Lucent Technologies
Bell Labs Innovations

NETWORK PLANNING LETTER

Switching Systems

4ESS™ SWITCH 4E26 GENERIC FEATURES FOR LOCAL EXCHANGE COMPANIES (LECs)

DESCRIPTION

This Network Planning Letter (NPL) and attachment describe the 4E26 Generic Release software features and hardware-related features for the Local Exchange Companies (LECs). The Core and UNIX® Real Time Reliable Operating System are required and have a right-to-use fee. An additional right-to-use fee applies to each Optional feature.

AVAILABLITY

The 4ESS Switch 4E26 Generic will be available (General Availability) beginning 1st calendar quarter 2001.

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4ESS™ SWITCH 4E26 GENERIC FEATURES FOR LOCAL EXCHANGE COMPANIES (LECs)

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1. CORE

1.1 Improved Message Header Reduction for API Capacity (564i)

This feature consists of two parts. The first part was provided in 4E25 and removes the header field reductions. The second part is the redesign of the API ISUP Header reduction capability.

The API acts as the message interface between the 1B Processor, the Common Network Interface (CNI) ring, and the 3B Attached Processor. The total API bandwidth with the 3B21D APS is 85k words per second. This feature reduces the size of the ISUP call related signaling messages that traverse between the 1B and the CNI ring. Signaling size reduction is accomplished by eliminating non-essential header information data from the ISUP messages.

Benefits

This feature improves the overall message throughput of the API. By reducing the size of the ISUP messages, the overall call handling of the API is increased by 20-25%.

1.2 Enhanced Scheduling & Executive Control (6989i)

In 4E25R3, this feature enhanced the task scheduling algorithms to take advantage of the faster 1B Processor by restructuring the software to allocate more resources (e.g., real time, call registers, other facilities) during peak Base Level Cycles (BLCs). As a result, 1B processor loads will be distributed more evenly, and additional real time per BLC will be available for call processing. In 4E25R3, measurements were added to the 4ESS Switch Measurement Report to monitor this feature. In 4E26R1, these measurements are being moved to the 4ESS Switch Machine Load Service Summary (MLSS) report.

Benefits

This feature is expected to result in a 6 to 10 percent greater call capacity in the 1B Processor. In 4E26R1 the measurements are available on the MLSS report.

1.3 Change to 1B Prefetch Destination (7255)

New software and hardware is introduced that enhances the use of two existing fetch ports to allow the 1B to effectively fill the instruction queue with the next program instructions to be executed.   The flow of code is interrupted when branching is chosen. The enhancement not only allows the next instruction in the direct program flow to be waiting for execution, but enhances the index port fetching algorithm to allow the branch destination instructions to be pre-fetched and waiting, should that branch be taken. The overlapping of destination fetch and IF:T (conditional transfer instruction) comparisons eliminate some wasted clock cycles in the 1B.

New hardware upgrades are required and must be purchased prior to March 31, 2002 to engage this feature.

Benefits

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This feature provides an improvement in availability of overall 1B Processor real time. The 1B Processor will fetch program text faster by taking advantage of the two fetch ports in the hardware, thus speeding up direct and indirect transfers. This could improve 1B real time usage by approximately 7-10%.

Hardware

Requires purchase order to upgrade two circuit packs KLW105 and KLW117. **Existing packs must be upgraded to KLW205 and KLW217 prior to March 31, 2002.**

1.4 Application Improvement Feature (7412)

This feature provides improvements in routines to reduce the amount of 1B Processor real time used. It provides two distinct improvements related to LEC switches that are considered "application improvements". The improvements include the following:

Revision to Windowed Call Store (WCS) Lookup routine - The routine used to convert addresses for use in WCS is very fault tolerant and includes many checks for the integrity of the inputs. The checking adds dramatically to the real time used by the routine. The checking done was designed primarily to prevent inappropriate writes to the call stores. Call processing and other software that is only reading the windowed memory does not need to spend the real time on the integrity checks. A simpler routine is developed that saves real time in the switch.

Build Hash Table for Call Gap Control – Manual Call Gap controls are used by Network Management to control congestion and whenever a new number is returned as a result of a query, another call gap check is made. Each call gap control check requires searching the table of code controls. If a hash table of codes in the control table can be checked, then the search of code table can be avoided when there is no control for the call being checked.

