

TRUNK GROUP DATA
OVERVIEW OF THE SMALL OFFICE NETWORK DATA SYSTEM
NETWORK SWITCHING ENGINEERING-TRUNKING DATA
NETWORK SERVICES METHODS

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1. GENERAL

1.01 This section provides a general overview of the Small Office Network Data System (SONDS) used in small noncommon control step-by-step (SXS) offices for the collection of end office data, including trunk group data. The output of SONDS, as it relates to trunk group data collection systems, is discussed as well as the engineering techniques applied by SONDS to produce the output.

1.02 Whenever this section is reissued, the reason(s) for reissue will be stated in this paragraph.

1.03 References in this section to methods, planning, data requirements, service levels, and equipment requirements are based on American

Telephone and Telegraph Company recommendations.

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

1.05 A fully mechanized system, SONDS provides data collection, analysis, report generation, and distribution for noncommon control SXS offices of up to 5,000 main stations. It is a standard operations support system that uses Extreme Value Engineering (EVE) data techniques in the analyzing and processing of traffic data.

1.06 While SONDS is a total office monitor-measure system, this section deals primarily with SONDS as it provides trunk group data to the trunk forecaster and servicer.

1.07 Bell System Practices providing additional details concerning SONDS installation, equipment, hardware, software, or procedures are found in the 190-514-ZZZ, 226-0YY-ZZZ, and 252-188-ZZZ series.

2. THE SONDS EQUIPMENT

2.01 Providing data required for network surveillance and Division of Revenue purposes, SONDS requires minimal equipment. The SONDS equipped end office uses a small data collection device, such as Western Electric's Pollable Data Terminal-2A, Telesciences TE-450, Alston 565, or Alston 566. User terminals, located in network administration offices, are required for user interface purposes and to receive SONDS reports.

2.02 The AT&T Information Systems Computer Center, a time-shared computer system lo-

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cated in Piscataway, NJ, is the host computer for SONDS. Each operating telephone company (OTC), which uses SONDS, pays a monthly fee to AT&T for data collection, analysis, automatic and demand report generation, and user interface activity.

2.03 Each night, during the traditionally light traffic of the early morning hours, the AT&T Information Systems Computer polls each SONDS office for data collected on each piece of equipment, such as trunk groups, line finders, connectors, selectors. Dial tone delay results are also collected.

2.04 The computer processes and analyzes the data, assembles it into the various reports, and later that morning returns due reports and exception reports, if any, to the proper user terminal. The computer stores the data required later for weekly and monthly reports.

3. FEATURES OF SONDS

3.01 Several features have been built into SONDS for the provision of data analysis, processing, and report generation. Some of the more important features are detailed in the following paragraphs and include:

- Trunking Data
- User Selected Days of Week
- Extreme Value Engineering Analysis
- Service Measurements
- Scheduled Reports Generation
- Demand Reports Generation
- Peak Hour Data Collection
- Accumulative Data Collection
- Interactive User Interface
- Division of Revenue Data

3.02 *Trunking data* measurements available from SONDS are useful data to the trunk forecaster and servicer. While SONDS is basically an end office equipment report system, the SONDS data collection device in the small SXS offices can collect

traffic usage on incoming, outgoing and 2-way trunk groups. Since many inter-end office and tandem connecting trunk groups are connected to a larger switching system at the distant end, trunk measurements should normally be measured there. Such distant end measurements can be passed to the Engineering and Administrative Data Acquisition System (EADAS) and/or the Traffic Data Administration System (TDAS) and sent downstream to the Trunk Servicing System (TSS). An exception is inter-end office trunking between small end offices where terminating measurement equipment is normally not provided.

3.03 The *user selected days of week* feature provides the capability to the user to select which five of the seven days of data are to be reported. However, average business day (ABD) data are normally Monday through Friday data and should not include Saturday and/or Sunday data.

3.04 *Extreme value engineering analysis* provides an engineering technique applied to data readings for the single busiest hour of the day. Extreme value engineering techniques applied to peak data, as opposed to other engineering techniques applied to time consistent busy hour data, are generally more applicable to small offices. This is due to the fact that patterns of demand in small offices are usually less predictable than in larger offices. Extreme value engineering techniques incorporate statistical manipulations that would not be applicable to the time consistent busy hour data collections typified by larger end offices. Unusual peak data derived from uncommon events such as a severe storm, a presidential visit, etc, are recorded by SONDS. Outlier tests, based on the extreme value distribution of the peak data, estimate the probability of a data point being too high or too low to be an acceptable member of the given set of data. The application of the outlier tests gives SONDS a continual data verification feature which identifies potentially incorrect data values. Rejected data values are reported on the exception report. This feature identifies changes in office trends due to growth and/or seasonal variations.

3.05 *Service measurements* of different types are available within SONDS. These types of measurements include Automatic Number Identification (ANI) attempts, the several types of ANI failures, and all line finders busy usage (AFBU) for dial tone delay (DTD). Dial tone speed and ANI measure-

ments from SONDS are specifically designed to meet the requirements for the Network Switching Performance Measurement Plan (NSPMP).

