POINT-TO-POINT DATA

OVERVIEW

NETWORK SWITCHING ENGINEERING—TRUNKING DATA

NETWORK SERVICES METHODS

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1. GENERAL

1.01 This section provides an overview of point-to-point traffic data. The application of this data in trunk forecasting and servicing and the types and sources of point-to-point data are discussed. Other Bell System Practices in the 780-401-3ZZ series discuss in greater detail the available point-to-point data collection systems, the quality of point-to-point data, and the administration of point-to-point data.

1.02 This section is being reissued to provide illustrations of point-to-point data and to add information on the future local point-to-point data acquisition system. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

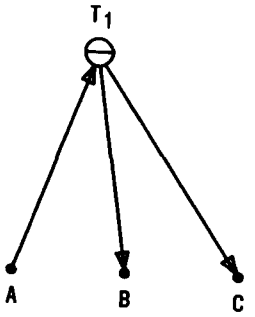
1.03 References in this section to methods, planning, data requirements, service levels, and equipment quantities are based on American Telephone and Telegraph Company recommendations.

1.04 For the standard meaning of terms and definitions used in this section, see Section 780-400-305, "Glossary of Trunk Facilities Terms and Definitions."

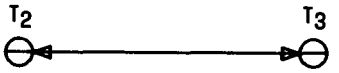
DEFINITION OF TERMS

1.05 Point-to-point data are measurements of the volume of traffic from one defined geographic area to another. Point-to-point data are normally expressed in terms of traffic items, where a traffic item is the one-way traffic for a particular class (or classes) of service from an originating NXX, trunking entity, or toll center to a terminating NXX, trunking entity, or toll center. Point-to-point data systems consist of the hardware and software necessary for recording, accumulating, processing, and summarizing these data.

1.06 In the trunking configuration shown below, the load offered to A → T_1 that is destined to complete to B is a traffic item. The measurement of the A to B traffic is called point-to-point data.



1.07 A trunk group $T_2 \rightleftarrows T_3$, illustrated below, carries regular dial 1 + traffic, 800 Service traffic, and wide area telephone service (WATS) traffic from T_2 to T_3 and from T_3 to T_2. The WATS traffic from T_2 to T_3 is a traffic item. The measurement of this WATS traffic is called traffic item data.



2. REQUIREMENTS FOR POINT-TO-POINT DATA

2.01 Point-to-point data are required whenever it is necessary to derive loads for individual traffic items that share a trunk group with other traffic items. Point-to-point data are required to forecast new trunk groups and to engineer reroutes in the metropolitan and intertandem network.

2.02 Trunk group measurements include the measurements of all traffic items sharing the group. Therefore individual traffic item loads, when a trunk group carries several traffic items, cannot be determined from this source. The condition of multiple traffic items on one trunk group generally includes all traffic items switched at a tandem. However, end office to end office trunk groups may carry multiple traffic items, eg, coin and noncoin, measured rate and flat rate, etc.

2.03 In trunk forecasting, point-to-point data are necessary for each traffic item that may be routed in any of the forecast periods differently from the base or measurement period. These routing changes are commonly the result of the rehoming or replacing of end offices or tandems which require the establishment of new trunk groups and the resizing of existing trunk groups. Point-to-point data are also needed for traffic items that require different projection treatment. For all such items, the point-to-point loads must be determined when forecasting the trunk groups involved.

2.04 In trunk servicing, point-to-point data are useful when the assumptions underlying the forecast have not been realized. Point-to-point data can also be useful for planning the alleviation of network overloads caused by unpredicted shorter term fluctuations.

3. TYPES OF POINT-TO-POINT DATA SYSTEMS

3.01 A limited number of point-to-point data systems have evolved from the differing needs of engineering metropolitan networks and the North American Network. The particular universe of point-to-point data, required for a given network in any forecast period, is theoretically all of the traffic items that may require individual treatment in the forecasting process. The impracticality of advance identification of such a universe in detail, the forces that prevent complete realization of an engineering plan, and the economics of point-to-point data collection systems have all influenced the design of these systems. These reasons have also limited the number of sources of point-to-point data. As a result, the design of a particular system dictates the universe of point-to-point data encompassed in a particular study. Hence, point-to-point data systems may provide data for toll traffic, or traffic in a metropolitan network, or a limited predetermined set of traffic items.