New hardware upgrades are required and must be purchased prior to March 31, 2002 to engage this feature.

Benefits

This feature improves 1B real time and buys back program store capacity.

1.5 Segmented Memory (7573)

This feature provides a new method to expand the memory capacity in the 1B Processor to provide relief for 4E26 and beyond. The existing use of 1 Mega-word Call Stores is at eight duplicated stores, with 3 Mega-word of which are WCS, in the largest equipped office. The 1B is designed to support up to twenty duplicated Call Stores. The Segmented Memory feature takes advantage of the fact that the 1B Processor has two distinct and independent buses available for access to memory. The CS bus is usually used for data storage and retrieval and the PS bus is usually used for program text fetching.

This feature provides the software necessary to do multiple mappings and manage the new segmented memory approach for Call Store (no SW is provided for Program Store, but the HW will be in place).

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This feature <u>does not include any application software changes</u> that would allow existing features or new features to take advantage of the new segmented memory. For existing features this would need to be done as separate features and for new features this would need to be identified at the time the requirements are written.

New hardware and circuit pack upgrades must be purchased by March 31, 2002 to engage this feature. Also, this feature requires the Extended Stores optional feature 3355 available in 4E21.

Benefits

Provides an access mechanism for additional Call Store and Program Store for new 4E features. Segmented Memory is a new 4ESS capability to expand 1B memory.

Hardware

Hardware required includes the upgrade of KLW117 to KLW217; KLW10 to KLW210 **and the purchase of new** KLW222 **packs** along with a new back plane cable and additional memory boards (KLW1 in duplex). The Segmented Memory feature will be available in 4E25R4. **Hardware orders need to be placed prior to March 31, 2002.**

2. UNIX REAL TIME RELIABLE OPERATING SYSTEM

2.1   4ESS 3B APS Software Upgrade
The 4ESS 3B21D must be upgraded to the 4AP19 to be compatible with 4E26 generic release.

3. OPTIONAL FEATURES

3.1 ETC (End-Office Toll Connect) Trunk Terminating Access Record Enhancement (575)

Terminating Access Records (SC625/CC119) were introduced at divestiture to allow recording of calls received over trunks from IXCs [OCC Types of Trunk (TOT)]. LNP requirements call for the IXC to perform the LNP query; therefore calls arriving over IXC trunks were expected to be pre-queried LNP calls [with the LRN in the CdPN, and the original Directory Number (DN) in the Generic Address Parameter (GAP)]. For pre-queried calls from IXCs, LNP requirements called for appending Bellcore AMA Format (BAF) Module 720 containing the LRN and placing the DN from the GAP into the Terminating NPA and Number fields of the CC119 record generated. AMA recording for calls from other local networks was addressed in the LNP requirements by introducing Connecting Network Access (CNA) Records (SC625/CC720), with recording requirements similar to those for Terminating Access Records, but performed for ETC TOTs.

Some LEC networks are currently generating Terminating Access Records (SC625/CC119) for calls received over trunks from CLEC offices (ETC TOT). This capability will extend the LNP recording requirements for pre-queried LNP calls to Terminating Access Records (SC625/CC119)

generated for ETC TOTs. This is done by appending BAF Module 720 containing the Location Routing Number (LRN) and placing the DN from the GAP in the terminating NPA and number fields.

This feature is available as an SCP to 4E25.

Benefits

This feature allows the needed Automatic Message Accounting (AMA) information to be captured without re-provisioning of trunk data (that is, without changing FENCLASS from ACCESSA to OEO).

3.2 4ESS Access Tandem Support for ISUP FACility Message (582)

This feature allows the 4ESS Access Tandem (AT) switch to function as an intermediate exchange in LEC networks implementing the Advanced Intelligent Network (AIN) Send to Outside Resource (STOR) capability, or other capabilities requiring ISUP Remote Operations Service Elements (ROSE). A FACility message received by the 4ESS Intermediate Switch will be passed through the switch unchanged by this feature. The ISUP FACility message provides an additional mechanism to transport RO parameters. Currently, the RO parameters are passed as unrecognized parameters by the 4ESS Switch in the IAM, REL, and other previously implemented ISUP messages.

