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WIRE CENTER LOADING PLANS

PROCEDURES FOR PREPARATION AND ADMINISTRATION

SWITCHING, BILLING, AND CENTRAL OFFICE SYSTEMS MANAGEMENT

NETWORK SERVICES METHODS

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LIST OF FIGURES

1. GENERAL

1.01 This practice contains the procedures for preparing and administering multientity wire center loading plans. It describes the major sources of information upon which loading plans are based. Also included are worksheets for preparing the loading plan.

1.02 When this practice is reissued the reason(s) for reissue will be listed in this paragraph.

1.03 The title of each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

1.04 *The primary objective of a wire center loading plan is to achieve optimum use of installed equipment while providing an objective grade of service to all customers.*

1.05 A loading plan combines the main station *demand* for service in a wire center with the *capabilities* and *limitations* of the switching equipment available. It must give consideration to the *types* and *quantity* of customers being served in order to provide good quality of service throughout the *entire* engineering period.

1.06 The loading plan should not be confused with load balance for an individual switching entity. While a loading plan is defined as a strategy for allocating main station demands across all switching entities in the wire center, load balance is a strategy for assigning all of the entity inward movements across all of the line equipment serving units [ie, line link frame (LLF) horizontal groups, line link network (LLN) concentrators, etc] within a particular switching entity. Detailed information on load balance may be found in Practice 780-350-050.

1.07 An initial loading plan is necessary for a new wire center and must be maintained on an ongoing basis throughout the life of the wire center. The loading plan should be reviewed on an *annual basis* and revised whenever there is a *change in any of the official wire center forecasts.* The loading plan should also be revised any time there is a *significant capacity affecting change* in the wire center. This capacity affecting change could be caused by:

- Shifts in the customer calling characteristics of a switching entity
- A switching entity addition
- Any large unanticipated customer growth in the wire center.

1.08 Switching entities within a given multientity wire center may be the responsibility of more than one network switching administrator (NSA). In this case, the NSAs responsible for the individual offices must work closely together to develop a loading plan for the entire wire center complex. Joint effort between the NSA and the traffic engineer is also essential in developing a loading plan.

1.09 The loading plan should be developed for the *engineering period of the wire center.* This is usually a 2- to 3-year time span. The loading plan should be divided into monthly or quarterly intervals for each forecasted class of service. The plan should identify the anticipated inward and outward movements, as well as the anticipated main section gain or loss figures (by rate zone if required), for each of the forecasted classes of service for every switching entity within the wire center. The forecasted classes of service will include message residence (MR), message business (MB), coin, centrex, party (PTY), etc. Also, the *actual inward and outward movements, along with actual main station gain or loss figures, should be obtained and logged each month for comparison.*

1.10 Tracking actual versus anticipated inward and outward movements by major class of service assists in developing preferential assignment strategies as part of the overall loading plan. For example:

(a) Using actual disconnect data, anticipate the attrition rate of subscribers for Dual Tone Multifrequency (DTMF) (ie, TOUCH-TONE service or DIGITONE* service).

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* DIGITONE is a registered service mark of Northern Telecom, Inc.

(b) Compare the anticipated attrition rate against the anticipated DTMF telephone inward movements.

(c) Can the new DTMF telephone demand be served without costly line equipment transfers (LETs), held orders, or reduced DTMF telephone sales campaigns?

1.11 When developing the loading plan, another consideration is digital versus analog service. Digital and analog lines are served by different types of equipment (ie., digital carrier line unit [DCLU] and line unit [LU]). Therefore, multiple loading divisions must be created when an office serves both types of customers.

1.12 Once the loading plan is developed, special class of service loading priorities must be developed to assist in the daily assignment job. These priority considerations should identify heavy users such as centrex and PBX customers so they can be assigned to the switching entity having the capacity to serve the particular class of service. These special considerations also apply to high call volume or long holding time services [ie, data ports, Outward Wide Area Telecommunications Service (OUTWATS), or Enhanced 800 Service]. For example, a line equipment or number-limited traffic unit with a large amount of available call carrying capacity is a prime candidate office for serving high usage data ports or anticipated high call volume/high usage business subscribers. This results in better use of that particular entity's available call carrying capacity.

