Residential Enhanced Services (RES)

Everyday life has put greater demands on data access and bandwidth. The number of households that telecommute or bring work home continues to multiply. About one-third of North American residences have access to the Internet, changing the way we bank, invest, and shop. With this demand comes the need for more cost-effective bandwidth and more intelligent services to help simplify everyday life.

Market research conducted by Nortel Networks and others has indicated that residential subscribers want better control of their privacy. They want more information about who's calling them before they would interrupt a call in progress or respond to a call they've missed. Because of these factors, the penetration rates of popular services among residential users — Caller ID (30%), Call Waiting (46%), voice mail service (12%) — are at an all-time high in the U.S. market. In Canada, these services also have impressive penetration rates: Caller ID at 41%, Call Waiting at 36%, and voice mail service at 29%.

The research also indicated that residential subscribers are willing to pay an additional amount per month for enhanced versions of services that offer these benefits. At the same time, service providers are coming up with unique revenue-boosting strategies to best fit these services into their networks.

To help make your offerings more compelling, Nortel Networks provides the industry's most extensive and innovative service portfolio. As competition in these market sectors intensifies, our Residential Enhanced Services (RES) solutions offer the power and flexibility to respond quickly and cost-effectively to changing market opportunities.

IN THIS CHAPTER

OFFER MORE FLEXIBILITY AND VALUE

A few of the many benefits of our RES portfolio include:

- Builds subscriber interest and demand with industry-leading display-based telephony services and powerful call management capabilities.
- Enhances ease of use to lower barriers to service usage, stimulate growth of services, and increase customer satisfaction.
- Helps improve call completion with subscriber features for busy/no answer conditions, call waiting handling, and more.

KEY RES FEATURES

DMS system solutions discussed in this chapter include:

- Know who's calling
  - **Automatic Recall with Name** adds the name of the last caller to the standard Automatic Recall (*69) announcement, which only provides a phone number.
  - **Who's Calling** screens incoming calls by prompting all anonymous callers to record their name or a brief message. The subscriber can then listen to the message and decide whether to accept the call.
- Handle waiting calls better
  - **Talking Call Waiting** enhances standard Call Waiting by speaking the name of a waiting caller.
  - **Call Redirect** provides two innovative functions. Subscribers can now send calls from telemarketers directly to a pre-recorded message that tells the telemarketer to add the subscriber's name and number to their "do not call" list. This feature also lets residential users transfer a call directly into voice mail, just as they would in an office.
- Offer solutions for mobility: **Simultaneous Ring and MADN Compatibility** expands the popular Simultaneous Ring feature — which enables a call to a single number ring multiple phones at the same time — by allowing Simultaneous Ring to interwork with standard MADN call-pickup arrangements.
- Deliver solutions that save money: **Call Transfer Fraud Prevention** (also a Nortel Networks Centrex feature) can help subscribers limit the fraudulent use of Call Transfer by not letting end users transfer calls to certain types of numbers, such as 900-numbers.

NEW RES FEATURES

TALKING CALL WAITING — RES00091

Plays an audible notification of the name of a call-waiting caller when the subscriber is already on a call.

Talking Call Waiting
LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

Call Waiting is by far the most popular residential service today. Talking Call Waiting (TCW) leverages the proven success of this service and enhances it by providing the name of the call waiting party after the first call-waiting alerting tone. When a waiting call comes in to a Talking Call Waiting subscriber's line, the name of the caller is translated to an audible announcement via the text-to-speech technology provided by an offboard service node platform.

Talking Call Waiting does not alter how end users experience the Call Waiting feature. The TCW subscriber simply flashes the switchhook to answer the incoming call, either during or after the audible announcement of the waiting caller's name. And the subscriber can deactivate TCW — along with Call Waiting — by simply pressing the Cancel Call Waiting access code (such as *70).

While the Talking Call Waiting subscriber hears the tone and calling party name, the other party on the active call hears silence — in the same way as these parties hear interruptive silence during Call Waiting tones today. And, as with Call Waiting, the new calling party only hears ringing tone until the subscriber elects to connect to the new call.

Technical reference: 59007568

PRINCIPAL BENEFITS

This subscription-based feature offers an attractive overlay service on top of the Call Waiting service, already in high demand across North America. Currently, basic Call Waiting provides the subscriber with no identifying information about a new calling party, which can ultimately result in the subscriber answering unwanted calls. By removing the mystery behind the call waiting tone, Talking Call Waiting subscribers can better determine whether they want, or need, to interrupt a current conversation to answer the waiting call. Talking Call Waiting is an attractive offering to both the well-established base of Call Waiting subscribers as well as to potential new subscribers.

MAJOR DEPENDENCIES

Hardware: The Talking Call Waiting software works in conjunction with an offboard service node platform, using text-to-speech technology to translate the name of the calling party from the Name database into an audible name announcement played back to the TCW subscriber.

NEW RES FEATURES, *continued*

AUTOMATIC RECALL WITH NAME — RES00089

Plays an audible notification of the name of the last caller — with the option of returning the call — when the subscriber activates Automatic Recall.

Automatic Recall with Name

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

This new service enhances the traditional Automatic Recall (*69) feature by providing the name of the last caller, in addition to the standard announcement of the last calling party's number, and the date and time of the call.

After dialing the Automatic Recall feature access code (*69), the last calling party's phone number is mapped to a name, and an offboard service node platform uses text-to speech technology to convert this name into an audible announcement. The user then hears an announcement on the order of, "The last call you received was from (name). The last number that called your line was from (number). This call was received on (date) at (time). To call this number, enter 1, otherwise, hang up now."

When Automatic Recall with Name is turned on in an office, it replaces the number-only version.

Technical reference: 59007670

PRINCIPAL BENEFITS

This feature enhances the proven Automatic Recall service by removing the mystery behind the last calling party's telephone number. Often, the number itself is not easy to recognize; matching a name with the number lets the user better determine whether they want, or need, to return the call. As with traditional *69, Automatic Recall with Name can be offered on both a subscription and pay-per-use (PPU) basis, helping increase revenue through new subscribers and occasional users who are attracted to the enhanced convenience and time savings.

MAJOR DEPENDENCIES

Software: RES00005 Non-Display Services

Hardware: Automatic Recall with Name works in conjunction with an offboard service node platform, using text-to-speech technology to translate the name of the last calling party into an audible name announcement played back to the Automatic Recall with Name subscriber.

SIMULTANEOUS RING — RES00081

Offers a simple and effective "Find Me" service, in real time, for subscribers who are mobile but don't want to miss important calls.

New Simultaneous Ring and MADN Compatibility

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

The Simultaneous Ring feature enables a call to a single directory number (DN) to ring up to five DNs in multiple locations at the same time; the first phone to go off-hook answers the call. Simultaneous Ring requires that one of these DNs be designated as a primary DN (PDN). The PDN typically is an office landline DN, and one or more of the secondary DNs can be a mobile phone. Currently, the PDN cannot be an office line that is the primary member of a Multiple Appearance Directory Number (MADN) Single Call Appearance (SCA) group — a common configuration for office call-handling arrangements. By allowing Simultaneous Ring and MADN to be provisioned on the same line, this feature lets a MADN SCA DN be the PDN of a Simultaneous Ring group.

Technical reference: 59005798

PRINCIPAL BENEFITS

This feature is especially useful for mobile business subscribers, who can now use the Simultaneous Ring feature with more business lines. Making Simultaneous Ring and MADN compatible expands calling options and increases subscriber satisfaction.

MAJOR DEPENDENCIES

Software: RES00002 Advanced Custom Calling Features

NEW RES FEATURES, *continued*

CALL REDIRECT — RES00099

Provides subscribers with an easy way to forward answered calls to either a voice mailbox or a prerecorded announcement.

Call Redirect

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

The flexible Call Redirect feature introduces two new distinctive services that enable residential customers to transfer answered calls to preassigned destinations.

- **Sales Blocker.** Residential subscribers can transfer answered, but unwanted, telemarketing calls to an announcement. When an end user receives one of these calls, the subscriber flashes the switchhook and presses a feature access code (determined by the provider). The system automatically transfers the calling party to a prerecorded announcement created by the provider.
- **Residential Call Transfer.** Residential subscribers can transfer answered calls to voice mail. If a subscriber discovers that a caller wants to speak to a person that is not currently at the premises, then (in place of taking a message that can be misplaced or illegible) the user can have the system transfer the calling party to the intended person's voice mailbox. All the subscriber needs to do is flash the switchhook then press a feature access code (determined by the service provider).

In both cases, the subscriber can either hang up after dialing the access code or wait for treatment to verify the transfer was completed successfully. The service provider determines whether this verification treatment is a tone, an announcement, or a transfer to an external platform.

In both cases, the subscriber can either hang up after dialing the access code or wait for treatment to verify the transfer was completed successfully. The service provider determines whether this verification treatment is a tone, an announcement, or a transfer to an external platform.

Technical reference: 59007494

PRINCIPAL BENEFITS

Call Redirect is two revenue opportunities rolled up into one service. This versatile feature can be used creatively to offer new revenue-generating residential services that were not previously possible. For instance, with Sales Blocker, service providers can relieve customers from having to think of a graceful way to end an unwanted sales call. As a convenient alternative to being rude or abrupt, a simple flash and access code sequence lets an announcement bring the call to a close by indicating the end user's desire to be added to the telemarketer's "do not call" list. The Residential Call Transfer to Voice Mail feature can be bundled with a voice mail package to help retain the current base of subscribers with enhanced functionality, while also helping to attract new voice mail subscribers.

CALL SCREENING, MONITORING, AND INTERCEPT (CSMI) RES00047

Enables subscribers to monitor and intercept calls currently being handled by a network-based answering service.

New CSMI Message Enhancement

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

Call Screen, Monitor, and Intercept (CSMI), introduced in Rel•5, has been enhanced in Rel•13 to allow the removal of a "stub" message that is generated when the subscriber intercepts a message being left on a Voice Messaging System (VMS). CSMI makes it possible to screen calls coming into a voice mail service, just as you can listen to a message being left on an answering machine. The CSMI subscriber receives a ring splash when a caller enters their VMS. They can then dial a feature access code to monitor the message as it is being left, and if they decide to intercept the message and answer the call, they simply press flash to be connected with the calling party.

Prior to this feature, any messages intercepted by the subscriber were recorded by the VMS until the point of interception — creating a "stub" message. CSMI Message Enhancement removes this extraneous "stub" message from the subscriber's voice mail.

Technical reference: 59013873

PRINCIPAL BENEFITS

With CSMI Message Enhancement, voice mail subscribers receive notification of new voice mail messages only, and not messages that were intercepted through CSMI. This enhancement brings the best features of an answering machine — being able to intercept messages, along with automatic removal of messages that were picked up in the middle of a call — to voice mail. Call Screen, Monitor, and Intercept is an attractive addition to a voice mail package, encouraging new subscribers as well as helping to retain the current base.

MAJOR DEPENDENCIES

Software: RES00002 Advanced Custom Calling Features

NEW RES FEATURES, *continued*

CALL TRANSFER FRAUD PREVENTION — RES00095

Helps prevent loss of revenue from fraudulent call transfer operation.

New Call Transfer Fraud Prevention – RES

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

The Call Transfer Fraud Prevention (CTFP) feature helps limit fraudulent use of existing call transfer features by enabling the service provider to define a set of limitations to the use of call transfer through:

- **Dial plan screening**. This capability validates outgoing and incoming portions of the call transfer against the dial plan and call code restrictions in a new Dial Plan Screening (DPLNSCRN) table. If either party is invalid, this feature drops the call when the controlling party attempts a call transfer. Dial plan codes that can be restricted include:

Dial Plan Codes and Associated Dial Plans

Code Category	Dial Plan Examples
Feature Group B	1+950+WXXX
Carrier cut-through	101+ Carrier Identification Code
Intertoll, Intratoll	Toll calls (all types), including the translation of a Speed Call code
Coin	A DN that is a coin line on the same switch as the CTFP feature
Digit Sequence	Pre-translation digits (such as 1-800 or 911), or Post-translation digits (such as NPA or NPA-NXX)
International Direct Dial	011+ international calls (end-to-end ISUP signaling needed)
Operator Assisted	0+/0-, 00-, 01+ (end-to-end ISUP signaling needed)

- **Call transfer throttling**. This capability regulates the number of times the controlling party can initiate valid call transfers over a given time period. Thus, even if a call passes the dial plan screening, it must still be checked against the Call Transfer Fraud Prevention Information (CTFP_INFO) office parameter in the Office Engineering (OFCENG) table. In CTFP_INFO the service provider can specify the time period and number of permitted transfers at any station through:
  - The DURATION field, specifying a time period between 30 and 240 minutes.
  - The MAXTRANSFER field, specifying between 1 and 30 transfers (or a "zero" to disable the throttling on an office-wide basis).

Technical reference: 59011902

PRINCIPAL BENEFITS

This optional feature helps prevent an unauthorized telephone user from enabling an external party to bypass toll charges or caller identification through call transfer. This software is also available for the Nortel Networks Centrex business market with order code MDC00069, described on page 130.

MAJOR DEPENDENCIES

Software: RES00002 Advanced Custom Calling Features

GENERIC NAME PARAMETER — RES00096

Resolves interaction issues with other-vendor switches for delivery of the CLASS Calling Name Delivery feature.

