positions
- miscellaneous frame conversions, which provide connections for up to 80 positions

The recommended placement for Ethernet hubs and routers is in the NTNX51JA 24-inch open frame. There are two recommended configurations of this frame: new installations, and token-ring retrofits. Each configuration requires a kit that includes mounting hardware, brackets, and a power strip. The kit may be factory- or field-installed. An optional placement is in a retrofitted NT0X02AB frame converted with a kit to an NTNX51JA frame.

3.3.1 BIX block interface with Ethernet LAN

Along with the channel bank and TSG equipment, BIX blocks are required. The TOPS IWS equipment frames provide for mounting these BIX blocks. Six 50-pin connectors are provided in each BIX block for cable connections to the channel-bank units and the TSG. The BIX block assembly (NTNX5103) is mounted in the TOPS IWS equipment frame and

uses one mounting panel for two BIX blocks. Figure 14 shows the TOPS IWS equipment frame with BIX blocks.

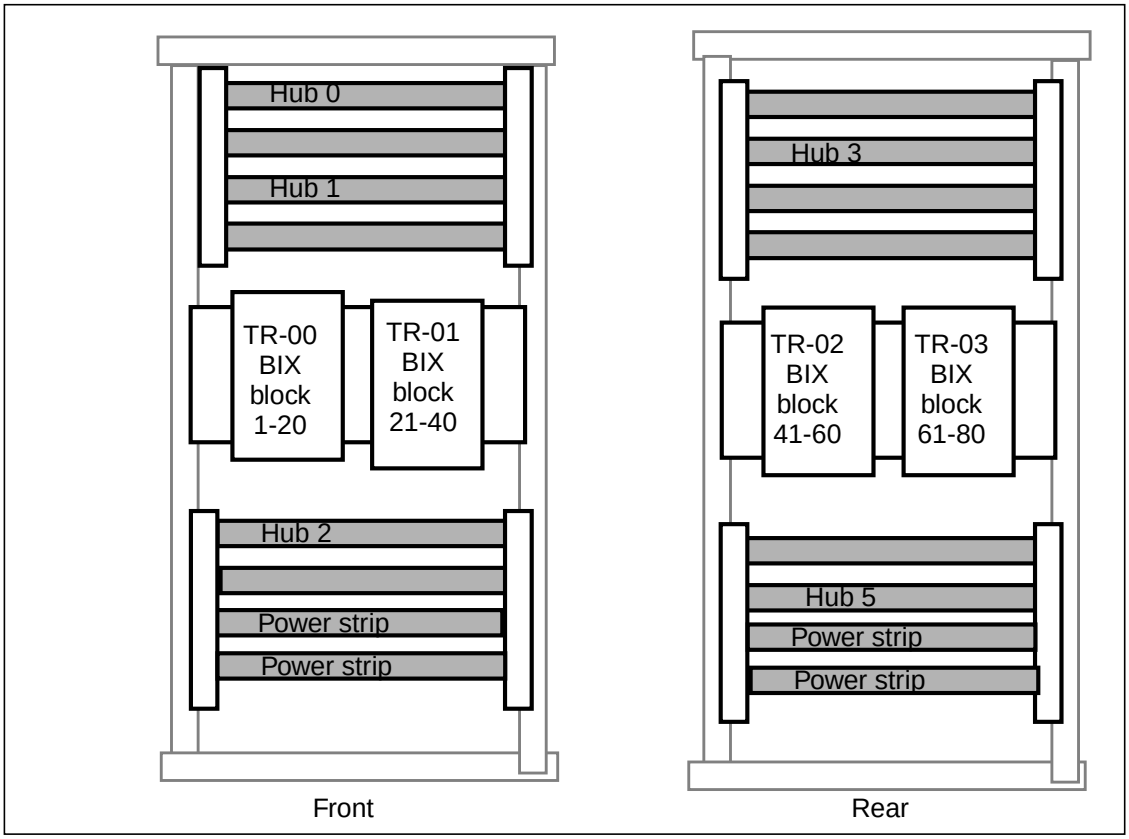

Figure 14. Wiring closet equipment with Ethernet hubs and BIX blocks

Refer to figure 17 for a diagram of the operator service center TOPS IWS connections for the BIX block interface. Located in the wiring closet, the BIX block terminates cable pairs from the TOPS IWS positions. Each BIX block is associated with the operator positions on a single Ethernet LAN and can accommodate up to 20 positions. The BIX block is prewired with 20 connectors for voice data and 20 connectors for message data going to the position. The message data connections are used in configurations with V.35 protocol.

Figure 15 shows how the audio card connects to the BIX block.

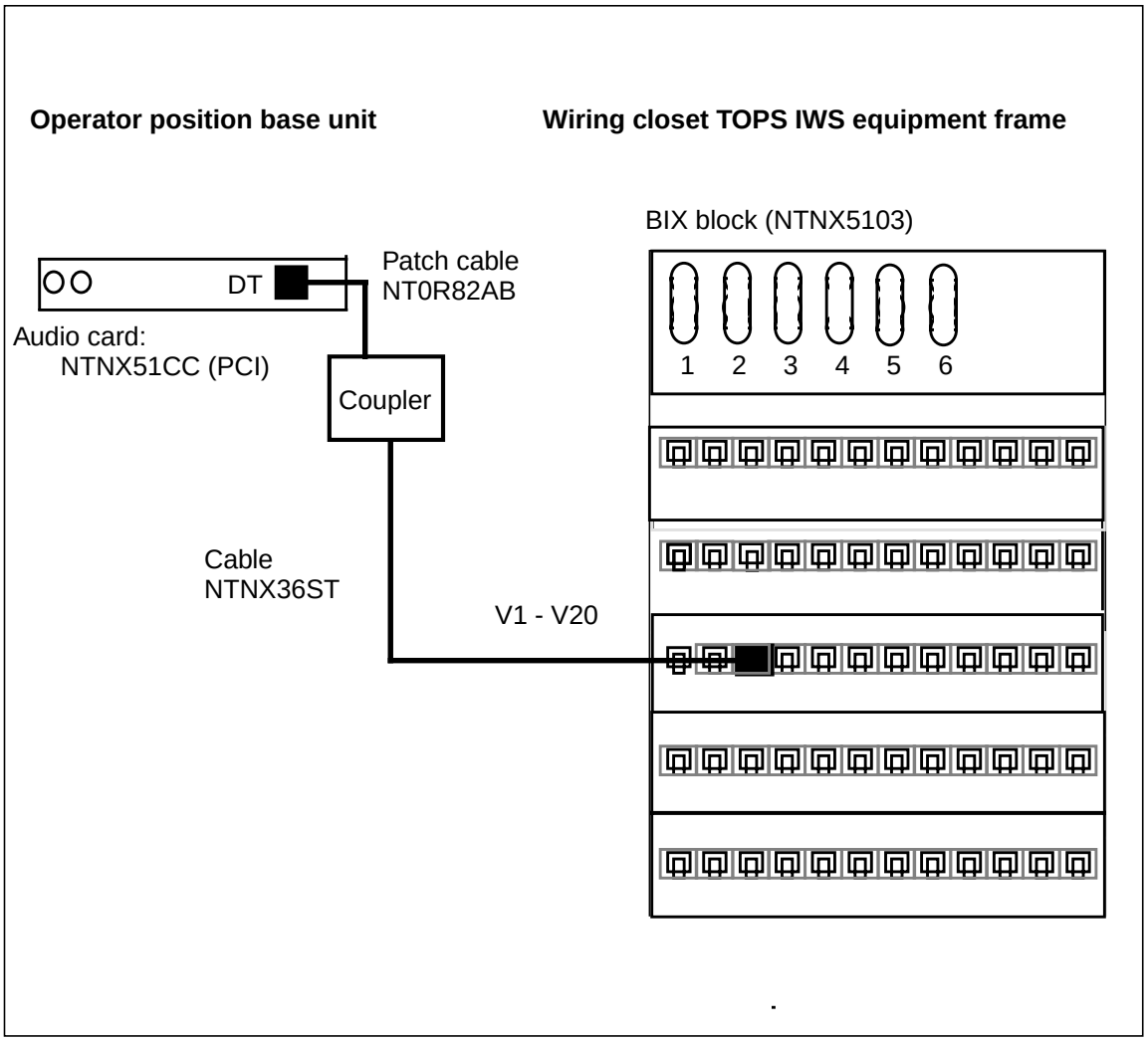

Figure 15. Audio card connections to frame

3.4 Wiring closet equipment for token ring

In a token-ring environment, voice and data signals from the operator positions are cabled to the TOPS IWS wiring closet equipment frame. The equipment frame contains cable connector hardware for links to the LAN, the DMS switch, and the directory assistance

database. The wiring closet equipment includes one or more equipment frames dedicated to TOPS IWS LAN equipment. Equipment frames dedicated to TOPS IWS do not receive power and can house only TOPS IWS LAN hardware.

TOPS IWS equipment frames provide for mounting MAUs and insulated displacement connections (IDC), which are known as building internal cross-connect (BIX) blocks. This equipment provides the token-ring and data-link connectivity and voice connections for all TOPS IWS positions in the operator service center. Each equipment frame provides connections for TOPS IWS on four token rings.

A TOPS IWS equipment frame hardware kit (NTNX510) is required for each TOPS IWS equipment frame. The kit is used to mount MAUs, BIXs, and brackets in the TOPS IWS equipment frame.

Because the TOPS IWS equipment frame does not require power, Nortel Networks does not provide a frame supervisory panel. Also, TOPS IWS equipment frames do not have cable troughs. You can install cable racks in accordance with site floor-plan drawings. Do not install trim panels, doors, and lights on TOPS IWS equipment frames.

3.4.1 Multistation access unit

In a token-ring configuration, the MAU connects positions to the token ring. Extenders mount the MAUs in the TOPS IWS equipment frame. Two extenders are used for each set of three MAUs.

Figure 16 shows the front and rear views of the frame: each side serves two token rings. There are three MAUs for each token ring. Each MAU has eight ports. The 16-position token ring configuration has eight spare MAU ports. The 20-position configuration has four spare MAU ports. You can use these spare ports for other connections. For example, you can add a bridge to connect the token-ring LAN to a WAN or provide access for dial-up capability.

3.4.2 BIX block interface for token-ring LAN

Along with the channel bank and TSG equipment, BIX (IDC) blocks are required. The TOPS IWS equipment frames provide for mounting these BIX (IDC) blocks. Six 50-pin connectors are provided in each BIX block for cable connections to the channel-bank units and the TSG. The BIX block assembly (NTNX5103) is mounted in the TOPS IWS equipment frame and uses one mounting panel for two BIX blocks. Figure 16 shows the TOPS IWS equipment frame with BIX blocks.

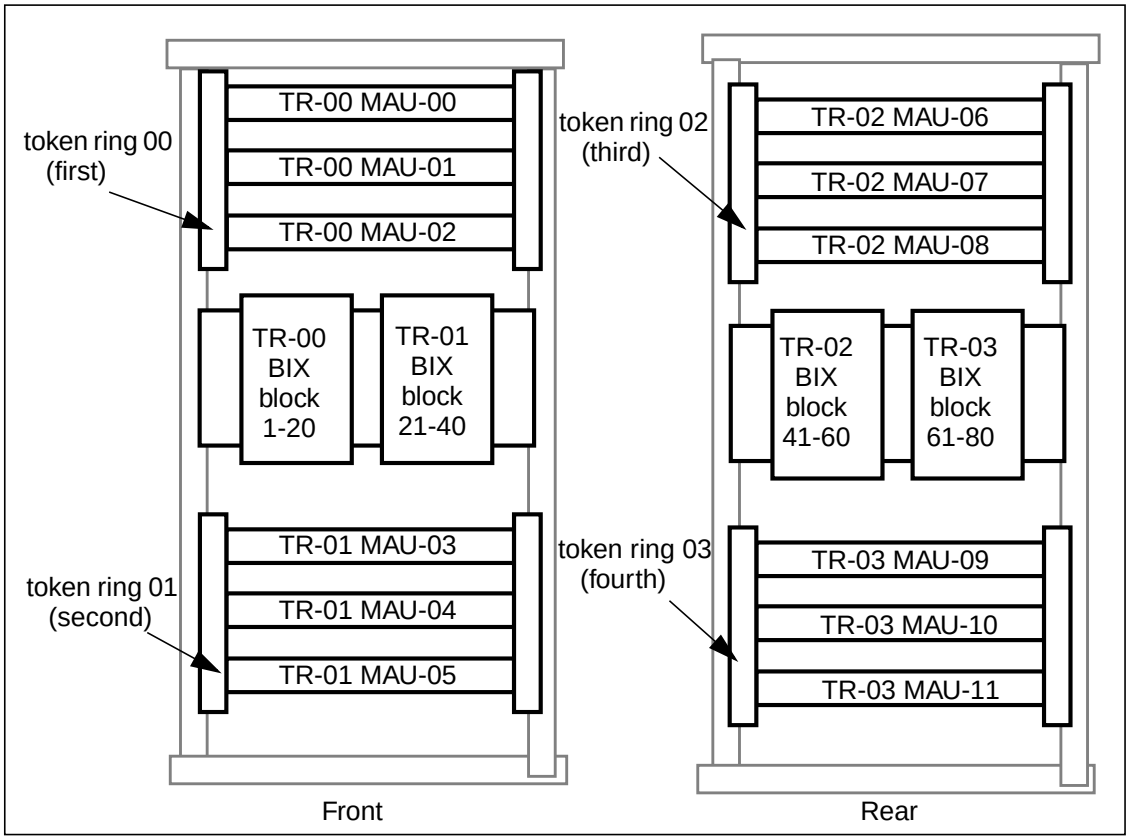

Figure 16. Wiring closet equipment with BIX block

Figure 17 shows the operator service center TOPS IWS connections for the BIX block interface. Located in the wiring closet, it terminates cable pairs from the TOPS IWS positions. Each BIX block is associated with the operator positions on a single token-ring LAN and can accommodate up to 20 positions. The BIX block is prewired with 20 connectors for voice data and 20 connectors for message data going to the position. The message data connections are used in configurations with V.35 protocol.

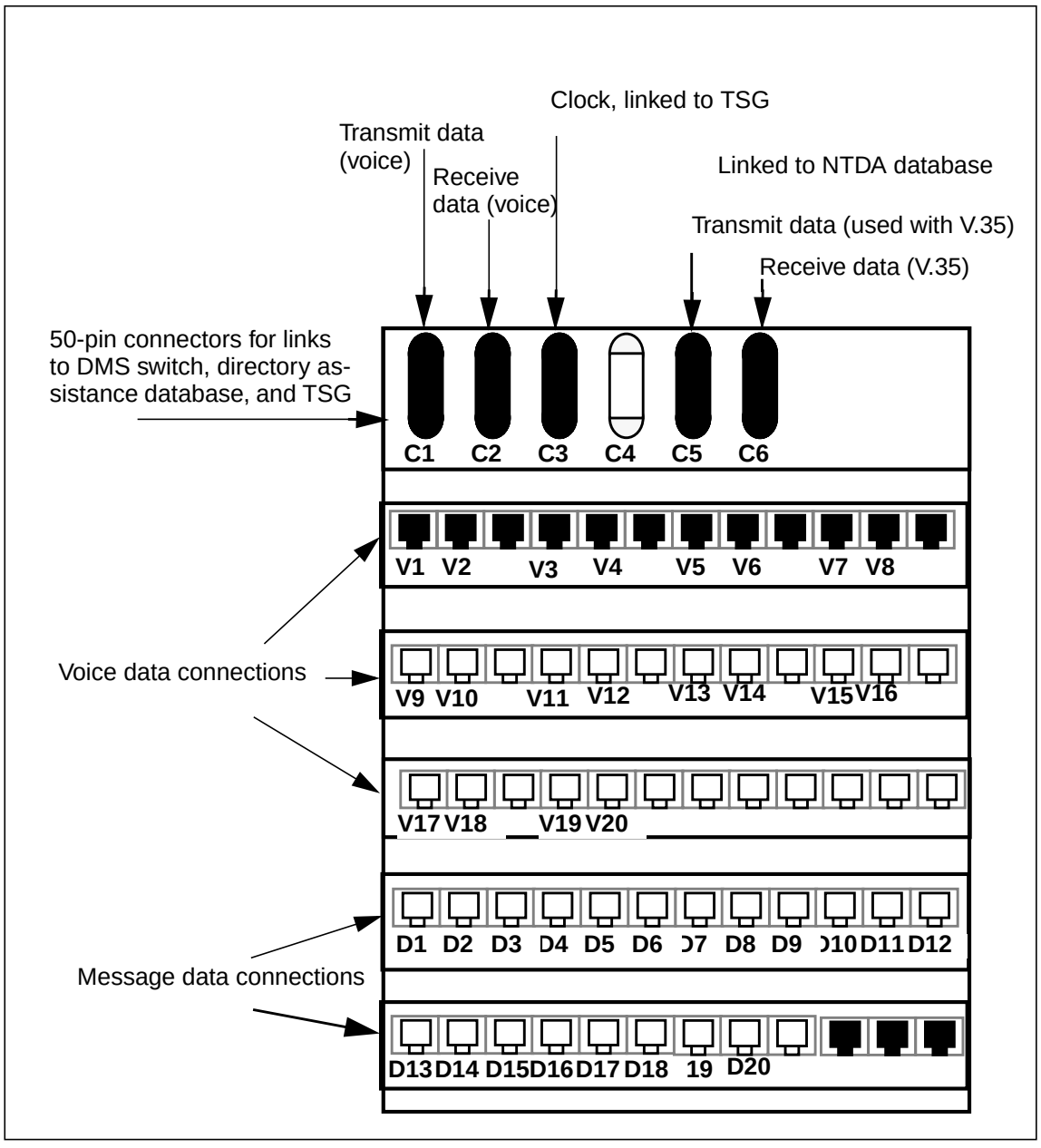

Figure 17. BIX block

Figure 18 shows how the token-ring card and the audio card connect to the BIX block.

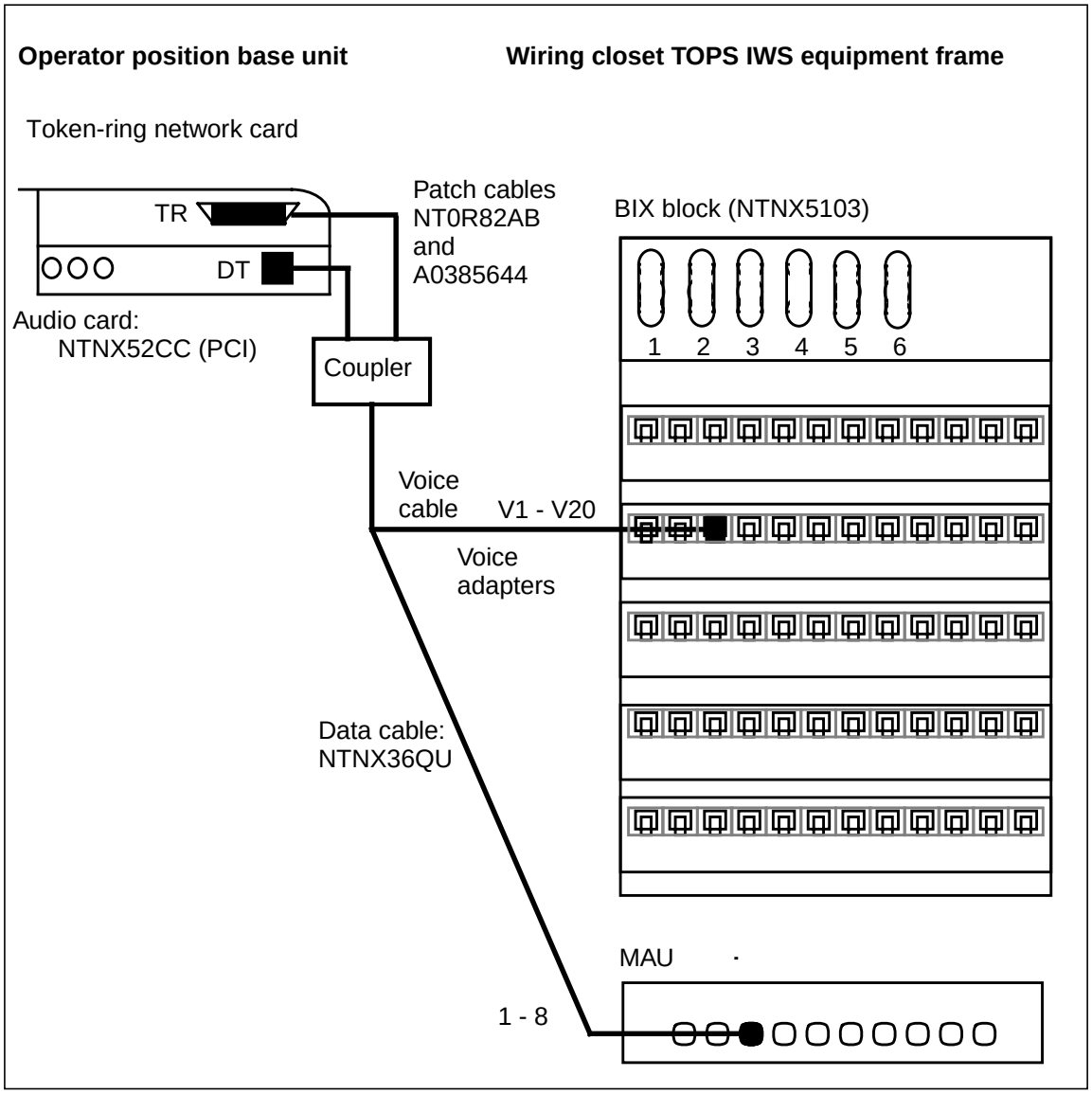

Figure 18. Audio card and token-ring connections to frame

3.5 Channel bank

Channel banks act as multiplexer/demultiplexers. The multiplexed side of the channel bank interfaces with T1 pathways (1.544 Mbit per second, 24 channel) for North American installations or E1 pathways (2.048 Mbit per second, 32 channel) for international installations. The demultiplexed side provides a separate set of output signals for each usable data channel. Message data channels must conform to X.25 messaging standards with RS-422 electrical interface. To meet the voice interface requirements of the TOPS IWS operator position, voice channels must conform to DS0-A or G.703 standards. Figure 19 shows the function of the channel bank in separating and formatting channels.

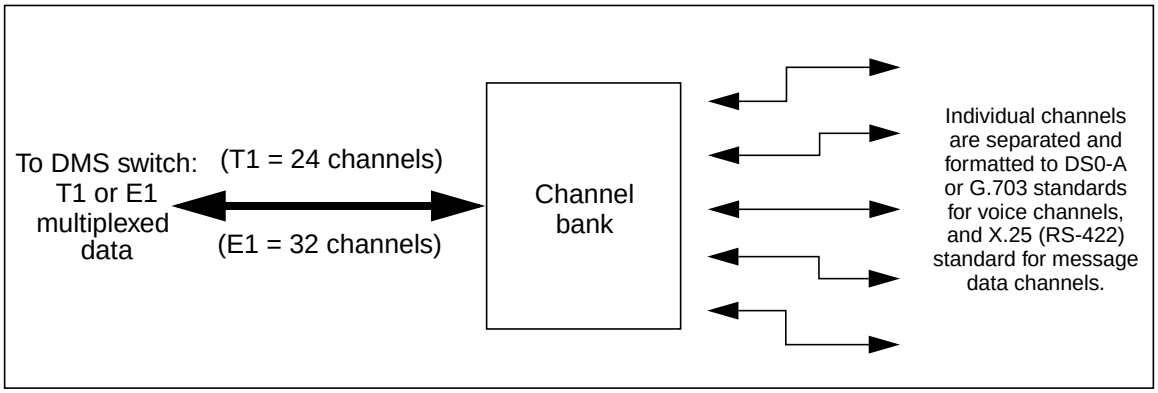

Figure 19. Channel bank

The channel bank is external to the TOPS IWS wiring closet equipment.

3.5.1 Compatible channel banks

The operating company supplies channel bank equipment. Nortel Networks recommends two compatible channel banks:

- Bayly (for E1 applications only)
- DE-4E Smart (for T1 applications only)

The Bayly voice channel module contains circuitry to demultiplex four voice channels. The data channel module contains circuitry to demultiplex four message data channels. Voice channel output is co-directional, based on CCITT G.703 protocol. Data channel output is based on RS-422 protocol.

The DE-4E Smart voice channel card supports DS0-A functionality. The message data channel card provides output based on RS-422 protocol. Both channel cards provide standard four-wire interfaces to the IWS operator position.

3.6 Cables

The operating company is responsible for integrating TOPS IWS with the furniture of its choice and for managing cable routing effectively. The first step is to run cables for each operator position and each cluster of positions. Cable routing between operator positions and the TOPS IWS equipment frames in the wiring closet is site-specific. Cables must be properly secured to prevent interference with the raising and lowering of the operator's work surface.

3.6.1 Cables in an Ethernet configuration

In an Ethernet LAN environment, TOPS IWS requires the following cables to provide voice and data connection to the DMS switch:

- For carrying voice between audio card in the operator position and the coupler: a voice patch cord (NT0R82AB)
- For carrying voice between the coupler and the BIX block in the miscellaneous equipment frame: the position voice cable (NTNX36ST). This cable assembly includes the coupler.
- For carrying timing signals from the TSG to the BIX block when DS0-A protocol is used: the TSG cable (NTNX36DQ)
- For carrying voice between the BIX block and the MDF: the BIX voice cable (NTNX36DN)
- For carrying data, or data and voice, between the MDF and the channel bank: the channel cable (NTNX36SK or an operating company-provided cable). In a T1 environment, this is the channel data cable; in an E1 environment, it is the channel data and voice cable. The following paragraphs explain the distinction:
  - — In a T1 environment, NTNX36SK serves as the data channel cable between the DE-4E Smart channel bank and the MDF. For other brands of channel banks in this environment, operating companies must provide their own cables.
  - — In an E1 environment, NTNX36SK serves as the voice and data channel cable between the Bayly channel bank and the MDF. For other brands of channel banks in this environment, operating companies must provide their own cables.
- For carrying data between the RTIC card in the gateway position and the MDF: the position message cable (NTNX36SD)

Figure 20 provides an overview of the pathway between the position and the DMS switch, for both voice and data signals.

