



American Telephone and
Telegraph Company
295 North Maple Avenue
Basking Ridge, N. J. 07920
Phone (201) 221-2000

type letter: Recommendation Letter

date: June 3, 1981

distribution lists: BSV-005, NSV-105, SRM-008

sl: RL 81-06-024

related letters: IL 80-04-094

other:

to: Vice Presidents - Network Services, Business Segment Heads, Company
Headquarters Bell Independent Relations People

from:

description: Recommends the use of the Integrated Routing Assignment System (IRAS) to
provide Network Routing Orders for intertandem switching systems.

* * *

System Letter IL 80-04-094 introduced the Integrated Routing Assignment System, a family of computer subsystems which will mechanize the routing process. The IRAS-Routing Data (IRAS-RD) subsystem will provide intertandem Network Routing Orders (NRO's) for Class 4 and above switching systems, produce the Network Routing Guide (NRG), and provide on-line inquiry capability. The NRG and inquiry will replace the current routing documents, i.e. the Traffic Routing Guide (TRG), the Long Lines Routing Plan (LLRP), and the Advanced Routing Guide Information System (ARGIS). The IRAS-4E Subsystem will produce and transmit Recent Change Data Messages (RCDM's) to the 4ESS buffer and provide full or partial route audit capabilities. This letter provides additional information on IRAS, covers the related costs, advises of the development status, and recommends IRAS for use in your Company. In order to establish the communications network for dedicated facilities and terminals, responses on your plans to participate are requested by July 15, 1981.

Mechanization of the routing discipline is a prerequisite for the implementation of Dynamic Non-hierarchical Routing (DNHR) in the mid-1980's. DNHR is a new technology that will improve network utilization by adapting routing to time of day and seasonal variations. The servicing requirements of DNHR will increase significantly the number of routing changes and the speed with which they must be implemented. Because of these considerations, the Total Network Operations Plan (TNOP) recommends IRAS for System use to support both conventional static routing and variable DNHR in the post 1985 time frame.

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement.

IRAS offers a number of advantages to the Bell System including 1) the enhanced integrity of NRO's will result in fewer blockages in the DDD network, 2) trunk group efficiency will be increased with the reduction of misrouted traffic and 3) projected savings in clerical support of \$2.5 million to \$4.2 million for the Bell System.

IRAS-RD is scheduled for availability in the first quarter of 1982. Shortly thereafter, the existing routing documents, the TRG, the LLRP, and ARGIS will be discontinued and replaced by NRG and on-line inquiry. The IRAS-4E subsystem will be available in the second quarter of 1982.

Attachment 1 of this letter expands on the IRAS features and those of the Common Network Routing Data Base (CNRDB) which provides the routing change inputs to the IRAS process. Attachment 2 discusses the cost allocation. Attachment 3 covers estimated savings. Questions regarding this information may be addressed to R. C. Berglin, 201-221-5214, or W. B. Plossl, 201-221-4759.

M. J. Blein

for Assistant Vice President
Network, Distribution Service and Engineering

Notes on Routing Mechanization

Common Network Routing Data Base

CNRDB is a repository of code and route information and is being developed to provide routing information that is common to more than one system. Expectations are that phase 1 will provide for IRAS, phase 2 for the Centralized Message Data System (CMDS) and phase 3 for various systems associated with Toll Network Planning. CNRDB in phase 1 will consist of the data required by toll switching systems (class 4 and above) to route intertandem traffic through the DDD Network. Routing data necessary for CNRDB will be sent by the Bell Operating Telephone Companies to the Traffic Routing Engineer (TRE) in Kansas City using procedures similiar to those already in effect for the exchange of routing information. The TRE organization will process the data and update CNRDB.

To increase the effectiveness of CNRDB/IRAS, the LLRP will be expanded to include the Bell and Independent Operating Company intertandem trunk groups and routes that adhere to the Bell System standards for load aggregation. Trunk groups included become part of the Toll Network Routing Plan (TNRP) and will be published in the NRG.