New Generic Name Parameter

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

The Custom Local Area Signaling Services (CLASS) feature Calling Name Delivery (CNAMD) delivers a calling party's name to the CPE of a CNAMD subscriber. Currently, to deliver this feature, the DMS system uses proprietary Party Information Parameter (PIP) messaging. Other-vendor switches use Generic Name (GN) parameters for this messaging.

This feature enables a DMS system to send and receive a calling party's name in the GN parameter of the Integrated Services Digital Network User Part (ISUP) Initial Address Message (IAM). With this ability, the DMS system will be able to send and retrieve CNAMD information in concert with other-vendor switches.

Technical reference: 59013088

PRINCIPAL BENEFITS

This feature resolves interaction issues between systems in the U.S. and in Canada, enhancing the CLASS CNAMD feature to comply with current Telcordia standards. Allowing the DMS system to deliver calling party names to other-vendor systems will also increase subscriber satisfaction by making available more information about calls.

MAJOR DEPENDENCIES

Software: RES00003 Display Functionality and Privacy

Hardware: Customer premises equipment with display capabilities is required to receive and display the incoming information.

NEW RES FEATURES, *continued*

WHO'S CALLING — RES00094

Enhances Caller ID by screening all anonymous calls to a subscriber's line and providing various disposition options for handling the call.

New Who's Calling

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

Who's Calling is a service that screens incoming calls to a subscriber's line before the telephone rings. With Who's Calling, all calls from numbers that are marked "unavailable," "blocked," "private," and "out of area" are intercepted and sent to an offboard service node platform. This offboard platform prompts the caller to record their name or a brief message, and only upon receipt of this recording will the subscriber's telephone ring. The service node then plays that recorded information to the Who's Calling subscriber, who is then presented with a number of options for handling the intercepted call, including:

- Accept the call.
- Refuse a telemarketing call. The service node plays an announcement back to the caller requesting that the subscriber's name and telephone number to be added to the telemarketer's "Do Not Call" list.
- Reject a call. The service node plays an announcement back to the caller stating that the person they are calling is unavailable and to try calling back later.
- Send the call to voice mail.

Technical reference: 59012655

PRINCIPAL BENEFITS

With Who's Calling, Caller ID subscribers no longer receive anonymous calls. Approximately one-third of incoming calls are unidentified, and the majority of these are from telemarketers. RES00094 significantly reduces the number of unwanted disturbances: market trials have shown that approximately 70% of callers will hang up when prompted to record their name or a brief message.

Who's Calling addresses the growing demand for more intelligent call management through enhanced caller identification. With Who's Calling, the subscriber may accept, reject, or even send a call to voice mail based on the caller's identification and the subscriber's preference.

MAJOR DEPENDENCIES

Hardware: Who's Calling software works in conjunction with an offboard service node platform, responsible for prompting the unidentified caller to record their name, as well as playing back the respective announcements to both the subscriber and calling party.

DMS-500 Long Distance Services

The DMS-500 Local and Long Distance system is a DMS SuperNode application that combines local services of the DMS-100 switch, toll and operator services of the DMS-100/200 Traffic Operator Position System (TOPS) portfolio, and Long Distance services of the DMS-250 system. In addition to the trunk connections supported by the DMS-250 switch, the DMS-500 system delivers all line types currently supported by the DMS-100 system for residential and business applications.

The DMS-500 system is a total solution with one of the industry's most application-rich portfolios of carrier services loaded with major capabilities that are market-ready today. These include local services, Long Distance services, call center services, operator services, data services, and more. And, as part of the Nortel Networks Succession Solutions plan, the DMS-500 system is uniquely positioned for the evolution to data-centric communications.

The descriptions of new *Local* features in LLT00012, LLT00013, and LLT00014 PCLs appear throughout this document. This chapter discusses the DMS-500 system as a whole — and then details new *Long Distance* features.

IN THIS CHAPTER

COMPETITIVE ADVANTAGES

The DMS-500 system offers the following benefits to the service provider:

- **Accelerated delivery of new features** to quickly generate new revenue through new services, new markets, and new end-to-end telephony offerings. This full-featured Local and Long Distance system delivers revenue opportunities on both sides of the switching business.

- **Easy growth to match market needs** with a modular, scalable system architecture. Network providers can add processing capacity, memory capacity, trunk capacity, and services — as they are needed. For example, a DMS-500 system can easily grow from a relatively small configuration to 100,000 ports though incremental additions. Enhanced processors, additional switching matrices, peripherals, and trunk cards can be added without redesigning the system or interrupting service.

- **Maximum market flexibility** for service providers:
  - Selling or reselling Long Distance services
  - Operating with or without operator services
  - Offering business and residential line services

- **Lower costs and higher operational efficiencies** gained in combining DMS-100/200 and DMS-250 system services:
  - Reducing front-end hardware requirements
  - Reducing office site and environmental requirements
  - Centralizing operations, administration, maintenance, and provisioning (OAM&P)

- **Expanded pre- and post-sales service support** to build a network, train the staff, and operate the network, if needed

- **Multi-vendor network operability** with the DMS-500 SuperNode system's open architecture.

THE CHANGING LONG DISTANCE MARKET

The convergence of regulatory, technology, and market forces is opening up new opportunities for shares of the multi-billion-dollar Long Distance market. Today, this industry is served by widely divergent types of enterprises — from the full-service carrier that owns its own nationwide network to the reseller who offers customers a discounted price on services it buys from others and delivers on leased facilities. The Nortel Networks DMS-500 switching system offers widely divergent types of network providers new opportunities for profitability and growth in this era of heightened competition. These providers can be:

- **"Facilities-based" carriers** tend to own almost all of their own network facilities (such as switches, transmission systems, and special access lines). Their own business offices manage their accounts, provide customer service, and bill subscribers.
- **"Switchless" resellers**, sometimes known as "true resellers," lease network facilities to provide Long Distance services. From the subscriber's perspective, these companies look like Long Distance companies (as they market and sell services branded with their name) but, in fact, they are reselling a carrier's switching, access, transmission, and billing systems.
- **Wholesalers**, also known as "aggregators," do not own or lease Long Distance facilities; they simply resell volume blocks of Long Distance service provided and billed by others.

The wholesale market gave rise to a new type of Long Distance company, the "carriers' carrier", that builds extensive fiber optic and microwave circuits primarily to sell to other carriers, rather than to retail to end customers.

BUSINESS CONSIDERATIONS

The question is whether it is advantageous to serve as a carrier — owning and controlling its own switches — or as a reseller, capitalizing on facilities provided by other companies. Here are some considerations that weigh into this decision:

- **Network costs**. Carriers that own their own switches and transmission systems are in control of operating costs. In addition, as new technologies become available to reduce operations costs — such as improvements in access and transmission systems, and centralized network management systems — the savings can be seen immediately. Carriers that rely on others to provide facilities may or may not see these savings passed along in lease rates. Consider that for switchless resellers, network acquisition and management costs (which can represent 60 to 70 percent of total costs) are determined and controlled by a third party that is also likely to be a competitor in the retail market.
- **Features**. Network features, such as sophisticated new calling capabilities, are controlled by the network provider. Carriers that own their own switches determine which features to purchase, based on their own knowledge of their customers. Given that many sales are won or lost on features and feature flexibility, providers would be hard-pressed to offer a competitive edge when they do not control the set of features they could offer. Resellers that don't own the switches are also unlikely to be invited into the feature design process.

THE CHANGING LONG DISTANCE MARKET, *continued*

- **Customer information**. The organization that owns the Long Distance switch and billing system also has the customer information it produces, including name, number, billing data, and usage trends. The billing data produced by switches is extremely valuable input for target marketing programs. Which customers bill more than $1000 a month in Long Distance calls? Which ones are candidates for more sophisticated services or a new bundling of services? Which business customers are new or have grown more than 25 percent in the last three years? For switchless resellers, this kind of information is in the hands of a carrier who could also be a competitor.

- **Fraud**. Typically, the reseller that does not own its own Long Distance switch is responsible for the costs of fraudulent use of the phone system — over which it has no control. On the other hand, carriers that own their switches can implement fraud prevention systems to control or eliminate this cost.

- **Quality**. The provider that owns and maintains a switch has the control and responsibility over its quality of service. In the event of a service problem, customers may become aware that the service is not actually provided by the "branded" carrier but by another carrier. In this case, customers may question whether they should be getting their service directly from the carrier that owns the facilities.

- **Brand identification**. Whether the carrier owns its own switches or procures switch services from another carrier, it is essential that the call be "branded" appropriately. When Long Distance customers reach directory assistance and recorded announcements, for example, they should hear the name of the company selling the service — which might or might not be the company that owns the switch. The technology is available to have switches and audio processing platforms brand calls for different carriers, but the control for implementing this capability correctly will rest with the carrier that owns the switch platform.

WHY SELECT THE DMS-500 SYSTEM?

Competition in the Long Distance market is aggressive. Price discounting, prevalent through the 1980s, has given way to brand recognition and market differentiation. Since divestiture in 1984, Long Distance revenues continue to show strong growth. Carriers are investing heavily in promotion and advertising, service customization, and international expansion in order to continue the high growth levels they previously experienced. New entrants will fuel higher levels of competition based on price, branding, differentiation, and niche marketing.

The successful interLATA and international Long Distance carrier provides these services, all available with the DMS-500 system:

- **Service parity with the big players.** At a minimum, new entrants are expected to offer 1+ outbound, toll-free, and calling card services — all with operator backing. The DMS-500 platform provides all these services, including the world's most widely deployed operator services system.

- **Differentiating services.** The DMS-500 system offers an impressive portfolio of enterprise network services, information database services, data and video services, custom dialing plans, and trunk routing capabilities — the tools for competitive differentiation.

- **Speed to market.** Success can depend on a close partnership with a key supplier, such as Nortel Networks, that has the experience, resources, and financing necessary to support rapid business launch and service delivery.

- **Brand recognition and image.** DMS-500 switch software triggers call branding for calls that bypass the end office, such as dedicated access line calls, to help ensure that a particular carrier's name is known.

- **Premium service quality.** Extensive performance monitoring, surveillance, and trouble-shooting capabilities built into the DMS-500 operations, administration, maintenance and provisioning (OAM&P) platform make it possible to maintain premium levels of service quality.

- **Competitive price.** The DMS-500 system — by reducing operations cost — enables carriers to offer competitive pricing to their wholesale and retail customers.

- **Successful selling in niche markets.** The DMS-500 system can be partitioned to serve multiple customers for this type of scenario — with separate branding, billing, and service capabilities available to each customer. This makes the DMS-500 solution ideal for carriers wishing to resell blocks of capacity or services to others.

WHY SELECT THE DMS-500 SYSTEM?, *continued*

COMPREHENSIVE NETWORK SOLUTIONS

Nortel Networks offers the broadest portfolio of network products in the industry, designed specifically for turnkey solutions in Long Distance markets. With end-to-end products and services for the complete Long Distance network, Nortel Networks removes the negatives associated with multi-vendor networking: the need to coordinate development activities and interoperability issues with representatives from multiple vendors.

Nortel Networks products are designed and built to work together, with common components, operational practices, and interfaces. This strategy reduces costs for training, administration, maintenance, and provisioning. It also enables the flexible reuse of equipment from the local exchange network. And when regulators permit incumbents to merge their toll and local business, the DMS architecture makes this transition easy.

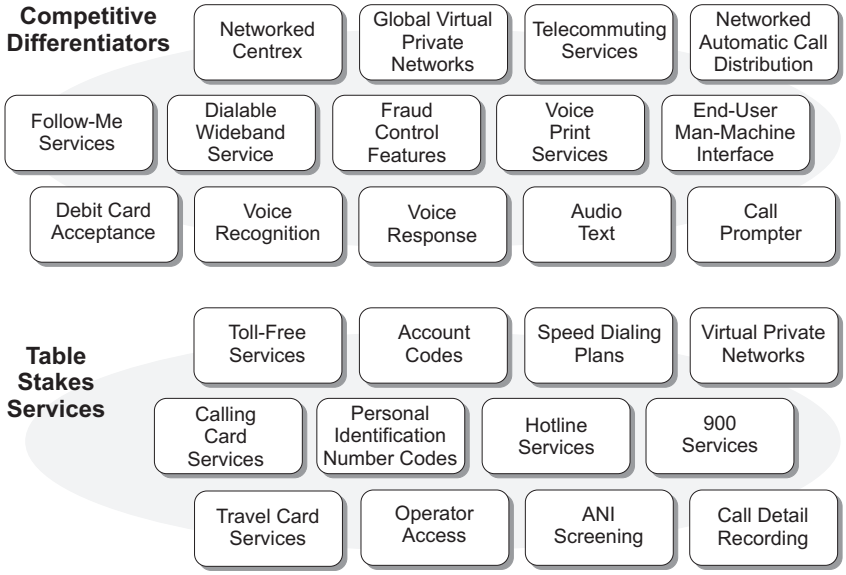
In addition, a full portfolio of compatible products — from key systems to international gateway switches — makes it possible to develop and market truly unique and customized services for end users. With an industry-leading Advanced Intelligent Network (AIN) service creation environment, these services can be developed quickly to lead the market.