2. SOURCES OF INPUT

2.01 The NSA uses several source documents to obtain the planning information necessary for developing an effective wire center loading plan. These documents include the wire center forecasts, the Wire Center Demand and Facility (D and F) Charts, and any current traffic orders. Each of these source documents is briefly described in the following paragraphs.

Note: These sources of input are not intended to be all inclusive. They are used as examples.

A. Wire Center Forecasts

2.02 Although there are several types of wire center forecasts, the NSA is most likely to use the *Commercial Wire Center Forecast.* The commercial forecast is the prediction of the type and quantity of future customer demand for telephone service within a defined geographic serving area. This forecast is usually for a 5-year period. In some companies, this Commercial Wire Center Forecast is called a *General Planning Forecast* (GPF). A typical Commercial Wire Center Forecast is shown in Fig. 1. See Part 3 for a detailed description of the Wire Center Forecast.

2.03 Other types of wire center forecasts include:

- Centrex forecasts from Customer Service Engineering and Sales Organizations
- Coin forecasts from Marketing or Public Telephone Organizations.

2.04 Business office sales campaigns and sales objectives could influence inward movement, customer features, and calling characteristics. These should also be considered by the NSA in developing the wire center loading plan.

2.05 A wire center forecast should be in a format that provides the short-term and long-term forecasts of customer demand on a single source document. Such a document facilitates the use of the forecast by all departments involved in the planning, design, and administration of the wire center equipment and facilities.

2.06 The primary purpose of wire center forecasts is to provide the basis for the planning, sizing, and general timing of the following items:

- Additions to wire center switching and vertical service equipment
- New wire centers and related switching equipment

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- Replacement and modernization of switching equipment
- Land and building requirements.

2.07 The NSAs may use the commercial forecast and their own capacity calculations to determine the exhaust dates of a wire center. These results should be discussed with the traffic engineer, and any differences in capacity should be reconciled.

2.08 The wire center forecast is also useful in determining future line equipment and number requirements. Previous forecasts provide a means of documenting main station capacity and may enable network administration to substantiate requests to advance or postpone equipment relief jobs.

2.09 The NSA can often assist the commercial forecaster and thus improve plans for office growth. Noting new construction developments which could affect area growth and relaying this information to the forecaster is an example of such assistance.

B. Demand and Facility Chart

2.10 The D and F Chart depicts historical and current data and contains projections of working main stations, main station capacity, and actual message rates for a wire center or single switching entity. This includes an individual D and F Chart for each remote switch associated with a host office.

2.11 The function of a D and F Chart is to state the comparison of future subscriber demands versus capacities and demonstrate the adequacy of the capacity relief plans. The D and F Chart also presents comparison of past and present main station demands versus capacities for historical trending purposes.

2.12 The D and F Chart projects future working main station levels and main station capacities for a wire center based on historical and current data. Thus, the chart compares demand with capacity in order to forecast future equipment needs. Main station capacity, which represents the number of main stations which can be served at objective levels of service, can be limited by line capacity, number capacity, call processing (common control equipment), or call carrying (equipment used during the entire conversation) capacity. Service criteria are established to show what the objective level of service should be and that numerical limits have been set for these criteria.

2.13 A D and F Chart is usually prepared and maintained by the traffic engineer or current planner. This individual reviews the D and F Chart at least twice a year (April and October) and also after each construction plan review. The D and F Chart is also reviewed whenever significant changes occur in the demand, capacity, or timing and sizing of the wire center's relief program. Commercial forecasts serve as a basis for the projected main station demand on a D and F Chart.

2.14 Part A of the D and F Chart is the graphics page and is divided into the following sections:

- Graphics section, which summarizes wire center relief plans
- Forecast section, which shows projections of future usage
- Service results section, which records monthly service measurements
- Job information section, which provides job-related information.