Integrated Routing Assignment System

IRAS will support several types of users; full participants, partial, and incidental users. Full participants will experience the greater savings as they will receive NRO's, the NRG, and have total on-line access. Partial users will receive the NRG which will be augmented by dial-up inquiry, while the dial-up inquiry only will probably suffice for incidental users.

1) Partial participation in IRAS provides:

Network Routing Guide - IRAS-RD will produce a monthly microfiche NRG containing the switching system-destination code grouping currently in the TRG, the full trunk group routing for both Long Lines and the participating Operating Companies (TNRP) and miscellaneous information required for the maintenance of the DDD network. In essence, nearly all the information now reflected in the TRG and the LLRP will be in the NRG, and in the case of TNRP as mentioned above, more than is currently provided. However, it will not reflect tributary names nor 800 Service contacts. Special routing instructions or graphics, when required, will be provided through other means.

The microfiche NRG will be available to all users currently receiving the TRG and LLRP.

On-line Inquiry -

To support the microfiche NRG, IRAS will allow users to access information in the major NRG sections. This type of on-line inquiry will recognize a variety of terminals, including Silent 700, Vucom 2 and Dataspeed 40.

2) Full Participation in IRAS provides:

Network Routing Orders -

IRAS will enter CNRDB nightly and note code and route changes for the served offices. NRO's for switchers involved in a change will be sent to a dedicated terminal at the routing administrator's location. Changes for the 4ESS switchers will be further processed in IRAS-4E (See IRAS-4E features). When all of the trunk group information for the participating offices has been entered in CNRDB, NRO's will be generated for both Operating Company and Long Lines traffic. Page 4 of this attachment is a sample NRO.

Management Reports -

Each NRO created by IRAS will be assigned a unique order number by which the NRO may be tracked and completions reported. Completions not reported within a specified time frame will appear on the "Missed Date Report", which is transmitted to the routing group's terminal. This report can be used to determine changes that may be overdue.

On-line Inquiry -

A list of pending orders may be obtained for each Switching System within the routing group's area of responsibility. NRO's which have been issued, but not completed, can be requested by trunk group, three digit code, six digit code, or order number.

3) The IRAS-4E subsystem furnishes these additional benefits:

Recent changes -

NRO's generated by IRAS-RD and required by client 4E's will be formatted into Recent Change Data Messages (RCDM's) and transmitted to the 4ESS recent change buffer. Copies of pending NRO's are sent to the terminal at the routing administrator's location and to the Machine Administration Center (MAC). The MAC will verify the RCDM's and transfer the changes from the buffer state to the test state.

Route Audit -

Routing administrators for 4ESS switchers may request a full or partial route audit which will compare routing data in CNRDB and the routing data block translations in the 4ESS.

Discrepancies will be transmitted to the routing administrator's terminal where they should be checked manually to insure CNRDB integrity and to determine any valid local routing variances. These should be reported to the IRAS system administrator in order to remove them from the error listings. RCDM's to correct any true routing errors will be generated to the affected 4ESS.

ODA Package -

Shortly after initialization of the IRAS-4E subsystem, it will be possible to create a magnetic tape containing the routing data input for the Office Data Assembly (ODA) information for 4ESS offices.

IRAS Cost Allocation

A previous system letter (IL-80-04-094) discussed the distribution of IRAS development costs. At that time, however, no dollar amounts were available. This attachment covers the various categories of costs and their application to each user.

NRG and Inquiry

There will be no separate billing to the Operating Companies for the NRG and NRG on-line inquiry features. Cost for both will be absorbed in the Division of Revenue as distribution of routing information has been delegated to the Long Lines Department and is their responsibility. Terminal and toll charges for dial-up inquiry will be the responsibility of the Operating Companies. These will be the only visible charges incurred by other than full participants.

Full Participants

Full participants in IRAS-RD and IRAS-4E will pay two types of cost: one-time developmental and annual recurring.

Dollar amounts shown in this attachment are based on the average number of trunk groups terminated on each equipment type. Additionally, estimates were based on responses to earlier questionnaires regarding potential Operating Company participation in the full IRAS.