A COMPLETE PORTFOLIO OF REVENUE-GENERATING SERVICES

For new and established players alike, success in the Long Distance market is inevitably linked to the portfolio of service offerings. With a host of choices before them, subscribers are more likely to choose the provider they perceive to have a superior service selection. And with a Long Distance provider already in hand, customers are not likely to go through the trouble of switching providers unless they can see a clear advantage to doing so.

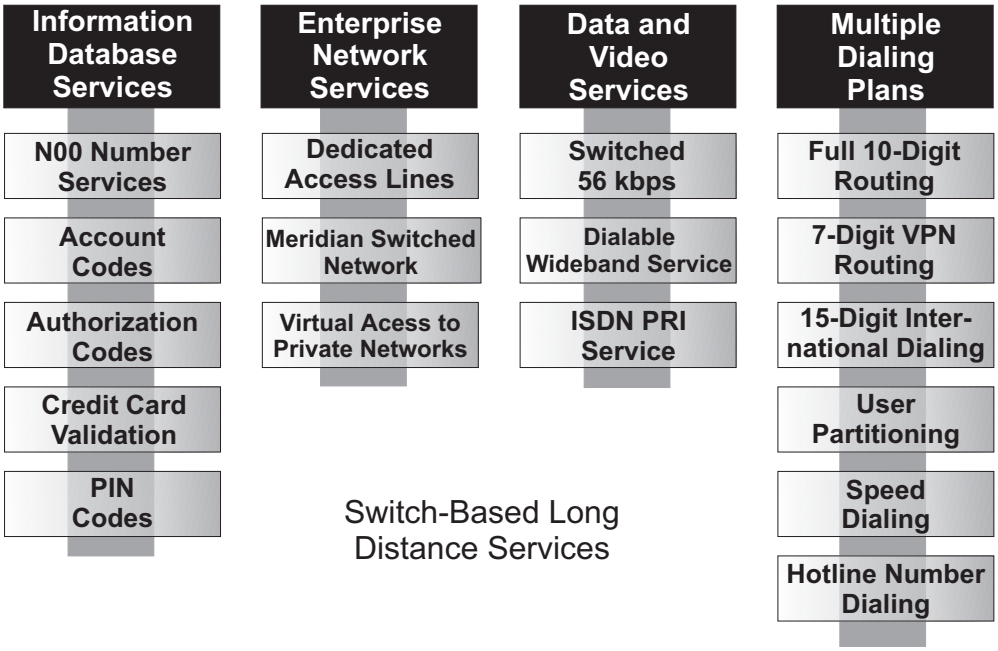
At a minimum, Long Distance providers are expected to offer outbound 1+, toll-free, and calling card services — all with operator backing. Competitive advantage, however, requires more than service parity. It will require strategic differentiators, such as debit card acceptance, voice recognition, global virtual private networks, and telecommuting services.

Basic and *differentiating* service portfolios are both required for success. All these services, and more, are available on the DMS-500 switching system — and can be creatively packaged to match the network provider's business strategy.



Value-Added Long Distance Services

In addition to basic Long Distance services, that provide basic toll revenues, the competitive Long Distance provider offers additional revenue-generating services — such as information databases, enterprise networking, data and video services, and multiple dialing plans such as International Direct Distance Dialing (IDDD). These services make extensive use of advanced signaling systems such as SS7 and ISDN PRI, as well as Intelligent Network (IN) capabilities.



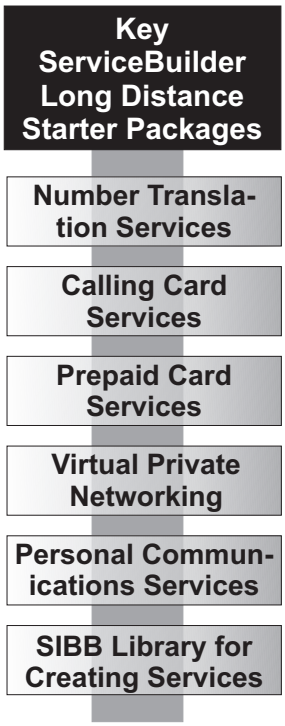
Key Revenue-Generating Services

WHY SELECT THE DMS-500 SYSTEM?, *continued*

SIMPLIFIED SERVICE CREATION: SERVICEBUILDER

Design and develop custom services on the platforms of choice — independent of their network switching infrastructure.

ServiceBuilder implements standards-compliant Advanced Intelligent Network (AIN) capabilities with several competitive advantages. For one, it offers true portability: services are created and deployed on an industry-standard UNIX processing platform, not a proprietary one. Based on standard C++ programming, ServiceBuilder makes it easy to find programming talent to create and maintain applications — and to transfer those applications across different hardware environments.



Creation of new services is made even easier by the availability of a graphical user interface (GUI) and software "building blocks." Developers don't have to build from the ground up; they build from a foundation and framework, with modular components that are easily modified to form new services.

Stock, "off-the-shelf" services are offered in a Long Distance Service Package for interexchange carriers. This package enables network providers to offer number translations services, such as Toll-Free services and other inbound and outbound screening and translation functions. The Long Distance Service Package also delivers Virtual Private Networks and flexible network access and carrier selection services for small businesses, telecommuters, and work-at-home employees.

NEW LONG DISTANCE CAPABILITIES

The following *Long Distance* features are all planned to be optional with the DMS-500 platform. New *Local* features, available with LLT PCLs, appear throughout this document.

NETWORKBUILDER LOCAL NUMBER PORTABILITY — CAIN0700

Provides DMS-500 system support for the accurate routing of calls to offices with ported telephone numbers.

LNP Intra-IMT RX Selector

LLT00012

This feature provides the Long Distance side of the DMS-500 system the ability to query on Local Number Portability (LNP) calls that originate over Intra-IMT (Inter-Machine Trunk) agencies and encounter the Retranslation (RX) route selector. It enables network providers that use Intra-IMT agencies to traverse their network to route calls at the terminating switch using the RX selector and continue to support LNP.

Technical reference: 60072607

New NOJIP Option

LLT00013

The Rel•8 feature AX0198, *LNP on NetworkBuilder — Phase 2*, allowed a default Jurisdiction Information Parameter (JIP) to be provisioned for a call on a per-trunk-group basis. This software enabled the JIP to be built on an outgoing Initial Address Message (IAM) — and sent the JIP to the Service Control Point (SCP).

The NOJIP option feature expands this functionality by blocking the sending of JIP on a specific node if the NOJIP option is datafilled in table ADJNODE.

Technical reference: 60097313

New LNP Sub-System Number (SSN)

LLT00013

Some of the service control points (SCPs) currently deployed in the network to support Local Number Portability (LNP) queries will recognize only one subsystem number (SSN) per node. The LNP SSN feature enables LNP to work on both sides of a DMS-500 switch — one subsystem number for the DMS-100 side and another subsystem number for the DMS-250 side. It enables either version of LNP (CAIN or AIN) to initiate queries to the SCP using a common SSN, and allows the responses to be received on the correct side of the DMS-500 platform. To the SCP, both versions of LNP on the DMS-500 appear to share a single SSN.

Technical reference: 60101062

NEW LONG DISTANCE CAPABILITIES, *continued*

New LNP RX Selector

LLT00013

The Rel•8 feature AX1016, *LNP Support of RX Selector*, enables calls that subscribe to NetworkBuilder and encounter the Retranslation (RX) selector from incoming Local Number Portability (LNP) information (or from an LNP information response with a change in the called party number) to potentially perform an LNP query. (The RX selector allows the system to retranslate a call and choose another outgoing route on a route-choice basis.)

This feature enhances the AX1016 feature to include calls that encounter the RX selector from incoming LNP information or from an LNP information response with a change in the serving translation scheme (STS) to potentially perform an LNP query.

Technical reference: 60008135

UCS DMS-500 DNIS TRUNK OPTION — NXXR0003

Gives service providers the option to send the original dialed NXX number on a per-trunk-group basis.

UCS DMS-500 DNIS Trunk Option

LLT00012

This feature buffers an NXX number on origination. On the terminating side, the number is:

- Placed in a Generic Address Parameter (GAP) of the outgoing IAM for SS7 agencies,
- Sent as the called party information in a SETUP message for ISDN agencies, or
- Outpulsed as the called party address for Per-Trunk Signaling (PTS) agencies.

This feature gives service providers the option to send the original dialed NXX number on a per-trunk-group basis. Also, if the service provider receives a call with an untranslated NXX number, the Long Distance side of the DMS-500 system can pass Dialed Number Inward Service (DNIS) information through the network without using an SCP, or by using the SX selector to route through table RTEATTR.

Technical reference: 60078696

LONG DISTANCE TRANSLATIONS AND ROUTING — UTRS0001

Provides routing based on the Carrier Identification Code (CIC) rather than the ANI.

TR-533 CIC Routing

LLT00012

This feature enables the Long Distance side of the DMS-500 switch to route calls based on a Carrier Identification Code (CIC) and a Local Access and Transport Area (LATA). This feature enhances the functionality provided by feature AX1377, *TR-533 Database Interworking,* in Rel•11.

Technical reference: 60089224

UCS BASE UCSB0001

Provides the basic Long Distance software on the DMS-500 switch.

Calling Card GTT

LLT00012

This feature adds a new office parameter, TCN_ENHANCED_GT_CDPA, to indicate that the format of the Signaling Connection Control Part (SCCP) Global Title Translations (GTT) called party address parameter is to contain the first six digits of the Travel Card Number (TCN) rather than a "0" or "00." This enables interaction with IN/1 SCPs requiring the first six digits of the TCN in the SCCP called party address parameter.

Technical reference: 60091564

Enhanced Reorigination with STR Card

LLT00012

This feature provides the Long Distance side of the DMS-500 switch with a minimum short duration of 40 milliseconds (ms) for reorigination on PTS and SS7 originating legacy and AXXESS reorigination-capable agents. This enables callers to reoriginate by using the asterisk or octothorpe key at 40 ms duration. Previously, the Special Tone Receiver (STR) card hardware and software could only detect reorigination at a minimum of 500 ms duration.

Technical reference: 60006720

Short-Digit Duration Reorigination on the SPM

LLT00012

This feature provides short duration recognition of the reorigination digit using the Spectrum Peripheral Module (SPM). Tones with a duration as short as 40 ms can be detected by the SPM. This permits reorigination service on SPM trunk groups from customers who may be using PBXs, electronic phone systems, or cellular phones that are only capable of transmitting short-duration Dual Tone Multi-Frequency (DTMF) signaling tones.

Technical reference: 60007298

New Suspend Resume Message Handling Passed to DMS-300

LLT00012

This feature optionally enables an international DMS-300 system to process ISUP Suspend (SUS) and Resume (RES) messages, rather than the DMS-500 system.

When the new office parameter, DMS300_ORIG_BOUNCe_SUS_RES, is set to "Y", SUS and RES messages are sent to the DMS-300 system over originating SS7 IMT trunks with the TRKSGRP field ADJNODE datafilled with the value "DMS300."

Technical reference: NR90253

NEW LONG DISTANCE CAPABILITIES, *continued*

CDR Management for Rel•12

LLT00012

This feature updates call detail recording (CDR) fields as a result of additions, deletions, or modifications of data needed to support LLT00012 Long Distance features.

Technical reference: 60006696

New CDR Management for Rel•13

LLT00013

This feature updates CDR fields as a result of additions, deletions, or modifications of data needed to support LLT00013 Long Distance features.

Technical reference: 60007776

New Find File Tool — FINDIT

LLT00013

The FINDIT Command Interpreter (CI) tool searches for a file on the switch.

- If the file exists on the switch, the CI responds with the location(s) of the file name
- If the file does not exist on the switch, the CI responds with a message stating that the file was not found.

Technical reference: 60008214

New CLID Delivery Enhancements

LLT00013

This feature optionally delivers a calling party number (CPN) rather than charge number parameter (CGN) for ISUP terminations when a CPN information element (CPNIE) is not present in the setup message on PRI originating agencies. This gives the service provider the ability to have the DEFCLID displayed at the far end, based on the Presentation Indicator (PI) field in the received CPN parameter. This reduces the blocking of calls by customer premises equipment (CPE) when the PI bit is not set to "allowed."

Technical reference: 60097639

New Information Digit Reversal

LLT00013

In Rel•7 and Rel•8, patch GKX00 outpulsed the Originating Line Information (OLI) or Information (II) Digits on PRI terminations within the setup message, based on a new TRKGRP parameter, INFODIGS. Now, the Info Digit Reversal feature gives the service provider the ability to control the reversal of digit order for the information digits in the outgoing PRI setup messages. This enhancement adds a subfield to the INFODIGS option on PRI trunks that indicates the order of the info digits (NORMAL or REVERSE).

Technical reference: 60098029

NETWORKBUILDER MESSAGES — CAIN0100

Provides a variety of tools to improve network routing.