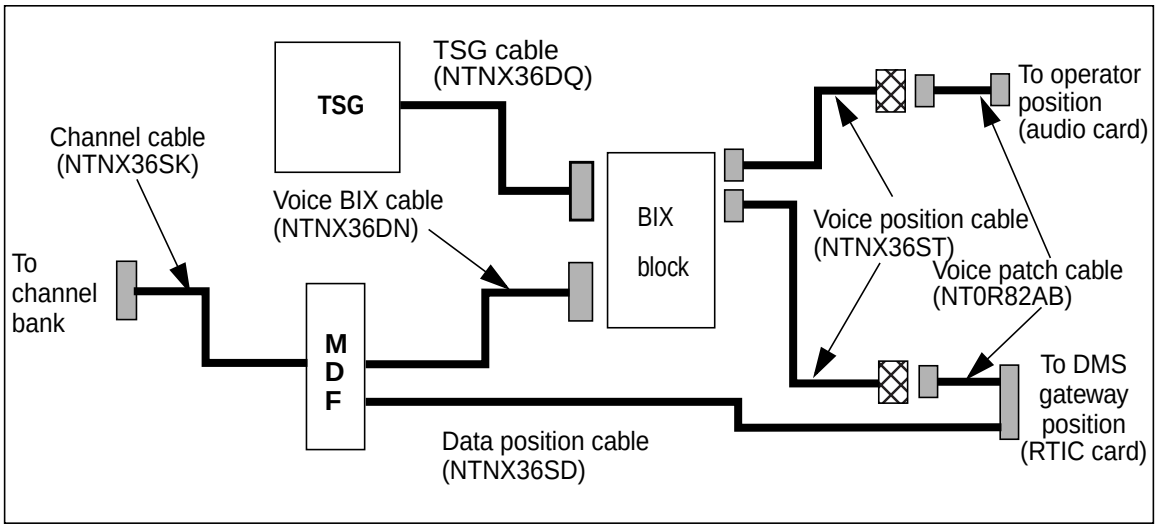

Figure 20. Voice and data cables from position to channel bank (Ethernet)

To connect operator positions to an Ethernet LAN, TOPS IWS requires the following cables:

- From the Ethernet port on the operator position to the Ethernet coupler: the Ethernet patch cord (A0786050)
- From the coupler to the Ethernet hub: Ethernet plenum cable (NTAR40AS)

3.6.2 Cables in a token-ring configuration

For voice and data connection to the DMS switch in a token-ring LAN environment, TOPS IWS requires the following types of cables:

- For carrying voice between the audio card in the operator position and the coupler: a voice patch cord (NT0R82AB)
- For connecting the token-ring LAN card in the operator position to the coupler: a token-ring patch cord (A0385644)
- For connecting the coupler with the BIX block in the miscellaneous equipment frame inside the wiring closet: the position cable (NTNX36QU). This cable assembly includes the coupler.
- For carrying timing signals from the TSG to the BIX block when DS0-A protocol is used: the TSG cable (NTNX36DQ)
- For connecting MAU to MAU in the miscellaneous frame inside the wiring closet: the MAU-to-MAU cable (NTNX36DK)
- For carrying voice between the BIX block and the MDF: the BIX voice cable (NTNX36DN)
- For carrying data between the RTIC card in the gateway position and the MDF: the position message cable (NTNX36SD)
- For carrying data, or data and voice, between the MDF and the channel bank: the channel cable (NTNX36SK or an operating company-provided cable). In a T1 environment, this is the channel data cable; in an E1 environment, it is the channel data and voice cable. The following paragraphs explain the distinction:
  - — In a T1 environment, NTNX36SK serves as the data channel cable between the DE-4E Smart channel bank and the MDF. For other brands of channel banks in this environment, operating companies must provide their own cables.
  - — In an E1 environment, NTNX36SK serves as the voice and data channel cable between the Bayly channel bank and the MDF. For other brands of channel banks in this environment, operating companies must provide their own cables.

Figure 21 provides an overview of the pathway between the position and the DMS switch, for both voice and data signals.

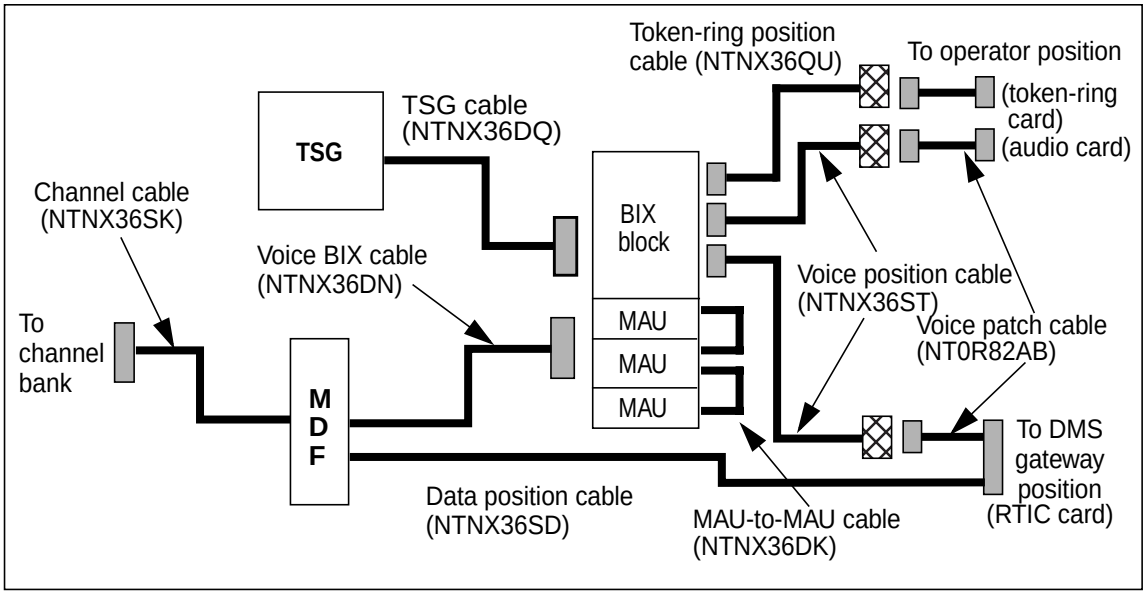

Figure 21. Voice and data cables from position to channel bank (token ring)

Table 3 summarizes the TOPS IWS cable types.

Table 3. IWS cables

Product engineering code (PEC)	Purpose	Description	Length
A0385644	For token ring only. This cable connects the token-ring card in a position to a coupler.	Type 6 data cable: 9-pin male DSU, MAU data connector	1.82 m (6 ft) fixed
NTNX36QU	For token ring only. This cable connects a coupler, which is part of this cable assembly, to a token-ring MAU in the equipment frame. This cable also connects the coupler to a BIX block in the equipment frame for audio.	Type A plenum cable: 6-position connector, 6-position keystone jack connector, stranded Siamese type 1/type 3 plenum, 24 awg, with junction box	Maximum of 365.76 m (1200 ft) including A0385644
NTNX36DK	For token ring only. This cable connects one MAU to another MAU in the equipment frame.	Type A plenum cable	1.22 m (4 ft) fixed
A0786050	For Ethernet only. This patch cord connects the Ethernet port on the operator position to the Ethernet coupler.		
NTAR40AS	For Ethernet only. This cable connects the coupler to the Ethernet hub.	Ethernet plenum cable	

Table 3. IWS cables (Continued)

Product engineering code (PEC)	Purpose	Description	Length
NTNX36DN	Audio. Four of these cables connect a BIX block in the equipment frame to the company- supplied channel bank.	Non-plenum cable: 25-pair, 24 awg, 50-pin key telephone plug, hood	Maximum 365.76 m (1200 ft); maximum 457.20 m (1500 ft) from a position to the channel bank.
NTNX36DQ	Audio. This cable connects a BIX block in the equipment frame to a company-supplied TSG. Use NTNX3731 to ground this cable to the TSG.	Non-plenum cable: 25-pair, 24 awg, 50-pin key telephone plug, hood	Maximum 457.20 m (1500 ft); maximum 457.20 m (1500 ft) from a position to the channel bank.
NTNX36SD	Data. This cable connects an RTIC card in a position to the equipment frame.	Plenum cable: non-filtered, 12 pair, 24 awg, 37-pin D-sub female connector, 37-pin filtered assembly	Maximum 365.76 m (1200 ft)
NTNX36SK	Data for T1; audio and data for E1. This cable connects the main distribution frame to the company-supplied channel bank.	Plenum cable: 12 pair, 24 awg, 25-pin D-sub female connector	Maximum 91.44 m (300 ft)

3.6.3 Customer-provided V.35 solution

The turnkey solution for IWS uses RS-422. Some customers prefer to use V.35 as the electrical interface instead of RS-422. Customers who use V.35 as the electrical interface must provide the following pieces of equipment:

- GDC 500A DSU
- RTIC card to DSU cable
- coupler

These parts are packaged in a kit that can be purchased directly from GDC. The part number for the kit is 027H449-010/048A061-003/S-031H008-001. To order, contact GDC at 1-800-523-1737, option #1, #3.

Note: Customers who choose to make their own cables must still purchase the coupler from GDC.

When V.35 is used, neither the NTNX36SD nor the NTNX36SK cable is used. The data pathway goes through the BIX block. It is not directly connected to the main distribution frame.

The following cables are required to complete the V.35 connection to the channel bank:

- NTNX36DP
- NTNX36DN

The V.35 solution can be used with the DE-4E and DE-4E Smart channel bank. The following data cards supportV.35:

- DE-4E uses QPP-684
- DE-4E Smart uses NT4S04AB

Figure 22 shows the V.35 data connection to the channel bank.

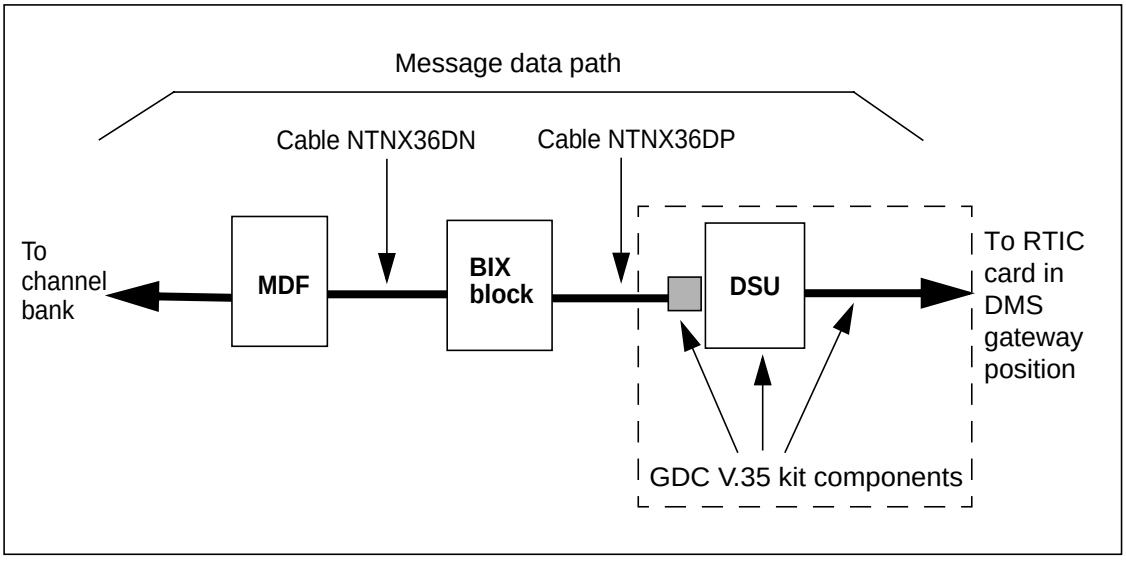

Figure 22. V.35 hardware for message data path

4.0 TOPS IWS software structure

This chapter explains how TOPS IWS software is structured and provisioned for the switch and the positions.

DMS switch software is available in product computing-module loads (PCL). Each PCL contains all the generally available software for a particular switch application in a particular market. All features are present in the switch. You receive software in the exact configuration in which it is developed, and then you choose which services to deploy. TOPS software for the DMS switch is provided in a TOPS load that includes all generally available TOPS software for DMS-100/200 and DMS-200 TOPS switches in North America. For example, a TOPS15 customer receives all the software in the DMS software platform as well as the TOPS component.

TOPS software is divided into two overall products: TOPS computing-module (CM) software and TOPS IWS software.

4.1 TOPS CM software

TOPS IWS application software interacts with base software in the DMS-100/200 switch, with existing software in the enhanced TOPS message switch (ETMS), and with the directory assistance database. DMS CM software for TOPS IWS is included with the DMS load tape. The CM software can be installed in stand-alone, host operator center, and remote operator center configurations.

Chapter 5.0, “TOPS CM functions,” describes the functional groups in detail.

Before Release 15, TOPS software was organized into the following functional groups:

- OSB00001: Operator Services Basic (a prerequisite for all other TOPS functional groups)
- ABS00001: Alternate Billing Service
- ADVQ0001: Advanced Queuing
- ENSV0001: Enhanced Services
- EWSS0001: Enhanced Workstation Services Software
- GOS00001: Global Operator Services (GOS)
- OSAN0001: Operator Services System AIN (OSSAIN)
- OSDA0001: Operator Services Directory Assistance
- OSEA0001: Operator Services Equal Access
- UNBN0001: Unbundling

In Release 15, the software options within these functional groups were consolidated to align them with the new TOPS-IP architecture, and the number of functional groups was reduced from ten to eight:

- OSB00101: Operator Services Basic (still a prerequisite for all other TOPS functional groups)
- ABS00101: Alternate Billing Service
- ENSV0101: Enhanced Services
- GOS00101: Global Operator Services (GOS)
- OSAN0101: Operator Services System AIN (OSSAIN)
- OSDA0101: Operator Services Directory Assistance
- OSEA0101: Operator Services Equal Access
- UNBN0101: Unbundling

Functional groups ADVQ and EWSS were eliminated, and their functionality was included in the Operator Services Basic functional group, OSB00101.

4.1.1 Table TOPSFTR

Consolidating SOC options simplifies the ordering and maintenance of SOC order codes. But turning a SOC code on or off does not automatically activate or deactivate the individual features within it. For that you need the new table TOPSFTR, which contains a tuple for each of the options that were previously controlled by SOC states but are now consolidated with other order codes.

Table TOPSFTR provides master on-off switches for individual software features. The features listed in this table do not have right-to-use key codes. They are available to everyone, and you control which ones you turn on and when. This arrangement decouples the purchase of a feature from the activation of it. It allows you to own TOPS features without having to activate them until you are ready.

Before Release 15, activating new TOPS functionality in a particular traffic office meant simply turning on the SOC option. With the introduction of table TOPSFTR, activating a feature requires two steps. First the parent SOC option must be turned on, and then the appropriate tuple in table TOPSFTR must be set to Y. This second step activates the functionality.

In Release 15, both the SOC IDs and the TOPSFTR values are set appropriately for all functionality that was enabled before TOPS15. To enable new functionality in TOPS 15 and up, however, you must ensure that the parent SOC option is on and that the appropriate feature is set to Yes in table TOPSFTR. When you upgrade to a new release, all values stay as they are set.

This chapter provides a brief overview of the functional groups. For more detailed information, refer to the *Translations Guide*.

4.1.2 Operator Services Basic (OSB00101)

Functional group OSB00101 consists of the DMS TOPS switch software that is fundamental to all operator services or that is widely used. OSB00101 provides such services as basic queuing and toll and assistance. Customers who purchase the Operator Services Basic functional group have the right to use all functions in the group.

Table 4 describes functional group OSB00101. This list is not exhaustive. All TOPS functionality not identified in one of the other functional group listings resides in OSB00101.

Table 4. OSB00101

Order code and function name	Description	Dependencies
OSB00101 Basic Operator Services	Basic Operator Services functionality: • 09 realtime recovery • 800+ interworking • AMA mods • AMA table 281 • Attendant pay station • Automated OIA session start • Code removal of TOPS IV • DNSCRN enhancements • DA/toll branding • Extended audio response host/remote • Host OC datalink • Host/remote networking by queue type • Logical TID for T&C • MD code removal and engineering • QMS MIS (including MIS over IP) • Dial-up autoquote (DUAQ) • Table PICNAME expansion • Position/device evolution to IP • QMS host/remote queuing • RU robustness • Remote OC datalink • Screened service routing • TCAP TRID replacement • TOPS 0- XFR billing • TOPS 11 robustness and real-time recovery	None

Table 4. OSB00101 (Continued)

Order code and function name	Description	Dependencies
	• TOPS alternate announcements • TOPS AMA enhancements • TOPS AWT enhancements • TOPSBC, STS, and SNPA • TOPS Bellcore AMA • TOPS call processing feature • TOPS cityzone rating • TOPS closedown • TOPS directory assistance subtending TMS • TOPS E911 • TOPS extended Bellcore AMA (EBAF) • TOPS IDDD 15-digit expansion • TOPS increased multiplexing • TOPS IP evolution • TOPS inward validation • TOPS multi-NPA support • TMS networking • TOPS NOTIS format • TOPS NoRestartSWACT • TOPS Open Position Protocol (OPP) • TOPS operator password • TOPS permanent hold • TMS processor upgrade • TOPS remote CAMA • TOPS robustness • TOPS service billing • TOPS yr2000 • TOPS/carrier interworking • TOPS06 robustness • Table LATANAME expansion • Table TOPSDISP expansion • Two-digit ANI ID • XA-core analysis and preparation Additional functionality enabled by table TOPSFTR: • Country direct • Operator centralization increment • Operator centralization • Estimate of charges	

Table 4. OSB00101 (Continued)

Order code and function name	Description	Dependencies
	• Message delivery service • Music and announcements in queue • Pre-paid coin • QMSCASE • QMS billing satisfied • TOPS on/off switch	
OSB00102 OPP Over IP	Voice and data over IP for OPP positions NOT ORDERABLE IN RELEASE 15	OSB00102

Table 5 maps the old ADVQ and EWSS SOC IDs to OSB00101 in Release 15. The ADVQ and EWSS functional groups are eliminated in Release 15, and their SOC ID are included in the Operator Services Basic functional group. Some of these features are determined by table TOPSFTR.

Table 5. Old and new OSB, ADVQ, and EWSS SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
OSB00001	Operator Services Basic	OSB00101	Operator Services Basic
ADVQ0001	Advanced Queuing	OSB00101	Operator Services Basic
ADVQ0002	TOPS Closedown	OSB00101	Operator Services Basic
ADVQ0003	Host QMS	OSB00101	Operator Services Basic
ADVQ0004	Remote QMS	OSB00101	Operator Services Basic
ADVQ0005	Host/Remote Networking by Queue Type	OSB00101	Operator Services Basic
ADVQ0006	QMS Customer Assistance Service Enhancements (CASE)	OSB00101	Operator Services Basic (Table TOPSFTR)
ADVQ0007	QMS Queue by Billing Satisfied Directory Assistance Enhancements	OSB00101	Operator Services Basic (Table TOPSFTR)
ADVQ0008	Music and Announcement in Queue	OSB00101	Operator Services Basic (Table TOPSFTR)
ADVQ0009	Host/Remote Queuing	OSB00101	Operator Services Basic
EWSS0001	Enhanced Workstation Services	OSB00101	Operator Services Basic
EWSS0002	Auto OIA Session Start	OSB00101	Operator Services Basic
EWSS0003	TOPS DA Subtending TMS	OSB00101	Operator Services Basic
EWSS0004	TOPS Open Position Protocol	OSB00101	Operator Services Basic
EWSS0005	TOPS Increased Multiplexing	OSB00101	Operator Services Basic
EWSS0006	TMS Networking	OSB00101	Operator Services Basic
EWSS0007	Prepaid Coin Overtime	OSB00101	Operator Services Basic

4.1.3 Alternate Billing Service (ABS0101)

Functional group ABS00101 provides for alternate billing methods such as calling cards, credit cards, third numbers, or collect. To use this functional group, you must have functional group OSB00101. In TOPS15, the ABS functional group was completely collapsed from 14 SOC options to one.

Table 6 describes functional group ABS00101.

Table 6. ABS0101

Order code and function name	Description	Dependencies
ABS00101 Automated Alternate Billing Service (AABS)	Basic Alternate Billing Service functionality: • Automated alternate billing services (AABS) • Operator hand-off to AABS • Account code billing • French/English AABS • AABS call screening • AABS enhanced services TOPS directory number call screening Additional functionality enabled by table TOPSFTR: • Authorization code billing • Automated room and authorization number collection • Calling card denial reason • Commercial credit card support • Disallowed card issue • Originating line number screening	OSB00101

Table 7 maps the old AABS SOC IDs to new ones in Release 15.

Table 7. Old and new AABS SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
ABS00001	Alternate Billing Service	ABS00101	AABS
ABS00002	Automated Alternate Billing Services (AABS)	ABS00101	AABS
ABS00003	Operator Hand-Off to AABS	ABS00101	AABS
ABS00004	Account Code Billing	ABS00101	AABS
ABS00005	French/English AABS	ABS00101	AABS
ABS00006	AABS Call Screening	ABS00101	AABS
ABS00007	TOPS Directory Number Call Screening	ABS00101	AABS

Table 7. Old and new AABS SOC IDs (Continued)

ABS00008	TOPS Commercial Credit Card Validation	ABS00101	AABS (Table TOPSFTR)
ABS00009	Automated Room and Authorization Number	ABS00101	AABS (Table TOPSFTR)
ABS00010	Calling Card Denial Reason	ABS00101	AABS (Table TOPSFTR)
ABS00011	AABS Enhanced Services Access	ABS00101	AABS
ABS00012	Originating Line Number Screening (OLNS)	ABS00101	AABS (Table TOPSFTR)
ABS00013	TOPS Authorization Code	ABS00101	AABS (Table TOPSFTR)
ABS00014	Disallowed Card Issue	ABS00101	AABS (Table TOPSFTR)

4.1.4 Enhanced Services (ENSV0101)

Functional group ENSV0101 consists of enhancements to TOPS services and is the foundation for all switch-based operator services. To use this functional group, you must have functional group OSB00101. In TOPS15, the ENSV functional group was collapsed from 18 to seven options.

Table 8 describes the functions you can order if you have functional group ENSV0101.

Table 8. ENSV0101

Order code and function name	Description	Dependencies
ENSV0101 Enhanced Services Base	Placeholder for the functional group.	OSB00101
ENSV0102 Automated Coin Toll Service (ACTS)	Uses digital recorded announcement machines (DRAMs) and coin detection circuits to automate coin collection. Includes coin phone testing.	ENSV0101
ENSV0103 External Rater Interface	External rater interface -- provides an interface between the switch and an external rating device for more flexibility in screen and rating interLATA and inter-zone calls. Includes the service provider ID (SPID) to the external rater interface and the release link trunking functions that support billing for card services. Seconds-based announcements for external rating--provides the ability to play collection or time and charges announcements in sub-minute increments for calls from coin phones.	ENSV0101
ENSV0104 OLNS Foreign Language	Uses the OLNS foreign language indicator to set the front-end language for automated prompts and operator queuing.	ENSV0101
ENSV0105 OLNS Support for No Automation	Enables service providers to offer specific subscribers direct connection to a live operator and no handoff to an automated service.	
ENSV0106 IN Interworking	Allows TOPS to bridge temporarily into an intelligent network (IN) service call to provide an operator backup platform.	
ENSV0107 TOPS IP Operator Centralization	Enables operator centralization to be handled over a managed IP network. ORDERABLE FOR NORTH AMERICA ONLY	ENSV0101

Table 9 maps the old ENSV SOC IDs to new ones in Release 15.

Table 9. Old and new ENSV SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
ENSV0001	Enhanced Services	ENSV0101	Enhanced Services
ENSV0002	Automated Coin Toll Service (ACTS)	ENSV0102	Automated Coin Toll Service (ACTS)
ENSV0003	TOPS Alternate Announcement	OSB00101	Operator Services Basic
ENSV0004	Screened Service Routing	OSB00101	Operator Services Basic
ENSV0005	External PARS	OSB00101	Operator Services Basic
ENSV0006	Two-digit ANI-TOPS Office	OSB00101	Operator Services Basic
ENSV0007	Prepaid Coin Overtime	OSB00101	Operator Services Basic (Table TOPSFTR)
ENSV0008	Enhanced TOPS Operator Centralization	OSB00101	Operator Services Basic
ENSV0009	External Rater Interface	ENSV0103	External Rater Interface (Table TOPSFTR)
ENSV0010	Country Direct Billing Service	OSB00101	Operator Services Basic (Table TOPSFTR)
ENSV0011	Enhanced Operator Centralization, Increased Remote Support	OSB00101	Operator Services Basic
ENSV0013	Busy Detect for Message Delivery Service	OSB00101	Operator Services Basic (Table TOPSFTR)
ENSV0018	Estimated Call Charges	OSB00101	Operator Services Basic (Table TOPSFTR)
ENSV0021	OLNS Foreign Language	ENSV0104	OLNS Foreign Language (Table TOPSFTR)
ENSV0022	OLNS Support for No Automation	ENSV0105	OLNS Support for No Automation (Table TOPSFTR)
ENSV0023	TOPS IN Backup	ENSV0106	IN Interworking (Table TOPSFTR)
ENSV0025	Seconds-Based Announcements	ENSV0103	External Rater Interface (Table TOPSFTR)
ENSV0026	TOPS-IP Operator Centralization	ENSV0107	TOPS-IP Operator Centralization

4.1.5 Global Operator Services (GOS00101)

Functional group GOS00101 consists of software for TOPS switches outside North America that is functionally incompatible with North American software. Support for TOPS operator positions requires EWSS0101 and EWSS0103. To use this functional group, you must have functional group OSB00101. In TOPS15, the GOS functional group was collapsed from four SOC options to three.

Table 10 describes the functions you can order if you have functional group GOS00101.

Table 10. GOS00101

Order code and function name	Description	Dependencies
GOS00101 Base Global Operator Services	Placeholder for the functional group	OSB00101
GOS00102 GOS GOSS7 Signalling	GOSS7_ETSI: Provides direct connectivity from a European Telecommunications Standard Institute ISDN user part (ETSI-ISUP) trunk. GOSS7_ANSI: Provides American National Standards Institute (ANSI) connectivity to the TOPS position.	GOS00101
GOS00103 GOS Competitive Access	Allows TOPS to support non-North American equal access processing.	

Table 11 maps the old GOS SOC IDs to new ones in Release 15.