3.06 The *scheduled reports generation* feature provides for daily, weekly, and monthly reports generated by SONDS. The most comprehensive of these, the Monthly Report, contains basic traffic data and is timed so the network administrator can use the information in filing routine Bell System reports.

3.07 The *demand reports generation* feature of SONDS allows the user to call the computer and request a specific report. When a request for a demand report is received, SONDS analyzes the data thus far accumulated and transmits the report to the user's terminal.

DATA COLLECTION FEATURES

3.08 For each measurement in SONDS there are three registers each of which is associated with a data collection device. The registers are, namely; active hour, previous hour, and long term register. For each measurement, the active hour register records the current hour activity. At the end of the hour, the value is transferred to the previous hour register. For the long term register, a choice for each measurement must be made between peak or 24 hour accumulative data.

(a) *Peak hour data collection* combines the benefit of hourly monitoring with once a day collection. This combination provides a measurement of traffic loads in small offices that reduces the cost and quantity of data. Each hour the peak register values are compared to stored values which represent the highest reading so far during that 24 hour period. The larger of the compared values is retained as the stored number. The 24 hour peak value is collected when the daily SONDS computer poll is made.

(b) *Accumulative data collection* is used for instances where accumulative totals are desired, such as originating peg count. For the accumulative register, each hourly value is added to the stored value which represents an accumulative total for all previous hours in the 24 hour period. The 24 hour accumulative total for each measurement associated with an accumulative register will be collected and the register will reset when the daily SONDS computer poll is taken.

3.09 With the *interactive user interface* built into SONDS, the computer leads the user through a communication, querying the user for required information. User interface programs have been written especially for easy use by administrative personnel when asking for a demand report based on current data, copies of back reports, or when updating the data base.

3.10 *Division of Revenue* data are available from SONDS. Originating peg count is a Division of Revenue requirement and should be assigned to an accumulative register. The total first selector originating peg count is collected and stored each day. The measurement is reported on the SONDS Hourly and Weekly Data Reports and is summarized on the monthly SONDS Originating Peg Count Report. This peg count report is vital in the determination of each company's share in the monthly interstate Division of Revenue settlement. Reports of originating call volumes are required by the Federal Communications Commission and many state regulatory commissions.

4. SONDS OUTPUT REPORTS

4.01 Output reports, generated by SONDS, are transmitted to the user's terminal over the regular message network. Output reports are generated on demand daily, weekly, and monthly.

4.02 *Office Information Reports* are generated on demand. These reports produce a complete set of user input information about a specific office.

4.03 *Hourly Data Reports* are optional. The user interface feature permits the user to requisition this report which will be produced before the next business day. Or, if a day-to-hour Hourly Data Report is desired, the user may requisition it. This report provides originating and terminating time consistent usage broken down by hours for all trunk groups, line finers, and connectors. The report also provides originating peg count.

4.04 *Exception Reports* are generated daily by SONDS after the early morning polling. The purpose of exception reports is to alert the user that either (1) no meaningful data has been collected, or (2) the data fails the outlier test. See paragraph 2.11.

4.05 *Total Office Originating Peg Count Reports* from SONDS are received monthly.

This measurement is required for Division of Revenue purposes and is accomplished using an accumulative register to collect peg count events for all first selectors.

4.06 Always Busy Reports are generated weekly by SONDS. Each morning, during the early morning poll to read the peak and accumulative long term registers, the AT&T computer also reads the previous hour registers. Components which have been busy for the complete hour of this off-hour measurement period will each contribute 36 CCS. The off-hour usage measurements for each component are stored by SONDS and formatted into the weekly Always Busy Report.

4.07 The SONDS Monthly Report is divided into two sections, originating results and terminating results. These reports present traffic usage measurements of trunk groups, line finders, connectors and selectors. Among all of the SONDS reports, the Monthly Report is the one that is of greater use to the trunk forecaster and servicer.

4.08 The SONDS Monthly Report is automatically generated by the system on the 23rd day of each month. It is programmed for this date to coincide with the due date of other traffic service results and reports.

4.09 The SONDS Monthly Report is also available on demand. However an on-demand report contains data on a month-to-date basis only. If an on-demand request for the report is made during the month, the system still automatically generates the SONDS Monthly Report on the 23rd day of that month.

4.10 Pertinent load data on every office component is contained on the SONDS Monthly Report. This section details only those areas of the report that are pertinent to the trunk forecaster and servicer. Figure 1 provides a sample of the SONDS Monthly Report, Originating Results.

4.11 Originating 1-way and 2-way trunk group data are reported on the originating results portion of the SONDS Monthly Report. Data pertaining to terminating trunk groups are printed on the terminating results portion of the SONDS Monthly Report. Pertinent data to the trunk forecaster and/or trunk servicer include the following:

- **Trunk Group Name**—This is the name of the trunk group as entered by the user.