Digital and analog service should be represented in separate graphs. It is important to remember that the capacity for the entire office may be adequate but the digital or analog capacity by itself, may not be adequate. See Fig. 2.

A sample graphics page produced by the D and F Data Base System (DBS) is shown in Fig. 3.

2.15 Part B is the data page and provides detailed information on each relief job. There are also lines designated for additional information where more detailed equipment or capacity may be recorded. A sample data page produced by the D and F DBS is shown in Fig. 4. Refer to Practice 780-400-260 for additional information on the mechanized D and F Charts DBS.

2.16 The NSA should review the D and F Chart for accuracy prior to using it for input to a loading plan. Actual and predicted main station levels should be compared against present and future equipment capacities.

2.17 The NSA has other sources available to obtain additional planning information which should be used in developing the wire center loading plan. These sources include:

(a) *Historical Data:* Historical data should be looked at for developing trend information and to assist in making realistic decisions about subscriber calling characteristics such as hundred call seconds/main station (CCS/MS) by class of service, expected inward and outward movements, calling rates, etc. This should also include expected growth/decline for digital versus analog services.

(b) *Unique Traffic Characteristics:* Each office has its own unique traffic characteristics which should be identified for loading purposes. These traffic characteristics can be affected by community items such as seasonal business, conventions, college activities, planned mobile parks, or retirement communities, etc.

(c) *Discussions With the Traffic Engineer:* Coordination with the traffic engineer is very important. The engineer has designed the office based upon basic traffic characteristic assumptions and historical data. The office should be loaded and administered with this information in mind. It is recommended that prior to each job and prior to every busy season, the basic design data values, originating and terminating busy hour calls, and traffic trends should be manually discussed with the traffic engineer and agreed upon. The engineer will then use this information to determine the main station serving capacity of each of the switching entities in the wire center. If the calling characteristics or class-of-service mix should change during the year, the NSA should inform the traffic engineer. Any major changes in office traffic characteristics or capacity should be reflected in a revised loading plan.

C. Traffic Order

2.18 A traffic order is a recommendation for the installation of traffic-sensitive equipment required to meet the forecasted customer demands while maintaining established service objectives for a given group of customers. The approved traffic order becomes the basis for the more detailed telephone equipment order.

2.19 The traffic order may be prepared manually or prepared automatically by a mechanized ordering system (ie, Central Office Equipment Engineering System [COEES]). A manually prepared order is composed of a collection of data summaries and reports which vary according to company policy and the type of equipment needed.

2.20 Off-line reports available from a mechanized ordering system provide the information necessary for a traffic order in a standard format. Even so, these reports are summarized and combined with various other attachments to form the traffic order.

2.21 The traffic order should include the following information and sections:

- Statement of needs section discussing the nature and necessity of the job, associated facilities, and service features provided. A sample statement of need is shown in Fig. 5. It outlines the recommended equipment additions and the basis for recommendation. This section of the traffic order sometimes states the item most limiting the main station capacity upon job completion.
- A design data section containing a summary of listing the call, usage, and station data used as a basis for the design.

- An equipment requirements section containing the traffic-sensitive equipment requirements of the proposed job.

2.22 A capacity summary should be included in the equipment requirements section of the traffic order. Specific items included in a capacity summary depend upon the type of job for which the order is written. It may consist of a summary page, followed by one or more pages detailing specific items such as centrex, custom calling, line and number, and processor capacities. From this section, the NSA can determine which includes centrex should describe the centrex requirements by both the number of new centrex customers and total number of centrex main stations. The type can be centrex-CO or centrex-CU. A sample capacity summary is shown in Fig. 6.

2.23 This capacity summary information is provided by capacity determination worksheets. Whatever the source of the office capacities, the official capacity statement should be jointly agreed upon by traffic engineering and network administration.

2.24 The sections that are most valuable to the NSA in preparing a loading plan are the statement of need and the capacity summary portion of the equipment requirements section.