Table 11. Old and new GOS SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
GOS00001	GOS	GOS00101	GOS GOSS7 ETSI Signaling
GOS00004	GOS GOSS7 ANSI Signaling	GOS00102	GOS GOSS7 ETSI Signaling (Table TOPSFTR)
GOS00005	GOS GOSS7 ETSI Signaling	GOS00102	GOS GOSS7 ETSI Signaling (Table TOPSFTR)
GOS00006	Global Competitive Access	GOS00103	GOS Competitive Access (Table TOPSFTR)

4.1.6 Operator Services System AIN (OSAN0101)

Functional group OSAN0101 supports basic Advanced Intelligent Networking (AIN) capabilities in the Intelligent Services Environment (ISE). To use this functional group, you must have functional group OSB00101. In TOPS15, the OSAN functional group was collapsed from eight SOC options to three.

Table 12 describes the functions you can order if you have functional group OSAN0101.

Table 12. OSAN0101

Order code and function name	Description	Dependencies
OSAN0101 OSSAIN Base	• OSSAIN initial release, which supports additional AIN capabilities in the operator services environment, including TOPS Programmable Switch data communications. Enables development of third-party services external to the TOPS switch through the OAP protocol. • OSSAIN release 07, which introduces key AIN principles that work with TOPS capabilities, including node centralization and switch support of FCC requirements for local competition, such as local number portability (LNP), release link trunking (RLT), and service provider ID (SPID). • OSSAIN release 09, which expands AIN capabilities such as unbundling features, three-way conferencing, and connection to broadcast trunks.	
OSAN0102 OSSAIN Enhancements	• OSSAIN release 10, which provides event data about OSSAIN agents and call queues driving off-board reporting facilities and real-time displays. Addresses the transport method used to export event data. Allows OSSAIN to support International Inbound Country Direct by sending calls directly to the service node to collect the terminating number and billing information while bypassing the operator. Generates AMA records to show the originating country, terminating domestic number or country code and the alternate billing information. Assigns a service node (SN) to override switch translations and screening. • OSSAIN release 11, which allows the OSSAIN SN to override the translations route specified by the switch, expands the number of digits in a directory number that the SN sends to the switch, enhances the connection capabilities, and refines QMS call types for routing.	

Table 12. OSAN0101 (Continued)

Order code and function name	Description	Dependencies
	• OSSAIN release 12, which allows the following: common assignment of a trigger profile index for TOPS and OSSAIN calls; SNs and operator terminals to limit the number of operator handoffs to an SN for a call; transmission of the called number to the DS for OSSAIN DA calls; selection of the called or calling party in table OATLKPRF for triggering on the * or # digit during the talking state; triggering on the * or # digit in table OAVLMAP when the calling party listens over a broadcast link; OSNM voice links to be two-way so either end can detect remote make bus; service nodes to enable or disable calling number delivery locking on a call and to request generation of an AMA record when the forward party is connected. Supports special location routing number services.	
OSAN0103 OSSAIN Session Pricing	Allows OSSAIN features to be priced on a per-session as well as a per-message basis.	

Table 13 maps the old OSAN SOC IDs to new ones in Release 15.

Table 13. Old and new OSAN SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
OSAN0001	OSSAIN	OSAN0101	OSSAIN Base
OSAN0002	OSSAIN Initial Release	OSAN0101	OSSAIN Base (Table TOPSFTR)
OSAN0003	OSSAIN NA007 Enhancements	OSAN0101	OSSAIN Base (Table TOPSFTR)
OSAN0004	OSSAIN NA009 Enhancements	OSAN0101	OSSAIN Base (Table TOPSFTR)
OSAN0005	OSSAIN NA010 ENhancements	OSAN0102	OSSAIN Base (Table TOPSFTR)
OSAN0006	OSSAIN NA011 Enhancements	OSAN0102	OSSAIN Base (Table TOPSFTR)
OSAN0007	OSSAIN NA012 Enhancements	OSAN0102	OSSAIN Base (Table TOPSFTR)
OSAN0100	Session Pricing for OSSAIN	OSAN0103	OSSAIN Base

4.1.7 Operator Services Directory Assistance (OSDA0101)

Functional group OSDA0101 consists of the switch software that supports directory assistance and related services. To use this functional group, you must have functional group OSB00101 and EWSS0101. In TOPS15, the OSDA functional group was collapsed from seven SOC options to two.

Table 14 describes the functions you can order if you have functional group OSDA0101.

Table 14. OSDA0101

Order code and function name	Description	Dependencies
OSDA0101 Directory assistance base	Gives the caller the option of automatically completing a DA call to the requested number, for a fee, which can be station-paid or billed alternatively. Basic functionality: • Automated DA service (ADAS), which automates the greeting and inquiry portions of a DA call, saving an average of 2-4 seconds of operator work time. • DA Automation Interface (ADAS Plus), which provides an interface between the TOPS switch and the Network Applications Vehicle (NAV) for evolution of the ADAS application. • LPP/APU support, which provides UNIX and resource management support for link peripheral processor (LPP)-based and application processing unit (APU)-based products, such as ADAS Base.	OSB00101
OSDA0102 Directory assistance call completion,	Gives a subscriber who changes a phone number the option of having calls to the old number automatically completed to the new number. Basic functionality: • Automatic DA call completion (ADACC) with alternate billing • Automated intercept call completion (AINTCC), which gives a subscriber who changes a phone number the option of having calls to the old number automatically completed to the new number.	OSDA0101
	Additional functionality enabled by table TOPSFTR: • Cellular automatic DA call completion, which extends automatic call completion capabilities to include calls from cellular, inter-exchange, and local exchange carriers.	

Table 15 maps the old OSDA SOC IDs to new ones in Release 15.

Table 15. Old and new OSDA SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
OSDA0001	Operator Services Directory Assistance	OSDA0101	Directory Assistance Base
OSDA0002	Automated DA Call Completion with Alternate Billing (ADACC)	OSDA0102	Directory Assistance Call Completion
OSDA0003	Automated Intercept Call Completion (AINTCC)	OSDA0102	Directory Assistance Call Completion
OSDA0004	Automated Directory Assistance Service (ADAS)	OSDA0101	Directory Assistance Base
OSDA0005	Cellular/IXC/LEC ADACC Enhancements	OSDA0102	Directory Assistance Call Completion (Table TOPSFTR)
OSDA0006	DA Automation Interface	OSDA0101	Directory Assistance Call Completion
OSDA0008	Link Peripheral Processor/Application Processing Unit (LPP/APU) Support	OSDA0101	Directory Assistance Base

4.1.8 Operator Services Equal Access (OSEA0101)

Functional group OSEA0101 consists of switch software that supports operator services in the Equal Access environment. This functional group includes feature group B (FGB) and feature group D (FGD) carrier code expansion. To use this functional group, you must have functional group OSB00101. In TOPS15, the OSEA functional group was collapsed from 13 SOC options to four.

Table 16 describes the functions you can order if you have functional group OSEA0101.

This functional group is available to North American customers only.

Table 16. OSEA0101

Order code and function name	Description	Dependencies
OSEA0101 TOPS equal access base	Basic functionality • TOPS InterLATA Carrier Service (TICS), which allows the TOPS switch to provide operator services for inter-exchange carriers. • EAOSS signaling, which provides the ability to implement EAOSS as defined by Bellcore, for maximum trunk efficiency. • EAFGD/COMFGD signaling, which enhances TICS with the ability to modify, based on dialed digits, the carrier associated with a call. Additional functionality enabled by table TOPSFTR: • IntraLATA preferred interexchange carrier (PIC) through OLNS, which, for 0- calls, enables the TOPS office to perform intraLATA screening and carrier selection, using data from the Originating Line Number Screening (OLNS) database. • Canadian equal access, which allows display of the subscriber's pre-subscribed carrier on the TOPS operator terminal in Canada. Adds the capacity to provide music and announcements while calls in queue await operator services. • Flexible automatic number indicator (ANI), which allows the TOPS switch to forward to the carrier the automatic number indicator (ANI) ID digits received from the end office. Enables carriers to comply with and benefit from FCC regulations requiring compensation of pay phone service providers on a per-call basis in the absence of an existing service agreement. Ensures that TOPS LNP adheres to the Illinois Commerce Commission (ICC) LNP requirements and meets future LNP requirements as defined in Bellcore specification GR 2936.	OSB00101 ABS00101

Table 16. OSEA0101 (Continued)

Order code and function name	Description	Dependencies
OSEA0102 TOPS ISUP signaling	Functionality enabled by table TOPSFTR: • ISUP for TOPS, which provides support for TOPS calls over ISUP trunks. • OSS7 OSNC, which supports Common Channel Signaling No. 7 (CCS7) for operator services. • Release Link Trunking (RLT) for ISUP, which allows the TOPS switch to release ISUP connections into a DMS-250 UCS carrier network, giving service providers greater efficiency by maximizing trunk use. • RLT2 for ISUP, which adds calling card services to the TOPS carrier RLT capabilities.	OSEA0101
OSEA0103 Local Number Portability	Functionality enabled by table TOPSFTR: • Number portability, which enables the TOPS switch to forward to the carrier the ANI ID digits received from the end office. Allows service providers to comply with LNP regulatory requirements with minimal impact on operator services and revenue-generating features. • Bellcore number portability, which ensures that TOPS LNP adheres to the Illinois Commerce Commission (ICC) LNP requirements and meets future LNP requirements as defined in Bellcore specification GR 2936.	OSEA0101 LNP00100

Table 17 maps the old OSEA SOC IDs to new ones in Release 15.

Table 17. Old and new OSEA SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
OSEA0001	Operator Services Equal Access	OSEA0001	Operator Services Equal Access
OSEA0002	TOPS InterLATA Carrier Service (TICS)	OSEA0001	TOPS Equal Access Base
OSEA0003	Exchange Access Operator Services Signaling (EAOSS)	OSEA0001	TOPS Equal Access Base
OSEA0004	TOPS Incoming Feature Group D (FGD) Signaling	OSEA0001	TOPS Equal Access Base
OSEA0005	Operator Services CCS7 Signaling (OSS)	OSEA0102	TOPS ISUP Signaling (Table TOPSFTR)
OSEA0006	TOPS IntraLATA PIC via OLNS Presubscription	OSEA0101	TOPS Equal Access Base (Table TOPSFTR)
OSEA0007	TOPS Carrier Release Link Trunking	OSEA0102	TOPS ISUP Signaling (Table TOPSFTR)
OSEA0008	TOPS Local Number Portability	OSEA0103	Local Number Portability (Table TOPSFTR)
OSEA0009	TOPS Carrier Release Link Trunking II	OSEA0102	TOPS ISUP Signaling (Table TOPSFTR)
OSEA0010	TOPS Bellcore Local Number Portability	OSEA0103	Local Number Portability (Table TOPSFTR)
OSEA0011	Canadian Equal Access (for Canada) Music in Queue	OSEA0101	Canadian Equal Access (Table TOPSFTR)
OSEA0012	TOPS Flex ANI Bellcore Local Number Portability	OSEA0101	TOPS Equal Access Base (Table TOPSFTR)
OSEA0013	OSNC signaling	OSEA0101	TOPS Equal Access Base (Table TOPSFTR)

4.1.9 Unbundling (UNBN0101)

Functional group UNBN0101 includes the various methods of obtaining service provider ID (SPID) and automatic message accounting (AMA) capability. To use this functional group, you must have functional group OSB00101. In TOPS15, the UNBN functional group was collapsed from seven SOC options to three.

Table 18 describes the orderable functions within functional group UNBN0101.

Table 18. UNBN0101

Order code and function name	Description	Dependencies
UNBN0101 Unbundling base	Functionality enabled by table TOPSFTR: • Unbundling translations through SPID, which adds SPID to the translations and routing capability, allowing TOPS to support mixed service provider call traffic (TOPS calls that do or do not require service provider processing). Supports Telecom Reform Act requirements for SPID. • Unbundling SPID in the management information services (MIS) stream, which updates the QMS MIS protocol to include queuing and operator statistics in support of unbundling. Enhances the ability to distinguish interactions between interLATA or inter-zone carriers and local service providers. • Call restrictions for wholesaling, which provides the ability to screen billing types on calls routing through TOPS offices by incoming trunk group, assigned carrier, or SPID, as well as by directory number. • Screening for billing agreement, which screens for a billing agreement between the service provider of the calling party and that of the billed-to party.	OSB00101
UNBN0102 Queuing by SPID	Functionality enabled by table TOPSFTR: • Unbundling refinement for SPID, which adds SPID to the queuing criteria for QMS.	UNBN0101
UNBN0103 Branding by SPID	Functionality enabled by table TOPSFTR: • Unbundling branding through SPID, which adds SPID to the translations and routing capability, allowing TOPS to support mixed service provider call traffic (TOPS calls that do or do not require service provider processing). Supports Telecom Reform Act requirements for SPID.	UNBN0101

Table 19 maps the old Unbundling SOC options map to new ones in Release 15.

Table 19. Old and new Unbundling SOC IDs

Release 14 SOC ID	Name	Mapped to Release 15 SOC ID	Name
UNBN0001	Unbundling	UNBN0101	Unbundling Base
UNBN0002	QMS Queuing	UNBN0102	Queuing by SPID (Table TOPSFTR)
UNBN0003	Translations and Routing	UNBN0101	Unbundling Base (Table TOPSFTR)
UNBN0004	QMS MIS Support	UNBN0101	Unbundling Base (Table TOPSFTR)
UNBN0005	TOPS SPID Branding	UNBN0103	Branding by SPID (Table TOPSFTR)
UNBN0006	Unbundling Call Restrictions for Wholesaling	UNBN0101	Unbundling Base (Table TOPSFTR)
UNBN0007	Screening for Billing Agreement	UNBN0101	Unbundling Base (Table TOPSFTR)

4.1.10 Ordering TOPS CM

NT-ACCESS and the NT86*xx* series questionnaires can help you formulate a procedure for tracking and administering a DMS-100 Family switch. The knowledge that you gain from these tools increases your ability to provision memory in DMS-100 Family switches equipped with either an NT40 central control complex or a DMS-SuperNode. It can also aid in planning the transition from NT40 to DMS-SuperNode.

4.1.10.1 Using NT-ACCESS

NT-ACCESS is an automated tool for provisioning and pricing the components of the DMS-100 Family of switches. The DMS-100 Family order capture document, NT8630, is the primary document that you use with this system to provision the DMS-100 Family of switches. The questions allow the NT-ACCESS programs to provision the feature packages that meet the requirements of your office configuration.

4.1.10.2 Using NT86*xx* series questionnaires

The NT86*xx* series of on-line questionnaires within NT-ACCESS help you determine what your operating company needs in a DMS-100 Family switch, based on present and projected traffic within each office. These questionnaires determine the provisioning requirements of a new DMS switch or an upgrade. The questionnaires cover the entire profile of the operating office and help you plan for future needs.

4.2 TOPS IWS software

The TOPS IWS software consists of the following applications:

- TOPS IWS base human machine interface (HMI)
- IWS Billing (formerly NTOA/NTOA Plus)
- TOPS IWS Nortel Networks Directory Assistance (NTDA)
- TOPS IWS InfoAgent client
- TOPS IWS Open Information Access (OIA)

The InfoAgent client replaces the Enhanced Information Services client, providing similar, but improved, functionality.

You always install the base HMI and IWS Billing. You can install NTDA, the InfoAgent client, and OIA on the same positions. Or you can use separate positions for operator assistance and directory assistance. You can install OIA with operator assistance, directory assistance, or both.

Chapter 6.0, “TOPS IWS applications,” provides an overview of each of these applications.

4.2.1 Base HMI

The TOPS IWS base HMI is required for all other applications. It provides the underlying user interface for operator positions.

4.2.2 IWS Billing

The IWS Billing application provides the user interface for operator assistance calls, which are also known as toll and assistance calls. This application handles billing and connects calls. It can also be used to access an external database that provides account codes, voice mail message waiting indication, speed dial access, calling restrictions, and access to other services.

4.2.3 NTDA

The TOPS IWS NTDA application provides integrated directory assistance and intercept services through the Nortel Networks Directory and Operator Services (D & OS) databases.

4.2.4 EISAC

The TOPS IWS EISA client application is an interface between the operator position and the internet, so the operator has the ability to provide a caller with information as diverse as airport delays, stock quotes, restaurant reviews, and phone numbers.

4.2.5 OIA

The TOPS IWS OIA application provides reference data such as emergency number information, rate and route information, phraseology, and city name to numbering plan area (NPA) translations through an external database.

4.2.6 Provisioning position software

Position software for TOPS IWS is delivered on 3.5-inch diskettes for personal computers. A version number on the load diskette set indicates the revision level. Each software package on the diskettes is also assigned a version number. When any software package version is changed, the revision level of the diskette set is increased. Positions on any given local area network (LAN) can support different applications.

5.0 TOPS CM functions

This chapter provides an overview of the major TOPS functions located in the computing module (CM). For feature information to help prepare for a TOPS CM software load or to understand elements of the software, refer to the *Feature Description Manual*. For guidelines for the preparation, datafill, and validation activities associated with the DMS TOPS software functional groups, refer to the *Translations Guide* or contact your Nortel Networks representative.

TOPS provides services that assist the subscriber in making long distance or toll calls. Operator assistance (IWS Billing) is the basic service provided. The operator can also provide directory assistance and intercept service (NTDA) from the same position, as well as open information access (OIA) service to an external database. For details about operator functions, refer to *TOPS IWS Operator Guide*, 297-2251-304.

An operator can assist subscribers in completing 0, 0+, and 1+ calls from various types of telephone stations and can perform the following functions:

- initiate outgoing calls to a subscriber or to an operator in another office (known as an inward call)
- transfer a call to another operator
- provide assistance for emergency calls
- assist subscribers with completing calls
- assign proper billing to subscriber calls
- make credit adjustments
- collect and return coins for calls billed to coin stations
- perform busy line verification upon subscriber request
- request assistance from the service assistant or in-charge manager
- answer pages sent by the service assistant or in-charge manager
- issue trouble reports for service difficulties

5.1 Operator Services Basic (OSB00101)

Operator Services Basic consists of DMS TOPS switch software that is fundamental to all operator services or that is widely used. OSB00101 provides services such as basic queuing and toll and assistance. Customers who purchase the Operator Services Basic functional group have the right to use all functions in the group.

In addition to operator assistance functions, the operator can also provide directory assistance and intercept services from a single TOPS IWS position. As new services are developed, they can also be integrated into the TOPS IWS system. The datafill in the translations determines the services an operator can provide and the services a TOPS IWS position can handle.

In Release 15, OSB00101 contains all the functionality previously contained in the Advanced Queuing functional group (ADVQ0001), including all the software for the Queue Management System (QMS). The advanced queuing function provides operator centralization, host/remote networking by queue type, and queue management.

OSB00101 also contains the functionality previously provided by Enhanced Workstation Services Software (EWSS). Until Release 15, all software that allows the DMS switch to communicate with TOPS IWS operator positions, such as Open Position Protocol (OPP), was contained in EWSS0001.

Software formerly located in EWSS also allows a network provider to initiate open information access (OIA) sessions automatically, based on call information. The OIA interface permits direct connection to an OIA-compliant database, such as an operator reference database, from a TOPS IWS position. Using the OIA interface to provide on-line access to the reference database, the operator can access data such as dialing instructions, rating information, emergency numbers, or city-to-NPA conversion information, directly from the TOPS IWS position.

5.1.1 Operator centralization

With operator centralization (OC), you can provide operator services for several offices from one central location. Figure 23 shows an example of an office configuration.

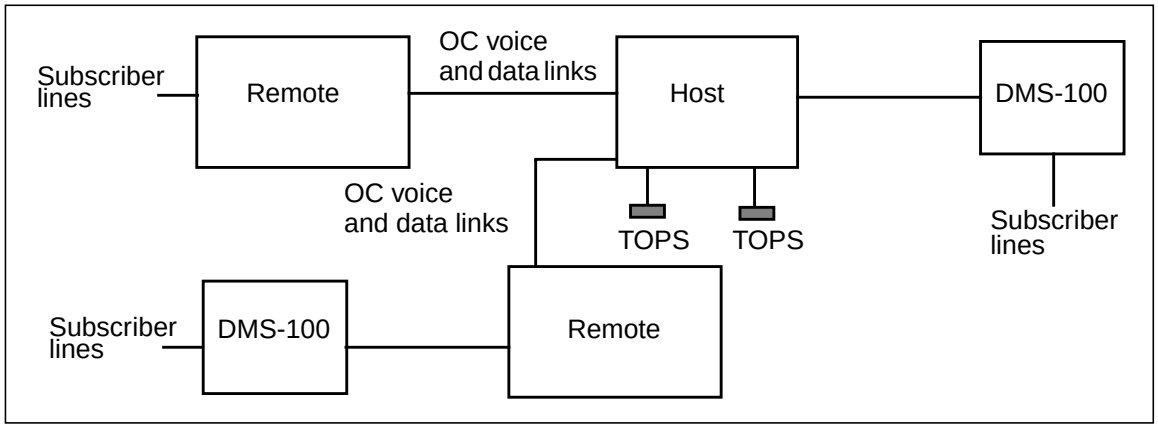

Figure 23. OC system architecture

Operator centralization establishes voice and data communication links between remote offices and the host office. Data links provide a messaging mechanism for the two switches during call progression. Tasks are divided between the two switches in such a way that most of the work (that is, real-time intensive tasks) is done by the remote switch. The remote switch processes calls and executes the operator key functions. The host switch sends messages to the remote switch indicating which operator keys are pressed, and it updates the operator screen in response to messages from the remote switch.

The voice links allow the operator's voice to be connected into the call circuits at the remote switch. Each call must have a dedicated voice link while the operator services the call.

When a subscriber originates a call, the remote switch assigns a virtual circuit to the call. A virtual circuit is a logical identifier that links calls in the host and remote switches. When a virtual circuit is allocated, it is assigned a physical data link number. The remote switch then sends a request for an operator to the host switch over the data link using the assigned virtual circuit.

When it receives the request for an operator, the host switch obtains an idle operator. Then it sends a message to the remote switch over the data link to indicate that an operator position has been obtained. The host switch gives the remote switch the position type and the position controller type. This information determines whether the remote switch sends TOPS IWS commands to the host switch, because the host switch is likely to have a mix of position types.

The remote switch stores this position information for the duration of the call and uses it to send and process messages and commands correctly for the appropriate position type. The call is then handled by the remote switch, which sends messages over the data link to the host switch telling it what to display at the operator position handling the call. The host switch then updates the operator position as directed by the remote switch.

When the operator releases the call from the position, a direct connection is made between the calling and called trunks, and a release message is sent from the remote to the host switch. The host switch releases the position and sends a message to the remote switch indicating that resources have been released. The remote switch then releases the virtual circuit.

5.1.2 Host/remote networking by queue type

With host/remote networking by queue type, you can network calls to different operator centralization host switches, based on a call's queue assignment. This feature allows

- a remote switch to use up to four different hosts simultaneously, based on queue type
- a switch with stand-alone and remote software packages to function simultaneously as a stand-alone and remote switch
- a switch with host and remote software packages to function simultaneously as a host and remote switch
- a switch with stand-alone, host, and remote software packages to function simultaneously as a stand-alone/host and remote switch
- a remote switch to use an alternate host when the primary host is unavailable. This ability exists on a queue basis.
- selective interaction with operator centralization night closedown
- a call that is transferred from one queue to another to be transferred from one switch to another

You can segregate operator centralization operational measurements (OM) on a switch basis. You can also segregate operator centralization operational measurements on a queue basis and specify the number of calls deflected to an alternate host.

An AMA record billable to the calling subscriber is generated in the originating end office when the call is successfully completed and one of the two parties goes on-hook. Two AMA records are generated in the TOPS IWS office.

5.1.3 Queue Management System

QMS manages call and agent queues. It provides support for basic periodic force management reports, which you can activate and deactivate as needed. It can also supply music and announcements while a call is waiting in queue. *TOPS IWS Force Management Guide*, 297-2251-313, describes how to use QMS.

With QMS, you can segregate traffic across the 255 queues by such criteria as

- class of service
- restricted
- prefix dialing
- inter-LATA or inter-zone carrier
- called digits
- time of day
- originating area language
- automated service

QMS integrates absolute priority queueing of operators with assignable grade of service, on an operator profile basis. You can assign primary and secondary responsibilities for QMS operators. For example, one group of operators might provide directory assistance as a primary responsibility but help with toll and assistance when required.

5.1.3.1 Force management

The term *force management* refers to all the functions and responsibilities associated with managing an operator work force. Effective force management provides information used for allocating the number of operators needed to handle traffic during each quarter-hour of each day throughout the year. It also monitors the quality of the service being provided.

The force management component of QMS receives a continuous stream of event-driven messages from the call and agent manager. The force management component is responsible for

- interpreting the messages it receives
- accumulating the statistics corresponding to the reported events
- driving real-time displays based on these statistics

You can display these statistics in traditional reporting formats. QMS reports are printed on the QMS mechanized force administration data system (QMFADS) device. The QMFADS uses data from the DMS switch to calculate service and work force statistics. The statistical summaries of operator activity determine the number of operators required.

For detailed information about TOPS IWS force management, refer to *TOPS IWS Force Management Guide*, 297-2251-313.

5.1.3.2 QMS MIS interface

Basic QMS force management devices, report formats, and data are fixed for all offices. A TOPS office can customize its force management system, however, through the QMS management information system (MIS) interface and an external vendor's force management software. For example, you might use the QMS MIS interface to generate graphical instead of numerical reports, to generate reports on a flexible basis instead of every half hour or 15 minutes, or to create new types of force management devices.

Real-time and periodic reports are calculated from the same set of base queue and operator events. With the QMS MIS interface, the DMS switch gives an external vendor the information about these base events, continuously and within a few seconds of the event. The external vendor can then choose which statistics and reports to generate.

5.1.4 QMS Customer Assistance Service Enhancements

QMSCASE allows selected QMS operators, called customer service experts (CSE), at general operator positions to have functionality historically associated with service assistance (SA) and in-charge (IC) operators and positions. With QMSCASE software in the position and the DMS switch, the SA and IC positions can be eliminated, and the SA and IC operators can be datafilled as QMS operators with special capabilities. More experienced general operators can be datafilled to handle assistance requests, without giving them access to full SA functionality.