New NetworkBuilder Routing Log

LLT00013

This feature provides the DMS-500 switch with a new log (CAIN303) to assist craftspersons with the identification and resolution of network routing problems. The log contains the following information:

- Date
- Time
- Originating trunk group
- Terminating trunk group
- Automatic Number Identification (ANI)
- Dialed number — the original number dialed by the end user
- Backend number — digits from the CalledPartyID parameter received from the SCP in an Analyze_Route message
- Called number — the number normally used by the DMS-500 switch to translate and route a call
- Cause Code information — description of the event causing the routing problem (translation error, database failure, incomplete number, or unassigned number)

Technical reference: 60089576

New Table TANDMRTE T Selector Addition

LLT00013

This feature adds the "T selector" to table TANDMRTE, used by NetworkBuilder features for direct termination routing to tandem trunks connecting switches in an interexchange carrier network.

The T selector enables the use of Dynamically Controlled Routing (DCR) with direct NetworkBuilder terminations. The T selector indicates that a route is to be chosen in another routing table, enabling a call to be directed to another table (such as OFRT, which supports the routing selectors specific to DCR).

Technical reference: 60093018

NEW LONG DISTANCE CAPABILITIES, *continued*

TAKEBACK AND TRANSFER — CAIN0802

Allows a terminator to transfer or redirect the calling party to a third party.

New NetworkBuilder Short Duration Tone Detection on Takeback and Transfer

LLT00013

This feature enhances the Rel•11 feature AX1372, *NetworkBuilder Midcall Services Framework*, by providing short duration tone detection for NetworkBuilder Takeback and Transfer. Hookswitch flash events within the range of 40 to 300 ms and 500 to 3000 ms can be detected using either an NT6X62EA Special Tone Receiver (STR) card in both XPMs or an SPM.

Technical reference: 60007655

LONG CALL FRAUD DETECTION — UBFR0006

Provides fraud detection and prevention tools for the DMS-500 switch.

New Long Call Audit Enhancements

LLT00013

This feature enables the DMS-500 switch to optionally run the long call duration audit more often than the previous functionality of once every 24 hours, set by a new office parameter. UBFR0006 also enables the selection of specific originating agencies for the long call audit and the option of disconnecting long calls based on terminating country code.

Technical reference: 60007650

ROUTING ENHANCEMENTS — UTRS0003

Provides carriers with enhanced routing capabilities.

New NETSEC Screening Expansion

LLT00013

This feature increases the number of country codes that can be datafilled in the country code criterion selector of table NETSPROF. In addition, this feature expands the information digit criterion selector of table NETSPROF to include Originating Line Information (OLI) digits, which are the ISDN User Part (ISUP) equivalent of the Per-Trunk Signaling (PTS) information digits currently supported.

Technical reference: 60007645

Emergency Number Services (E911)

With the Nortel Networks DMS Tandem-based E911 Emergency Number Service (ENS), a caller needing urgent help can quickly reach the emergency service best able to respond. E911 selectively routes and transfers an emergency call to the appropriate Public Safety Answering Point (PSAP) agency serving the location of the calling party — regardless of geographic location or telephone-service provider boundaries.

The benefits that make Enhanced 911 (E911) different from Basic 911 service are:

- The ability to selectively route an E911 call so that it automatically reaches the emergency service located closest to the caller.
- Delivery of caller-related data, such as address and other geographic information.

Emergency calls can be processed quickly because all required information is available as soon as a calltaker answers. With E911 service, emergency assistance is available immediately — even if the connection is broken, help can still be sent.

IN THIS CHAPTER

BENEFITS OF DMS E911

Benefits the service provider can offer the serving area:

- The caller automatically routes to the answering point best able to respond
- Emergency response time is significantly reduced by correct first-time routing
- Answering agent receives accurate caller/location information
- Built-in multiple routing options help ensure emergency calls are answered

Benefits the service provider can offer with a central office-based Integrated Public Safety Answering Point (PSAP):

- Only limited capital investment needed — traditional PSAP customer premises-based switching equipment is not required
- Central-office based system delivers a high level of reliability
- No hidden costs, such as maintenance, power, and battery back-up
- Optional Management Information System (MIS) capability enables trends and performance to be analyzed
- An integrated DMS Centrex Automatic Call Distribution (ACD) solution is available
- Evolution path available to Centrex IP-based PSAPs.

UNIQUE IN THE MARKETPLACE

By meeting ANSI standards and Telcordia generic requirements, Nortel Networks E911 tandems can provide:

- E911 Inter-tandem routing in a multivendor environment. This ability includes initial routing of calls, selective transfer of calls, and fixed transfer of calls.
- A Selective Routing Database that resides within the switch — not as an adjunct processor — and requires less space for the same amount of data. The advantages include lower cost, higher reliability, and faster operation.

  Note: if a network provider opts to use an external industry-standard Service Control Point (SCP) database, this capability is available with the ENS00011 *E911 Routing via AIN* order code.

- Centrex Line and ACD PSAP provide the same functionality as customer premises equipment solutions but with lower costs and higher reliability. This solution benefits from interworking with the DMS Centrex Automatic Call Distribution system.
- Proper routing of Wireless 911 calls to meet FCC Phase I requirements and the ability to provide Phase II service today (with all other necessary network components in place).

NEW CAPABILITIES

WIRELESS ALI INTERFACE — ENS00016

Supplies wireless E911 data to the PSAP with an ASCII–based, out-of-band data link from the DMS switch to the Automatic Location Information (ALI) controller.

Wireless Data to External ALI Database

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

In Rel•12, ENS00016 makes it possible to deliver a twenty-digit wireless 911 call to an eight-digit PSAP with an ASCII-based out-of-band link. Currently, when the DMS E911 Access Tandem receives a twenty-digit wireless 911 call, the system sends the pseudo-ANI (pANI) and Mobile Directory Number (MDN) to the PSAP. To support full emergency capabilities, this method generally requires updates to PSAP equipment and software to receive and process the additional digits.

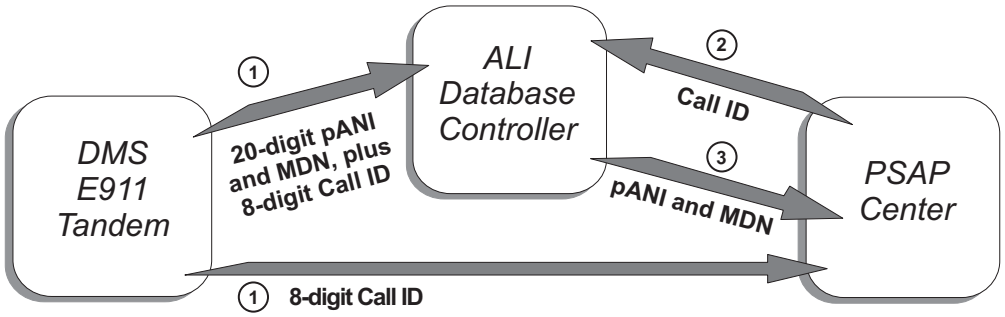
Now, with ENS00016, a wireless 911 call causes (numbers refer to the illustration below):

① The DMS E911 Access Tandem to send:

- An eight-digit Call ID to the PSAP using the existing CAMA trunk
- The pANI, MDN, and Call ID to the ALI controller using an RS-232 or X.25 data link

② The PSAP queries the ALI database using the eight-digit Call ID

③ The ALI database sends the pANI and MDN data to the PSAP to identify the caller and the cell sector where the call originated



Support Wireless 911 Calls without PSAP Upgrades

Technical reference: 59006350

PRINCIPAL BENEFITS

The E911 Wireless ALI Interface enables the delivery of a twenty-digit wireless 911 call to an eight-digit PSAP without costly PSAP upgrades, and serves as a partial solution to FCC Docket 94-102, Wireless E911 Phase 1.

NEW CAPABILITIES, *continued*

MAJOR DEPENDENCIES

Software: ENS00005 Enhanced 911 Base
ENS00001 Line Appearance on a Digital Trunk PSAP
ENS00012 E911 Wireless Phase 1

Hardware: NT1X89 Multi-Protocol Controller (MPC) card

E911 ROUTING VIA AIN — ENS00011

Supplies wireless E911 data to the PSAP with an AIN–based data link from the DMS switch to the ALI controller.

E911 Parameter Expansion

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

Similar to ENS00016, this enhancement to ENS00011 delivers a twenty-digit wireless 911 call to a PSAP — using an intelligent Advanced Intelligent Networking (AIN) query data link between the DMS switch and the ALI database. With this new ENS00011 enhancement, a wireless 911 call triggers the following (numbers refer to the illustration below).

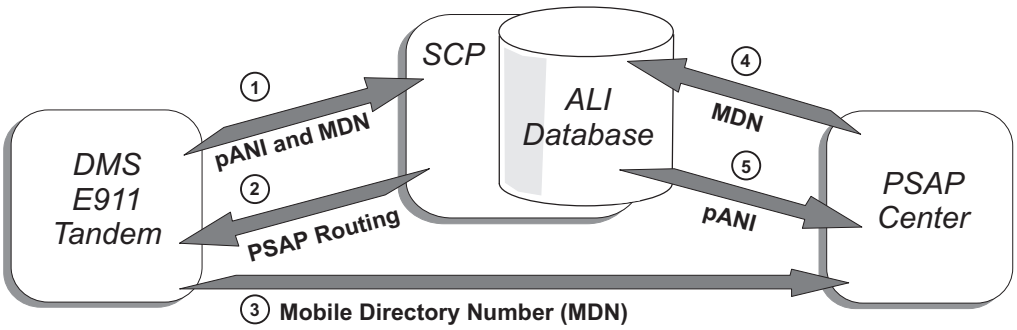
① The DMS E911 Access Tandem sends the pseudo-ANI (pANI) and Mobile Directory Number (MDN) to the ALI database using a Transaction Capabilities Application Part (TCAP) data link

② The SCP returns PSAP routing information

③ The DMS E911 Access Tandem sends the MDN to the PSAP

④ The PSAP queries the ALI database using the MDN

⑤ The ALI database sends the pANI data to the PSAP to identify the cell sector where the call originated



Use the Power of AIN to Handle Wireless 911 Calls without PSAP Upgrades

Technical reference: 59006358

PRINCIPAL BENEFITS

This feature enables the DMS system to support FCC Wireless E911 Phase 1 requirements. Through an intelligent interface to the ALI controller, an eight-digit PSAP can now process twenty-digit wireless E911 calls without costly upgrades.

Although developed initially for wireline calls, this enhancement makes ENS00011 capable of handling wireless calls as well.

MAJOR DEPENDENCIES

Software: ENS00005 Enhanced 911 Base
AIN00002 AIN Essentials
AIN00006 AIN Call Management
AIN00007 AIN Call Model Control
AIN00009 AIN Services Support

ENHANCED 911 BASE — ENS00005

Offers essential E911 service capabilities.

New E911 ISUP Enhancements

LEC00013, LET00013, LLT00013, LWW00007

KEY CAPABILITIES

This enhancement to ENS00005:

- Adapts for E911 calls over ISUP trunking:
  - SS7 OSNC (Operator Services Network Capabilities) connection hold and ringback features.
  - E911 Enhanced Call Party Hold (ECPH).
- Provides two new ISUP Initial Address Message (IAM) parameter values to enhance the DMS E911 Tandem system compliance to Telcordia GR-2956:
  - A new "emergency service call" value of 11100000 for the existing Calling Party Category parameter in the IAM.
  - A new "cellular services (type 1)" value of 00111101 for the existing Originating Line Information Parameter (OLIP) in the IAM to support wireless 911 calls.

Technical reference: 59006371

PRINCIPAL BENEFITS

OSNC connection hold and ringback features match the existing Origination Hold (ORIGHOLD) and ringback capabilities currently available on multi-frequency (MF) E911 trunks. Service providers who need to supply hold and ringback capabilities for E911 can now do so on SS7 ISUP trunks.

NEW CAPABILITIES, *continued*

The 911 network is evolving from a single E911 tandem supporting a cluster of end offices to a multi E911 tandem network offering increased reliability and routing capabilities. The new ISUP IAM parameter values improve platform interoperability in a multivendor environment. These strategic parameters may be used in the future to route 911 calls across the public telephone network instead of 911 dedicated facilities.

MAJOR DEPENDENCIES

Software: ISP70001 ISUP Base

ISP70005 ISUP Charge Number / OLI Parameter (required in all DMS-100/ DMS-500 end offices and DMS E911 Tandem systems to support SS7 OSNC)

ISP70006 SS7 OSNC (required in all DMS-100/DMS-500 end offices and DMS E911 Tandem systems to support connection hold and ringback, described next)

OFF-BOARD SELECTIVE ROUTING — ENS00017

Supports proprietary links to an external ALI/Selective Routing database server as an alternative to deploying the internal DMS Selective Routing Database (SRDB).

New Off-Board Selective Routing Interface

LEC00014, LET00014, LLT00014

KEY CAPABILITIES

This order code supports proprietary links to an ALISA-type database for network providers that choose to deploy this external Automatic Location Information (ALI)/SRDB platform as an alternative to the DMS SRDB offering.

Technical reference: 59016808

PRINCIPAL BENEFITS

Previous to ENS00017, the off-board server could operate as a combined ALI/SRDB platform only on E911 Tandem switches manufactured by the same vendor as the server. Now, this order code supports dedicated links from the DMS E911 Tandem to the external server so the network provider can:

- Enhance investments by having the same off-board platform serve more tandems.
- Terminate wireline and wireless emergency calls uniformly.
- Simplify the multivendor network by having PSAP-directed features offered by the proprietary server also extend to calls reaching the DMS E911 Tandem.