3. DEVELOPING A LOADING PLAN

LOADING PLAN CONCEPTS

3.01 A loading plan has the following principal goals:

- Keep each switching entity within its capacity
- Provide uniform service to all subscribers
- Utilize to the fullest the different capabilities of the various switching entities in the wire center.

3.02 The foremost priority of the NSA is keeping each machine within its service capacity. Exceeding the stated capacity may cause service deterioration.

3.03 The NSA must continually watch for changes in factors that contribute to a loading plan. Some common changes are:

(a) Increases in forecasted demands before the next relief is scheduled

(b) Increases in usage by existing customers

(c) Changes in office capabilities (ie, adding a new capability such as Remote Call Forwarding [RCF]).

3.04 This is done by comparing the total wire center capacities by type of capability to forecasted demand for that capability. If capacity exceeds demand, then develop a loading plan to distribute the load among the various appropriate entities to preserve the best levels of services. However, when demand does exceed the forecast for a class of service and capacity overloads are expected, the following strategy is recommended for the NSA:

(a) Convene an interdepartmental meeting

(b) Discuss the severity of the anticipated capacity overloads with the engineer

(c) Formulate strategies to minimize adverse customer impact until relief capacity comes.

3.05 The rules for class-of-service spread must be followed when determining where in the switching entity to load this customer in order to achieve and maintain load balance. (Refer to Practice 780-350-050 for a description of the load balance procedure.)

3.06 The NSA can direct the Line and Number Administrator (LNA) to transfer load from one switching entity to another within a wire center through the use of:

- Directed line assignments
- Forced number changes.

Because of customer inconvenience, forced number changes should ***only*** be used when the pace of the directed assignments is not fast enough and service is below objective levels.

3.07 Typically, a loading plan is prepared to cover the interval between major equipment additions (engineering interval). The loading plan interval is usually a minimum of 1 year and in most cases will extend to the wire center capacity exhaust date.

3.08 A loading plan is an ongoing process. One of the overall goals is to provide objective or better than objective levels of service throughout the engineering period, not just to achieve objective service levels by the end of the period. This is accomplished by the NSA directing the LNA to load new subscribers into the growth entities. This allows the other entities in the wire center to be maintained at their limiting capacity. The entities in the wire center can then be loaded with new subscribers at a rate that will bring all the entities to capacity exhaust in the same time frame. The minor deloading of overloaded entities or entities at capacity provides some improvement in service protection to the customer by allowing the entity to be better able to handle any network shocks (peak traffic periods) without serious service degradation.

3.09 Although a loading plan has a starting date and an end-of-period date, the plan will require revision periodically due to changes from the original plan.

LOADING PLAN CONSIDERATIONS

3.10 There are numerous factors which affect the preparation and accuracy of a wire center loading plan. Since all possible cases cannot be covered, only the more prominent ones are addressed herein.

A. External Switching Factors

3.11 The following external switching factors affect the total wire center loading plan:

- Dial-for-dial replacements
- Area transfers
- Estimated in/out movement
- Estimated main station growth (by major class of service)
- Estimated centrex growth
- Equipment additions and junctor rearrangements
- Rate Zones
- Cable serving areas for digital subscriber line carrier (SLC)
- Remote switches or remote modules.

3.12 *Dial-for-dial replacements* can affect loading plans in varied ways. For example, an electromechanical machine may be scheduled for immediate replacement, whereby the entire load of this machine will be transferred to a new analog or digital electronic switch. In this case, consideration must be given to the anticipated demand for the new services made available by the new switching system. This usually requires modification of the loading plan which should be completed well in advance of actual cutover.

3.13 Dial-for-dial replacements can also occur on a more gradual basis. A switching machine slated for future retirement may be deloaded through attrition over a period of time (eg, 2 years). In this case, new growth should be directed away from this machine when revising the loading plan.

3.14 *Area transfers* involve moving customer lines and numbers in a given geographic area from one switching machine to another. Such transfers are sometimes necessary to gain capacity relief for a machine, to avoid natural or man-made obstacles in cable routes, and for other economic reasons. The wire center loading plan must be revised to allow for an area transfer. The LNA must reserve an adequate quantity of line equipments, numbers, and special features necessary to effect this transfer.