3.02 Point-to-point data systems measure the one-way traffic volumes from an NXX, trunking entity, toll center or numbering plan area (NPA) to an NXX, trunking entity, toll center or NPA. Thus, a system may collect and/or summarize point-to-point data for individual traffic items, or selected groupings of traffic items. Data may be collected for various hours and study periods but are normally scheduled coincident with related trunk group measurements in busy hour, busy season, study periods. The coordinated scheduling of point-to-point and trunk group data supports the proper tracking of data from these two sources.

3.03 Data collected by different systems may not be expressed in identical terms due to the design of the particular system. The basic difference in point-to-point data systems is that some count events only, such as attempts or messages, while others

count events and record the associated occupancy time, such as length of conversation. Table A provides a comparison of point-to-point data systems, the traffic items measured, and details of the measurements.

THE CENTRALIZED MESSAGE DATA SYSTEM

3.04 The most widely used and readily available system for obtaining toll point-to-point data is the Centralized Message Data System (CMDS). The operating telephone companies provide input to the CMDS process from automatic message accounting frame (AMA) tapes of customer-dialed traffic as well as records of operator-handled and operator-serviced traffic. These combined sources provide the base for toll traffic data. The CMDS provides a system standard operation for exchange of data on all intercompany billed toll traffic. In addition, CMDS provides a data base from a 5 percent sample of all toll traffic.

3.05 An application of CMDS pertinent to the network engineer, ie, the trunk forecaster and trunk servicer, is CMDS-Trunk Engineering (CMDS-TE). Since toll billing procedures that support CMDS require basic calling, called and billable conversation time detail, the data base provides a convenient source of toll point-to-point data for CMDS-TE.

3.06 The CMDS-TE data base is used for producing basic data tapes, during identified study periods, which are available to the operating telephone

TABLE A

COMPARISON OF POINT-TO-POINT DATA COLLECTION SYSTEMS

POINT-TO-POINT DATA COLLECTION SYSTEM	COLLECTION LOCATION	DATA SOURCE	UNIVERSE MEASURED	SAMPLE SIZE	DATA DETAIL
CMDS—TE	End Office (or centralized location for recording billing data)	Billing data	Toll messages	Five percent of toll messages processed each day in each Revenue Accounting Office	Messages and conversation CCS per traffic item
Preroute Peg Count	End Office (1XB, 5XB, ESS)	Marker or Common Central Control in End Office	All attempts to preassigned destination code(s)	One hundred percent of traffic for assigned code(s)	Number of attempts per traffic item
End Office AMA Tapes	End Office and centralized location for reading billing data	AMA tape of billing data	Toll, multi-message, and billed local	One hundred percent of predetermined code(s)	Messages and conversation minutes/ seconds
Local Point-To-Point Data Acquisition System (Future)	End Office and centralized location for recording billing data	AMA tapes of billing data	Toll, multi-message, and local	Five to twenty percent of messages on specified trunk groups	Messages and conversation CCS

companies. Applying the CMDS-TE basic data tape processing program, user study requests are processed. These tailor-made studies of toll point-to-point data provide a source of estimated traffic item loads expressed in messages and conversation hundred call seconds (CCS).

3.07 Section 780-403-345 describes the CMDS-TE data base and data summaries. Section 780-403-350 explains the input required to develop CMDS-TE studies that can be used for trunk engineering. The trunk engineering applications for this data are described in Section 780-401-320.

POINT-TO-POINT DATA COLLECTION SYSTEMS FOR LOCAL TRAFFIC

3.08 Trunk groups that carry predominantly local traffic comprise about 65 percent of the total groups in the Bell System. Because these trunk groups are established at lower minimum trunk group size than trunk groups that carry predominantly toll traffic, trunk requirements are placed in the trunk forecast on the basis of smaller loads indicated by point-to-point data measurements. The trunk forecast for trunk groups carrying local traffic, because of these small traffic items, is more sensitive to measurement error and can lead to the establishment of new trunk groups that are too early or too late. It is therefore important to obtain local point-to-point data as it is available.