MAJOR DEPENDENCIES

Software: ENS00005 Enhanced 911

DMS SuperNode Access Solutions

INTERFACES LINES AND TRUNKS

DMS Remotes make the geographic distribution of advanced digital services very flexible and cost-effective. These solutions provide powerful platforms for digital integration, network simplification, exchange area consolidation, and penetration into new markets or territories. **Switch remotes**, including the new Star Remote System, extend DMS SuperNode host switch services deeper into the network. **Remote access vehicles** — operating as digital loop carriers (DLCs), next generation digital loop carriers (NGDLCs), and sophisticated servers — offer a variety of high-speed data and wideband business services.

The new, versatile **Spectrum Peripheral Module (SPM)** provides high-speed OC-3 trunking, significant footprint savings, reduced operating costs, and carrier-class reliability — on a scalable, evolvable, multi-application platform. Beyond helping to reduce office cost of ownership, the SPM can also become an integral component of the next-generation multiservice Succession Solutions.

The Nortel Networks family of **Subscriber Carrier Modules (SCMs)** offers service providers a wide choice of switch access interfaces that flexibly meet a variety of applications for both DMS system and third-party transmission products. These direct digital interfaces offer numerous economic and operational benefits to network providers deploying digital loop carrier and residential broadband access systems. This chapter discusses enhanced features for the newest member of the SCM family — the **Expanded Subscriber Carrier Module-100 Access (ESMA)** — for GR-303 capabilities.

IN THIS CHAPTER

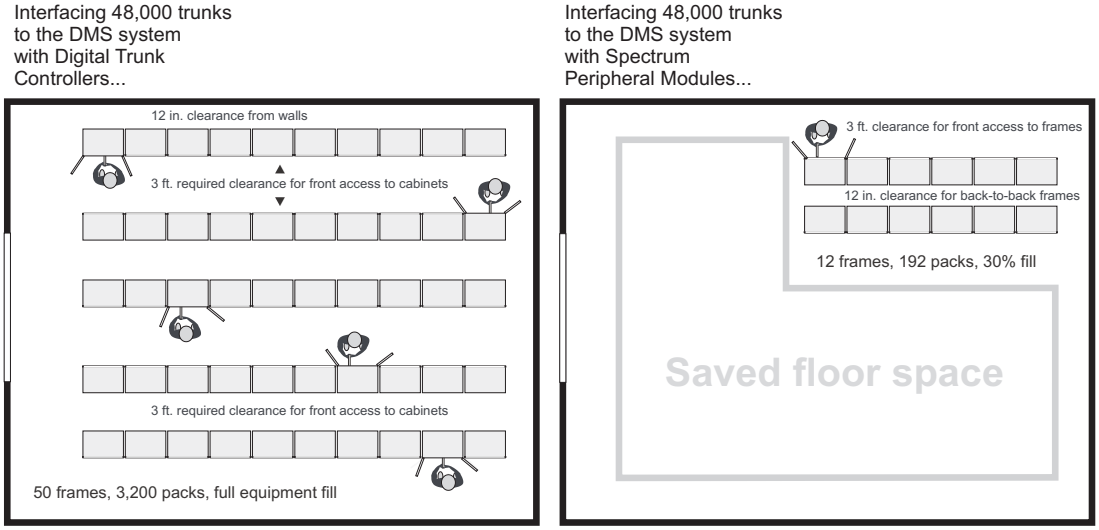
SPECTRUM PERIPHERAL MODULE (SPM)

REDUCE COST OF OWNERSHIP WITH DIRECT SONET TRUNKING

The Nortel Networks Spectrum Peripheral Module (SPM) opens the door to new opportunities by introducing Optical Carrier signal-level 3 (OC-3) interfaces directly into the DMS SuperNode system. This flexible, multiple-application platform brings the latest high-speed trunking technology to the evolving DMS Family with a modular, scalable, world-class design that prepares the DMS office for the transition to next-generation multi-service networking.

Now tandem and large end offices can gain new operating cost savings by simplifying office operations, cabling, powering, planning, engineering, and heating-ventilation-air-conditioning (HVAC) — while enhancing the quality of service to subscribers. A single frame with two SPMs has the same footprint as a Digital Trunk Equipment (DTE) frame, yet supports up to 4032 DS-0s with OC-3 links. This significantly reduces the number of switching-peripheral frames — helping to trim the trunking footprint at least 4.2 times over current configurations. And, since the SPM is a full "front-access" cabinet, even more floorspace can be recaptured by installing SPMs back-to-back or up to 6 inches away from walls.

Plus, Nortel Networks designed spare processing capacity and hardware slots (near 70% free shelf space in initial releases) to help make the SPM future-ready for other trunk services, to meet network provider requirements.

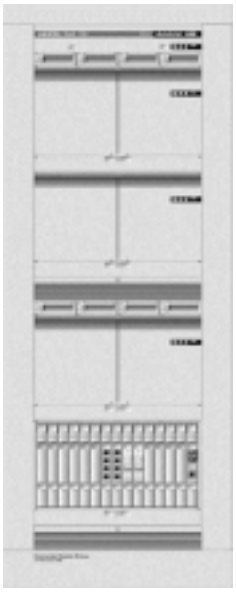


Recapture Valuable Floor and Shelf Space with the Cost-Reducing SPM

The reduction in peripheral frames, batteries, and rectifiers in the office can translate into lowering power expenses — some five to ten times less than existing lineups. Engineering, planning, and physical provisioning tasks associated with adding new trunks are cut by as much as 48 times over a DS-1 office — with the potential to reduce total cable termination by 21 times the equivalent DS-0 configuration.

Beyond reducing operating costs and significant space savings, the SPM also helps:

- **Simplify maintenance** by integrating with DMS operations, administration, and maintenance (OAM) systems, such as the Maintenance and Administration Position (MAP) and logs. Many hardware modules support hot insertion / hot extraction — helping to reduce service disruptions. And the modular, scalable frame — with space-saving front access — offers a long list of fault detection and isolation enhancements.
- **Enhance reliability** by reducing the number of points-of-failure in the system. *Redundant* optical switch links, impressive low bit error rate, duplicated crossover links, and no optical-to-electrical conversions also contribute to high in-service time. Hot standby common equipment can switch over without dropping current stable calls.
- **Open revenue opportunities.** The SPM's wide bandwidth, scalable processing, and flexible SONET payload mapping makes this an ideal integrated platform for easy entry into data services, video (including video conferencing), and other high-bandwidth offerings. And the SPM's multiple-application architecture simplifies the deployment of new revenue-generating services, quickly, without increasing peripheral count.
- **Protect investments**. Not only does the SPM provide an ideal DMS-integrated platform to expand high-bandwidth services, reduce the cost of switching office ownership, and enhance service reliability today — but it also can support an upgrade to an integral platform in a future, next-generation, multi-service network.



Helps Reduce Costs with Direct Optical Trunking

Superiority of OC-3 Trunking

Optical-based OC-3 trunking has proven to be superior to electrical-based STS-1 options. Field-tested OC-3 is more reliable with a higher class of service due to its full redundancy, high resistance to noise, and low bit error rate. Not only are fiber cables and connectors easier to handle than coax; they also support a greater reach.

SPECTRUM PERIPHERAL MODULE (SPM), *continued*

PLANNED ENHANCEMENTS

Beyond handling high-capacity OC-3 local exchange carrier (LEC) ISDN User Part (ISUP) and Per-Trunk Signaling (PTS) trunking, more enhancements are planned for the SPM. ISDN Primary Rate Interface (PRI) trunking for ISP NI-1 and NI-2 services will be available beginning with the Rel•12 release. Echo Cancellation for long haul LEC ISUP trunks will be available in Rel•13.

And, as discussed earlier, SPMs can be transitioned into multi-service gateways in a Succession Solutions network, with simple circuit pack changes and a software upgrade. This evolution protects and expands SPM investments after the convergence of voice and data networks.

SPM NON-COMPUTING MODULE LOADS (NCLS)

Separately orderable NCLs provide software functionality locally on the SPM. These software releases are downward compatible with PCLs at the DMS-Core (for compatibility details, refer to the Non-CM Software Baseline table on page 302) and align with Computing Module (CM) releases in the following way:

SPM release name	NCL Order Code (used in this chapter)	Associated CM Release
SP11	SPM00031	Rel•10 and Rel•11
SP12	SPM00033	Rel•12
SP13	SPM00035	Rel•13
SP14	SPM00039	Rel•14

Because software functionality requires a certain PCL release at the CM and a certain NCL release at the SPM, both PCL and NCL order codes appear under the feature name in the software descriptions in the remainder of this section.

OTHER INFORMATION

The SPM is available with DMS SuperNode systems having the Enhanced Network (ENET) switch fabric. Also required, for Rel•11 or earlier software loads, are the 32-megabyte Link Interface Unit for SS7 (LIU7) external routers.

For a brief multimedia tutorial on SPM benefits and evolution, access this URL:

http://www.nortelnetworks.com/spmtutorial

NEW SPM CAPABILITIES

SPM PRI ON NA-100 — SPM00018

Addresses demand for larger bandwidth interfaces to Internet Service Providers (ISPs), businesses, and other heavy-bandwidth accounts.

NI-2 PRI on SPM

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00033

KEY CAPABILITIES

SPM00018 extends key National ISDN-2 Primary Rate Interface (PRI) features over OC-3 links. Now ISPs and business accounts can use direct optical trunking, without sacrificing functionality. NI-2 PRI functionality supported over optical trunking (as defined in SR-2120) originate with the following ISDN PRI order codes:

NI-2 PRI Functionality Supported Over SPM OC-3

Order Code	Order Code Name	Order Code Availability
NI000043	PRI NI-2 Base (previously NI000015)	Rel•12
NI000030	Calling Name Delivery	
NI000032	Hotel/Motel Services	
NI000035	Circular Hunt Services	
NI000018	Two B-Channel Transfer	Rel•13
NI000037	Messaging Services	
NI000040	NI-2 Dialable Wideband Services	
NI000047	Call Forward Interface Busy	
NI000034	B-Channel Packet Provisioning	Rel•14

Technical reference: 59007501

PRINCIPAL BENEFITS

With order code SPM00018, the Spectrum Peripheral Module can help network providers decrease facilities costs while serving a wider variety of accounts. The direct high-bandwidth optical links into these destinations address the demand for higher-bandwidth interfaces.

MAJOR DEPENDENCIES

Software: SPMS0001 Spectrum Peripheral Module Base

Hardware: NTLX72AA Data Link Controller (DLC) pack in SPM

SPECTRUM PERIPHERAL MODULE (SPM), *continued*

NTNA ISP PRIMARY RATE INTERFACE — SPMS0015

Provides basic NI-1 capability to meet the needs of the growing ISP market and those NI-1 customers with needs for particular features.

New ISP Basic Call

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00033

The following NI-1 capabilities are introduced on the SPM with order code SPMS0015:

- Basic Call, including provisioning, operational measurements, Automatic Message Accounting (AMA), SS7 interworking, and maintenance.
- Calling Name and Number Delivery features, on a local basis.
- D-Channel Backup with Non-Facility Associated Signaling (NFAS) for multiple PRI links assigned to the same SPM.

The optional NI-1 feature, Circular Hunt, NI000036, can be assigned to PRI links assigned to SPM. Once DS-1 links are established on the SPM, assignment and operation of the features are generally consistent with the implementation used on the Digital Trunk Controller for ISDN (DTCI) DMS peripheral.

PRINCIPAL BENEFITS

This feature makes it possible to meet the needs of the expanding PRI market with an optical peripheral that provides greater bandwidth and economical interfaces with the Inter-Office Facilities network. The increasing size of Internet Service Provider (ISP) groups can be handled more effectively with the increased capacity of the SPM.

The same SPM can support these NI-1 features, the NI-2 services shown above, and supported ISUP and PTS trunk types. This results in a multi-service peripheral that provides all the benefits of SPM and consolidates different trunking types on the same peripheral for increased efficiency and performance of network provider resources.

MAJOR DEPENDENCIES

Software: SPMS0001 Spectrum Peripheral Module Base

Hardware: NTLX72AA DLC pack in SPM

New SPM NI-1 PRI Functionality

PCL: LEC00013, LET00013, LLT00013, LWW00007
NCL: SPM00035

KEY CAPABILITIES

The following NI-1 base capabilities are added to this order code with Rel•13:

- Integrated Services Access (ISA) for Call-by-Call Service Selection
- Network Redirection and Reason

In addition, this software also supports the assignment of NI000024 Release Link Trunking to PRI links on the SPM.

PRINCIPAL BENEFITS

This software offers network providers an expanded list of NI-1 capabilities over PRI links, while expanding the efficiencies of SPM deployment. With this software, the following NI-1 PRI capabilities are supported (shown with originating ISDN PRI order codes):

NI-1 PRI Functionality Supported in SPMS0015

Order Code	Order Code Name	Availability on SPM
NI000033	PRI NI-1 Base Basic Call Calling Name/Number D Channel Back-up/ NFAS	Rel•12
NI000036	Circular Hunt Services	
NI000033	PRI NI-1 Base ISA for Call-by-Call Network Redirection and Reason	Rel•13
NI000024	Release Link Trunking	

MAJOR DEPENDENCIES

Software: SPMS0001 Spectrum Peripheral Module Base

Hardware: NTLX72AA DLC pack in SPM

SPECTRUM PERIPHERAL MODULE (SPM), *continued*

SPECTRUM PERIPHERAL MODULE BASE — SPMS0001

Delivers software support for Nortel Networks next-generation, high-speed, optical inter-office trunking.