An enhancement to QMSCASE enables the operating company to designate certain queues as alerting queues. This feature can be used to give assistance queues priority over subscriber call queues. Datafilling call queues in this way ensures that an operator who handles both assistance requests and subscriber calls will always get queued assistance requests before new subscriber calls.

5.1.5 Extended Bellcore AMA format

Extended Bellcore AMA format provides call record information for AMA billing records by implementing structure codes and by appending modules containing additional call record information to the AMA record. Call type codes indicate the general service received for a call. Extended Bellcore AMA format can be implemented in phases.

With Extended Bellcore AMA format, you can identify AMA records to which you want to append modules on a trunk group basis. You can also use table control to append

modules to AMA records for the entire office. Extended Bellcore AMA format provides the correct billing details on DA and ADACC calls and calling cards for Consultative Committee on International Telegraphy and Telephony (CCITT). For complete details about Extended Bellcore AMA format, refer to the *Translations Guide* and to *Bellcore Format Automatic Message Accounting Reference Guide*, 297-1001-830.

5.2 Alternate Billing Service (ABS0101)

Alternate Billing Service provides for alternate billing methods such as automatic billing services, calling cards, credit cards, third numbers, or collect. With automated billing, you can verify billing for a call with minimal or no operator involvement. For example, a database can keep track of what directory numbers accept collect calls. A query to the database notifies the operator whether to place a collect call to a specific number.

5.2.1 Exchange Alternate Billing Service

Exchange Alternate Billing Service (EABS) automates the billing verification process for collect and third-number-billed calls by querying a line information database (LIDB) to determine whether billing is allowed, conditionally allowed, or not allowed. Queries are sent to the LIDB using common channel signaling number 7 (CCS7) protocol.

With EABS, you can be independent of the billing verification center (BVC). The LIDB also can provide more information about a directory number (DN) than the BVA can. For example, for a given DN, you can associate any one of the following statuses with the DN for third-number billing:

- Third-number-billed calls are not allowed to the DN at customer’s request or because of service denial.
- All third-number-billed calls are allowed to the DN.
- The operator must secure acceptance for all third-number-billed calls to the DN.
- All third-number-billed calls within a local access transport area (LATA) or zone are automatically accepted and all inter-LATA or inter-zone calls are rejected.
- All third-number-billed intra-LATA or intra-zone calls are automatically accepted and acceptance must be secured for all inter-LATA or inter-zone calls.

EABS can provide differentiation between intra-LATA (or intra-zone) and inter-LATA (or inter-zone) calls that are either billed collect or billed to a third number.

EABS performs calling card validation and billed number screening queries for automated or operator-assisted intra-LATA or intra-zone for the following services:

- Automatic Calling Card Service (ACCS), which allows subscribers to charge calls to calling cards.

- Terminating inward service, which allows an operator in one office to assist or handle calls for an operator in another office.
- Collect billing service, which allows subscribers to place calls and bill them to the called party.
- Third number billing service, which allows subscribers to place calls and bill them to a number other than the called or calling number.

The screen display notifies the operator about the status of the query. If the query indicates that all third-number-billed calls are automatically accepted by the DN, then the operator does not need to connect to the billed party to secure acceptance. The operator bills the call to the third number and connects the calling and called parties. However, EABS can also provide verification of billing acceptance by a live operator, if you specify such verification.

5.2.2 TOPS account code billing

With TOPS account code billing, a subscriber can enter an account code with the call number. TOPS enters the account code into the automatic message accounting billing record for the call. The subscriber’s bill groups all account codes together.

5.2.3 Originating Line Number Screening (OLNS)

With OLNS, you can store subscriber information in a line information database (LIDB) and for access by the DMS switch, with a CCS7 query, during call processing. The following features implement IWS support of OLNS:

- TOPS layer data for CCS7 query, response, and error handling and for associated operational measurements (OM) and logs
- TOPS layer call processing that uses restricted billing and carrier information that is returned in the OLNS database
- CI tool to launch queries to the OLNS database and display results
- code that requests an intra-LATA or intra-zone pre-subscription from the OLNS database and uses it in call processing on 0- intra-LATA or intra-zone competitive calls
- prevention of hand-off to any automated service of calls from specific customers

5.3 Enhanced Services (ENSV0101)

The Enhanced Services functional group consists of enhancements to TOPS services. It is the foundation for all switch-based operator services. Enhanced Services functions include the optional, special capabilities needed for providing services and creating new applications.

5.3.1 TOPS Personal Audio Response System

With TOPS Personal Audio Response System (PARS), an operator can play customized announcements to subscribers when a call is presented at a TOPS IWS position. The announcements are made in the operator’s own voice.

5.3.2 Coin telephone service

TOPS IWS operators can handle calls manually from coin telephones. In addition, automatic coin toll service (ACTS) allows the operating company to automate the handling of 1+ dialed calls from coin telephones. *TOPS IWS Operator Guide,* 297-2251-304, explains how operators handle coin calls.

5.3.2.1 Automatic coin toll service

With ACTS, subscribers can place 1+7- or 1+10-digit calls from coin telephone stations without operator assistance. After the subscribe enters the digits, a digital recorded announcement machine (DRAM) prompts for the necessary coin deposit. ACTS keeps a

count of the coins deposited. When the necessary deposit has been made, ACTS plays a "Thank You" announcement and outpulses the called number.

The subscriber has the option of accessing the operator at defined stages of the call. Appropriate operator displays are provided for the operator to identify calls that were initially routed to ACTS for handling.

ACTS can be provided only if the following conditions are met:

- No restrictions on automation for the subscriber

  Based on OLNS, you can identify calls from individual subscribers so that those calls cannot be handed off to any automated service.

- ACTS-compatible coin phone

  An ACTS-compatible phone is one that can generate dual-frequency coin deposit tones that the coin detection circuit can recognize. For information about defining ACTS compatibility of coin phones in datafill, refer to the *Translations Guide*.

- Successful ANI

  If an ANI failure occurs on a coin call, the call is routed to an operator for the initial contact. ACTS can handle subsequent contacts (recalls).

- Machine ratability

  If a rate step is not available for a coin call, the call is routed to an operator for initial contact. ACTS can handle subsequent contacts (recalls).

- No large charge calls

  If the cost of a coin call exceeds the coin phone hopper limit, the call is routed to an operator. The large charge limit is defined in datafill for each coin phone.

5.3.2.2 Pre-paid coin overtime

With pre-paid coin overtime, you can collect overtime charges on coin phones before the charges are incurred, saving lost revenue from customers who fail to deposit the final payment when a call is completed. If a caller fails to make a deposit or if the deposit is insufficient, the call is either routed to an operator or disconnected. Pre-paid coin overtime can function in an ACTS or non-ACTS environment.

With the pre-pay option, an announcement at the end of the initial period indicates that the call is going into overtime and that pre-payment for that period is required. When the caller deposits the coins, the call continues. If the deposit is too slow or insufficient, an announcement requests the balance due. If the caller does not make a deposit after the announcement, either the conversation between the two parties is split and then disconnected or the call is routed to an operator. If the deposit is in excess of the requested amount, the extra amount is acknowledged with an announcement, and credit is given for the next overtime period.

5.3.3 Audiogram delivery services

With audiogram delivery services, the caller can leave a message for a called party. The DMS switch determines whether a called party's line is busy or ringing with no answer. After determining that the called line is busy or network busy, the DMS switch plays an offer-of-service prompt to the audiogram delivery services subscriber, indicating the status of the called party's line.

You can datafill a timer to control the length of time of the busy tone before the busy offer-of-service prompt is played. You can also determine the length of time the subscriber has to access audiogram delivery services after hearing the busy offer-of-service prompt. It is also possible to provide bilingual prompts.

All 0- calling card calls can be eligible for audiogram delivery services.

5.3.4 Country direct service

With the country direct feature, callers in one country can use access codes to reach operators in another country in which the call is to be billed. This feature also allows operators to process country-to-country calls. For example, a caller in one country can access an operator in a second country and request a call to a third country. You can provide a separate branding announcement for country direct calls.

5.3.5 External rating system

Real-time rating is required when the charges for a TOPS call must be calculated while the call is in progress or immediately at its conclusion. The following types of calls receive real-time rating:

- calls billed to a coin phone, for which charges are collected as the call progresses
- calls billed to a hotel phone or an attendant pay station that requires a room or authorization number, for which charges are reported to a device when the call ends
- calls for which time and charges are quoted to the billed party when the call ends
- calls billed to an institutional phone that requires an authorization number, for which charges are reported to a device when the call ends

With an interface to an external real-time rating system (RTRS), you can rate calls using a rating system outside the DMS switch. When a billable call arrives at a position, the system determines whether to rate it internally or externally.

5.4 Global Operator Services (GOS00101)

Global Operator Services consists of software for TOPS switches outside North America that is functionally incompatible with North American software. GOS allows TOPS to handle international translations and modifies AMA and R1 signaling for global use. Incoming and outgoing calls are supported using fully functional CCITT R2 signaling with the DMS switch. The full range of TOPS features is available without having to use the "loop-around" method from the DMS-200 switch to the DSM-200 switch. GOS enables TOPS software to work with the TOPS message switch in a PCM30 environment.

*TOPS IWS Operator Guid*e, 297-2251-304, indicates what functions apply to GOS environments and explains how operators use the GOS functions.

5.4.1 Booking calls

If a call cannot be processed immediately, an operator can store it in the internal booked call database, either because the called party is not available or because there are insufficient network resources at the moment. The operator can also book a call if a subscriber asks to make a specific call at a specific future time.

The call can return automatically, or the operator can retrieve it manually. If the subscriber for whom the operator booked the call is speaking to another party, the operator can break in on that connection to notify the subscriber that the call is ready. The operator can mute the line so that only the subscriber hears the notification.

5.4.2 Handling chronic line trouble

If an operator anticipates that a connection will experience trouble, the operator can monitor the connection to ensure good quality service. The operator can make the connection and split from the connection to listen for any problems.

If the connection seems good, the operator can set a notification interval to check again. When the call returns, the operator's connection is muted; the operator can listen but not speak. If a problem has developed on the connection, the operator can join the connection and offer to place the call again.

5.4.3 IN fallback

The ServiceBuilder intelligent node (IN) routes a calling card call to an operator position for the conditions that your company specifies. The reasons for which your company can have IN present calls for assistance can include the following:

- The PIN is not valid.
- The calling card or directory number is suspected of a high incidence of fraud.
- The query failed.

- Screening restrictions apply.
- The call is on one inter-exchange carrier but is using a calling card that is restricted to another inter-exchange carrier.

Text, in the error text color or mode, in the message and status area indicates why the call requires assistance.

5.4.4 DN screening

With directory number (DN) screening, you can impose screening on domestic called numbers for every terminating call, except for overseas or third number calls. When the operator enters the called number at the IWS position, the switch checks the number against the datafill in table DNSCRN for attributes UNPAID and BLCKCALL. When the called number is listed in the table and has one or both of the restricted attributes, the switch indicates its status to the IWS position. The switch does not determine whether the call should be completed. Based on the indication from the switch, the operator decides to reject or complete the call.

5.4.5 Global competitive equal access

In a GOS environment, global competitive access provides the same functions that equal access provides in the North American environment. However, instead of using a local access and transport area (LATA), global competitive access can define zones. A zone can be a any area, from a city to a country to a group of countries. When a call originates in the zone served by your traffic office and terminates to a point outside the zone, it is considered an inter-zone call. Calls that originate and terminate within the same zone are called intra-zone calls. A carrier that provides inter-zone service is an inter-zone carrier (IC). TOPS IC Service (TICS) is not available in global competitive access. Section 5.7, “Operator Services Equal Access (OSEA0101),” on page 90, describes the equal access functions.

5.5 OSSAIN (OSAN0101)

Operator Services System Advanced Intelligent Network (OSSAIN) supports basic Advanced Intelligent Networking (AIN) capabilities in the Intelligent Services Environment (ISE). OSSAIN implements data communications-related functions such as the following:

- datafilling of OSSAIN nodes on the DMS switch
- message routing of Open Automated Protocol messages on the DMS switch
- usage monitoring of OSSAIN services
- Open Automated Protocol for interfacing between the DMS switch and the service node for OSSAIN

- base software architecture for OSSAIN call processing
- enabling of callflow to and from new systems and interaction with existing systems (for example, between TOPS IWS operators and OSSAIN functions provided for service nodes)
- implementation for the part of the Operating Services call model that enables TOPS calls to perform OSSAIN trigger processing
- OSSAIN routing and queuing
- OSSAIN billing
- OSSAIN operation, administration, and maintenance (OA&M)
- OSSAIN 0- automation
- ability to connect up to 1,023 calls simultaneously to a single OSSAIN voice link
- service node (SN) changing the calling party number parameter in the outgoing ISUP initial address message
- SN access to terminating trunk information through the Open Automated Protocol
- ability to trigger calls directly to an operator
- SN switching of the base service of a call from operator assistance service to directory assistance service
- variable length PINs for custom calling cards through Open Position Protocol
- ability to inform the IWS position of the original SN function provider for calls redirected to an operator when the calls cannot obtain a session with the SN

An OSSAIN Service Node can use DMS conference resources to implement three-way calling. This feature allows an SN to initiate a session with a floated call and to merge two calls. Open Automated Protocol notification timers can run while the call is connected to the SN and when the call is floated.

5.6 Operator Services Directory Assistance (OSDA0101)

Operator Services Directory Assistance consists of the switch software that supports directory assistance and related services. Operator Services Directory Assistance includes functions for both directory assistance and intercept service. *TOPS IWS Operator Guide,* 297-2251-304, explains how to use the directory assistance functions.

5.6.1 Directory assistance

Directory assistance service allows a subscriber to ask an operator to look up information from a telephone listing database. A subscriber can request directory assistance when a

telephone number is not known, when there is no ready access to a telephone book to look up the number, or when a handicap prevents the subscriber from looking up the number.

When you integrate operator assistance and directory assistance services from a single position, less equipment is required, and you can handle a larger volume of calls in the same amount of time.

Directory assistance can provide automatic DA call completion (ADACC). With ADACC, the subscriber can ask the operator to complete the call to the number provided by the directory assistance search.

Support for Directory One provides a set of NTDA search and display capabilities and performs extended searches.

5.6.2 Intercept service

With intercept service, you can provide announcements or perform database searches for telephone numbers that have recently changed or are out of service. For example, when a subscriber dials 789-1234, the following announcement is played, “The number you have dialed, 789-1234, has been changed. The new number is 789-5678.”

Handling of intercept calls is usually automated, but operator assistance is still required in some cases. For example, when the database query results in more than one directory number, the operator must ask the calling party which number is desired and connect the call.

5.7 Operator Services Equal Access (OSEA0101)

Operator Services Equal Access consists of switch software that supports operator services in the equal access environment. This functional group includes Feature Group B (FGB) and Feature Group D (FGD) Carrier Code Expansion. With TOPS equal access, you can transfer 0 calls from non-equal access end offices to specific inter-LATA carriers. The calls can be either inter-LATA or intra-LATA. Intra-LATA calls originate and terminate in the same LATA). Inter-LATA calls originate in one LATA and terminate in another. Operators can route calls to inter-LATA carriers and international carrier.

The *Translations Guide* contains the complete information about implementing TOPS equal access. *TOPS IWS Operator Guide*, 297-2251-304, explains how operators provide dialing assistance for inter-LATA and intra-LATA calls.

With equal access, you can comply with the requirement to provide subscribers with access to inter-LATA carriers and international carriers of their choice. The complete EA picture includes an equal access end office (EAEO), an access tandem (AT), and the inter-LATA and international carriers, as shown in Figure 24.

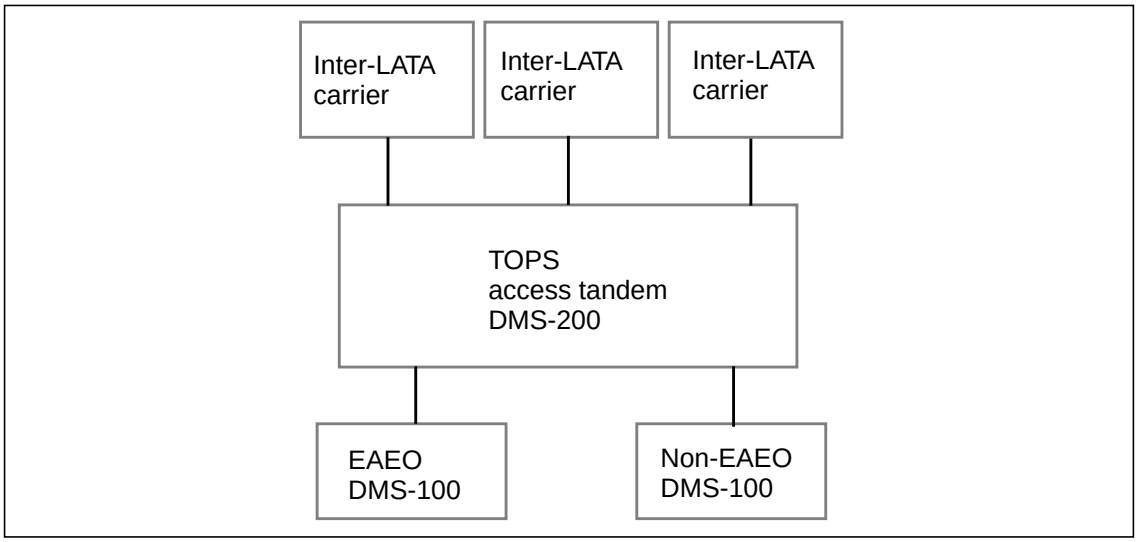

Figure 24. DMS-based EA configuration

Your operators handle the intra-LATA calls. The inter-LATA calls are routed out of the TOPS IWS office directly to the inter-LATA carrier, without involving the operators unless you provide operator service on behalf of the carrier. Refer to the *Translations Guide* for complete details about the translation of these calls.

The access tandem determines whether a call is inter- or intra-LATA in different ways, depending on the type of signaling used by the trunk group carrying the call. Typically, inter-LATA calls are routed to an inter-LATA carrier, and intra-LATA calls are routed to the operating company. When the AT determines that a call is inter-LATA, it selects the route the call will take to the carrier. To do this, the AT searches for more information about the call, such as call type and class of service. It determines this information in different ways, depending on the characteristics of the incoming trunk on which the call is carried. These characteristics include the following:

- group type: dedicated or combined
- pulse type: multifrequency or dial
- signaling type: traditional operator services signaling, interim operator services signaling, or equal access signaling.

With TOPS equal access, you can also determine handling of 0 calls. Because 0 calls are presented directly to the operator, it is not known whether they are inter- or intra-LATA. You can designate that all 0 calls be routed directly to the inter-LATA carrier's operators or to your own operators. If all 0 calls are routed to your own operator system, supporting operator displays help the operator determine the status of the call. For example, the operator can determine whether the calling party can dial an inter-LATA call directly.

TOPS equal access provides the necessary billing support for inter-LATA calls, including identifying the carrier code on AMA.

TOPS equal access supports feature group B (FGB), feature group C (FGC), and feature group D (FGD) signaling types.

5.7.1 800+E overflow call routing

Overflow call routing provides a list of alternative terminating numbers for an 800+ subscriber. If the primary DN is busy, calls can be diverted to the alternative terminating numbers. Overflow call routing applies to TOPS call terminations only over ISUP circuits. Overflow call routing supports the existing overflow call routing capability used in 800+ database query.

The following 800 service call types are affected:

- 0+ hotel and attendant pay station calls
- 1+ hotel and attendant pay station calls
- 0- calls
- 0+ ONI/automatic number identification fail (ANIF) calls
- 1+ ONI/ANIF calls

5.7.2 Equal access billing

TOPS EA provides carrier code on AMA for terminating TOPS calls, and it provides FGB call code 134.

The carrier access code (CAC) associated with an inter-LATA carrier is recorded on an AMA record for all inward service type calls (for example, verification requests and directory assistance) sent to TOPS IWS from an inter-LATA carrier. Therefore, you can charge the international carrier for services provided.

You can also generate Bellcore automatic message accounting (AMA) records (call code 134, structure code 625) for non-operator-handled feature group B (FGB) calls.

5.7.3 Exchange access operator services signaling

With exchange access operator services signalling (EAOSS), a DMS-100/200 or a DMS-200 switch can accept feature group D operator services signaling from an equal access end office, which means that you can use your trunking facilities more efficiently. EAOSS is used by operating companies that handle their own intra-LATA, corridor, and carrier traffic.

EAOSS combines your operator services traffic with non-operator traffic on a single trunk group or on a number of trunk groups. Combined traffic can fall into these categories:

- operator services traffic
- operating company traffic not requiring operator handling
- carrier traffic requiring operator services
- carrier traffic not requiring operator exchange access services
- international carrier traffic requiring operator exchange access services

- international traffic not requiring operator exchange access services

This signaling also provides the information necessary to process 0+ and 1+ calls arriving on a trunk group carrying traffic with different station classes.

EAOSS combines OSS traffic with other types of traffic on a single trunk group by giving the DMS-100/200 or DMS-200 switch these capabilities:

- accept various types of operator and non-operator traffic coming from an end office on a combined trunk group
- receive carrier information sent by the end office
- receive an indication of call origination from a dual-tone multifrequency (DTMF) or from a rotary dial station, regardless of the carrier access code (CAC) dialed

The carrier version of EAOSS, EAOSSIC, provides signaling capabilities that allow the TOPS-equipped office to receive calls using 2- and 3-stage outpulsing and to look in datafill to locate the CAC for inter-LATA calls. Calls without a valid CAC are routed to a call treatment. Intra-LATA calls use 2-stage outpulsing, and inter-LATA calls use 3-stage outpulsing.

For FGD outpulsing, ANI information digits sent to the inter-LATA carrier can indicate whether the call involved operator handling. If the inter-LATA carrier requests this indication, the trunks over which the calls arrive can be datafilled to use the ANI ID digits to indicate whether the operating company is providing operator services for the inter-LATA carrier. Otherwise, the trunks can be datafilled to pass the ANI information digits unchanged to the inter-LATA carrier.

5.7.4 TOPS inter-LATA carrier service

With TOPS inter-LATA carrier service (TICS), you can provide operator services on a contractual basis to inter-LATA carriers. TICS eliminates the need for a carrier to establish its own operator services to handle inter-LATA traffic. It also allows an operating company to handle the inter-LATA traffic for a carrier and to designate itself as a primary inter-LATA carrier.

5.7.5 Transfer to E911 with ANI forwarding

You can expedite 0- emergency calls by forwarding ANI information on the outgoing trunk connecting a TOPS IWS position to the E911 tandem. The ANI information can be used to determine the E911 attendant who receives the call and to identify the address of the calling party. A three-way voice connection is also available to allow the operator to converse with the E911 system attendant, if necessary.

5.7.6 Pre-OSS7 ISUP signalling

Calls using pre-OSS7 ISUP signalling can connect to a TOPS environment and receive operator services. The feature, called ISUP to TOPS Enhancements, also provides the following services:

- support for the conversion of ANI from an incoming multifrequency trunk to calling line identification (CLI) for an outgoing ISUP trunk with the added ability to block the calling party's number from being presented to the terminating party
- support for release of connection to a party if that party hangs up while the call is at an operator position or automated system
- expansion of support for operator assistance for ISUP
- searches in DN tables to determine calling station type and billing restrictions
- support of TOPS release link trunking, which allows a TOPS office to request an originating office to complete a call
- support for the receipt and transmission of charge number and CLI if both are received

5.7.7 TOPS authorization code screening

A subscriber is prompted for an authorization code, which can be checked against datafill and recorded in AMA. Authorization codes are either validated or non-validated. Validated codes are checked against datafill. Non-validated ones are passed to AMA. This feature does not apply to coin, hotel, or automatic room and authorization number calls.

5.7.8 Carrier release link trunking

With release link trunking, you can maximize your use of the Signaling System 7 ISUP inter-machine trunks by releasing connections between a previous Universal Carrier Switch DMS 250 and a TOPS switch. The TOPS switch uses the Universal Carrier Protocol ISUP protocol to signal call completion information to the previous office. This feature provides release link trunking to calling card services. With release link trunking, the TOPS switch provides card validation and asks the previous DMS 250 to complete the call and maintain the connection. This feature also allows sequence calls to use release link trunking.

5.8 Unbundling (UNBN0101)

Unbundling includes the various methods of obtaining service provider ID (SPID) and automatic message accounting (AMA) capability. As a result of the Telecommunications Reform Act of 1996 (TRA96), incumbent local exchange carriers (ILEC) can resell local exchange carrier (LEC) operator services to competing LEC (CLEC) providers. The process of reselling various aspects of operator services to CLECs by the ILECs is called unbundling.

The TOPS office can support service provider traffic on both combined and dedicated trunks. Unbundling provides a limited capability to translate and screen calls based on the service provider. The service provider is considered only in translations to determine the route from TOPS. Only screening based on numbering plan area (NPA), or area code, uses the service provider identification (SPID).

TOPS software supports the SPID requirements of the TRA96. Unbundling capability is included in the line information database (LIDB). TOPS QMS contains a call types for queueing (CT4Qs) table that can use the SPID in the list of criteria that operating companies use to segregate traffic.

When a call originates from a local service provider that is different from the one for which the operator works, the use of SPIDs allows operators to brand the call accurately. With local competition, subscribers of different operating companies can be affiliated with the same trunk. The SPID display is the actual local service number of the subscriber.

6.0 TOPS IWS applications

This chapter provides an overview of each of the TOPS IWS applications that Nortel Networks provides for operator positions:

- Base HMI
- IWS Billing
- NTDA
- EISAC
- OIA

Using the TOPS IWS API, you can create other applications that you can also use on TOPS IWS operator positions.

There are three types of operator positions:

- general operator position
- service assistant (SA) position
- in-charge (IC) position

A general operator position can run any of the TOPS IWS applications and handle customer calls. An SA or IC position runs the Base HMI and provides supervision and assistance for general operators but cannot handle customer calls.

If you use QMSCASE, you do not need SA or IC positions. In your datafill, you can define operators and operator positions to also have some or all the capabilities that SAs and ICs have. An operator with QMSCASE capabilities is a customer service expert (CSE). A CSE can both handle customer calls and provide supervision and assistance for other operators

The TOPS IWS system includes features for Global Operator Services (GOS), which apply only outside North America. If your company is outside North America, whether you use any or all of these features depends on how your company configures the TOPS IWS system.