3.15 *Estimated in/out movements* of the wire center should be reflected in the wire center forecasts used as a basis for the loading plan. However, unexpected growth or attrition can occur due to contingencies such as an unexpected large centrex customer, change in business/residence mix, or in/out movement rates. In such an event, the current loading

plan must be adjusted.

3.16 *Estimated main station and centrex growth* are key inputs to the loading plan. Total coin, noncoin, and centrex main station demand must be matched against the individual switching machine capacities. A new loading plan should be prepared any time there is a significant change in the main station growth forecast.

3.17 *Equipment additions* have an effect on the loading plan because of the change in capacity that follows the completion of an addition. The impact may be broad or limited in nature, depending upon the type and scope of the addition. *Junctor rearrangements* in some electronic machines have a potentially significant impact on the loading plan. The switching capacity of the individual loading units within the particular entities may decrease with the junctor rearrangement. Digital switches do not require junctors, therefore, this item is not a consideration for this type switch.

3.18 *Rate zones* in large metropolitan areas have an impact on wire center loading plans. When a wire center is located on or near a rate zone boundary (see in Fig. 7) and serves customer in both zones, the two separate rate zones must be considered individually in developing the loading plan. This should be handled similar to the handling of two separate entities, with each rate zone having its own capacity and customer demands. In the situation where a wire center serves two rate zones, the demand for service in a particular zone must be carefully weighed against the resources allocated in the wire center for that zone. The two zones may not have equal cable distribution as shown in Fig. 7. Furthermore, the availability of zone registration equipment (in crossbar systems) and thousand groups designated for a given zone must be considered.

3.19 *Cable Serving Areas* are those areas that provide service using digital subscriber line carrier facilities. This type of service minimizes the amount of cable facilities required in the field. The lines entering the office are digital and should be connected to digital line equipment. Since this could have a significant impact on the loading of a switch, there should be close coordination with distribution engineering.

B. Internal Switching Factors

3.20 *Remote switches or remote switching modules* have an effect on loading plans. The remote switch has its own forecast as well as being included in the wire center forecast. A remote switch may have a significant impact on the loading of an entity (host) because of the high usage on the channels between the remote switch and the host office.

3.21 Other factors affecting the wire center loading plan are those internal to the switching machine such as:

- Relative Loading
- Loop Range Extension (LRE)
- Concentrator Ratio Changes
- Digital integration.

Note: This list is not intended to be all inclusive.

3.22 *Relative loading* must be employed when preparing a loading plan because all the switching machines within a wire center do not have equal capacities and capabilities. Each machine's share of the total load is based upon its relative capacity and capability to serve various broad classes of service. Customers requiring custom calling features or DTMF must be loaded in those machines capable of providing such services.

3.23 Care should be taken by the NSA in developing a loading plan to ensure that adequate capacity is preserved in stored program entities to serve future anticipated demands for Custom Calling Services and other high revenue producing vertical services.

3.24 *Loop range extension* impacts on loading plans because not all equipment in an entity is wired for this feature. Therefore, anticipated demand, main frame and rate zoning, and installed equipment all must be taken into account by the NSA when preparing a loading plan.

3.25 *Concentrator ratio changes* impact on loading plans because they can be disruptive and expensive to implement. New line equipment being installed may have a different type of concentrator than the existing line equipment. Mechanized systems (ie, computer system for main frame operations [COSMOS]) include a default factor that adjusts the engineered usage and the customer equipment usage (CEU). This causes 4:1 concentrators to appear as 2:1 concentrators for assignment. The 605 document in the Total Network Data System—Load Balance System (TNDS-LBS) allows 2:1 and 4:1 sections of an office to be defined separately in LBS.

3.26 If a ratio change is planned well in advance and can be implemented before the current line serving capacity exhausts, the need to condense (or expand) existing lines should not cause unacceptable blockage or service impairment.