Large System Support

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00033

KEY CAPABILITIES

The DMS Series 70 EM processor option supports up to 20 SPMs in Rel•10 and Rel•11 — and up to 56 SPMs in Rel•12. With 56 SPMs, this large system support feature enables a DMS-100 or DMS-500 office to handle over 100,000 ports. As with any system of this size, a traffic capacity study should be performed to verify system capacity.

PRINCIPAL BENEFITS

Rel•10 and Rel•11 support the bulk loading feature (originally developed for Rel•12), that loads up to 20 SPMs at once. Customers can now take advantage of a substantially reduced time for Open Network Provisioning (ONP) of large system offices.

MAJOR DEPENDENCIES

Software: AJ5244 INM Large System Support and accompanying patches

New Crossover Messaging

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00033

KEY CAPABILITIES

By enabling each common equipment module (CEM) to send messages through both planes of the Enhanced Network (ENET) switch fabric, this feature provides redundancy with four bi-directional DS-512 serial links. Also, this feature supports an in-service upgrade from LX63AA to LX82AA CEM in a dual shelf (reconfiguring from a dual shelf to a single shelf is not recommended).

Technical reference: 59008910

PRINCIPAL BENEFITS

This feature provides the redundancy to enhance the robustness of SPM-to-Core messaging, thereby permitting a single ENET shelf installation for the SPM.

MAJOR DEPENDENCIES

Hardware: NTLX82AA

PANTHER Support for the SPM

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00033

KEY CAPABILITIES

In Rel•11, Peripheral Module Upgrade Automation (PANTHER) supported automated upgrades with milestone loads. In Rel•12, maintenance and emergency loads are also supported for automated upgrades. Additionally, PANTHER now provides concurrent support for the following configurations:

- In-service loading of resource modules (RMs) in up to four different protection groups.
- Mate-loading RMs in some protection groups and in-service loading RMs in other protections groups.
- In-service loading of up to four common equipment modules (CEMs) on four different SPMs.

Technical reference: 59009203, 59009208

PRINCIPAL BENEFITS

Currently, maintenance loads and emergency loads deliver fixes for the SPM — but PANTHER only supports functionality introduced during milestone loads. With this new feature, maintenance and emergency loads can be included as supported loads for PANTHER automated upgrades. This reduces the time and manual intervention required to complete these software upgrades.

Further efficiencies, especially for large office systems, can be gained with the introduction of concurrent loading functionality.

Patching on the SPM

PCL: LEC00012, LET00012, LLT00012, LWW00006
NCL: SPM00035

KEY CAPABILITIES

This functionality simplifies the delivery of software patches to the Spectrum Peripheral Module. The same infrastructure in use today for supplying and applying patches to the DMS applies to this feature. SPM patching is modeled on the XPM patching tool set. Although imaging the current patched load to the flash memory will be available with NCL SPM00035, the capability to image to disk is not yet available. Also, ACT and OP patches are not supported in this release.

Technical reference: 59009197

PRINCIPAL BENEFITS

Currently, fixes for the SPM are delivered by maintenance loads, which require the SPM to be reloaded in order to apply software fixes. With the introduction of patching, network providers can use the existing Post Release Software Manager (PRSM) database to perform an in-service application of SPM patches in the same manner currently used for XPMs.

SPECTRUM PERIPHERAL MODULE (SPM), *continued*

Black Box Fraud Prevention Over OC-3 PTS

PCL: LEC00013, LET00013, LLT00013, LWW00007
NCL: SPM00035

KEY CAPABILITIES

This enhancement extends the revenue protection of the "Black Box Fraud" feature in BAS00064 (first generally available in Rel•8) to OC-3 links using the per-trunk signaling (PTS) protocol. Billing systems use answer supervision signals to mark the start of charges in a call billing record. Although fraudulent, it is possible to suppress or delay the return of answer-supervision signals from a PBX (or other terminating device, euphemistically called a "black box"). This practice resulted in improper billing and lost revenues to the network provider.

This feature helps inhibit fraud by allowing only a one-way transmission path until the terminating device returns answer supervision signals. The originating party still hears call progress and comfort tones, but two-way communication is impossible before the DMS system receives answer supervision.

This software also offers an optional timer that will tear down the call if answer supervision has not been received within one, two, three, four, or five minutes (datafilled on a trunk-group basis). If this timer is used, the DMS SuperNode system pegs an operational measurement (OM) and creates a log (TRK 610) whenever the black box fraud timer expires before receiving answer supervision signals.

Technical reference: 59010382

PRINCIPAL BENEFITS

Black Box Fraud Prevention can help recoup revenues to the network provider from calls that were previously not billed due to fraud by "black box" customers, resellers, and carriers at the terminating end. SPMS0001 now extends this simple, effective revenue protection to optical spans with PTS signaling. To help the network provider identify possible fraud violators, the TRK 610 log contains key information, including the originating agent, terminating trunk, called number, calling number, and time-out value.

New LEC Echo Cancellation

PCL: LEC00013, LET00013, LLT00013, LWW00007
NCL: SPM00035

KEY CAPABILITIES

This feature provides internal SPM Echo Cancellation for these LEC ISUP trunk types: IT, ATC, TI, TO, T2, IBNTI, IBNTO, and IBNT2. This enables deployment of long haul trunks from the DMS SPM to a distant switch without the requirement to de-multiplex the SPM OC-3. Voice Service Processors (VSP) must be installed in the SPM for integrated Echo Cancellation. There are three circuit packs available from Nortel Networks providing either 64 ms or 128 ms tail delay in varying increments. Resources may be dedicated or pooled, based on traffic characteristics.

Datafill determines which trunks are eligible for Echo Cancellation. The SPM then dynamically applies cancellation when required. In the case of fax/data calls, the SPM does not allocate echo cancellation — based on the reception of a valid G.164/G.165 tone or the USI field in the IAM. This feature also provides additional logs and surveillance information.

Technical reference: 59013302

PRINCIPAL BENEFITS

SPM-integrated Echo Cancellation saves network providers the cost of investment in external cancellation equipment and associated inter-connection points and their associated powering and floor space requirements. And, since there are fewer connections and possible points of failure, integrated Echo Cancellation can also enhance reliability.

MAJOR DEPENDENCIES

Software: SPM NCL: SPM00035

Hardware: NTLX66BA, NTLX85AA, or NTLX66AA

New Internal Routing

PCL: LEC00013, LET00013, LLT00013, LWW00007
NCL: SPM00035

KEY CAPABILITIES

This feature implements Message Transport Protocol (MTP) internal routing for the SPM to route SS7 call processing messages to the correct SS7 signaling link for transmission. With the implementation of this feature, the engineering rules for determining when external routers are required are now based on the trunk and message quantities, rather than the peripheral type installed. External routers are still required for large offices.

Technical reference: 59013504

PRINCIPAL BENEFITS

With this feature, External Routers (LIU7s) in the Link Peripheral Processor (LPP) are no longer automatically required with an SPM, helping to save capital investments, operating costs, and LPP card slots. Current SPM sites with external routing activated have the option of continuing with that implementation or change to internal routing, consistent with engineering rules.

SPECTRUM PERIPHERAL MODULE (SPM), *continued*

New DS-1 Assignment Control

PCL: LEC00014, LET00014, LLT00014
NCL: SPM00039

KEY CAPABILITIES

This feature provides two parameters in table OFCOPT to set the maximum number of DS-1s that can be assigned for ISUP/PTS message trunks and PRI links. The limits are separately set on an individual office basis to allow network providers full flexibility in trunk assignment.

Note: Initial quantity limit and the size of increments will be defined in a contract between the network provider and Nortel Networks.

Technical reference: 59018431

PRINCIPAL BENEFITS

This DS-1 assignment feature allows network providers to match purchases of DS-1 capacity with network requirements. Once hardware is installed, additional DS-1s can be purchased based on an existing contract.

OC-3 LINE TIMING — SPMS0040

Aligns SPM's OC-3 interface to Telcordia GR-253 synchronization standards.

OC-3 Line Timing

PCL: LEC00013, LET00013, LLT00013, LWW00007
NCL: SPM00035

KEY CAPABILITIES

This new, optional functionality exploits the high phase resolution and sampling frequency provided by the SPM to improve synchronization performance and meet the optical (SONET) synchronization standards GR-253 on the SPM's OC-3 output.

Technical reference: 59013912

PRINCIPAL BENEFITS

The Message Switch (MS) clock can be configured to use the SPM as a source of timing for the entire DMS office, as an option to operating the SPMs in a loop-timed configuration.

MAJOR DEPENDENCIES

Hardware: NT9X53AD Digital Phase Lock-Loop Clock Card

SPM ECHO CANCELLER SUPPORT — SPMS0002

Expands SPM echo cancellation functionality on the DMS-500 system.

New SPM ECAN Call Control

PCL: LLT00013
NCL: SPM00035

KEY CAPABILITIES

This feature, for the DMS-500 system, enhances the Echo Canceller (ECAN) Call Control algorithm first implemented as a part of feature AD9959, *SPM ECAN Call Control.* EC Bit setting and automatic ECAN allocation has been introduced on the SPM for ISUP trunks (SPM00031) and PRI trunks (SPM00033). However, the ECAN Allocation Algorithm on the Computing Module (CM) did not use these new SPM features prior to Rel•13.

PRINCIPAL BENEFITS

This feature optimizes the SPM ECAN Algorithm on the CM to take advantage of the EC Bit setting and automatic ECAN allocation via supervision messages to the SPM. These supervision messages are no longer required on ISDN User Part (ISUP) and ISDN Primary Rate Interface (PRI) trunks because of automatic ECAN allocation on the SPM, and have been removed. The CM also ensures that EC Bits from incoming messages propagate to the EC Bits of outgoing messages from the CM.

Technical reference: 60007747

MAJOR DEPENDENCIES

Software: SPMS0001 Spectrum Peripheral Module Base

New ATR Dialing Plan Enhancements to Support ECRM/ECRN Selection

PCL: LLT00013
NCL: SPM00035

KEY CAPABILITIES

This feature, for the DMS-500 system, enables the craftsperson to enter the ECAN Resource Module (ECRM) and ECAN Resource Number (ECRN) to be used for Automatic Route Trunk (ATR) call termination to an SPM trunk. The enhanced ATR dialing plan also recognizes the direction of the ECAN. This value can be forward (0), backward (1), or back-to-back (2). For back-to-back ECAN, the craftsperson enters two ECRMs and ECRNs.

Technical reference: 60007752

MAJOR DEPENDENCIES

Software: SPMS0001 Spectrum Peripheral Module Base

NEW DMS REMOTE FEATURES

With DMS System remotes, high-demand services — such as Centrex, CLASS/Call Management Service, 1-Meg Modem, ISDN, and more — can be extended as much as 650 miles away from the host office (over facilities supporting a roundtrip delay of 13 milliseconds or less).

Robust and efficient in either standalone or bi-directional ring configurations, these flexible remotes provide:

- Emergency Standalone service to continue local call service even if the connections between the host and a switch are severed.
- Resource savings by enabling calls that originate and terminate within the switch remote to connect without tying up links back to the switch, except during initial call setup.
- Pair-gain and feeder relief by fine-tuning line concentration to reduce facilities costs.

In 1999, the supported maximum number of host links on the Remote Switching Center-S (RSC-S) and Dual RSC-S switch remotes expanded from 16 to 20 DS-1s. This increase in host-to-remote ("C-Side") links can support 29% more traffic with a simple, nondisruptive upgrade.

REMOTES GENERIC — BAS00012

Extends revenue-generating DMS system services deeper into the network.

RLCM ESA Processor Upgrade

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

This feature offers software support of a new processor, NTMX45AA, for DMS-100, DMS-500, and DMS-100 Wireless remotes. This global replacement processor is needed to support the Emergency Standalone (ESA) capability whenever host-to-remote communication is lost (during ESA, local call service continues even if the connections between the host and the remote are severed). In Rel•12, this new NTMX45AA processor is available for new shipments of the Remote Line Concentrating Module (RLCM) and Outside Plant Access Cabinet (OPAC) remotes.

Technical reference: 59008339, 59008344, AF7870

PRINCIPAL BENEFITS

Nortel Networks is introducing a new ESA processor to deliver to network providers the latest components available. The new NTMX45AA processor, needed for ESA protection, is *not* gating hardware with Rel•12: replacement of existing NT6X45AF processors and NT6X47AC memory in the field is not required, *except* on RLCM, OPAC, and Outside Plant Module (OPM) remotes to support order code BAS00078 LNP Duplicate NXX Remote (see next).

LNP DUPLICATE NXX REMOTE — BAS00078

Supports Duplicate NXX numbering plans when host links are cut and remotes enter Emergency Standalone mode to continue providing local calling services.

Duplicate NXX for DMS Remotes in ESA

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

"Duplicate NXX" applies to having the same NXX office code for different Numbering Plan Area codes (NPAs) on the same DMS system. Order codes NPE00001 and NPE00002, both introduced in Rel•9 for the host, expand DMS call processing, provisioning, and line maintenance to support the use of Duplicate NXX in the same switch.