6.1 Base HMI

The base HMI application controls the underlying TOPS IWS window, in which the other applications run and display their information. The base HMI application provides system and call information to the operator through windows, icons, and text. Each window consists of one or more fields that display information and receive keyboard input from the operator. The *TOPS IWS Base HMI Application Guide*, 297-2251-013, describes how to configure the base HMI for your requirements.

For general operators, communication to the DMS switch includes logon, administrative searches, accessing the position profile, accessing the operator profile, changing colors on the position, changing the password, accessing operator statistics, and accessing the menus. The *TOPS IWS Operator Guide*, 297-2251-304, explains how an operator uses the base HMI.

For CSEs, SAs and ICs, the communication also includes paging operators, querying operator and position statistics, providing operator assistance, and monitoring operators. The *TOPS IWS Force Management Guide*, 297-2251-313, explains how CSEs, SAs, and ICs use the base HMI.

Figure 25 shows the areas of the base HMI.

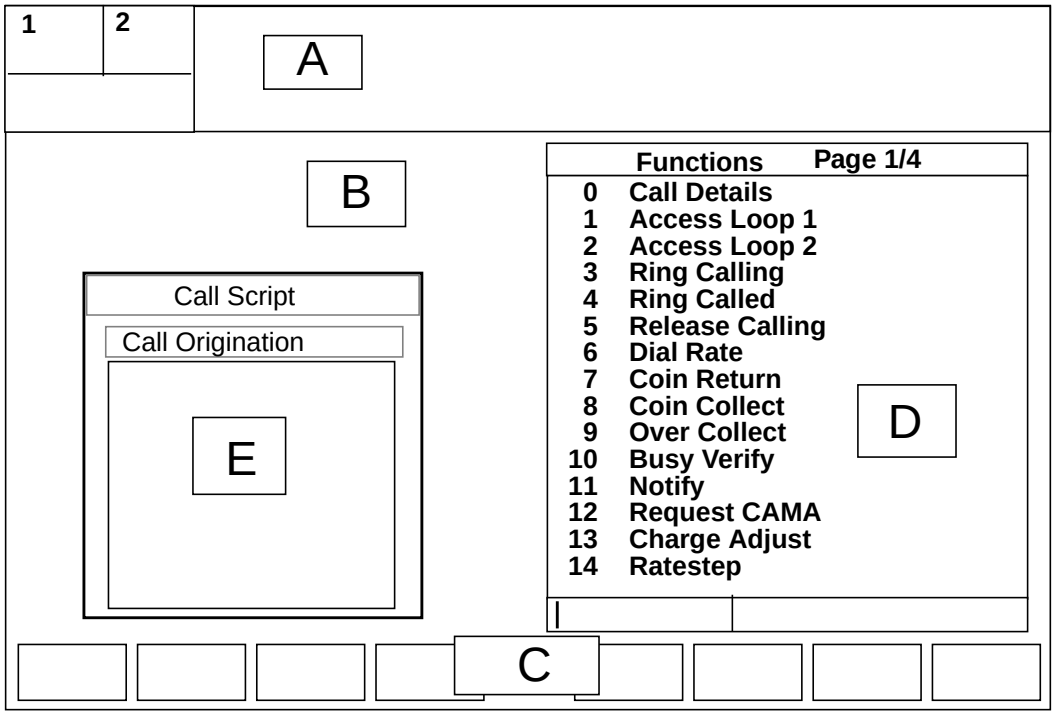

Figure 25. Base HMI

The top of the window (A) is the message and status area. The message and status area relays system and service or application-specific information to the operator. It has a text display area, two loop information blocks and a port status information block. No other windows can overlay this window area. The right portion of this area displays text strings that provide information to the operator. To the left of the text display area are two loop information blocks and the port status information block. These blocks provide information about the state of the two loops currently supported by TOPS, and the calling and called port.

The center of the window (B) is the application area. The applications that run on the position create and manage displays in the application area.

The bottom of the window (C) displays the names of the software programmable keys, called softkeys. The IWS keyboard has eight softkeys, which invoke IWS system functions or application-specific functions. The softkey labels associate the softkeys on the keyboard with the functions they invoke. Each IWS application is responsible for the functions of softkeys.

When an operator presses the appropriate keyboard key, the menu (D) for that key appears in the application area.

You can create macros, each of which combines a series of keystrokes, and assign each macro to a keyboard key. The *TOPS IWS RAMP and Provisioning User's Guide*, 297-2251-015, explains how to define and assign these macros. The *TOPS IWS Operator Guide*, 297-2251-304, describes how operators use these macros.

You can provide directions for how an operator handles a specific call type in a script window (E) in the application area.

An operator can capture a screen display during a call for reporting problems. The *TOPS IWS Operator Guide*, 297-2251-304 explains how to create a screen capture. The system saves the captured screen in a file on the hard disk. You can print the screen capture at the RAMP. The *TOPS IWS RAMP and Provisioning User's Guide*, 297-2251-015, explains how to access and print a screen capture.

6.2 IWS Billing

The IWS Billing application provides basic toll and assistance capabilities for the operator. It also enables you to specify whether an Intelligent Service Node Provisioning System (IPS) database or an enhanced calling card database (CCDB) is connected to the network.

IWS Billing provides an interface between the DMS switch, the operator, and the database that relays information to the operator through the IWS Billing application windows.

IWS Billing provides call information to the operator. The operator provides input by pressing the cursor control keys to access specific fields and using the keyboard to enter information.

The Billing & Access Services Intelligent Service Node (ISN) maintains configuration tables that determine the specific service and service options to offer for incoming calls such as branding and 0- and 0+ automation. You provision and maintain these tables in the IPS database. You can create a custom program of services such as sequence dialing and billing restrictions for subscribers, branding options such as initial and terminating announcements to callers, and initial greetings to the billed party during billing acceptance for resellers.

You can configure the IWS Billing application to connect to an enhanced CCDB. The operator accesses information in the enhanced CCDB by pressing the appropriate database softkey displayed at the bottom of the position screen. IWS Billing provides the operator such enhanced calling card features as account codes, voice mail message waiting indication, speed dial access, calling restrictions, automatic custom Automatic Message Accounting (AMA) information appended to AMA records, and access to a variety of other

services.

Figure 26 shows the IWS Billing application window.

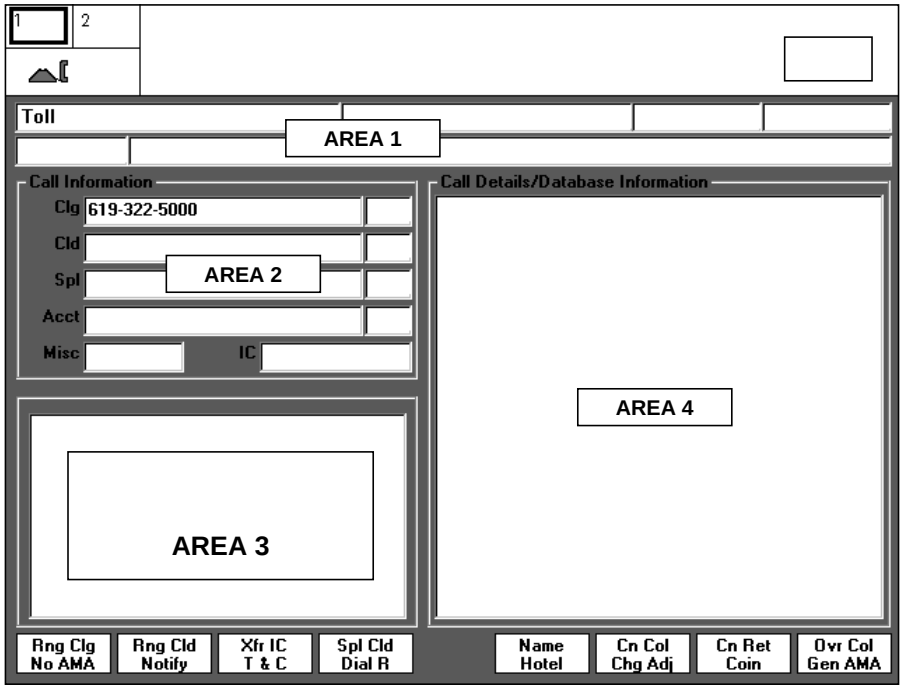

Figure 26. IWS Billing application window

Call headlines appear at the top of the IWS Billing application area (A) to identify the type of call. In this example, a toll call from a hotel has arrived at the position.

The Call Information window appears at the upper left of the IWS Billing application area (B). This information includes the line number of the calling party, the line number of the called party, and any additional information to identify the call. The operator can prompt the caller for any additional information needed to service the caller's request. For example, for a calling card call, the operator can request and enter the calling number, the called number, and the calling card number and personal identification number (PIN).

The lower left of the IWS Billing application area (C) displays such information as a list of violated restrictions for a calling card, a memo about the call, information about a booked call that has returned to the position, service provider information, and estimated call charges. The label of the window indicates the type of information.

The Call Details window, the Call Details/Database Information window, and the Scripting window can appear at the right of the IWS Billing application area (D), depending on the service that the operator is providing. The Call Details window displays billing and other information necessary to complete a service. The Call Details/Database Information window provides lists of the features (such as valid services, speed dial numbers, and restrictions) for an enhanced calling card.

The *IWS Billing Application Guide*, 297-2251-016, explains how to configure the IWS Billing application. The *TOPS IWS Operator Guide*, 297-2251-304, explains how operators use IWS Billing.

6.3 NTDA

NTDA provides call handling for TOPS services at the IWS operator position that are based on access to a directory assistance database. NTDA supports a variety of Nortel Networks Directory and Operator Services (D&OS) databases, such as the following:

- Directory One
- LSDB
- DDA
- DAS/C V2
- DAS/C V3
- Saint
- LION

NTDA can provide directory assistance, intercept service, and customer name and address service. IWS Billing can also reside on the IWS position with NTDA to provide billing through the DMS switch for calls of these service types.

Figure 27 shows the NTDA window.

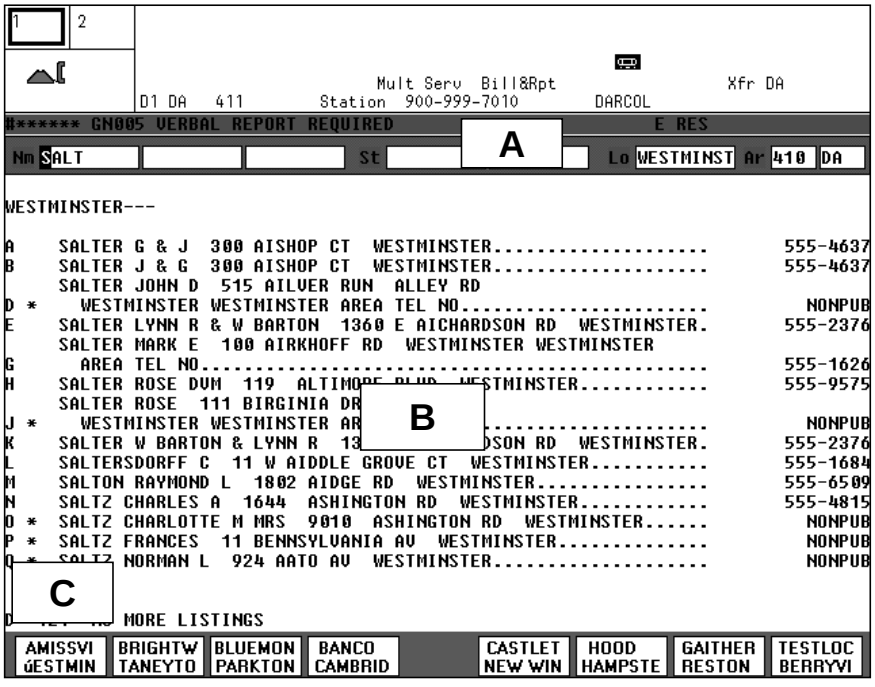

Figure 27. NTDA application window

The top (A) of the NTDA application area contains eight search input fields in which an operator can enter the criteria for a directory search.

The listing area (B) in the center of the NTDA application area displays subscriber directory information from the database as a result of a search. The listing area can display up to 21 lines of information with 80 characters on each line. Messages can appear in the

top line of the listing area. For example, a message could request that the operator narrow the search by providing more detailed criteria.

The search message area (C) at the bottom of the NTDA application area provides information about the listing display. For example, it can indicate that the operator can page forward for more listings or that the operator has reached the end of the listings.

The *TOPS IWS NTDA Application Guide*, 297-2251-017, explains how to configure NTDA. The *TOPS IWS Operator Guide*, 297-2251-304, explains how operators use NTDA.

6.4 EISAC

The EISA client is a browser-based, registering application, residing on the TOPS IWS platform, that can access hypertext markup language (HTML)-based information directly from the internet or an intranet. The operator uses the EISA client on the IWS position to access information beyond the scope of a traditional white-pages database. This information can be provided by an individual service provider, the internet, or in-house HTML pages. Currently, the web pages are set up and maintained by the operating company or its agent, the data provider.

The enhanced information services available to callers can be drawn from topics as diverse as yellow page information, weather, movie locations and times, sports scores, stocks, even horoscopes. The EISA client could also be used to facilitate trouble tickets and other, in-house tasks. This information is limited only by the browser design restrictions imposed by the service provider and the abilities of Microsoft Internet Explorer 5.0.

As an application residing on the IWS base platform, the EISA client communicates with the DMS 100/200 switch by way of open position protocol (OPP) software. The EISA client provides both access to HTML data and communication with the DMS switch. The EISA client can complete a call between the calling number and a called number retrieved from the web page, support billing records, and service switch.

The EISA client application window is divided into the control view and the web view. While the EISA client is running, the IWS MSA also displays.

Five different versions of the control view are available. They can be datafilled in the EISAC.INI file.

The *TOPS IWS Enhanced Information Services Application Client Guide*, 297-2251-305, provides a description, plus installation and configuration discussions, of the EISA client.

Figure 28 shows the EISA client window with the default home page in the web view.

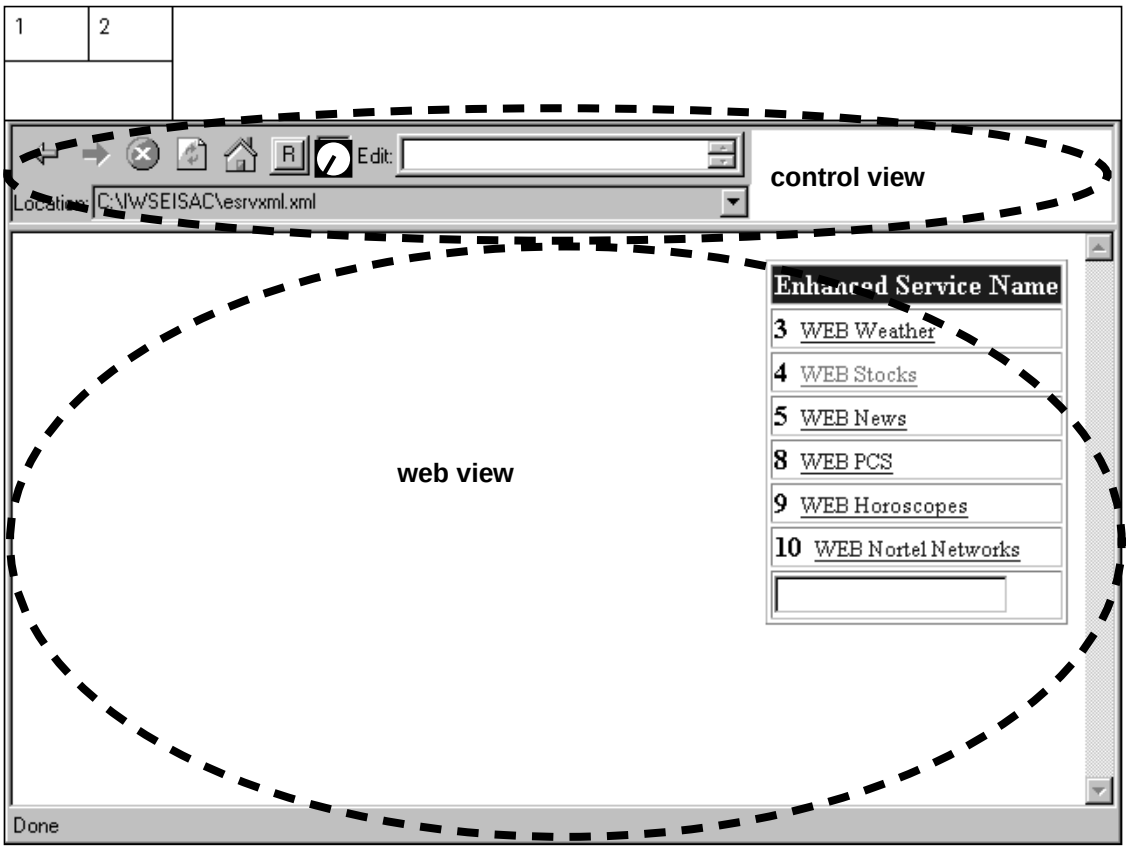

Figure 28. EISA client application window

6.5 OIA

The OIA application on the IWS position is optional software that supports communication between the IWS position and an external database implementing the OIA generic protocol specification. The protocol enables the external database to accept input from the operator and display resulting output to the operator by manipulating the softkeys and some of the windows on the position screen. The OIA windows locations and sizes are predefined by the IWS OIA application.

The IWS OIA application is compliant with the OIA generic protocol specification; however, the IWS OIA application does not implement the application check and application OK messages of the OIA generic protocol specification.

Communication with the database is defined as a session. A session is the period of communication with the database that occurs after the operator logs on to the database. The external database provides the ability to accept input and display output during a session.

The IWS OIA application is fully compliant with the TOPS IWS application programmer's interface (API). However, this application does not provide a service in the DMS context. The OIA application uses the keyboard datafill supplied by the IWS base software and is fully compliant with the keyboard API supplied with the IWS software.

Figure 29 shows the OIA window.

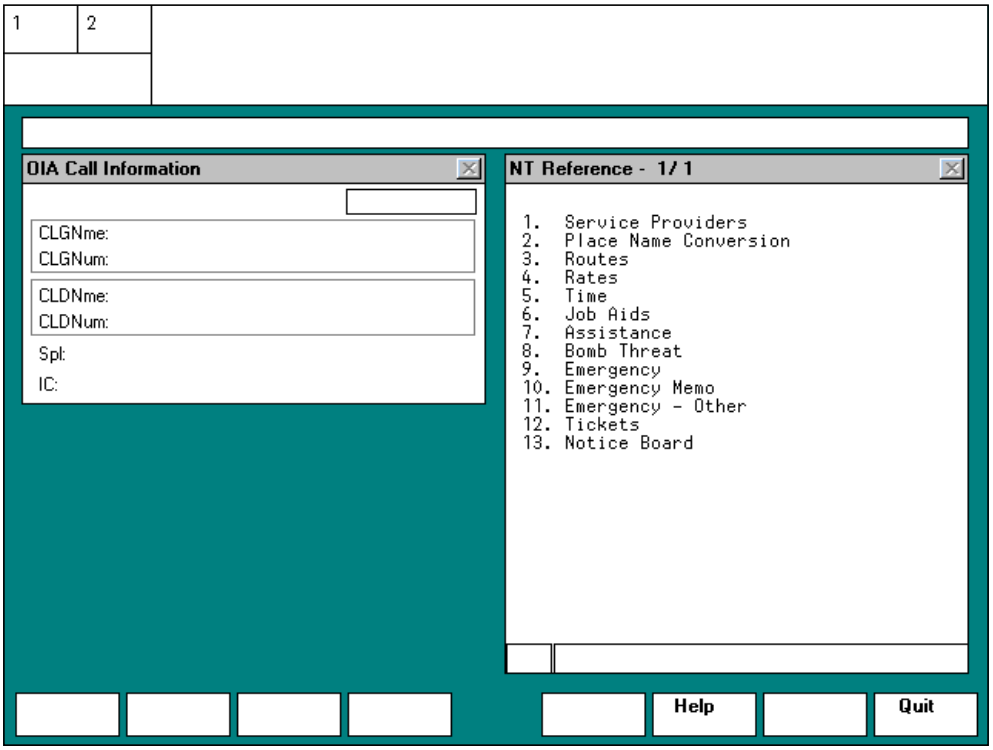

Figure 29. OIA application area

When an operator starts an OIA session, TOPS IWS displays call headlines (A), the OIA Call Information window (B), and the OIA menu (C). The call headlines area and the OIA Information window display during an entire OIA session, whether or not there is a call at the position and regardless of the OIA tasks.

The OIA application provides several types of windows that your company can use to present database information and accept input. Your company decides which windows to use and for what purposes. The text for the title and page area comes from the external database.

The *TOPS IWS OIA Plus Application Guide*, 297-2251-012, explains how to configure OIA. The *TOPS IWS Operator Guide*, 297-2251-304, explains how operators access and use the OIA interface.

7.0 Managing the operator work force

In a call distribution system, the operators who handle calls make up the work force. The term “force management” refers to the functions and responsibilities of managing an operator work force. Effective force management ensures that enough operators are available to handle call traffic for every quarter hour of every day throughout the year. In addition, force management involves monitoring the quality of service, including the speed with which the operators answer calls.

TOPS uses an electronic call processor with internal counting and scanning abilities. This provides the force management statistics that are used to determine how many operators are needed and to monitor the quality of service.

Force management statistics can be sent to a teletypewriter (TTY) or to an off-board computer. These statistics include the number of calls handled by operators in a given period of time, the types of calls received, and the usage measurements expressed in hundred call seconds. Statistics can also be reported through an outside vendor’s management information system (MIS).

An operator work force can be organized into single or multiple offices (known as single-traffic and multi-traffic offices). The configuration depends on the size of the operator work force and the geographic distribution of the operating company’s serving area. The office organization is based strictly on the operating company’s decisions, not on any requirements imposed by TOPS IWS software. The configuration of the office, however, can cause slight differences in the TOPS functions available.

This chapter provides an overview of the force management function. For additional information, refer to the *TOPS IWS Force Management Guide*, 297-2251-313.

7.1 Office equipment

Beyond the operator position, the minimum equipment in the given office configuration includes:

- for a single-traffic office:
  - — an in-charge (IC) position: a monitor and keyboard located in the traffic office
  - — a service assistance (SA) position: a monitor and keyboard where a service assistant can be reached for help
- for a single-traffic office using QMS Customer Assistance Service Enhancements (QMSCASE):
  - — none
- for a multi-traffic office
  - — a force management center

    A centralized location staffed with people who carry out administrative

tasks for the entire operator work force, not for individual traffic offices.

— a force management position

A TOPS MP position that displays force management statistics for the operator work force.

Alternatively, a telnet session on a PC or UNIX workstation can serve as an FMCRT device. Connectivity for this type of FMCRT is by TCP\IP connection over the EIULAN to the DMS switch. The EIULAN-based FMCRT (also known as an ANSI FMCRT device) should be configured as a VT100 terminal in the telnet session.

— a QMS force administration data system (QFADS) TTY

A TTY located in the force management center that is used to activate and deactivate force management features and to provide information on the system and the traffic offices.

Alternatively, device information can be made available through TCP/IP telnet connections on the DMS switch. PCs with telnet client software can connect to a specific device application on the switch to access QFADS data.

— a QMS traffic administration data system (QTADS) TTY

A TTY used in individual traffic offices to activate and deactivate force management features and to report information on various aspects of the system for the given traffic office. There is one QTADS for each traffic office.

Alternatively, device information can be made available through TCP/IP telnet connections on the DMS switch. PCs with telnet client software can connect to a specific device application on the switch to access QTADS data.

— an IC position

A position where the IC manager displays office statistics, receives assistance requests, monitors, pages, places outgoing calls, and makes administrative searches.

— an SA position

A position where a service assistant receives assistance requests, monitors, pages, places outgoing calls, and performs administrative searches.

The QTADS and QFADS TTYs are equipped with a standard QWERTY keyboard. They are used to enter commands or queries into the DMS switch, which uses the printer to confirm these inputs or to provide the requested information. The DMS switch transmits measurement statistics to the TTY at a rate of 300 baud to the switch and 1200 baud from the switch.

7.2 Determining the operator work force

Much of the provisioning for TOPS IWS depends on the size of the operator work force as determined by each operating company. Some provisioning, such as equipment for administrative positions, is possible without work-force considerations. Other equipment amounts are restricted to a range that must be specified. The average work time of the operator, the average processing time of the DMS switch for the predominant call type, and many other factors determine the number of operators supported.

7.3 The force management hierarchy

At the top of the hierarchy, a force supervisor is responsible for high-level decision making and control of the software features that affect the TOPS IWS work force as a whole. The force supervisor typically does not focus on the performance of individual operators, but instead monitors the relative performance of teams of operators grouped in separate traffic offices. These traffic offices can be geographically distant from the central DMS office. The TOPS system supports up to 30 traffic offices.

At the level below force supervisor is the IC manager for each individual traffic office. A specific traffic office can contain any number of operators, but usually contains about 30. The size of the traffic office is determined by the type of calls handled, the complexity of the operator's job, the amount of assistance normally required from management, and the administrative costs. The IC manager is responsible for the efficiency of one particular group of operators and has control of features that affect that particular office. Therefore, IC managers are concerned with information about individual operators. The IC manager uses a TOPS IWS IC position to help operators requiring assistance, to monitor and page operators, and to see the status of the traffic office displayed in real time. Each TOPS IWS traffic office supports one IC position.

Between the IC manager and the general operators, there can be a number of service assistants, whose main task is to assist operators as needed. Service assistants use TOPS IWS SA positions to help operators handle calls and to monitor and page operators. Assistance positions also reflect certain events taking place in the traffic office (for example, calls being deflected or the calls-waiting value exceeding a specified threshold). There can be up to 126 assistance positions in a TOPS system. The effective limit is determined by the telephone administration through an office parameter.

In the QMSCASE environment, operators have other, expanded capabilities based on datafill. Later in this chapter, Section 7.6, "The QMSCASE environment," describes these capabilities.

7.4 The force management objective

The basic objective of force management is to provide subscribers with consistently prompt operator service by managing the following factors:

- offered load: the number of people waiting for operator service at a given time

  Work volume is measured in tenths of seconds and reported in seconds.

- number of operators

  The number of operators needed depends the amount of operator time required to handle the work volume and the amount of additional operator time, known as ready-to-serve time, required to answer calls as quickly as planned.