<u>Cost Per</u>	<u>One-Time Developmental</u>	<u>Annual Recurring</u>
Operating Company	\$ 1136	\$ 393
4ESS (IRAS-4E)	15968	7595
4ESS (IRAS-RD)	13430	6122
4AETS	2635	1201
XBT	1360	620
5XB	340	155
1ESS	1190	542
1AESS	935	426
SPI	510	232
Digital	255	116
EAX	595	271
NB	765	349
XY-15	255	116
NTS	255	116
NX1	255	116

Savings

The savings provided by the Mechanization of the routing process is in two basic forms:

1) Overall system related -

A 1977 Long Lines study on misrouted traffic determined savings of \$600 thousand with the implementation of IRAS-4E. This would result from improved routing accuracy, reducing the amount of equipment and trunks required to handle the "Mis-routes".

2) Clerical productivity in the Companies -

A more tangible savings for the OTC's is realized through the elimination of manual analysis of all routing changes to determine the switching systems affected. Since IRAS will develop a routing profile of its served switching systems and create NRO's, it is estimated that routing clerks will be able to handle up to four times the number of toll offices for which they currently provide changes.

OTC's that choose to centralize the routing functions will gain additional benefits by becoming full IRAS participants. The following theoretical OTC is an example of the monetary benefits to be gained through mechanization and centralization. This is an example only; each OTC would have to calculate savings based on the numbers and types of switching systems in their area and its geographical layout. The 1 ESS was used as a model for simplicity, generally the systems would be a mixture of 1 ESS, 1A ESS, etc.

The theoretical OTC used as a study basis has these characteristics:

I EXISTING ORGANIZATION

Four states, five NPA's, thirty-two toll switches.

State A: 2 NPA's 9 toll systems
2 supervisors 5 clerks

Supervisor #1 handles NPA 000.
The switching systems and clerical assignments are as follows:

- 1-4ESS - 1 routing clerk
- 1-XBT - 1 routing clerk
(this clerk would also prepare reports and perform miscellaneous tasks)
- 3-Hi/lo 1 ESS - 1 routing clerk.

Supervisor #2 handles NPA 999.
The switching systems and clerical assignments are as follows:

- 1-4A ETS - 1 routing clerk (this clerk would also prepare reports and perform miscellaneous tasks)
- 1-5XB and 2-Hi-lo 1 ESS - 1 routing clerk.

State C: 1 NPA 5 toll systems
1 supervisor 2 clerks

The switching systems and clerical assignments are as follows:

- 1-4A ETS, 2-1 ESS - 1 routing clerk
- 1-XBT, 1-5XB - 1 routing clerk (this clerk would also prepare reports and perform miscellaneous tasks)

State B: 1 NPA 9 toll systems
1 supervisor 3 clerks

The switching systems and clerical assignments are as follows:

- 1-4 ESS - 1 routing clerk.
- 1-4A ETS and 1-XBT - 1 routing clerk (this clerk would also prepare reports and perform miscellaneous tasks)
- 2-Hi/lo 1 ESS and 3-5XB's - 1 routing clerk.

State D: 1 NPA 9 toll systems
1 supervisor 3 clerks

The switching systems and clerical assignments are as follows:

- 2-4A ETS - 1 routing clerk
- 2-XBT's - 1 routing clerk (this clerk would also prepare reports and perform miscellaneous tasks)
- 2-5XB's - 3-1 ES - 1 routing clerk.

II PROPOSED ORGANIZATION WITH IRAS SUPPORT

Western territory: States A & C
14 toll systems

3 NPA's 1 supervisor 3 clerks

1-4E - 2-4A ETS - 1 routing clerk
2-XBT's - 3 5XB's - 5-1 ES - 1
routing clerk
prepare reports & perform
miscellaneous tasks- 1 reports
clerk.

Eastern territory: States B &
D 18 toll systems

2 NPA's 1 supervisor 4
clerks

1-4E - 3-4A ETS - 1
routing clerk
2-XBT's - 3-1 ESS - 1 routing
clerk
5-5XB's - 1-1 ESS - 1 routing
clerk
prepare reports and perform
miscellaneous tasks - 1
reports clerk.