- **No. of Trks**—This is the number of trunks in-service in each trunk group, as entered by the user.
- **No. of Trks Req'd**—The trunk capacity table, compiled using extreme value engineering techniques, and stored in the SONDS computer, is used with the entry in the **Month Peak Load CCS** column to determine the number of trunks currently required. The value shown in the report is an integer, rounded up for any fractional trunk of 0.3 or greater.
- **Study Per TCBH CCS**—The study period time consistent busy hour CCS are derived by SONDS from the stored capacity table for time consistent busy hour blocking. It must be emphasized that the time consistent busy hour load is not directly measured within SONDS, but is a result of capacity table conversion. Basically, it means: If the **Study Per TCBH CCS** were converted by the Trunk Servicing System algorithms, the number of trunks required, as calculated by the Trunk Servicing System, will usually be equal to the entry in the **No. of Trks Req'd** column.
- **Base Load TCBH CCS**—The SONDS computer stores the Study Per TCBH CCS for the previous 12 months. It selects and reports the highest of these loads as the **Base Load Time Consistent Busy Hour CCS**. The trunk forecaster should use this figure for input to the Trunk Forecasting System for generating the current General Trunk Forecast.
- **Base Month**—This is the month during which the **Base Load TCBH CCS** occurred.

5. SONDS AND THE TOTAL NETWORK DATA SYSTEM

5.01 The Total Network Data System (TNDS) and the subsystems, the Engineering and Administrative Data Acquisition System (EADAS), the Traffic Data Administration System (TDAS), the Trunk Servicing System (TSS), and the Trunk Forecasting System (TFS) presently have no mechanized interface with SONDS. The possibility of mechanized transfer of data from the SONDS computer to TNDS has been evaluated. It has been determined that the mechanization of this interface is not economically feasible. This determination was based on the minute quantity of data that would be involved compared

with the vast development effort that would be necessary in TDAS and TSS to allow SONDS data to pass through unchanged.

5.02 The Trunk Administrative Measurement Plan (TAMP) is an output of TSS. Since most of the trunk groups between SONDS offices and other switching systems will continue to report results based on measurements taken at the non-SONDS end of the trunk group, they should be included in the TAMP results. A temporary exclusion has been granted to those trunk groups measured only by SONDS; however, consideration is currently being given to the feasibility of developing a SONDS output in TAMP banding format.

5.03 While SONDS has no direct interface with TSS, the trunk servicer can use for servicing

purposes the study period time consistent busy hour CCS and trunks required generated by SONDS and reported on the SONDS Monthly Report. It is recommended, however, that whenever possible, distant end trunk group measurements are taken that can be passed through EADAS and/or TDAS to TSS.

5.04 The trunk forecaster, having no other data available, may use SONDS data for only-route trunk groups. The base load time consistent busy hour CCS, as reported on the SONDS Monthly Report, is the highest study period time consistent busy hour CCS within the recent twelve month period. This load, validated as being representative, can be input, along with the base month as reported on the SONDS Monthly Report, to the Trunk Forecasting System.

SONDS MONTHLY REPORT

OFFICE B

MONTH ENDING: JAN 22, 1980

OFFICE FILE UPDATED: JAN 4, 1980

DAYS OF VALID EVE DATA: 13

ORIGINATING RESULTS

OUTGOING TRUNK GROUP	NO. OF TKS	DAILY	MONTH	PEAK	% CAP.	NO. OF TKS REQ	STDY	BASE	BASE PER.
		PEAKS AVG CCS	PEAK LOAD CCS	LOAD CAP. CCS			PER. TCBH CCS	LOAD TCBH CCS	
SNOK 73T SP NC3	13	101	134	290	46	7	91	98	DEC
SNOK 73T SP CN3	7	37	52	130	40	4	32	36	OCT
VNTR 01 LTD TI	4	63	112	54	208	7	75	96	NOV
VNTR 58T ANIONI	39	951	1082	1094	99	39	888	889	DEC
VNTR 01 648 IE	19	320	382	443	86	17	287	287	JAN
SATC 12 647 IE	14	378	461	315	146	20	350	353	OCT
OJAI 11 646 SG1	19	393	446	445	100	19	339	361	DEC
OJAI 11 646 SG2	20	520	582	469	124	25	451	474	DEC
VNTR 02 79T TO	15	216	255	341	75	12	186	201	NOV
VNTR 11 644 IE	10	338	368	215	171	15	277	285	NOV
VNTR 01 643 SG1	8	262	285	158	180	13	210	217	OCT
VNTR 01 643 SG2	9	259	312	186	168	13	232	232	JAN
VNTR 11 642 SG1	17	293	352	391	90	16	262	262	JAN
VNTR 02 1GB DA	5	30	43	78	55	4	26	33	OCT
VNTR 02 CG0 RS	3	9	15	33	45	2	8	9	DEC
VNTR 02 CT2 IR	4	19	40	54	74	4	24	29	DEC

*** NO TWO-WAY TRUNK EQUIP ASSIGNED ***

* START-UP MODE

? < 7 DAYS OF DATA IN CURRENT REPORT PERIOD

Fig. 1—Example of SONDS Monthly Report