- speed of answer: the average number of seconds subscribers must wait for the operator to answer.

- average work time: the average time it takes an operator to process one call

7.5 QMS reports

TOPS QMS generates force management reports that print at the QFADS and QTADS devices. The QFADS report pegs data about traffic offices, queues, services, and call classes. The QTADS report pegs data about queues, services, and call classes. The QFADS report (except for traffic office data) prints data that is summed over all traffic offices. The QTADS report prints only data accumulated by operators in the team to which that QTADS device belongs.

QMS can provide reports at 15-minute, 30-minute, 6-hour, and 24-hour intervals. parameter QMSFM_REPORT_INTERVALS in table TQMSOPT can be used to specify that the QFADS and QTADS devises print any or all of these reports. The *TOPS IWS Force Management Guide*, 297-2251-313, describes the QMS reports. The *Translations Guide* explains how to datafill table TQMSOPT.

QMS reports on the first 32 queues only. However, QMS can print up to 255 queue records, if it is used with an external vendor's management information system (MIS) report package.

7.6 The QMSCASE environment

With TOPS QMSCASE software in the IWS and the DMS switch, QMS operators at general operator positions can perform the functions of service assistants and IC managers and positions, including handling assistance requests. General operators who have these QMSCASE capabilities are referred to as customer service experts (CSE).

Without QMSCASE, service assistants and IC managers log on to positions datafilled as SA or IC. QMS operators can obtain assistance from them, but the service assistants and IC managers cannot complete subscriber calls that have been referred to them for assistance, and they cannot receive subscriber calls directly. When providing assistance, they do not have access to full call details. Assistance requests to service assistants and IC managers cannot be queued by type or priority, so it is not possible for an operator to direct an assistance request to a pool of specially trained service assistants and IC managers or to give higher priority to an emergency request. No statistics are available to measure service assistants' and IC managers' performance for use in managing the assistance work force.

With QMSCASE, CSEs have the same call handling capability as other QMS operators on both assistance requests and subscriber calls. On assistance requests, they have access to the same call details as the operator requesting assistance. In addition, CSEs do not require loop-around trunks.

The same mechanisms that are used for queueing subscriber calls in QMS are used for QMSCASE assistance requests. Therefore, datafill in the QMS environment can set up call queue priorities so that an operator who handles both assistance requests and subscriber calls gets any waiting assistance request with priority over any new subscriber call.

8.0 Planning and provisioning

This chapter provides a brief overview of provisioning TOPS IWS equipment, installing it, and planning the physical layout of the operator service center.

8.1 Equipment provisioning

The DMS-100/200 TOPS switch, with the enhanced TOPS message switch (ETMS), uses the provisioning guidelines of TOPS IWS.

8.1.1 Clusters on the LAN

Clusters are the hardware building blocks for TOPS IWS. They are made up of several operator positions interconnected by an Ethernet or token-ring local area network (LAN). In the integrated configuration, the operator positions are equipped with different plug-in cards to perform three different functions. All positions have plug-in audio cards that connect to the ETMS through channel-bank equipment. DMS gateway positions have the RTIC card.

In an Ethernet configuration, each position has an Ethernet port. Up to 20 operator positions are connected by Ethernet cables to an Ethernet hub.

In a token-ring configuration, each position has a token ring adaptor card that interfaces the position to the token ring. The token ring is made up of MAUs and interconnecting cabling. The token-ring interface in each position is connected to a MAU. Each MAU terminates up to eight positions.

8.1.2 Enhanced TOPS message switch

TOPS IWS requires the enhanced TOPS message switch (ETMS). The number of ETMSs needed is influenced by the number of operator positions and the traffic mix. For further information, refer to SEB 93-03-002, “TOPS Message Switch Provisioning.” Site configurations of more than 96 positions use more than one ETMS. The ETMS is repeated as necessary up to the limits of the DMS switch (including factors other than the number of positions).

8.1.3 DMS conference circuits

Three-port conference circuits are required in the host and remote (if present) DMS offices, according to the source of the calls.

8.1.4 DMS audio response trunks

Audio response units (ARUs) are used for automated DA and intercept call responses. The ARUs are internal (Nortel Networks-supplied) and external (Nortel Networks- or vendor-supplied). The DMS switch identifies an appropriate ARU trunk and establishes a connection between the ARU and the calling party. The directory assistance software sends the requested number over a dedicated ARU trunk on standard T1 facilities between the DMS switch and the directory assistance database. Standby ARU trunks are provided over physically separate T1 facilities. Trunks to audio response units should be provisioned based on traffic, grade of service, and redundancy requirements.

8.1.5 Office provisioning

Table20 lists the equipment needed in each office type.

Table 20. Office equipment

Single-traffic office	Multitraffic office	Equipment	Requirement
√	√	Operator position	1023 for each TOPS host (varies depending on real-time considerations)
√	√	SA position*	0 to 125 for each office
√	√	IC position*	0 to1 for each office
√	√	AQ TTY	1 for each hotel, maximum of 512 for each TOPS host
√	√	VQ TTY	2 (includes optional backup TTY)
√	√	REC TTY	1 for each TOPS host
√	√	HADS TTY	1 for each office, maximum of 30 for each TOPS host
	√	QTADS TTY	1 for each office, maximum of 30 for each TOPS host
	√	QFADS TTY	1 for each TOPS host
	√	FMCRT	1 for each TOPS host
√	√	QMFADS	1 for each TOPS host
√	√	Network operation trunking information system (NOTIS)	1 for each TOPS host
* SA and IC positions are not used in a QMSCASE environment.			

8.2 Planning the physical layout

Nortel Networks provides everything needed for the complete engineering and installation of TOPS IWS, meeting the following telephone operating company installation requirements:

- Installation kits with instructions for miscellaneous parts are provided.
- Craft interface instruction cards are provided.
- A ground-isolation pad with bolting-pattern drill template is provided as required.
- Engineering system mounting and support and cabling for raised-floor applications can be engineered as required.
- Network equipment building requirements (NEBS) are met for bolting pattern and footprint.

8.3 Floor plan considerations

Reflections on video displays from overhead lighting, windows, or contrasting color patterns (between the wall and ceiling, for example) must be recognized in the design of room lighting, furnishing, decoration, and window location.

There are two methods of cabling a TOPS IWS position or an office desk: from the floor below through a conduit and from the ceiling with a jiffy pole. Initial cost, flexibility, and appearance determine which method is employed.

The type of furniture used with a TOPS IWS position is determined by the operating company. A cluster of four positions occupies about 36.6 m^2 (120 ft^2), not including aisle space or provision for a center decoration.

8.4 Physical requirements

This section provides guidelines that can be adjusted to meet local conditions of the operating company.

8.4.1 Frame size

The following dimensions apply to the TOPS IWS (miscellaneous) frame in a wiring closet:

- 2.44 m (8 ft) high
- .73 m (2.4 ft) wide
- .45 m (1.5ft) deep

8.4.2 Spacing between frames

Recommended spacing between frames is 1/16 inch.

8.4.3 Floor loading

The floor loading requirement for DMS-200 equipment is 100 lbs/sq ft.

8.4.4 Equipment unloading

A frame in the DMS-100 Family can be handled in a vertical or horizontal position, provided that when it is lying horizontally it is positioned on its side, not on its front or back. Each frame must be kept fully packed until it reaches the office floor location to avoid damage.

Crated frames are 2.26 m (7.5 ft) deep and up to 1.67 m (5.5 ft) wide. To accommodate hoisting fixtures, the recommended equipment entrance door opening into the building should be at least 1.27 m (5 ft) wide and 2.54 m (10 ft) high. Within the building, the uncrated frames on shipping dollies require an equipment entrance door opening of 0.91 m (3 ft) wide and 2.44 m (8 ft) high.

A minimum 2-ton capacity hoisting beam, which can be extended six feet from the building, is recommended. It should be installed above the loading doors for upper floor installations.

An unloading area of approximately 150 ft^2 should be provided inside the loading door to facilitate equipment delivery.

8.5 Example of a traffic office

This section provides an example of a TOPS QMS multi-traffic office.

DMS-200 TOPS supports a work force of up to 30 traffic offices, each associated with at least one operator position. The office layout shown in Figure30 is an example of a floor plan for the main traffic office, based on current traffic office management and operating procedures. This layout is for a multitraffic office with an arrangement of 45 positions.

There is no need for separate training rooms, because training adapters allow training activities at any TOPS IWS position. Fire exits must be provided in accordance with local regulations. The operating company is responsible for integrating TOPS IWS with the furniture of its choice and for managing cable routing effectively.

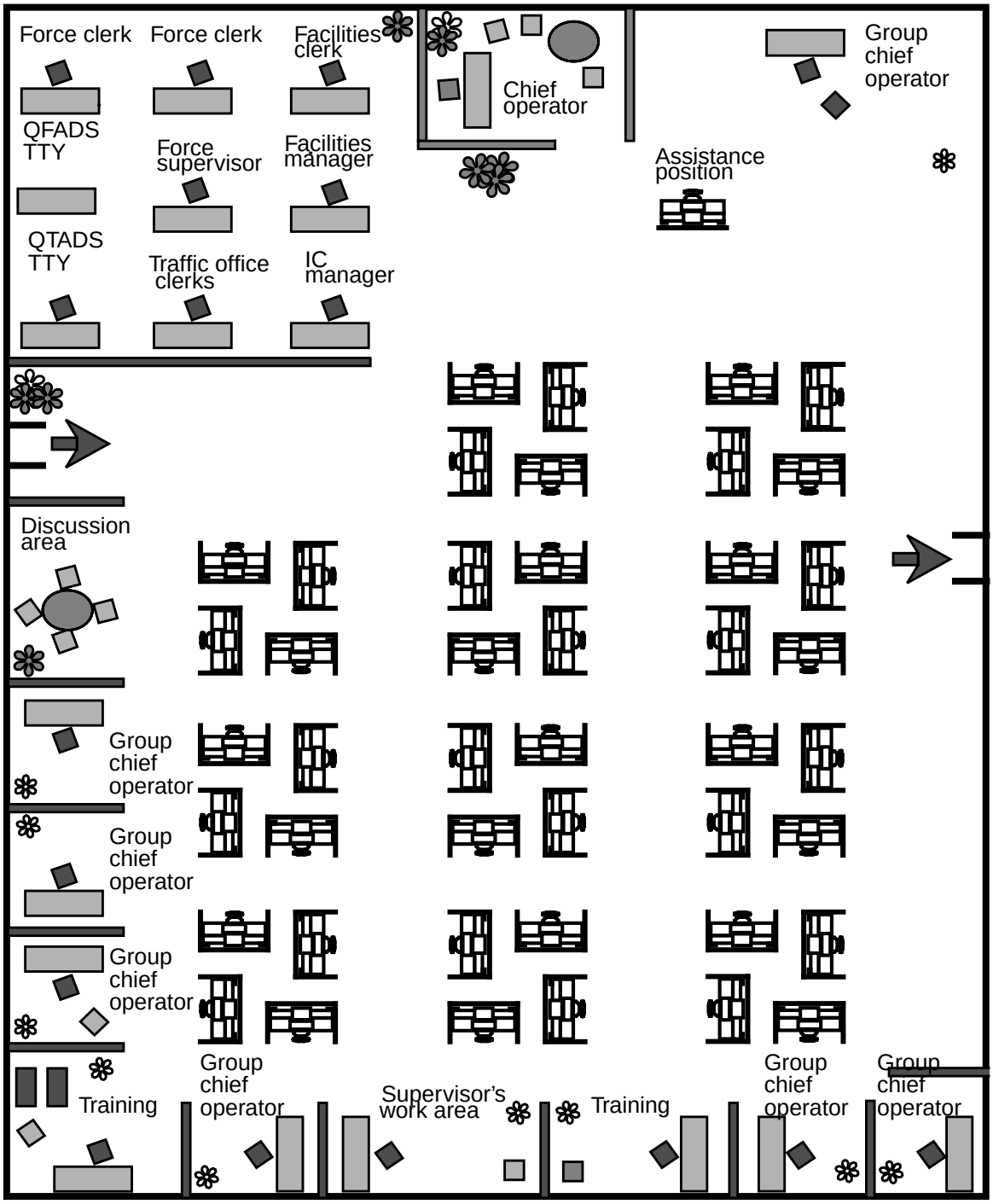

Figure 30. Example of a TOPS IWS multitraffic office

8.5.1 Using traffic space

Figure30 shows an open landscape concept throughout the office. Although not shown as such in this example, the office of the chief operator could be fully enclosed to improve privacy. The floor plan in the example includes the following:

- 45 operator positions (including 1 monitor position)
- 1 chief operator's office
- 6 group chief operator offices
- 1 administration group (a facilities manager, a force manager, four clerks, three teletypewriters, filing cabinets, and stationery cabinets)
- 1 IC manager's desk
- 1 assistance position
- 1 supervisor's work area
- 2 training areas plus filing cabinet
- 1 discussion area

8.5.2 Arranging TOPS IWS positions

The main consideration in locating a TOPS IWS position is to avoid areas with heavy personnel movement unless special dividers are provided to prevent distractions. The same principle applies throughout the office, because operators travel between the main entrance and the positions. Many aisles must be provided, or the routes must be dispersed by position layouts that prevent heavy usage over any one route.

The sample floor plan assumes that there are no reflections on video displays from overhead lighting, windows, or contrasting color patterns (between the wall and ceiling, for example). This problem with displays must be recognized in the design of room lighting, furnishing, decoration, and window location.

There are two methods of cabling a TOPS IWS position or an office desk:

- from the floor below through a conduit
- from the ceiling with a jiffy pole

Initial cost, flexibility, and appearance determine which method is employed. You, the operating company, determine the type of furniture used with a TOPS IWS position. A cluster of four positions occupies about 36.6 m^2 (120 ft^2), not including aisle space or provision for a center decoration.

8.5.3 Chief operator's office

The chief operator's office typically requires an area of about 30.5m^2 (100 ft^2), and it can be enclosed by either floor-to-ceiling walls or tall dividers for privacy. In either case, provide a view of the traffic office if possible. The chief operator's office is located within the traffic office adjacent to the administration area for availability to the staff.

8.5.4 Group chief operator's office

Each group chief operator's office requires an area of approximately 22.9 m^2 (75 ft^2) and has 1.5 m (5-ft) high dividers on two sides for privacy. The open side faces the center core of the office for monitoring office activities.

The group chief operator offices are located along two walls to facilitate the availability of the group chief operator to the operators. With this arrangement, operator groups can be located close to their own group chief operator.

8.5.5 IC manager's office

The IC manager is responsible for daily administration of the TOPS IWS traffic office. The IC manager works closely with the force supervisor and the person manning the assistance position and can also monitor when equipped to do so.

The IC manager's desk is located near the assistance position for observing the display on this position. The IC position is also near the administration area to facilitate communication with the force supervisor and the facilities manager.

If the duties of the force supervisor and the IC manager are combined, one desk is sufficient.

8.5.6 Administration area

The administration area provides space for the force supervisor, a facilities manager, and four clerks. The force supervisor, traffic office clerk, and force clerk perform the functions of the force supervisor, QFADS clerk, and traffic office clerk of present traffic offices, in addition to most of the functions of the district office force group. Additional duties can include any new force projection and adjustment routines resulting from future downstream computer processing.

The administration group is located within the traffic office to integrate the force and facilities personnel into the traffic office operation. This group is also located near the main entrance to facilitate contact between the traffic office clerk and the operators changing shifts. A location on the perimeter avoids cluttering the office with books, records, and calculators, and does not break up the space available for positions.

The force supervisor is located near the IC operator to facilitate the passing of half-hourly staff assignment information. Similarly, the facilities manager is located near the IC operator and the force supervisor for effective and prompt communication.

The QFADS TTY is located near the force supervisor. Ordinarily, the QFADS and the force supervisor are located separately from the traffic office.

The QTADS TTY is located near the traffic office clerk and the IC operator. A 1.2 m (4-ft) wide table is provided beside it for sorting TTY records.

In a multitraffic office there would be a QTADS TTY in each office and a QFADS TTY in the force management center.

The hotel administration data system (HADS) TTY is located in the hotel billing center (HOBIC).

Space is also provided for one stationery cabinet and four 2-drawer filing cabinets.

The TTY and desk calculators must be noiseless to limit distraction and to help maintain a low sound level. The typical space allocation is as follows:

- force supervisor: 22.9 m^2 (75 ft^2)
- facilities manager: 22.9 m^2 (75 ft^2)
- clerks: 18.3 m^2 (60ft^2)

8.5.7 Assistance position

One assistance position is provided. It can be located as follows:

- near the IC manager to facilitate communication and to enable sharing of the assistance position
- near the QFADS TTY to allow the person manning this position to collect information during night hours

8.5.8 Supervisor’s work area

The supervisor’s work area is provided with a 1.2 m (4-ft) wide desk, two chairs, and a filing cabinet with two drawers.

8.5.9 Training area

TOPS training can take place at any regular TOPS position. Initial training of new operators takes place either in the traffic office at one of the regular TOPS positions or in a training room outside the traffic office at a TOPS position dedicated to training. A room outside the traffic office should be provided for viewing visual aids and for group instruction.

Provision is made for two locations within the traffic office for operators to review training material, read operating practice changes, and so on. Each location contains a 1.2 m (4-ft) wide table, two chairs, and a small bookcase. The locations are on the perimeter of the room in places relatively free from distraction. The furthest corner from the entrance to the locker room should be avoided, since it tends to remove the trainee unnecessarily from involvement in office activities.

8.5.10 Discussion area

A discussion area is provided in the traffic office for the following purposes:

- so that a group chief operator can discuss work with an operator away from a TOPS position and the group chief operator's desk
- so that an operator or supervisor can read material on company policy, benefits, and other information, when the work load falls below estimated levels for longer intervals

This area is located to avoid distracting operators at positions. The farthest corner from the main entrance can be used for this purpose. The discussion area has a small bookcase, a small round table, and one or two chairs.

8.5.11 Night positions

Operating costs can be reduced by centralizing the night operation of a number of TOPS IWS positions at a single location. TOPS is centralized by locating a small number of positions away from the other positions in the 24-hour office and operating them at night and during other light load periods when positions at the home site are closed down.

These remote positions are located in the general vicinity of the assistance position to group all night operations together.

8.5.12 Other traffic positions

Space should be provided outside the traffic quarters for the following facilities:

- training and instruction room
- locker room
- lounge
- lunch room
- conference room
- headset rack room
- traffic engineering office
- terminal equipment for TOPS IWS, carrier equipment, and other equipment

With the exception of training space, which can be reduced because most training is done in the traffic office, space requirements for these quarters remain at the present levels used by telephone companies.

9.0 Product safety, integrity, and reliability

This chapter describes the conditions that must exist to ensure safety and enable TOPS IWS to work effectively. It summarizes power and grounding, environmental operating, and transportation and storage requirements. It also includes information on regulatory compliance and equipment reliability.

9.1 Power and grounding requirements

Power and grounding arrangements for the TOPS IWS system must conform to the requirements specified in *TOPS MPX Power Distribution and Grounding Guide*, 297-2291-156.

Nortel Networks recommends powering TOPS IWS operator position equipment from a protected 120 V, 60-Hz power source supplied by the operating company. The recommended method of installation is to include it in the common bonding network.

The power distribution system supplies controlled and protected DC and AC power to DMS-100 Family equipment. Signaling between components of the TOPS IWS system (such as operator positions, Ethernet hubs, routers, and channel banks) is AC coupled to provide ground separation. The operator positions are powered from protected AC mains using a power strip. Table 21 lists power requirements for the position devices that use the power strip.

Table 21. Position power demands

Component	Voltage	Wattage	Frequency
Base unit (NTNX51WB)	120 volts AC 240 volts AC	0.9A (108 watts) 0.4A (96 watts)	60 Hz 60 Hz
Monitor (NTNX51LR)	120 volts AC 240 volts AC	0.7A (84 watts) 0.4A (96 watts)	60 Hz 60 Hz

The grounding system provides hazard protection for personnel and equipment, and immunity, within accepted standards, from transient phenomena. TOPS IWS is designed for installation in integrated grounding environments. A TOPS IWS system with a token-ring LAN configuration can alternatively be installed in an isolated system grounding (ISG) environment, as described in *TOPS MPX Power Distribution and Grounding Systems*, 297-1001-156. A TOPS IWS system with an Ethernet LAN configuration cannot be installed in an ISG environment. TOPS IWS meets the intent of the Bellcore Isolated Ground Plans Requirements as described in document TR-EOP-000295.

TOPS IWS positions are grounded through the green wire safety ground provided in the main supply cords of the base, monitor, DSU, and power strip associated with each position. Electrostatic discharge (ESD) ground straps from the remote headset jacks to the rear panel of the base are provided. Ground studs are provided to terminate these wires on the metal plate at the back of the audio card in the base. These studs also terminate an operating company-provided ground wire.

For detailed information on power and grounding requirements and practices, refer to *TOPS MPX Power Distribution and Grounding Guide*, 297-2291-156.

9.1.1 Power and grounding for channel bank equipment

Voice and data links are transformer coupled (or equivalent) to ensure ground separation. Support equipment is also usually DC powered. Support equipment must meet the following requirements. If the channel bank and the TSG are located with the DMS equipment, they must be in the same isolated ground plane as the DMS switch.

- Each channel bank or TSG must be fused separately at its -48 V DC input.
- The frames housing this equipment must be insulated from the floor and from any incidental contact with metal raceways, cable racks, or other incidental grounds.

9.2 Transportation and storage requirements

All TOPS IWS equipment complies with shock and vibration requirements as specified in LATA Switching Systems Generic Requirements (LSSGR) Section 14.4.3, as well as Network Equipment-Building System (NEBS) Sections 4.4.1, 4.4.2, and 4.4.3. These requirements apply to equipment in non-operating condition during handling and transportation.

As shipped, database and DMS gateway position base units include three plug-in adapter cards: audio card, RTIC card, and token-ring card. The general operator position base units include two plug-in cards: the audio card and the token-ring card. These plug-in cards are not shipped loose.

The TOPS IWS platform can be safely shipped and stored within a temperature range of -40°F to 158°F (-40°C to 70°C). The cabling system components can be shipped and stored within the environmental limits shown in shown in table 22.

Table 22. Cabling system components environmental limits

Description	Temperature	Relative humidity	Max. wet bulb
Accessories	-40°C to 60°C	5%-95%	29.4°C
Cables	-40°C to 80°C	No limit	No limit

The frame-mounted equipment, the hub and router, can be shipped and stored within a temperature range of -4°F to 140°F (-20°C to 60°C).

9.3 Environmental operating requirements

The TOPS IWS platform is designed to operate within a temperature range of 50°F - 95°F (+10°C to +35°C) and in relative humidity of 90% at 95°F (35°C).

The extreme temperature and relative humidity conditions are based on a maximum duration of up to 72 continuous hours and up to 15 days per year. The maximum rate of temperature cycling should not exceed 12°F (6.7°C) per hour.

Air cleanliness should not be worse than class 100,000 (that is, 100,000 particles per cubic foot 0.5 micron or larger).

The area in which multiple clusters are arranged should employ a flooring material with a static factor of 3000 volts or less. The area should have a relative humidity of 40%-55%. These conditions ensure proper operation of the electronics in the TOPS console by minimizing static electricity.

The TOPS IWS cabling system components can operate within the environmental limits shown in table 23.

Table 23. Cabling system components operating environmental limits

Description	Temperature	Relative humidity	Max. wet bulb
Wiring closet	10.0°C-40.6°C	8%-80%	27°C
Accessories	0.6°C-51.7°C	5%-95%	29.4°C
Cables	-40°C-80°C	No limit	No limit

The hub and router can operate within a temperature range of 32°F to 104°F (0°C to +40°C) and a relative humidity of 20% to 80% (non-condensing).

9.4 Regulatory compliance

TOPS IWS is certified to meet the requirements described in the following paragraphs in this section.

9.4.1 National Electrical Code requirements

TOPS IWS meets relevant sections of the National Electrical Code (NEC) requirements. This includes any AC, DC, inverter, and power equipment that may be required to power the TOPS IWS position.

9.4.2 Electrostatic discharge

All TOPS IWS equipment is tested for electrostatic discharge (ESD) at level 1 (2 kV), level 2 (4 kV), level 3 (8 kV), and level 4 (15 kV). Tests are performed with both positive and negative polarity discharges. The required level of ESD tolerance is level 4 (15 kV). Tests are performed according to Bellcore TR-NWT-001089, *Electromagnetic Compatibility and Electrical Safety Generic Criteria for Network Communications Equipment* Issue 1, October 1991.

Nortel Networks also recommends an ESD tolerance of greater than 20 kV for the keyboard, terminal handset, and cords (see Nortel Networks Corporate Standard 1523.01).

Properly installed electrostatic discharge grounding (ESD) dissipative vinyl or carpet floor coverings are recommended for use in the operator position area. An ESD ground mat at each TOPS IWS operator position can be used instead of an ESD dissipative floor. Ordinary floor wax should not be used on ESD dissipative vinyl flooring. Refer to the manufacturer's recommendations for care of the flooring.

Only carpeting that is intended for ESD control and that meets American Association of Textiles, Chemists, and Colorists (AATCC) Test Method 134 without the use of antistatic sprays should be used in the operator area. Normal carpeting can cause excessive build-up of electrostatic charge. Antistatic carpet sprays are not dependable, need frequent replenishing, and can damage plastic surfaces and finishes of equipment in the operator area.

An ESD dissipative table top is recommended for use in locations historically conducive to ESD activity.

9.4.3 Electromagnetic interference

TOPS IWS equipment meets FCC Part 15, Subpart B, Class A requirements.

TOPS IWS equipment functions normally in the presence of a radio frequency (RF) energy field in the relevant frequency range with no unacceptable performance degradation. When placed in an RF screen room and exposed to an RF energy field of 5 V/m for a specific frequency range (10 kHz to 1 GHz), the equipment continues to function normally in a field of 10 v/m. For more information on RF susceptibility, refer to Bellcore Reference TR-EOP-000063.

The full text of the FCC and Industry Canada Label compliance statements appear in an Appendix to this document.

9.4.4 Fire resistance

TOPS IWS equipment and associated products such as external polymeric materials meet the requirements of Nortel Networks Standard 9001.12, "Fire Resistance Central Office Products," with the exception that UL94HB plastic is not used.