PREROUTE PEG COUNT

3.09 A limited source of local point-to-point data is preroute peg count for use in No. 5 Crossbar, No. 1 Crossbar, and electronic switching system (ESS) end offices. Preroute peg count provides a total of all attempts made to an NXX or group of NXXs first routed to a tandem.

3.10 Registers used for preroute peg count are general purpose registers. Quantities of available peg count registers are determined by the type of end office equipment and are often used for other purposes in the end office, limiting the amounts available for preroute peg count.

3.11 Even though it is limited, preroute peg count provides a valuable tool for determining volumes of traffic for specific traffic items and helping to identify potential trunk groups. Preroute peg count is discussed in greater detail in Section 780-401-330.

3.12 Step-by-step end offices are not equipped with preroute peg count registers. In these offices there are no feasible means of breaking down tandem trunk group loads into point-to-point traffic items.

END OFFICE AMA TAPES

3.13 End office AMA tapes are used on a limited basis for providing detailed billing information including messages and conversation time on billed calls, eg, multimessage unit and measured rate local.

3.14 Local flat rate message details are not included on end office AMA tapes. This omission limits their field of use for providing local point-to-point data.

LOCAL POINT-TO-POINT DATA ACQUISITION SYSTEM (A FUTURE SYSTEM)

3.15 The local point-to-point data acquisition system will be available about 1985 with Generic 9 of 1A ESS. That is, it will provide data tapes of detailed information on local messages including conversation time, the originating and terminating information, connect time, etc. Data will be based on up to a 20 percent sampling of local messages on user selected tandem access trunk groups.

3.16 Local point-to-point data will be produced by the operating telephone company for No. 1A ESS offices equipped with Generic Issue 9, No. 5 ESS Generic Issue 8, and No. 5 crossbar call data transmitter (CDT) via the Automatic Message Accounting Recording Center (AMARC). The data will be processed in each company's processing center. User selected studies of NXXs or groups of NXXs, completing to 7- or 10-digit dialed points, will be processed.

3.17 Planning objectives for the local point-to-point data acquisition system include:

(a) Providing a mechanism for obtaining measurements of point-to-point loads which are not routinely available from other sources, eg, CMDS-TE

(b) Providing user selected sampling rates that are consistent with statistical accuracy requirements

(c) Minimizing the volume of data that must be collected to satisfy these requirements

(d) Allocating various processing functions in the most economical manner between switching systems, support systems, and large scale computer systems

(e) Avoiding building a new data collection system specifically for this purpose.

3.18 The local point-to-point data acquisition system, adhering to the planning objectives, will function congruously with the regular AMA billing stream. A 20 percent sample of the total messages sent over preidentified trunk groups, and recorded on the AMA tape, will be "flagged" for study. At the billing center, as the local message records are processed, data associated with the flagged messages will be extracted from the billing stream and sent to an accumulation module. The study calls will be processed, similarly to CMDS-TE, in the accumulation module and reformatted by originating trunking entity, terminating trunking entity, connect time, length of conversation, etc, and recorded on a basic data tape.

3.19 The data summaries of local traffic will be useful for planning new trunk groups, rehomes, area throws, etc. Figure 1 provides a flow of data chart representative of the local point-to-point data acquisition system.

4. QUALITY OF POINT-TO-POINT DATA

4.01 Point-to-point data are one of the basic inputs to the trunk forecasting process and, accordingly, impact the accuracy of the output from that process. Point-to-point data vary in the accuracy with which data represent the traffic profiles of a base measurement period, being dependent on the type and volume of data collected and the size of the traffic items measured. Impact on forecast accuracy varies with the degree to which the forecast is based upon point-to-point data and with the percent of rerouting of the network between base and forecast periods. Since the effect of point-to-point data accuracy on forecast accuracy is not known, the objective is to obtain point-to-point data that are coincident in time with associated trunk group data and that produce traffic item loads that are reasonably consistent over a period of time.

4.02 The quality of point-to-point data is affected by several major influences, including:

(a) ***Sampling:*** Sampling error is statistically dependent on the size of the sample. As the sample size increases, sampling error decreases.

(b) ***Conversion:*** Conversion error is the error resulting from converting source loads into offered CCS loads.

(c) ***Study Period Selection:*** Error from this source is the result of selection of study periods that are not representative of the significant periods for the traffic item and/or are not coincident with conjunctionally used trunk group data.