III COST COMPARISON

A Definitions

AR = Annual recurring
EC = Expenses, clerical
NC = Number of clerks
WC = Clerical wages (weekly) \$360 for Routing Clerk, \$335 for
Reports Clerk
F1 = Loading factor, Social Security & Pension
Es = Expenses, supervisory \$25,000 yearly
Ns = Number of supervisors
Ws = Wages supervisory
Ei = Expenses, IRAS
SWT = Toll Systems
Co = One time cost per company

B Expense for existing Arrangement

Yearly expenses for the theoretical OTC to provide routing are developed
using this formulae:

EC = NC X WC X F1 X 52.2
EC = 13 X \$360 X 1.3 X 52.2
Es = \$317,585

Es = Ns X Ns X F.1
Es = 5 x \$25,000 x 1.3
Es = \$162,500

Adding the EC to the Es, the yearly salary expense to provide routing
is approximately \$480.1 thousand.

C Expense for proposed organization with IRAS support

$$\begin{aligned} \text{Routing Clerks } E_C &= N_C \times W_C \times F_1 \times 52.2 \\ E_C &= 5 \times \$360 \times 1.3 \times 52.2 \\ E_C &= \$122,148 \end{aligned}$$

$$\begin{aligned} \text{Reports Clerks } E_C &= 2 \times \$335 \times 1.3 \times 52.2 \\ E_C &= \$45,466 \end{aligned}$$

$$\begin{aligned} \text{Total } E_C &= \$122,148 + \$45,466 \\ E_C &= \$167,614 \end{aligned}$$

$$\begin{aligned} \text{Supervisors } E_S &= N_S \times W_S \times F_1 \\ E_S &= 2 \times \$25,000 \times 1.3 \\ E_S &= \$65,000 \end{aligned}$$

$$\begin{aligned} \text{Company } E_I &= 1136 + 393 \\ &= 1529 \end{aligned}$$

$$\begin{aligned} 4 \text{ E's } E_I &= 2(15,968) + 2(7,595) \\ E_I &= \$47,126 \end{aligned}$$

$$\begin{aligned} 4 \text{ A's } E_I &= 4(2635) + 4(1201) \\ E_I &= \$15,344 \end{aligned}$$

$$\begin{aligned} \text{XBT } E_I &= 5(1360) + 5(620) \\ E_I &= \$9,900 \end{aligned}$$

$$\begin{aligned} 1 \text{ ES } E_I &= 13(1,190) + 13(542) \\ E_I &= \$22,516 \end{aligned}$$

$$\begin{aligned} 5 \text{ XB } E_I &= 7(340) + 7(155) \\ E_I &= \$3,465 \end{aligned}$$

$$\text{Total (in thousands) } E_I = E_I \text{ 4E} + E_I \text{ 4A} + E_I \text{ XBT} + E_I \text{ 1ES} + E_I \text{ 5XB} + C_0$$

$$\begin{aligned} E_I &= \$47.1 + \$15.3 + \$9.9 + \$22.5 + \$3.5 \\ &\quad + \$1.5 \end{aligned}$$

$$E_I = \$99.8$$

D. Expense for proposed organization with IRAS support (full participation)

1) First year = $E_C + E_S + E_I$ (in thousands)
 = \$167 + \$65 + \$99.8
 = \$331.8

2) Subsequent years

	E_C	=	\$167,614	
	E_S	=	65,000	
4 E	E_I	=	2(7,595)	= \$15,190
4A	E_I	=	4(1,201)	= 4,804
XBT	E_I	=	5(620)	= 3,100
1 ES	E_I	=	13(542)	= 7,046
5XB	E_I	=	7(155)	= 1,085

Yearly expense total = $E_C + E_S + E_I$ (in thousands)
 = \$167.6 + \$65.0 + \$31.2
 = \$263.8

First year estimated savings is only 31% due to the inclusion of the developmental costs while subsequent years reflect greater savings of 45%. This is an example and does not mean to suggest work loads for the clerical force. Each toll switching area has its own characteristics and force loads should be determined based on those characteristics.