All internal components in the system meet the Nortel Networks Corporate Standard 4118, "Fire Test"; 4119, "Abnormal Test"; and 4120, "Operation Test."

TOPS IWS contains printed wire boards that are UL recognized and meet UL94V-0. Flammability of outside coverings made of polymeric materials are rated minimally UL94V-1.

All polymeric materials, whether OEM or NTI specified, have a minimum oxygen index of 28% using the oxygen index method D-2863-77.

All air-handling systems (fans) internal to the system are UL recognized and meet UL94V-0 requirements. Air filters used in or on products with respect to air-handling systems are UL recognized (UL900 Class II) and meet a minimal flammability rating of UL94HF1.

9.4.5 Seismic requirements

The TOPS IWS operator position is not required to meet any seismic standards with regard to remaining operational. For safety considerations, however, when the operator position is integrated with associated furniture, it should remain structurally intact under zone 4 seismic conditions.

9.4.6 Hazardous materials

The customer is informed of all hazardous materials in the TOPS IWS equipment. Each component is checked with the manufacturer to verify what hazardous materials are in the component. This information is included in the "Technical Report on Hazardous Materials."

The hazardous materials are referenced in the following sources:

- 40 C.F.R. 190 Resource Conservation and Recovery Act
- 49 C.F.R. 702-792 Hazardous Materials Transportation Act
- 29 C.F.R. 1910 Occupational Safety and Health Act of 1970

9.4.7 Safety approvals

The following subsystems of TOPS IWS have regulatory agency approvals.

9.4.7.1 Display monitor and terminal base unit

The TOPS IWS display monitor and terminal base unit are UL listed under the requirements of UL1950, "Standards for Safety for Information Technology Equipment Including Electrical Business Equipment," and CSA certified under the requirements of CSA 22.2, #950 "Information Technology Equipment Including Electrical Business Equipment."

9.4.7.2 Real-time interface co-processor card

The X.25 real-time interface co-processor (RTIC) card is a UL-listed data processing equipment accessory under the requirements in the standard detailed above for the display monitor and terminal base unit.

9.4.7.3 Token ring card

The token ring card is a UL-listed data processing equipment accessory under the requirements in the standard detailed above for the display monitor and terminal base unit.

9.4.7.4 Audio card

The audio card meets the requirements for UL listing or CSA certification as outlined in the standard detailed above for the display monitor and terminal base unit.

9.4.7.5 Keyboard

The TOPS IWS keyboard meets the requirements as stated above for the display monitor and terminal base unit. UL component recognition and CSA component certification may be appropriate for the keyboard, provided there are no limitations (conditions of acceptability) regarding the enclosure, cable, or connectors. The entire keyboard product (such as the keyboard, printed circuit board, keycaps, cable, connectors) is included in the recognition/certification. The UL component recognition and CSA component certification are in accord with requirements in the standard detailed above for the display monitor and terminal base unit.

9.4.7.6 Data service unit

Nortel Networks recommends a stand-alone type UDS D56, or a GDC 56K or GDC 500N DSU equipped with type DB-25 and DDS pin configurations. The DSU must meet the requirements as stated above for the display monitor and terminal base unit. Alternatively, the unit must be UL listed under the requirements of UL1459, second edition “Telephone Equipment” and CSA certified under the requirements of CSA 22.2, #225, “Telephone Equipment.”

9.4.7.7 Power strip

Power strips equipped with overvoltage protection must be UL listed under the requirements of UL1449, “Transient Voltage Surge Suppressors,” and CSA certified under the requirements of “Temporary Power Taps,” consisting of requirements drawn from CSA 22.2, #8, “EMI Filters”; #21, “Cordsets and Power Supply Cords” and #42 “General Use Receptacles, Attachment Plugs, and Similar Wiring Devices.” Power strips without transient voltage surge suppression must be listed with the appropriate UL and CSA listing standards.

9.4.7.8 Wiring closet equipment

Equipment in the TOPS IWS wiring closet provided by Nortel Networks is UL listed under the requirements of UL1863, “Communications Circuit Accessories,” and CSA 22.2, #0.7.

9.5 System reliability

TOPS IWS downtime caused by the DMS switch is less than 28 minutes per year. This meets the requirements of LATA Switching System General Requirements (LSSGR), Section 12.7.

9.5.1 Position reliability

Under normal operation, TOPS IWS can be used for 40 hours a week. Keeping system power constantly turned on reduces the mean time between failures (MTBF) by two-thirds. Routinely powering down and maintaining the terminal significantly prolongs its life expectancy. The IWS position MTBF is five years, 24 hours per day.

The position keyboard is specified to withstand 15 million operations per key. Mean time to repair (MTTR) in case of failure is 30 minutes or less per occurrence.

9.5.2 Continuous voice communication

The system design ensures continuous availability of voice communication, even during a TOPS IWS failure. Voice communication does not depend on the motherboard processor in the position. Interruption of data communication between the virtual position controller and the switch does not exceed one minute per occurrence. MTTR in case of failure is 30 minutes or less per occurrence.

Voice transmission is digital throughout the system up to the audio card in the TOPS IWS positions. Nortel Networks does not provide pads or level adjustments for the voice paths between TOPS IWS and the DMS switch, because none are necessary. The voice transmission levels are the same as zero transmission level point (TLP) for the DMS switch. The audio card provides the following headset levels, as specified by the Operator Services Systems General Requirements (OSSGR), Section 21.4.3:

- The headset transmission TLP is +4 at 50 ohms impedance.
- The headset receiving TLP is -8 at 300 ohms impedance.

The audio card provides a default volume limit of +/-5 dB for the headset receive path. During installation, this limit can be adjusted up to +/-16 dB. Mute functionality is also provided.

When an IWS position is initialized, its headset volume reverts to a predetermined default level, which is the starting point for the operator’s volume adjustments. On all positions, this default is initially set at 0 dB. The service provider, however, can reset the default to any level within the company’s specified volume adjustment range. If the default setting is

changed, then at initialization the position reverts to the new volume level rather than to 0 dB, and the operator's subsequent volume adjustments are applied to that new default level.

If the operator logging in is the same one who last logged off, the position does not return to the default volume level but instead retains that operator's volume adjustment.

For information on changing the default setting and on the relationship between volume range limits and volume adjustment, refer to *TOPS IWS Audio Card Configuration and Diagnostics*, 297-2251-202.

Table 24 lists amplitudes of various call-arrival tones.

Table 24. Call-arrival tones

Tone	Frequency (Hz)	Level/frequency (dBm0)	Total level (dBm0)	Levels at headset (dBm)
Ziptone	480	-17	-17	-25
Dial tone	350/440	-13	-10	-18
DTMF	41/1633	-7	-4	-12

All LSSGR specifications are stated at a TLP of 0, but the operator's headset is at a -8 TLP. Therefore, the actual level at the headset is 8 dB lower than the values obtained from the LSSGR tone tables.

Dual-frequency tones at the same level or frequency value as a single-frequency tone are approximately 3 dB louder, because the dual tones add together. Therefore, the dial tone and the DTMF tone total-level values increase by 3 dB, and the ziptone does not increase. The duration of the ziptone is 100 ms.

9.5.3 Timing source generator reliability

Operation of the TOPS IWS voice interface requires a timing source generator (TSG) supplied by the operating company. Nortel Networks recommends a TSG manufactured by Telecom Solutions or its equivalent. For its DCD-400 system, with full redundancy, Telecom Solutions calculates a downtime of about 4×10^{-12} minutes a year.

10.0 Performance

The DMS-100 Family architecture provides distributed processing over three switching stages, of which the processor is the central control authority. The capacity of the central processing unit (CPU) is defined in terms of overhead and call-processing occupancies. The overhead occupancy accounts for both of the following:

- non-deferrable priority processes such as task assignment, scheduling, and system integrity
- deferrable functions such as operation, administration, and maintenance (OA&M) and auditing routines

The call-processing occupancy includes the following:

- originating and incoming system call processes
- related tasks such as call-request interrupt.

With SuperNode processors SN20-SN40, the maximum call-processing occupancy is 86%, with the overhead occupying 14% at a 20% grade of service. With NT40 processors, the maximum call-processing occupancy is 83%, with the overhead occupying 17% at a 20% grade of service. This total maximum call-processing time does not take into account optional features such as the CPU monitoring tool ACTIVITY. With the addition of optional features and maintenance considerations, total overhead occupancies increase above the minimum allocation and reduces CPU time for call processing. Figure 31 illustrates this concept. For actual calculation of maximum call-processing capacity, consult the REAL::TIME tool.

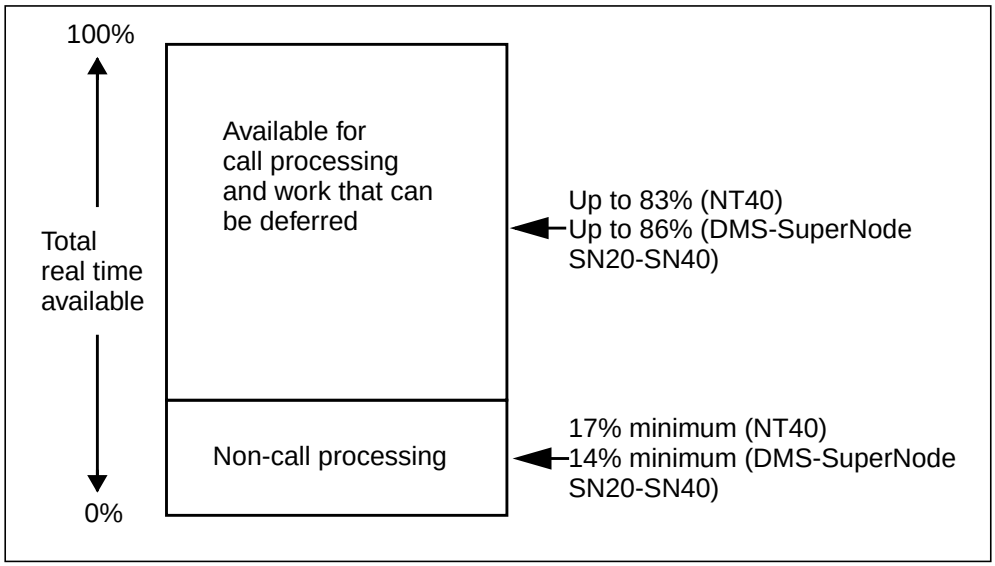

Figure 31. CPU real-time availability for call processing

10.1 Capacity and performance factors

The following factors influence the capacity and performance of the TOPS IWS system:

- DMS computing module (central processor)

  The central processor use affects the overall performance of TOPS IWS. If the central processor use is too high, the system can deny calls.

- Digital trunk controller (DTC) modules

  For directory assistance (DA) and intercept call types, the signal processor is the limiting component in the DTC. The multifrequency wink call-origination call timing is 50 ms if universal tone receivers (UTR) are used. The terminating audio response unit (ARU) call has a signaling processor call timing of 40 ms. The available signal processor real time for call processing is 17%, or 612,000 ms per hour.

- ETMS messaging

  Enhanced TOPS message switch (ETMS) messaging affects the overall performance of TOPS IWS. If the SP real-time use is too high, the system can discard or delay call messages, which degrades GOS. Problems can occur if the enhanced D-channel handlers in the ETMS are overloaded. For additional information, refer to SEB 93-03-002.

11.0 Maintenance

The TOPS IWS maintenance philosophy is to detect failures down to the replaceable unit. The TOPS IWS replaceable units for the terminal are the base, the appropriate cards, the keyboard, and the monitor. An operator at a failed terminal moves to another working terminal in the operator service center. Maintenance personnel then replace the failed unit. The DMS switch supports audit procedures to detect terminal failures that occur during operation.

TOPS IWS supports self-test of the terminal for power on. At power-on, the position runs a series of tests that include memory test, checksum verification of read-only memory, keyboard test, and checks that all configured plug-in cards are present.

11.1 System maintenance

Maintenance of TOPS IWS from the DMS MAP (maintenance and administration position) terminal includes the ability to return to service (RTS), manual busy (MB), and test the position. All audits that attempt to recover positions are applicable.

At the MAP, the DMS switch monitors and can control the TOPS IWS operator position, which it considers a TOPS MP, and the virtual position controller (VPC) residing in the TOPS IWS DMS gateway position, which it considers a TOPS position controller (TPC).

The DMS switch send the following messages:

Return-to-service

to the position that is being returned to service. TOPS IWS takes the appropriate action to return the position to service and sends a positive response back to the DMS switch. If it cannot respond within a time-out period or sends a negative reply, the position fails to return to service. No reason for the failure is indicated at the MAP, only the fact that the return-to-service failed.

Busy

to the position that is being busied. TOPS IWS takes the appropriate action to make the position busy and sends a positive response back to the DMS switch. Even if TOPS IWS cannot respond within a time-out period or sends back a negative reply, the DMS switch lists the position as made busy.

Test

to the position that is being tested. The position normally returns a positive reply. If it fails to reply or returns a negative response, the test fails. No reason for the failure is indicated, only the fact that the test failed.

TOPS IWS terminal failures are automatically detected and reported using the DMS log system. The DMS switch also reports failures of the data links to TOPS IWS.

11.1.1 TOPS position controller maintenance

TOPS IWS provides a VPC, associated with a cluster of one to four positions. The VPC software is resident in the DMS gateway positions of TOPS IWS.

The DMS switch treats the VPC as a TPC and provides TPC maintenance and the TPC MP level, even though a physical TPC does not exist.

When TOPS IWS receives a TPC RTS or busy message, TOPS IWS acts as the VPC and always replies with a positive message if it is able to respond. If TOPS IWS cannot respond to an RTS message, the RTS fails with no reason reported. Even if TOPS IWS does not respond to a busy message, the MAP level list the TPC as busy.

11.1.2 Audits

Audit procedures are employed by the DMS switch and the TOPS IWS DMS gateway positions to detect terminal failures that occur during operation. Position failures are reported to the DMS switch through unsolicited maintenance messages.

11.1.3 Error detection

The DMS switch provides the following error detection:

- Data errors in the messaging over the links from the DMS switch to the enhanced TOPS message switch (ETMS) are detected by existing XPM messaging software.
- Data transmission errors are detected by the level 2 protocol functions. the CCITT X.25 1980 specification describes these functions.
- DMS processing errors are detected and generate software error (SWERR) notification and standard DMS logs. The *Log Report Reference Manual* describes the standard logs.

11.2 RAMP

The remote access and maintenance position (RAMP) allows the maintenance of other TOPS IWS positions from a single maintenance position. The RAMP functionality is intended for use by service provider and Nortel Networks personnel who provide support for TOPS IWS operations. RAMP provides the following tools:

- dialup networking tool

  With a dialup (modem) connection to a commercial router, the RAMP can be used to maintain TOPS IWS positions on other, remote LANs.

- trace tool

  Provides the ability to trace messages remotely for each position and application. Tracing monitors application activity on a position in problem cases where you need to monitor the exact activity of a position.

- logs tool

  Gives a view of current logs as they occur and provides the use of menus or log windows to access remote log information.

- profile tool

  Provides a graphical view of a LAN and its IWS positions. You can obtain profile information for each IWS position on the ring and information on RAMP-compliant software applications running on the position.

- print screen capture tool

  Prints a file of a captured screen from an operator position.

- file transfer tool

  Provides a choice of the following:

  — manual file transfer tool

    Allows the transfer of files between the RAMP and the other TOPS IWS positions by using a commercial file transfer protocol (FTP) application. (Pathway FTP is the default.)

  — software distribution tool

    Allows the distribution of TOPS IWS software and data files between the RAMP and other IWS positions.

- schedule manager tool

  Provides the ability to save and edit software distribution configurations and to schedule those distributions.

- software editor tool

  Provides a Windows graphical user interface (GUI) for editing software and distribution script files. The script files list TOPS IWS application software and datafill files that can be transferred by RAMP.

- provisioning tool

  Resides on all positions on the token ring and can be accessed on individual IWS positions. You can also access it from RAMP and use the RAMP file transfer capabilities to transfer datafill to individual TOPS IWS positions. It provides access to the following:

  — GUI for datafilling the current table (.TBL), language (.LNG), and initialization (.INI) files that are required by IWS Base software.

  — KeyBind utility for assigning and validating keys.

- reboot tool

  Allows the RAMP to reboot other TOPS IWS positions.

Depending on how the position software is activated, the maintenance position can be used for general customer agent functionality as well as for maintenance.

11.3 Patching

Software patching is the process by which software problems are corrected in the field without releasing and installing entire new versions of the software loads. There are several advantages to using patches instead of re-releasing software packages:

- Patches are much smaller than the entire software load and are easier to distribute.
- Patches require less time to install than an entire software load and thus cause less down time.
- Patches are targeted to specific parts of the software load. You fix only what is broken; all other software remains the same.
- Patches make it easier to track specific problems and their corresponding fixes because there is usually a one-to-one correspondence between specific problems and patch solutions.

12.0 Finding TOPS IWS information

This chapter provides reference information about the documents that are associated with TOPS IWS. “About this book” on page xi lists the documents to which this book makes explicit references.

12.1 Installation documentation

Table 25 lists the installation documentation.

Companies who request installation documentation must have a Technical Information Agreement (TIA) and Installation Information Agreement (IIA). Information in this document is subject to change because Nortel Networks reserves the right to make changes, without notice, in equipment design or components as engineering or manufacturing methods warrant.

Table 25. Installation documentation

Title	Document number	Abstract
Installation Methods for DMS-100 Family	IM100ALL	Provides all the necessary procedures required to install and commission the initial, extension, and remote applications of the DMS-100 Family of products. Refer to the index for reference to specific products.

12.2 TOPS CM documentation

Table 26 lists the NTPs that are related to TOPS CM portion hardware and software. If the middle section of the document number for an NTP is *nnnn* in this table (for example, 297-*nnnn*-350 for the *Translations Guide*), the version of the NTP that you receive depends on the PCL you have.

Table 26. TOPS CM documentation

Title	Document number	Abstract
Alarm Clearing and Performance Monitoring Procedures	297-*nnnn*-543	Contains the following information: • external and power procedures required to maintain the DMS-100 switch. • procedures required to maintain lines, trunks, and peripherals. • procedures required to maintain network modules (NMs). • maintenance procedures for replacing cards in the peripheral modules, and for clearing alarms under the PM header of the MAP. • procedures for monitoring and clearing alarms that are related to TOPS IWS and equipment in DMS-200 TOPS and DMS-100/200 TOPS offices. • acceptance procedures for verifying the correct operation of new or repaired DMS SuperNode cards received from Nortel.
Basic Administration Procedures	297-1001-300	Provides information about setting up the operational measurement system for the DMS-100 switch. It is for use by switch administrators.
Card Replacement Procedures	297-*nnnn*-547	Contains procedures required to maintain lines, trunks, and peripherals and the card replacement procedures that are related to TOPS IWS and associated equipment in DMS-200 TOPS and DMS-100/200 TOPS offices.
Commands Reference Manual	297-1001-822	Describes all menu and non-menu commands that are used at a MAP in a Nortel Networks DMS-100 switch.
DMS-10 and DMS-100 Family Product Documentation Directory	297-8991-001	Provides an overview of NTP documentation, ordering options, CD-ROM documentation, and version and issue control.

Table 26. TOPS CM documentation (Continued)

Title	Document number	Abstract
Feature Description Manual Reference Manual	297-*nnnn*-801	Provides DMS-100 feature information to help operating company personnel prepare for a new software load or to understand elements of the software.
Hardware Description Manual Reference Manual	297-*nnnn*-805	Describes DMS circuit cards, which are listed by product engineering code. This manual is for maintenance and operating personnel in an operating company.
Input/Output System Reference Manual	297-1001-129	Describes the hardware and software aspects of the DMS-100 Family Input/Output System.
Log Report Reference Manual	297-*nnnn*-840	Provides information to understand and use log reports generated by the DMS-100 switches. It includes an overview of the log system and detailed log report descriptions.
Office Parameters Reference Manual	297-*nnnn*-855	Describes the office-dependent data common to all DMS switching units. This data is stored in a series of data store lookup tables that are used with software programs and circuits to advance the call through call processing. The data schema describes these lookup tables, with their fields and valid entries.
Operational Measurements Reference Manual	297-*nnnn*-814	Describes DMS-100 operational measurements groups. OM groups provide information on switch performance and activity. This document identifies the tasks required to administer TOPS from the DMS switch and provides the information required to complete those tasks. It includes a description of the administrative objective, a master list of administrative tasks associated with TOPS, and descriptions of the operational measurements.
Peripheral Modules Maintenance Guide	297-*nnnn*-592	Describes peripheral modules and how they interface with the DMS-100 Family of switching systems. It also describes the PMs of the Signaling Transfer Point DMS SuperNode application and includes information on the trunk module equipment frame.

Table 26. TOPS CM documentation (Continued)

Title	Document number	Abstract
All Products Computing Module Loads Provisioning Manual - Active Detail	PLN-8991-104	Describes the rules and guidelines for provisioning the DMS-100 Family switching machine, its components, and its features.
Recovery Procedures	297-*nnnn*-545	Contains procedures for analyzing the causes of alarms that are displayed under the CCS header on the MAP. It also provides the recovery procedures that are related to TOPS IWS and equipment in DMS-200 TOPS and DMS 100/200 TOPS offices.
Routine Maintenance Procedures	297-*nnnn*-546	Contains procedures to maintain lines, trunks, and peripherals.
TOPS Internet Protocol (TOPS-IP) User's Guide	297-8403-906	Describes the TOP-IP network and its components, as well as the capabilities of TOPS-IP.
TOPS Local Number Portability (LNP) User's Guide	297-8403-902	Describes how the TOPS unbundling capability changes the way TOPS translates, routes, screens, and bills calls.
TOPS OSSAIN User's Guide	297-8403-901	Describes the OSSAIN interface between the DMS switch and service nodes.
TOPS Unbundling User's Guide	297-8403-903	Describes how the TOPS unbundling capability changes the way TOPS translates, routes, screens, and bills calls.
Translations Guide	297-*nnnn*-350	Describes the function of the switching network within the DMS-100 Family of switching systems. It includes information about the double-shelf network equipment frame. It provides guidelines for individuals involved in the preparation, datafill, and validation activities associated with the DMS TOPS IWS translations.
Trouble Locating and Clearing Procedures	297-*nnnn*-544	Contains the trouble locating procedures for TOPS IWS and associated equipment in DMS-200 TOPS and DMS 100/200 TOPS offices.

12.3 TOPS IWS documentation

Table 27 lists the TOPS IWS NTPs in numeric order.

Table 27. TOPS IWS documentation

Title	Document number	Abstract
TOPS IWS Product Description/Technical Specification	297-2251-004	Describes the hardware and software features of the TOPS IWS system.
TOPS IWS Base Platform User's Guide	297-2251-010	Provides the following: • methods for installing and configuring hardware and software in an IWS position • description of datafill used in the IWS base software • description of configuration of other vendors' products • description of screen saver application • engineering, performance, and miscellaneous information This document is for support personnel only.
TOPS IWS OIA Application Guide	297-2251-012	Provides the following: • description of the OIA Generic Protocol specification and its implementation in the IWS position • method for installing the OIA application in the IWS position • method for tracing messages exchanged between the position and the external database • method for interpreting messages captured by the trace facility • OIA log reports
TOPS IWS Base HMI Application Guide	297-2251-013	Describes the screen displays of the Base human-machine interface of the TOPS IWS system.

Table 27. TOPS IWS documentation (Continued)

Title	Document number	Abstract
TOPS IWS RAMP and Provisioning User's Guide	297-2251-015	Describes the remote access maintenance position (RAMP) and explains how to use the RAMP, the provisioning tool, and the keybind utility.
IWS Billing Application Guide	297-2251-016	Describes IWS Billing in terms of the human machine interface that it provides to the operator and the call-related and system functionality that the operator uses.
TOPS IWS NTDA Application Guide	297-2251-017	Provides the methods for configuring NTDA datafill files and the application performance criteria.
TOPS MPX Power Distribution and Grounding Guide	297-2291-156	Describes the power and grounding requirements for TOPS IWS. This document is for personnel who are responsible for plant-equipment planning, engineering, installation, and maintenance.
TOPS IWS Network Configuration Guide	297-2291-201	Describes procedures for configuring the Ethernet hub, enabling the keystroke commands used in the IWS environment, and datafilling the TOPS IWS position.
TOPS IWS Audio Card Configuration and Diagnostics	297-2291-202	Explains how to configure and test the audio card in the IWS position.
TOPS IWS Operator Guide	297-2251-304	Contains information about operator equipment, screen displays, keyboard input, verbal responses, request and trouble reporting procedures, and in-charge and service assistance position capabilities. This document is for operator personnel.
TOPS IWS Enhanced Information Services Application Client Guide	297-2251-305	Describes the EISAC application, which provides operators with direct access to the internet.
TOPS IWS Force Management Guide	297-2251-313	Defines force management, describes the typical force management office configuration, and explains how the DMS switch distributes calls. It also explains force management measurements, features, positions, reports, and forms.

13.0 Appendix: Compliance statements

Customer Instructions

The TOPS IWS PCI Universal Audio Card complies with Part 68 of the FCC rules. On the component side of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The TOPS IWS PCI Universal Audio Card uses the following standard connections and codes:
USOC Code: RJ11C, RJ49; Facility Interface Code: 02LS2, 02IS5; Service Order Code: 9.0F, 6.0F

The REN number shown on the label is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. The sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

If the equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advanced notice isn't practical, the telephone company will notify the customer as soon as possible. Also you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

No repairs can be performed by the user. If you experience trouble with this equipment and for repair and warranty information, please contact:

Nortel Networks
1-800-4-NORTEL

If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

This equipment can not be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

Frank Casadonte, Senior Manager Date: July 15, 1999

Equipment Attachment Limitation

"**NOTICE**: The Industry Canada Label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation in service in some situations.

Repairs to certified equipment should be coordinated by representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate."

"**NOTICE**: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirements that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5."

14.0 List of terms

ABBS

Automated Alternate Billing Service.

ACCS

Automatic Calling Card Service.

access tandem (AT)

A switching system that provides a traffic concentration and distribution function for inter-LATA traffic originating or terminating within a local access and transport area (LATA). The access tandem provides the inter-LATA carrier with access to more than one end office within the LATA. The access tandem also acts as a toll tandem for intra-LATA traffic. The access tandem technical functions include automatic message accounting (AMA) recording, routing, and call supervision.

ACTS

Automatic Coin Toll Services.