(d) ***Processing:*** Processing error is the result of the rounding up or down of conversation time at each operating telephone company. Processing error is usually negligible in that rounding up compensates for rounding down and vice versa.

4.03 More detailed information about the quality of point-to-point data can be found in Section 780-401-130.

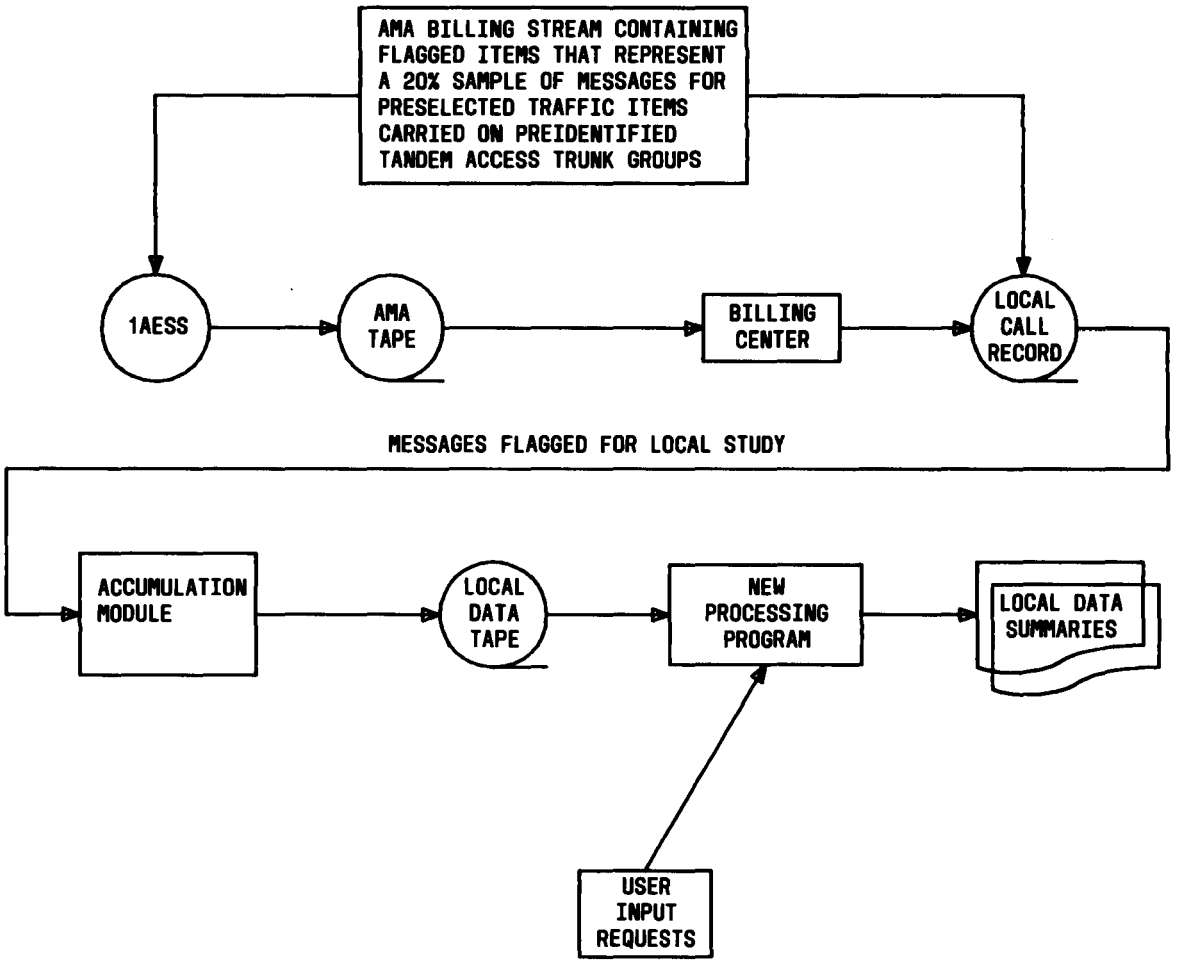


Fig. 1—Flow of Data Through the Local Point-to-Point Data Acquisition System