Now order code BAS00078 extends Duplicate NXX dialing to the following DMS remotes while in Emergency Standalone (ESA) mode:

- Star Remote System (Hub and Modules)
- Remote Switching Center-S (RSC-S)
- Remote Line Concentrating Module (RLCM)
- Outside Plant Access Cabinet (OPAC)
- Outside Plant Module (OPM)

Technical reference: 59007412

PRINCIPAL BENEFITS

BAS00078 is required to support Duplicate NXX dialing for DMS remotes while in Emergency Standalone mode. This enhancement helps ensure that local calls can be completed during ESA operation in areas having Duplicate NXX dialing plans.

MAJOR DEPENDENCIES

Software: BAS00012 Remotes Generic
NPE00001 Numbering Plan Evolution I

Hardware: NTMX45AA ESA processor pack (see previous) for RLCM/OPAC/OPM
NTAX74AA processor pack for RSC-S

NEW DMS REMOTE FEATURES, *continued*

ISDN LINE DRAWER FOR REMOTES — ISDN0003

Provides software support for the hardware that delivers low line-size Basic Rate Interface (BRI) ISDN services to an installed base of DMS-100 remotes.

ILDR Multipoint Embedded Operations Channel Support

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

For the ISDN Line Drawer for Remotes (ILDR), the Multipoint Embedded Operations Channel (MP-EOC) feature offers enhanced ILDR maintenance and diagnostic capabilities. With MP-EOC, the network provider can reset ISDN line repeaters, as well as monitor and diagnose various B1, B2, and 2B+D loopback configurations.

Technical reference: 59007278, 59007422

PRINCIPAL BENEFITS

As a maintenance enhancement to the existing ILDR hardware, the MP-EOC functionality significantly enhances the maintainability of lines on extended loops off the ILDR on DMS-100 remotes. Network provider craftspersons can now remotely test individual sections of the BRI loop to isolate problems from a central network location. This ISDN maintenance feature helps improve the Quality of Service and reduces the ongoing costs of delivering and maintaining ISDN services.

GR-303 ESMA FEATURE

The Nortel Networks Expanded Subscriber Carrier Module-100 Access (ESMA) provides digital integration of our next generation GR-303 business access vehicle, the AccessNode platform, as well as Telcordia GR-303 compliant remote digital terminals (RDTs) from other vendors.

ESMA WITH INTEGRATED CHANNEL BANK (ICB) SMA00012

Enhances the Expanded Subscriber Carrier Module-100A (ESMA) to directly terminate D4 channel bank DS-1s.

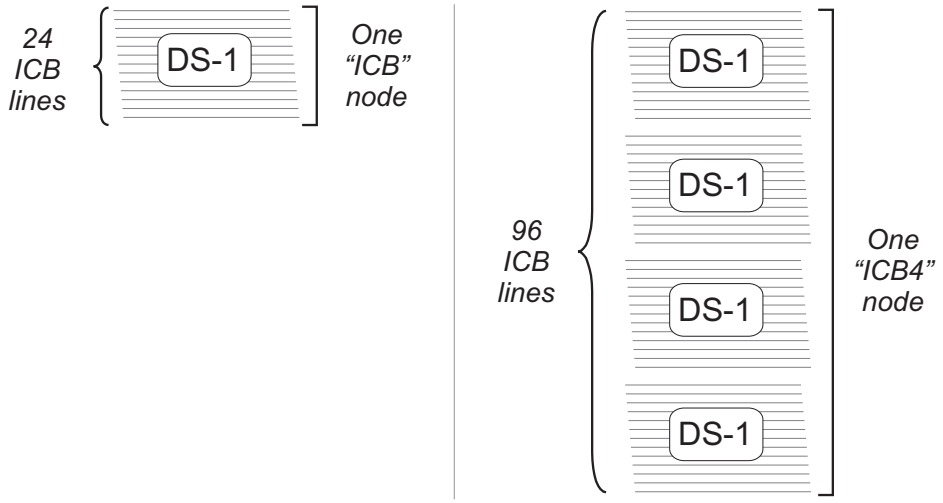
Integrated Channel Bank Line Capacity Increase

LEC00012, LET00012, LLT00012, LWW00006

KEY CAPABILITIES

Expanding local-service competition and burgeoning Internet traffic has increased line access demands, addressed in part by the addition of Integrated Channel Bank (ICB) lines. To leverage the dramatic growth in ICB configurations, SMA00012 is scheduled to expand the line capacity for this type of interface.

Currently, the "ICB" node type represents one DS-1 (with the capacity for 24 ICB lines). This new software introduces a new node type, "ICB4", that permits up to four DS-1 spans to be datafilled as a single, nonconcentrating node.



"ICB" Node Type Contrasted with the New "ICB4" Node Type

Technical reference: 59008509, 59008693, 59008707

PRINCIPAL BENEFITS

The introduction of a new node type provides an increase of four times the current capacity of 24,000 ICB lines. On a fully configured DMS system, this enhancement permits up to 96,000 ICB lines to be datafilled — to help keep ahead of exploding access traffic demands at the local loop.

Directory and Operator Services

The Nortel Networks portfolio of directory and operator services builds on the robust and reliable Traffic Operator Position System (TOPS) platform combined with innovative database and information technology, and leads the industry in automation, computer-telephony integration (CTI), and the convergence of data and voice in the public network.

At the center of the TOPS network is the DMS TOPS tandem switch — supporting up to 1000 operator positions defined into 30 operator teams. The DMS TOPS switch connects operator positions with directory assistance systems, operator reference databases, voice service nodes, and other systems and databases.

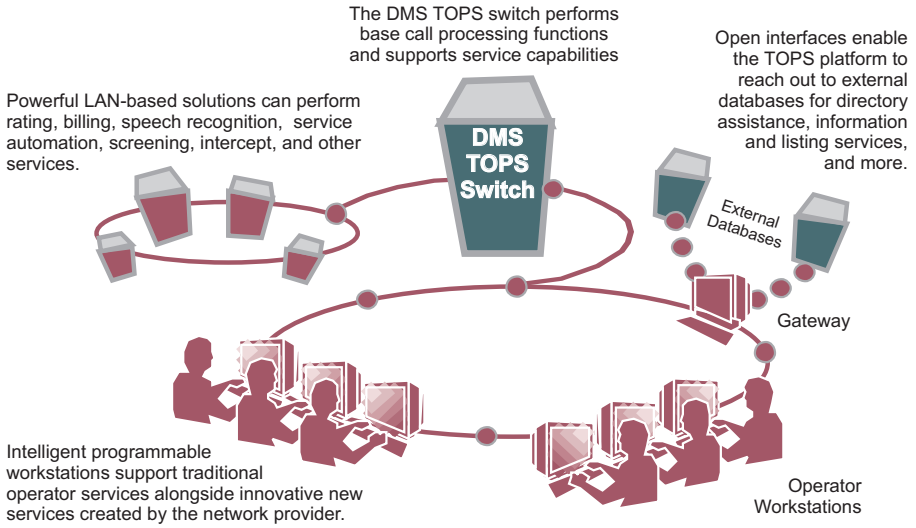
This chapter discusses the new software features that will reside in the Computing Module (CM) of the DMS TOPS switch to support a variety of services, operator positions, and databases that subtend from the switch.

IN THIS CHAPTER

BUILDING ON MORE THAN TWO DECADES OF EXPERIENCE

In the changing world of telecommunications, new opportunities and challenges are the order of the day. Deregulation of the industry and explosive advances in computer, communication, and information technologies have opened markets to tremendous potential growth.

Nortel Networks is currently the only vendor to provide end-to-end operator services — from the operator workstation to the switch, database applications, and audio processors — across the network. We are proud to offer the broadest portfolio of directory and operator services in the industry with highly customizable solutions based on standard operating hardware and open interface software. To optimize the value of these services, Nortel Networks offers comprehensive support packages, including technical education; computer-based and on-site training; systems integration and testing; warranty and maintenance contracts; and much more.



Nortel Networks Offers End-to-End Operator Services

Nortel Networks is now delivering a new generation of TOPS functionality within the Intelligent Services Environment (ISE), featuring the TOPS Intelligent Services Switch (ISS), the Intelligent Services Node (ISN), and the Intelligent Workstation (IWS). The ISE affords service providers tremendous versatility in configuring the precise network they need to compete and win in today's dynamic marketplace. Built to Nortel Networks Open Automated Protocol (OAP) specification, the ISE is a truly open and flexible environment, allowing full network integration and attendant backing at any time.

Our commitment to Directory and Operator Services is founded on more than two decades of experience in the business. As our industry moves toward an era of intelligent networking, the operator's role is evolving to that of a service attendant for an ever-increasing array of network services. Nortel Networks has expanded and advanced our product portfolio to accommodate these changes. The products and services available today are the platforms for building a profitable future for our customers.

THE FUTURE OF DIRECTORY AND OPERATOR SERVICES

The Nortel Networks portfolio of directory and operator services offerings is moving in step with customer initiatives toward Succession Solutions and the efficiencies of Internet Protocol (IP). For more information on the transition to a packet-based network, see the "Succession Solutions" chapter in this document, beginning on page 34.

Many new and advanced TOPS features that interwork in packet-based environments will be introduced in LET00013 and LET00014.

- LET00013 introduces "MIS Over IP" (see page 214) that allows service providers to consolidate their network information into one format. This release also lays the groundwork for centralization of operator networks over IP.
- LET00014 is planned to include a feature called "TOPS and Succession Solutions Interworking" (see page 215), which helps existing customers to leverage their installed base of Nortel Networks products while following a managed migration path to IP. This release is also planned to feature important infrastructure advances to allow Directory Assistance voice traffic to be transported over the IP network.

Nortel Networks is committed to providing customers with the latest advances in technology so service providers can benefit from improved speed to market, expanded revenue opportunities, and lowered operating costs.

PRODUCT EVOLUTION STATUS

Nortel Networks continuously refines product offerings to keep customers current with the latest technological advances. As we add new capabilities to our portfolio, development for some of our older products cannot keep up with new requirements. Please note the evolution status for the following products.

- **TOPS 03/04 Operator Positions**. No additional feature development will be undertaken for the TOPS 03 and 04 positions. Hardware and software will continue to be supported through regular customer-service channels and within existing contractual terms.
- **TOPS MP Operator Position**. Support for the TOPS MP position is now limited to required Additions and Maintenance (A&M) work, and software development support is limited to selected enhancements to traditional services and regulatory features implemented on the switch. Hardware and software will continue to be supported through regular customer channels and within existing contractual terms.
- **Voice Services Node (VSN)**. The Voice Service Node product has reached manufacture discontinued status.
- **Interactive Voice Subsystem (IVS)**. The Interactive Voice Subsystem product has reached manufacture discontinued status.

STANDARD OPERATOR SERVICES BASE SOFTWARE

The following are planned to be delivered as "standard" features; they do not have to be licensed separately.

Table LATANAME Expansion

LET00012, LLT00012

KEY CAPABILITIES

Service providers use table LATANAME to define the Local Access Transport Areas (LATAs) served by their switches. Currently, this table permits up to 31 entries. This feature expands the maximum number of LATAs handled by Table LATANAME to 255.

Technical reference: 59006827

PRINCIPAL BENEFITS

In today's new environment, 31 entries may no longer be sufficient for network providers using TOPS switches to wholesale services across the United States. By increasing the maximum number of LATA names handled by TOPS to 255, this feature allows wholesalers using TOPS switches to have greater flexibility in the markets they serve.

On/Off Switch for TOPS

LET00012, LLT00012

KEY CAPABILITIES

This feature allows access to TOPS call processing to be enabled or disabled using Software Optionality Control (SOC):

- When SOC option OSB00001 is **enabled**, the network provider can access TOPS functionality.
- When SOC option OSB00001 is **disabled**:
  - Operator login is denied.
  - Calls coming in on TOPS trunks are sent to reorder treatment.
  - Calls requiring operator assistance are sent to reorder treatment.
  - Operator Services System Advanced Intelligent Network (OSSAIN) session pools cannot be brought into service.

This safeguard feature is available in North American and global TOPS loads.

Technical reference: 59007019

PRINCIPAL BENEFITS

On combo switches incorporating TOPS functionality, this software helps prevent TOPS switch functionality from accidentally being turned on or off.

STANDARD OPERATOR SERVICES BASE SOFTWARE, *continued*

MD Code Removal and Re-Engineering

LET00012, LLT00012

KEY CAPABILITIES

This feature, MD Code Removal, removes outdated and manufacturer discontinued (MD) TOPS Automatic Call Distribution (ACD) code from TOPS software.

There are neither new functionalities nor new customer hardware dependencies introduced by this feature. It should be noted, however, that TOPS ACD operator positions will no longer operate. Therefore, it is imperative that customers upgrade all of their office equipment to TOPS QMS before upgrading their DMS switches to LET00012.