This feature applies to ISUP-ISUP calls only and is available as an SCP to 4E25.

Benefits

This feature allows introduction of AIN or other services requiring ISUP RO transport in networks containing 4ESS tandem switches.

3.3   4ESS Switch LEC LNP Final Handling Code Enhancement (583)

Number Portability (NP) provides the network infrastructure to give subscribers the ability to physically move from one switch to another while retaining their original Directory Number (DN). This ability is known as 'porting'. Industry consensus has limited the initial implementation of NP to the porting of subscribers within existing rate center boundaries (typically a zone a few miles in radius surrounding the EO), while the implications and requirements for porting beyond the rate center boundaries are being defined by the industry.

LEC LNP Feature 450 is built on the AIN platform (Feature 375) and is based on the Illinois Generic Requirements for Number Portability. NP introduced a new AIN LNP trigger and the concept of a Location Routing Number (LRN). The LRN is a ten-digit number (NPA-NXX-XXXX) that uniquely identifies an end-office or rate center within the end-office, and is used as a virtual address for the switch serving ported subscribers. When a DN is defined as portable via provisioning of the LNP trigger, checks are made to determine whether a query should be launched to the SCP. When a query is launched, service logic in the SCP determines whether the DN has been ported and returns either a LRN (if the number is ported) or the original DN (if the number is not ported). Calls to non-ported numbers are routed using the DN as usual. Calls to ported numbers are routed using the LRN returned from the SCP. In the ported number scenario, the original DN is carried in the ISUP Ported Number GAP parameter, while the LRN is contained in the Called Party Number parameter.

This feature will provide an enhancement to the 4ESS Switch call irregularity output associated with LNP calls that are final handled. For final handled calls involving an ISUP IAM containing a ported-number GAP parameter, the GAP information will be provided in any call irregularity output report, and will be identified as the dialed digits. The LRN will also be provided, and will be identified as the LRN.

This feature is available as an SCP to 4E25.

Benefits

This feature identifies the original dialed number in addition to the LRN for ported calls that fail, allowing easier troubleshooting.

3.4 4ESS Dual Stream AMA 50/50 Record Split (584)

Under the existing Dual Stream billing capability, the AMA records are split between the two links (streams) based on service (call codes). Since a split by call codes would not always result in an even split of the AMA records over both streams, this feature provides a way to split the AMA records evenly over both streams. This feature splits the AMA records approximately evenly between the IC and OC streams to 3B21D disk on a 4ESS switch configured for Dual Stream Billing. This maximizes the AMA record throughput when data is polled from the disk over the two 56kpbs links.

Benefits

This feature increases overall AMA throughput.

3.5 4ESS AMA SCSI Disk Capacity Expansion (585)

AMA records generated by the 4ESS Switch are stored on SCSI disks. Each 4ESS Switch has three pairs of SCSI disks for AMA storage. One disk in each pair mirrors the other so there are in effect three SCSI disks for AMA storage. The 2GB SCSI disk is actually configured as a 600MB SCSI disk (which has only 571MB available for AMA record storage). Due to growth in the average AMA record length coupled with strong growth in the number of AMA records, additional record capacity is needed so that the disks can store six business days of records and not exceed seventy percent utilization. This feature expands the available record capacity from 571MB on each disk to 986MB on each disk, and is applicable only to 4ESS Switches with the 3B21D processor.

Benefits

This feature increases AMA storage capacity to allow increasing the number of AMA records generated without compromising AMA storage requirements.

3.6 SS7 Network ID Expansion (587)

SS7 Network ID (NID) is the first of three 8-bit fields comprising the 'routing label' portion of the SS7 Point Code (PC). The original 4ESS implementation of SS7 provided support for 16 non-local NID values. This was increased to 24 with the introduction of Network Interconnect in 4E14. NIDs are used for each network to which the switch routes. NIDs are assigned in descending order beginning at 254 (1111 1110) for large networks, and in ascending order beginning at 1 (0000 0001) for small networks. This translation table capacity needs to be expanded due to the expanding number of emerging carriers and to support interconnection required. This feature expands the number of non-local Network IDs supported by the 4ESS switch from the current 24 to 64.

Benefits

This feature allows the 4ESS switch to support the expanding number of carrier networks.