ADACC

Automatic Directory Assistance Call Completion.

ADAS

Automatic Directory Assistance Service.

advanced intelligent network (AIN)

A set of Bellcore standards for software and hardware that enhance switch call processing capabilities to use centralized databases. These databases determine how AIN calls should proceed for further call processing. AIN also allows operating companies to design and deploy their own features and make these features available across private and public networks.

AIN

Advanced intelligent network.

ANIF

Automatic number identification failed.

AINTCC

Automated Intercept Call Completion.

AMA

Automatic messaging accounting.

ANI

Automatic number identification.

API

Application programming interface.

application programming interface (API)

A layer of TOPS IWS base software that provides an open interface enabling applications from different vendors to communicate with system software.

Area code

See numbering plan area (NPA).

ARU

Audio response unit.

AT

Access tandem.

attendant pay station (APS)

An attendant-supervised group of non-coin public telephones located in areas of high pedestrian traffic (for example, airports) that allows subscribers to place local, long-distance, or overseas calls and to pay an attendant for the chargeable calls upon completion.

audio response unit (ARU)

An output device that provides a spoken response to digital inquiries from a telephone or other device. The response is usually assembled by a computer from a prerecorded vocabulary of words.

Automated Alternate Billing Service (AABS)

A feature that allowed automated completion of a calling card, collect, and third-number calls using voice recognition technology and prompt generation to communicate with the calling and billed parties.

Automated Directory Assistance Service (ADAS)

A feature that automates the inquiry portion of directory assistance calls. The caller is prompted by a voice service node (VSN) to speak the locality and name for which a directory number is requested. The VSN records these details, deletes the initial and final silences then plays the recording to the operator before connecting the call to the operator.

Automated Intercept Call Completion (AINTCC)

A feature with which calls to intercepted numbers are automatically connected to the new number. AINTCC can announce the new number to the caller before the connection is made.

Automatic Calling Card Service (ACCS)

A feature that allows the subscriber to dial a call and bill it to a calling card number provided by the operating company.

Automatic Coin Toll Services (ACTS)

A feature that allows the operating company to handle long distance (1+) coin class from a coins station without operator assistance.

Automatic Directory Assistance Call Completion (ADACC)

A feature package that allows the subscriber who originates a directory assistance call to complete the call to the requested number without having to originate another call and without operator assistance.

automatic messaging accounting (AMA)

An automatic recording system that documents all the necessary billing data of subscriber-dialed long distance calls.

automatic number identification (ANI)

A system whereby a calling number is identified automatically and transmitted to the AMA office equipment for billing.

automatic number identification failed (ANIF)

A service that allows the operator to enter the calling number manually when automatic number identification (ANI) fails.

billing verification check (BVC)

An application process that verifies the number to which a call is billed.

BIX

Building interoffice cross-connect.

building interoffice cross-connect (BIX)

A modular cross-connect system for use in apparatus, satellite and riser closets, building entry terminals and other cross-connect fields.

BLV

Busy line verification.

branding

A feature that allows operating companies the option of connecting customer-definable announcements to directory assistance or toll calls before placing them in a queue or connecting them to an available operator or automated operator system.

busy line verification (BLV)

A service that allows the subscriber to obtain operator assistance to determine if a called line is in use or out of order.

BVC

Billing verification check.

CAC

Carrier access code.

Call type for queueing (CT4Q)

The basis for TOPS IWS call queue assignment. TOPS assigns each call origination type a CT4Q and sequentially refines the CT4Q associated with a call.

called party

The end-user who receives a call.

CCDB

Calling card database.

calling party

The end-user who originates a call.

calling card database (CCDB)

An external online repository that maintains enhanced calling card holder profiles for enhanced calling card services such as account codes, voice mail message

waiting indications, speed dialing, and access to car rental agencies, hotel and airline reservations, and travel agencies.

called party
The end-user who receives a call.

carrier access code (CAC)
A series of digits that a subscriber dials to select an inter-LATA carrier for a call.

CAMA
Centralized automatic message accounting.

CC
Central controller.

CCITT
Consultative Committee on International Telegraphy and Telephony.

CCS7
Common Channel Signaling 7.

CDC
Coin detection circuit.

central control (CC)
The data processing functions of the DMS-100 Family, with the associated data store and program store.

centralized automatic message accounting (CAMA)
A system that produces itemized billing details for subscriber-dialed long distance calls. Details are recorded at a central facility serving a number of exchanges. In exchanges not equipped for automatic number identification, calls are routed to a CAMA operator who obtains the calling number and keys it into the computer for billing.

central office
A switching office arranged for terminating subscriber lines and provided with switching equipment and trunks for establishing connections to and from other switching offices. Synonymous with Class 5 office, end office, and local office.

central processing unit (CPU)
A hardware entity, located in the central control complex frame, that contains the central data processor for the DMS-100 Family system.

channel bank
A part of a carrier-multiplex terminal that performs the first step of modulation. It multiplexes a group of channels into a higher frequency band and, conversely, demultiplexes the higher frequency band into individual channels.

CI
Command interpreter.

CLEC
Competing local exchange carrier.

CM

Computing module.

coin detection circuit (CDC)

A circuit at a coin box, or in the coin box line equipment at the central office, that calculates the duration of the call that has been paid for. When the paid time limit is reached, the CDC advises the caller to insert more money to continue the call.

command interpreter (CI)

A component in the Support Operating System that functions as the main interface between machine and user. Its principal roles include the following:

- reading lines entered by a terminal user
- breaking each line into recognizable units
- analyzing the units
- recognizing command-item numbers on the input lines
- activating these commands

Common Channel Signaling 7 (CCS7)

A digital message-based network signaling standard, defined by the CCITT, that separates call signaling information from voice channels so that interoffice signaling is exchanged over a separate signaling link.

competing local exchange carrier (CLEC)

Any local exchange carrier that is in rivalry with another local exchange carrier for providing services.

computing module (CM)

The processor and memory of the DMS SuperNode.

Consultative Committee on International Telegraphy and Telephony (CCITT)

Committee that is responsible for creating a series of recommendations for telephony service.

CPU

Central processing unit.

crosstalk

The unwanted transfer of energy from one circuit to another circuit.

CSE

Customer service expert.

CT4Q

Call type for queueing.

customer service expert (CSE)

An operator whose operator or position number has been assigned assistance and monitoring capabilities.

DA

Directory assistance.

data link

An ensemble of terminal installations and the interconnecting network operating in a particular mode that permits information to be exchanged between terminal installations. A bi-directional transmission path for data comprising two data channels in opposite directions which operate together at the same data rate.

DCH

D-channel handler.

D-channel handler (DCH)

A card in the TOPS Message Switch (TMS) that provides the interface for DS0 data communication channels. This card is also used in ISDN.

DDO

Direct dial overseas.

Digital Multiplexing System (DMS)

A central office switching system in which all external signals are converted to digital data and stored in assigned time slots. Switching is performed by reassigning the original time slots.

digital recorded announcement machine (DRAM)

A peripheral module in which voice messages are stored in digital form, providing access to up to 30 service voice announcements.

digital trunk controller (DTC)

A peripheral module that connects links from the network with digital trunk circuits.

direct dial overseas (DDO)

Dialing of calls to an overseas destination without operator assistance. To use DDO, the caller dials 011, a country code, and a city code.

directory assistance (DA)

DA is a service that allows a subscriber to ask an operator to look up information from a telephone listing database.

directory number (DN)

The full complement of digits that are required to designate a subscriber's station within one NPA.

DMS

Digital Multiplex System.

DN

Directory number.

DRAM

Digital recorded announcement machine.

DT

Digital telephony.

DTC

Digital trunk controller.

DTMF

Dual tone multifrequency.

dual-tone multifrequency (DTMF)

A signaling method that uses set combinations of two specific voice-band frequencies. One of these voice-band frequencies is selected from a group of four low frequencies, and the other is selected from a group of three or four relatively high frequencies.

EAEO

Equal access end office.

EAOSS

Equal access operator services signaling.

EIU

Ethernet interface unit.

EBAS

Enhanced Billing Access Services.

EMPC

Enhanced multi-protocol controller.

electrostatic discharge (ESD)

A transfer of electrostatic charge either caused by direct contact between two bodies that are at different electrostatic potentials or induced by an electrostatic field.

Enhanced Billing Access Services (EBAS)

An application that uses the IPS to determine the specific service and service options to offer for incoming calls.

enhanced multi-protocol controller (EMPC)

A general-purpose data communications card that allows data communications between a DMS-100 Family switch and an external computer (between a central office billing computer and a DMS-100 Family switch, for example). The EMPC card resides on the input/output controller shelf. The EMPC card's protocol software is downloaded from the DMS-100 central processing unit and then supports software routines for data packet network communication. The EMPC is used instead of the MPC in new installations.

enhanced TOPS message switch (ETMS)

A peripheral module that provides an interface (for voice and data) between the network and the positions.

equal access

An operating company tariff offering for LATA access that is equal in type, quality, and price for all connected inter-LATA and international carriers.

equal access operator services signaling (EAOSS)

A signaling service that permits an operating company to combine most traffic types between an equal access end office and an access tandem in many different ways.

ESD

Electrostatic discharge.

ETMS

Enhanced TOPS message switch.

file transfer protocol (FTP)

A flexible way to transfer files between computers.

FTP

File transfer protocol.

graphical user interface (GUI)

Hardware and software that allows an operator to interact with and perform actions at a TOPS IWS position.

GUI

Graphical user interface.

HADS

Hotel administration data system.

HMI

Human machine interface.

HOBIC

Hotel billing information center.

hotel administration data system teletypewriter (HADS TTY)

The teletypewriter located in the HOBIC and used to enter TOPS IWS billing information and to receive service alarm messages, HOBIC operational measurement information, and hotel charge-adjust (credit) messages generated by TOPS IWS operators.

hotel billing information center (HOBIC)

A centralized operator-attended location that provides call-details and time and charges information for guest-dialed long distance calls, details about hotel equipment problems, and billing inquiries.

HTML

Hypertext markup language.

Hypertext markup language (HTML)

The authoring software language used for creating Internet web pages.

human machine interface (HMI)

Hardware and software that allows an operator to interact with and perform actions at a TOPS IWS position.

IC

In-charge manager.

IDC

Insulated displacement connections.

ILEC

Incumbent local exchange carrier.

in-charge manager (IC)

The person using the TOPS IWS in-charge position to assist operators and monitor the operating team.

incumbent local exchange carrier (ILEC)

The company that currently provides local telephone service.

insulated displacement connection (IDC)

A connector module used for connecting unshielded twisted pair horizontal cable to a modular jack.

integrated services digital network (ISDN)

A set of standards proposed by the CCITT to establish compatibility between the telephone network and various data terminals and devices. ISDN is a fully digital network, in general evolving from a telephone integrated digital network. It provides end-to-end connectivity to support a wide range of services, including circuit-switched voice, circuit-switched data, and packet-switched data over the same local facility.

Intelligent Service Node (ISN)

A peripheral unit that supports service applications with media processing capabilities, vocabulary recognition, and an open-platform architecture.

Intelligent Service Node Provisioning System (IPS)

A database that determines the specific service and service options to offer for incoming calls

intelligent workstation (IWS)

A terminal capable of performing computer functions.

interactive voice response (IVR)

A voice processing arrangement that speeds the call to the most appropriate destination by asking the waiting caller a number of pertinent questions. An IVR system then instructs the DMS-100 switch to connect the call to the appropriate Automatic Call Distribution (ACD) group and provides the necessary information to look up and send relevant computer records.

intercept call

A call sent to an operator position when the subscriber dials an out-of-service number or a number that has recently been changed.

intercept service

A service where a call comes to an operator position when a subscriber dials an out-of-service number or a number that has recently been changed.

inter-LATA

Telecommunication services, revenues, and functions that originate in one local access and transport area (LATA) and terminate outside that LATA.

inter-LATA carrier (IC)

Any carrier that provides telecommunication services between a point inside a local access and transport area (LATA) and a point outside the LATA.

intra-LATA

The term that describes telecommunications services, revenues, and functions that originate and terminate inside one LATA.

intra-LATA carrier

An operating company or carrier that has regulatory approval to provide intra-LATA services.

inward call

A call that either goes through the inward operator of a country other than the country where the call originated or that is between positions in a traffic office.

inward wide area telephone service (INWATS)

A telephony service that allows a subscriber to receive long distance call originating with specified service areas without a charge to the originating party. A toll free number is assigned to a certain PBX to allow fro free calls.

INWATS

Inward wide area telephone service.

IOC

I/O controller

I/O controller (IOC)

An equipment shelf that provides an interface between the central message controller and up to 36 input/output devices.

IPS

Intelligent Service Node Provisioning System.

ISG

Isolated grounding system.

ISN

Intelligent Service Node.

isolated grounding system (ISG)

A grounding system for a set of equipment that is kept separate from other adjacent systems and usually tied to earth ground at one point.

ISDN

Integrated services digital network.

ISDN user part (ISUP)

A Common Channel Signaling 7 (CCS7) message-based signaling protocol that acts as a transport carrier for ISDN services. The ISUP provides the functionality in a CCS7 network for voice and data services.

ISUP

ISDN user part.

IVS

Interactive voice response.

IWS

Intelligent workstation.

LAN

Local area network.

LATA

Local access and transport area.

LEC

Local exchange carrier.

link peripheral processor (LPP)

The DMS SuperNode equipment frame or cabinet that contains two types of peripheral modules: a link interface module and one or more application-specific units.

LIDB

Line information database.

line information database (LIDB)

An external database for validating alternate billing requests.

LNP

Local number portability.

local access and transport area (LATA)

A geographic area within which an operating company can offer telecommunications-related services.

local area network (LAN)

A network that permits the interconnection and intercommunication of multiple computers, primarily for the sharing of resources such as data storage devices and printers.

local exchange carrier (LEC)

The company that provides local telephone service.

local number portability (LNP)

A service that allows subscribers to keep their directory numbers when they change service providers.

log system

The system that DMS software uses to record the occurrence of all significant events (for example, equipment failure) and then report the events to the operating company.

LPP

Link peripheral processor.

Maintenance and Administration Position (MAP)

A group of components that provide a user interface between operating company personnel and the DMS-100 Family switches. A MAP consists of a visual display unit and keyboard, a voice communications module, test facilities, and MAP furniture.

management information system (MIS)

AN information system that uses automatic data processing to aid in the acquisition, analysis, storage, retrieval, and distribution of data.

MAP

Maintenance and Administration Position.

MAU

Multistation access units.

MCCS

Mechanized calling card service.

mechanized calling card service (MCCS)

A service that replaces the operator's involvement by using digitally recorded announcements to instruct a subscriber to dial a card number, by using digitone receivers to receive the number, and by exchanging validating the card number.

MIS

Management information system.

MP

Multipurpose position.

MPC

Multi-protocol controller.

multi-protocol controller (MPC)

A general-purpose data communications card that allows data communications between a DMS-100 Family switch and an external computer (between a central office billing computer and a DMS-100 Family switch, for example). The MPC card resides on the input/output controller shelf. The MPC card's protocol software is downloaded from the DMS-100 central processing unit and then supports software routines for data packet network communication.

multipurpose position (MP)

An operator position that can be configured as toll and assist, in-charge, assistant, or force manager. The MP consists of the base unit, headset, keyboard, and video display unit.

multistation access units (MAU)

Units that are cabled together to form a token- ring LAN for TOPS IWS. Each MAU provides connections for up to eight positions.

Nortel Networks publication (NTP)

A document that contains descriptive information about the DMS-100 Family hardware and software modules, and performance oriented practices for testing and maintaining the system. NTPs are supplied as part of the standard documentation package provided to an operating company.

Nortel Networks Directory Assistance (NTDA)

The TOPS IWS application that supports operators who provide telephone numbers and intercept services for subscribers through the Nortel Networks Directory and Operator Services (D & OS) databases.

NPA

Numbering plan area. Synonymous with area code.

NTDA

Nortel Networks Directory Assistance.

NTP

Nortel Networks publication.

numbering plan area (NPA)

Any of the designated geographical divisions of the United States, Canada, Bermuda, the Caribbean, Northwestern Mexico, and Hawaii within which no two telephones have the same 7-digit number. Each NPA is assigned a unique 3-digit area code. Synonymous with area code.

NXX

An American central office code. A general way of referring to the three digits representing the central office code in a telephone number. N can be any digit 2 through 9; X can be any digit 0 through 9.

OA&M

Operation, administration, and maintenance.

OC

Operating company.

OEM

Original equipment manufacturer.

off-hook

The condition existing in telephone operations when the receiver or handset is removed from its hookswitch.

OGT

Outgoing trunk group.

OIA

Open Information Access.

OLNS

Originating line number screening.

OM

Operational measurements.

on-hook

The condition existing in telephone operations when the receiver or handset is resting on its hookswitch.

ONI

Operator Number Identification.

Open Information Access (OIA)

The TOPS IWS application that provides reference data such as emergency number information, rate and route information, phraseology, and city name through an external database.

operating company (OC)

The owner or operator of a DMS switch.

operation, administration, and maintenance (OA&M)

All the tasks necessary for providing, maintaining, or modifying the services provided by a switching system. These tasks include provisioning of hardware, creation of service, verification of new service, and trouble recognition and clearance.

operational measurements (OM)

The hardware and software resources of the DMS-100 Family switches that control the collection and display of measurements taken on an operating system. The OM subsystem organizes the measurement data and manages its transfer to displays and records. The OM data is used for maintenance, traffic, accounting, and provisioning decisions.

operator

Person who operates a TOPS IWS position.

operator-assisted call

Calls that are dialed by the subscriber but require help from the operator.

OPP

Open position protocol.

Operator Number Identification (ONI)

A feature that brings an operator into the circuit to check the calling number when a subscriber has direct-dialed a long distance call that is to be charged on an itemized bill basis by CAMA equipment.

Operator Services System (OSS)

A cost-effective method of providing subscribers with directory assistance. The OSS resides in the DMS-100 or DMS-200 switch. It handles directory assistance calls and includes a force management system and the capability for automatic message accounting (AMA).

Operator Services Systems Advanced Intelligent Network (OSSAIN)
A generic switch to service node interface that allows service nodes to control switch functionality associated with operator services.

open position protocol (OPP)
The procedures required for communication between a TOPS DMS switch and the TOPS IWS position.

original-equipment manufacturer (OEM)
A supplier of hardware that Nortel Networks markets.

originating line number screening (OLNS)
The ability to query a central, shared line information database that contains attributes for directory numbers and to base services and actions on individual directory numbers.

OSS
Operator Services System.

OSSAIN
Operator Services Systems Advanced Intelligent Network.

outgoing trunk group (OGT)
A trunk used for calls going out to a distant toll center.

outward wide area telephone service (OUTWATS)
A telephony service provided over one or more dedicated access lines to the serving central office. OUTWATS permits subscribers to make calls to specific service areas on a direct dialing basis for a flat monthly charge or for a charge based on accumulated use. OUTWATS line have special directory numbers.

OUTWATS
Outward wide area telephone service.

PARS
Personal Audio Response System.

PBX
Private branch exchange.

PC
Personal computer.

PCL
Product computing-module load.

PEC
Product engineering code.

PIC
Primary inter-LATA carrier.

primary inter-LATA carrier (PIC)
A line option assigned to a line when a subscriber has selected an inter-LATA carrier to handle toll calls.

product computing-module load (PCL)
The total CM software line-up required.

product engineering code (PEC)
An eight-character unique identifier for each marketable hardware item manufactured by or for Nortel Networks.

permanent virtual circuit (PVC)
A user facility that provides a permanent association between two units of data terminal equipment. The association is identical to the data transfer phase of a virtual call. No call setup or clearing procedure is necessary.

Personal Audio Response System (PARS)
A system that allows an operator to supply customized automated questions or prompts, often in the operator's own voice, to a subscriber.

personal computer (PC)
A workstation that has computational capability and that can be programmed to perform user-determined functions

personal identification number (PIN)
A unique number used with an access code to activate a feature such as a calling card.

PIN
Personal identification number.

ported number
A directory number that has been moved from one exchange to another where the exchange might not be the same service provider.

position
A TOPS IWS operator terminal.

private branch exchange (PBX)
A telephone exchange, either automatic or attendant-operated, that provides telephone service within an organization but does not provide connections to the public network.

protocol
A strict procedure required to initiate and maintain communication. Protocols can exist at many levels in one network, such as link-by-link, end-to-end, and subscriber-to-switch.

PVC
Permanent virtual circuit.

QFADS TTY
Queue Management System force administration data system teletypewriter.

QMFADS TTY
Queue Management System mechanized force administration data system teletypewriter.

QMS
Queue Management System.

QMSCASE
Queue Management System Customer Assistance Service Enhancements.

QTADS TTY
Queue Management System traffic administration data system teletypewriter.

queue
Customers waiting for attachment to operator positions.

queue length
The number of subscribers waiting at a given instant to be attached to an operator position.

Queue Management System (QMS)
A software package that provides up to 255 call queues and segregates traffic across these call queues.

Queue Management System Customer Assistance Service Enhancements (QMSCASE)
A software package for QMS that can provide operators with the ability to monitor and provide assistance for other operators.

Queue Management System force administration data system teletypewriter (QFADS TTY)
A teletypewriter located in the force management center of a TOPS office with the Queue Management System (QMS). It provides a printed record of force management statistics for each traffic office and for TOPS QMS as a whole. It also serves as an input and output terminal for various commands and reports.

Queue Management System mechanized force administration data system teletypewriter (QMFADS TTY)
A minicomputer system that extracts Queue Management System (QMS) force management measurements from a pollable port in a TOPS office and calculates summaries of service and force statistics.

Queue Management System traffic administration data system teletypewriter (QTADS TTY)
A teletypewriter located in each traffic office of a TOPS office with the Queue Management System (QMS). It provides a printed record of force management statistics for the traffic office in which it is located, and serves as an input and output terminal for various commands and reports.

queue threshold
The maximum number of calls in the call queue at one time.

RAMP
Remote access maintenance position.

real-time interface coprocessor (RTIC) card
An adapter card that supports RS-422 data communications for the TOPS IWS position.

remote access maintenance position
A TOPS IWS position on a token-ring LAN that allows support personnel to update all other positions on the same ring.

RTIC card
Real-time interface coprocessor card.

SA
Service assistant.

SADS TTY
System Administration Data System teletypewriter.

SDK
Software Development Kit.

service assistant (SA)
The person who uses the assistance position.

service provider identification (SPID)
An identifier that uniquely identifies a logical terminal and its service profile to the switch.

softkeys
Software-programmable keys.

Software Development Kit (SDK)
An optional tool to help operating company software engineers create their own TOPS -IWS-based applications that work on the operator positions and interact with the DMS-200 switch. The SDK includes documentation of protocols and the inner workings of the TOPS IWS software, software libraries that greatly simplify the process of crafting new programs, and utilities such as a test simulator that lets the programmer test the application without actually signaling with the switch.

Sonalert
A special tone generated by a position, not in the headset, to notify an operator of a situation that requires immediate attention.

SPID
Service provider identification.

subscriber
The individual user of a telephone station set that is connected to a DMS-100 Family switch.

System Administration Data System teletypewriter (SADS TTY)
The teletypewriter used in a TOPS single-traffic office. A SADS TTY provides a printed record of force management data and serves as an input and output terminal for various other input commands and output messages.

T&C
Time and charges.

TCP/IP
Transmission Control Protocol/Internet Protocol.

teletypewriter (TTY)
An electric typewriting device that generates a coded signal corresponding to each typed character. A TTY also receives and converts coded signals into typewritten copy.

TICS
TOPS inter-LATA carrier service.

time and charges (T&C)
A service in which operators quote the duration and charges for a long distance call to a subscriber.

timing source generator (TSG)
A digital clock timing source.

TLP
Transmission level point.

TOPS
Traffic Operator Position System.

TOPS inter-LATA carrier service (TICS)
A feature that allows the TOPS switch to provide operator services for interexchange carriers.

TOPS IWS
Traffic Operator Position System intelligent work station.

TOPS position controller (TPC)
A control unit that functions as an operator position-based microcomputer with networking capabilities.

TPC
TOPS position controller.

Traffic Operator Position System (TOPS)
A call processing system made up of a number of operator positions.

Traffic Operator Position System intelligent workstation (TOPS IWS)
A personal computer consisting of a controller, a video display, keyboard, headset jack, and software for monitoring call details and entering routing and billing information for operator assistance, directory assistance, and intercept calls.

Transmission Control Protocol/Internet Protocol (TCP/IP)
A protocol stack, designed to connect different networks, on which the Internet is based.

transmission level point (TLP)
A reference point against which transmission levels are measured.

TSG

Time source generator.

TTY

Teletypewriter.

UDP/IP

User Datagram Protocol/Internet Protocol.

UMP

Universal message protocol.

universal message protocol

A display format standard that defines the type of information that is to be displayed on each line of the directory assistance operators screen.

universal tone receiver (UTR)

A combined service that can perform the function of a Digitone Receiver for lines and a multifrequency receiver for trunks.

User Datagram Protocol/Internet Protocol (UDP/IP)

In TCP/IP, a packet-level protocol built directly on the Internet protocol layer. It is used for application-to-application programs between TCP/IP host systems.

UTR

Universal tone receiver.

virtual position controller (VPC)

A control unit that functions as an operator position-based microcomputer with networking capabilities.

voice service node (VSN)

An processor that is external to the DMS switch and that communicates with the switch through an application protocol to provide voice recognition and prompt generation components.

VPC

Virtual position controller.

VSN

Voice service node.

WAN

Wide area network.

WATS

Wide area telephone service.

wide area network (WAN)

A network that provides communications services to a geographic area larger than that served by a LAN.

wide are telephone service (WATS)

A special direct distance dialing service that, for a flat monthly charge or a charge based on accumulated usage, permits either inward or outward dialing between a subscriber and specific areas.

XMS-based peripheral module (XPM)

The generic name for XMS peripherals. XPM have two processors, the signaling processor and the master processor, in hot standby configuration.

XPM

XMS-based peripheral module.

X.25

CCITT-defined, network layer protocol that is used in packet switching to establish, maintain, and clear virtual circuit connections between an ISDN terminal and a destination in the packet-switched network.

zone

In global operator services (GOS), an area within which an operating company can offer telecommunications-related services. A zone can be any type or size area, from a city to a country to a group of countries.

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DMS-100 Family

TOPS IWS

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