Technical reference: 59006865

New MIS over IP

LET00013, LLT00013

KEY CAPABILITIES

The QMS Management Information System (MIS) over IP feature provides event-driven data about TOPS positions and call queues using an IP interface. Intended for use in driving off-board reporting facilities and real time displays, the IP link terminates on a DMS Extended Peripheral Module (XPM) containing an Ethernet equipped NTSX05DA card. With this feature, a TOPS office is able to use either the existing X.25 interface or the new QMS MIS IP interface for QMS MIS data, but not both at the same time.

Technical reference: 59007458

PRINCIPAL BENEFITS

This feature consolidates all MIS data — whether TCP/IP, X.25, TCAP, or ISDN — onto one data network, simplifying network administration and support. The QMS MIS data provided to the off-board facilities uses the existing QMS MIS protocol that is in use today, to help reduce the impact of this new feature.

MAJOR DEPENDENCIES

Software: TOPS Queue Management System (QMS) with QMIS

Hardware: NTSXO5DA card

New Billing Enhancements for EA Calls to Served Carriers

LET00013, LLT00013

KEY CAPABILITIES

This feature enables a network provider to generate two billing records for 0- call originations that become Equal Access (EA) calls destined to carriers that contract with the network provider for operator services.

Technical reference: 59013695

PRINCIPAL BENEFITS

By creating two different billing records, the network provider has both billable records and access records that can be used for billing both the subscriber and the carrier. This offers greater flexibility for providers who offer both local and long distance services.

New TOPS and Succession Solutions Interworking

LET00014, LLT00014

This feature enables TOPS features to continue to operate in nodes in a Succession Solutions environment. Prior to this feature, an existing Tandem system that has TOPS software operating could not be converted to a Succession Solutions Communication Server.

Technical reference: 59015896

New End of Life Activities in TOPS14

LET00014, LLT00014

This feature removes outdated functionality from the base TOPS software code, including:

- Delayed outpulsing
- Inward validation
- Table SPLNDID
- AMR5 signaling

The removal of end-of-life features helps keep the TOPS software processing at peak operating levels and helps contain memory and real time requirements.

Technical reference: 59015901

OPERATOR SERVICES SYSTEM AIN

This software grouping provides value-added Signaling System No. 7 (SS7) based Advanced Intelligent Network (AIN) capabilities that can interwork with DMS operator service features, bringing basic AIN functions and benefits to the operator services environment.

OSSAIN ENHANCEMENTS — OSAN0007

Provides additional functionality for Operator Services System AIN.

OSSAIN 12 Enhancements

LET00012, LLT00012

KEY CAPABILITIES

This feature enhances Operator Services System Advanced Intelligent Network (OSSAIN) software in the following ways:

- Allows trigger profiles to be set based on CT4Q
- Limits transitions between an operator and the service node
- Supports TOPS blocking of Open Automated Protocol (OAP) operations
- Provides OSSAIN Centralization (OSSAC) ability for remote call processing to handle OSSAC release/acknowledge
- Creates new extension blocks containing context block and passthrough messages
- Delivers options for return answer when a voice link is connected to a call
- Permits service nodes to indicate when local number portability (LNP) screening should be bypassed
- Enables service nodes to populate LNP GAP via the DMS switch
- Supports Calling Party Pays (CPP) wireless

Technical reference: 59006766

PRINCIPAL BENEFITS

These enhancements provide additional functionality and expand the value of TOPS OSSAIN capabilities.

MAJOR DEPENDENCIES

Software: OSAN0001 Operator Services AIN (OSSAIN)

New OSSAIN 13 Enhancement

LET00013, LLT00013

KEY CAPABILITIES

This feature enhances Operator Services System Advanced Intelligent Node (OSSAIN) to support Directory Assistance (DA) automation functionality that is database independent. These enhancements allow service nodes to provide an automated, interactive DA application that is similar to the existing Automated Directory Assistance Service (ADAS).

Technical reference: 59011611

PRINCIPAL BENEFITS

This feature gives service providers more flexibility in choosing directory assistance automation options, including switch-based or *non*switch-based applications from multiple vendors and use on multiple Nortel Networks platforms.

MAJOR DEPENDENCIES

Software: OSAN0001 Operator Services AIN (OSSAIN)

ENHANCED SERVICES

TOPS Enhanced Services software includes a collection of optional capabilities that enhance the basic functionality of TOPS call processing in various ways.

SECONDS-BASED ANNOUNCEMENTS — ENSV0025

Provides a finer degree of measurement for callers requesting Time and Charge information.

Seconds-Based Announcements

LET00012, LLT00012

KEY CAPABILITIES

Currently, Automated Coin Toll Service (ACTS) plays time duration announcements in per-minute increments for post and pre-paid calls from coin phones. Now, with this feature, ACTS can play the time duration to the second for post-paid calls from coin phones, and perform Time and Charge functions for calls, including hotel calls. Also, two other call types now reflect duration in seconds:

- External real-time rated calls that arrive at the operator position
- External rated hotel calls that go to a Hotel Billing Information Center (HOBIC) device

Technical reference: 59006873

PRINCIPAL BENEFITS

This feature enables the ACTS announcement to more accurately reflect the time information provided by an external rater.

MAJOR DEPENDENCIES

Software: ENSV0001 Enhanced Services

TOPS IP OPERATOR CENTRALIZATION — ENSV0026

Lays the groundwork to move Nortel Networks' directory and operator services offerings to the world of Internet Protocol.

New TOPS IP Operator Centralization

LET00013, LLT00013

KEY CAPABILITIES

This feature creates the provisioning and data infrastructure to support the transition of TOPS Operator Centralization (OC) voice and data links to IP transport. The feature enables:

- TOPS OC **voice traffic** to be carried over an IP data network through the use of the NT7X07 Gateway card.
- TOPS OC **data traffic** to be carried over an IP data network through the use of the NTSX05DA processor.

It also provides the DMS switch maintenance infrastructure to support TOPS OC voice and data links in the IP environment.

Technical reference: 59012723, 59013928, 59013932, 59013936

PRINCIPAL BENEFITS

This feature provides the necessary infrastructure for TOPS to run in an Internet Protocol (IP) environment. IP promises lower costs of transport, simplifies reconnection of hosts and remotes, greater flexibility in the use of host and remote switches, and decreased operational costs for maintaining network connections.

MAJOR DEPENDENCIES

Software: ENSV0001 Enhanced Services

Hardware: – New NT7X07 Centrex IP Gateway cards
– New Line and Trunk Controller for ISDN (LTCI) with NTSX05DA processor, NT6X0240 backplane, and NTMX76 Messaging circuit pack

UNBUNDLING

The *Unbundling* software group introduces a range of features to help service providers benefit from the unbundling and wholesaling of directory and operator service features.

UNBUNDLING — UNBN0001

Simplifies operator service unbundling for incumbent service providers.

Unbundling OPRTRANS

LET00012, LLT00012

KEY CAPABILITIES

This enhancement expands on UNBN0003 Translations and Routing to provide mandated unbundling capabilities required by the Telecommunications Reform Act for Operator and Equal Access translations.

Technical reference: 59006822

PRINCIPAL BENEFITS

UNBN0001 helps make translations easier by enabling them to be performed by one table. This functionality is optional and can be implemented on a per-tuple basis.

CALL RESTRICTIONS FOR WHOLESALING — UNBN0006

Adds flexibility for service providers operating in a wholesale environment.

Call Restrictions for Wholesaling

LET00012, LLT00012

KEY CAPABILITIES

UNBN0006 enables the network provider to restrict calls on a trunk group or on a Carrier Identification Code (CIC) basis if no restriction is found for the directory number (DN) in either tables SPLDNID/TDBCLASS or OLNS.

Technical reference: 59006832

PRINCIPAL BENEFITS

This optional software gives wholesalers greater control over how calls are restricted and makes it easier to offer call restriction on a per-call basis.

MAJOR DEPENDENCIES

Software: UNBN0001 Unbundling

SCREENING FOR BILLING AGREEMENT — UNBN0007

Provides greater control and certainty where billing questions might arise in an unbundled environment.

New Screening for Billing Agreement

LET00013, LLT00013

KEY CAPABILITIES

The Screening for Billing Agreement feature screens each call at call setup (prior to connecting to the terminating party or floating the call) for billing agreements between the service provider of the originating party and the service provider of the billed-to party/entity. The billed-to party/entity can be a Directory Number (DN) in the cases of a collect, third party, or calling card provider.

Technical reference: 59011929

PRINCIPAL BENEFITS

In an unbundled environment, helps service providers to ensure that service agreements exist before completing a call, preventing unbillable records from being generated.

MAJOR DEPENDENCIES

Software: UNBN0001 Unbundling
ABS00012 Originating Line Number Screening (OLNS) Interface

OPERATOR SERVICES DIRECTORY ASSISTANCE

The *Operator Services Directory Assistance* software group provides basic Directory Assistance (DA) call handling capability, protocols for communicating between the switch and directory assistance systems, and support of DA and intercept announcements made using Enhanced Digital Recorded Announcement Machine (EDRAM) technology.

DIRECTORY ASSISTANCE VOICE OVER IP — OSDA0009

Adds the benefits of IP to the Nortel Networks portfolio of Directory Assistance (DA) offerings.

New Directory Assistance Voice over IP

LET00014, LLT00014

KEY CAPABILITIES

This feature provides the ability to transport directory assistance (DA) and intercept audio data between the TOPS switch and the Intelligent Services Node (ISN) DA Audio Server via an IP network. In addition, this feature will allow a single ISN DA Audio Server to be accessible via any TOPS switch in a TOPS network.

Technical reference: 59015305

PRINCIPAL BENEFITS

This order code moves the connection between TOPS and the ISN DA Audio Server into the IP environment, along with all the inherent efficiencies and cost savings of packet-based transport.

MAJOR DEPENDENCIES

Software: OSDA0001 Operator Services Directory Assistance

ADVANCED QUEUING SERVICES

With the *Queue Management System (QMS)*, the DMS TOPS switch supports up to 255 unique queues of calls to operator positions — and up to 255 unique operator profiles that define the service capabilities of individual operators and teams.

QMS CUSTOMER SERVICE ENHANCEMENT — ADVQ0006

Adds increased customer support capabilities and flexibility to operators using QMS CASE.

QMS Customer Service Enhancement

LET00012, LLT00012

KEY CAPABILITIES

This feature provides a sonalert signal when a call requiring special assistance is in queue and the Service Assistant (SA) is busy or has calls withheld, excludes SA time and monitoring time from office Customer Service Time (CST) and automatic message accounting (AMA) records, and adds softkeys that display when the SA receives an assistance request.

Technical reference: 59006877

PRINCIPAL BENEFITS

The sonalert notification of a call waiting in queue gives added flexibility to the Customer Service Expert (CSE) position, adding capabilities previously available only on Service Assistant/In-Charge positions.

MAJOR DEPENDENCIES

Software: ADVQ0001 Advanced Queuing

ADVANCED QUEUING — ADVQ0001

Provides next-generation queuing capabilities, including support for hundreds of unique queue types and agent profiles.

Force Management CRT Elimination

LET00013, LLT00013

KEY CAPABILITIES

This feature develops an alternative for the Force Manager cathode ray tube (FMCRT) and eliminates out-of-date equipment, specifically the TOPS IV and TOPS Multi-Purpose (MP) positions and DMODEMS.

Technical reference: 59006812

PRINCIPAL BENEFITS

This feature eliminates the necessity for service providers to maintain manufacturer-discontinued TOPS IV or MP positions solely for force management use.

OPERATOR SERVICES EQUAL ACCESS

This software group provides the features required to deliver TOPS services in the Equal Access environment, including FGB (Feature Group B) and FGD (Feature Group D) carrier code expansion.

OPERATOR SERVICES NETWORKING CAPABILITY — OSEA0013

Allows service providers to standardize their trunking, leading to greater efficiency and ease of maintenance.

New Operator Services Networking Capability

LET00013, LLT00013

KEY CAPABILITIES

This feature brings operator calls routed on incoming OSNC trunks into the TOPS environment. Operator calls (which include call originations, intercept, and inward calls) are identified by the called digits and the Modified/Basic Nature of Address. This feature also formulates an Address Complete Message (ACM) — that may include coin signaling and a connection hold request — for sending to the incoming connection. With this feature, the Local Service Provider Identifier is retrieved from the initial address message (IAM) for branding and automatic message accounting (AMA).

This feature also formulates IAMs to establish outgoing OSNC connections for call completion, inward, and transfer calls. To establish end-to-end signaling, this feature saves the information in the ACM, CPG, and ANM received on the outgoing connection to forward to the incoming connection when these connections are cut-through. This feature also formulates CPG to send incoming connections to establish end-to-end signaling when the connection is cut-through. This feature also formulates the FAC for coin signaling, and for forwarding FAC messages from one connection to the other when a call has been transferred to an interexchange carrier's Operations Support System (OSS).

And finally, this feature formulates RELs to release incoming and outgoing OSNC connections independently, for formulating CPGs when a call recalls to an operator, for formulating an REL to support RLT version 1 on Automated Directory Assistance Call Completion (ADACC) calls, and for generating AMA records.

Technical reference: 59012548, 59014261, 59014265, 59014276

PRINCIPAL BENEFITS

This feature handles coin signaling, operator hold, and operator recall in an ISUP network. Now service providers can standardize on more efficient ISUP trunks for more efficient provisioning.

MAJOR DEPENDENCIES

Software: OSEA0001 Operator Services Equal Access