C. Interexchange Common Carrier Presubscription Service

3.27 If all the entities in a wire center do *not* have equal access features, the Interexchange Common Carrier presubscription service offering is treated as a *feature and must have loading plan consideration.* It is included with other services and feature loading plans sent to Business/Residence Service Center groups so that a new service request is assigned to the proper central office code (NXX).

3.28 If only one entity in a wire center is equipped for presubscription service, the customers served by that entity are solicited for equal access. The exception is where sufficient capacity exists and it is desirable to deload the nonserving entity by allowing subscribers to migrate.

3.29 In a nonserving entity, existing subscribers who request presubscription service will be accommodated if such moves are in accordance with wire center loading plans. However, number changes and office wiring changes are required.

3.30 If the serving entity reaches its capacity, the presubscription feature is suspended until the overload condition no longer exists.

D. Memory Administration

3.31 Memory administration is the long-term analysis and day-to-day monitoring of Stored Program Control System (SPCS) memory utilization and capacity. Memory considerations for digital switches are not addressed in this practice.

3.32 *Memory utilization* entails keeping track of used and spare memory. It also involves word usage as related to main station capacity. The average number of words gained or lost due to service order inputs should not exceed certain limits. These limits are a function of the office subscriber features and equipment.

3.33 The *memory capacity* determination activity uses the data obtained from the memory utilization analysis and from marketing forecasts in order to project the time of memory exhaust. The results of memory capacity studies indicate if sufficient memory exists to last until the end of the engineered period.

3.34 The NSA is responsible for long-term memory administration. This includes capacity determination, loading, interfacing with engineering for repacks and memory relief, and interfacing with the Switching Control Center (SCC) for memory allocation.

3.35 The Translation Administration (TXA) work group is responsible for the day-to-day memory administration function. The TXA work group also acts as a technical resource for the NSA with respect to the long-term memory administration function.

3.36 In keeping track of memory, the TXA work group is responsible for the following day-to-day tasks:

(a) In conjunction with the NSA, reviewing memory specifications in traffic orders. All traffic orders (for both new offices and additions) should ensure that adequate program store and call store space is provided for translations; and

that call store registers are properly sized for translation-sensitive items (eg, number of centrex groups).

(b) Analyzing all input requests for translations requirements and referring discrepancies to the originator for resolution.

(c) Coordinating with the NSA, LNA, and Recent Change Memory Administration (RCMA) for abbreviated line class codes.

(d) Calculating the percentage of spare memory and preparing memory reports.

(e) Recommending to the NSA the need for Translation Repack to Implement Memory Savings (TRIMS) based on Translation Area Analysis (TAA) and analyzing TRIMS results.

(f) Updating and distributing translation records affected as a result of TRIMS.

(g) Posting the percentage of abbreviation on abbreviated code records before and after TRIMS.

LOADING PLAN PROCEDURE

3.37 The stages in developing and preparing a loading plan are:

(a) Identifying spare capacities

(b) Determining the need for a new loading plan

(c) Developing and implementing the loading plan.

The following paragraphs provide detailed information on each of these items.

A. Identifying Spare Capacities

3.38 The NSA must identify the capacities and limiting items of each entity in the wire center for the upcoming engineering period. The procedure is as follows:

(a) Identify the line and number, call carrying, and call processing (ESS[TM] switch) capacities and the limiting item(s) of each switching entity to the end of the engineering period. These values can be found on the D and F Chart, traffic order (for newly proposed jobs), and the current Capacity Determination Worksheets (ESS switch only).

Note: Be sure that the D and F Chart and the traffic order have been updated to reflect current capacities. The D and F chart must also reflect the expected growth of analog and digital service.

(b) Determine the class-of-service capabilities and limitations of each entity. These affect the types of service provided (such as custom calling features, PBX, coin, etc). The best source for making these determinations is the current set of Capacity Determination Worksheets or the capacity summary section of a current traffic order. The capacity summary section will disclose how much of each type of service each switching entity is designed to carry during each calendar year.

(c) Obtain the current number of working main stations in each traffic unit. This figure should include equivalent main stations (MSs). The most accepted source of working MS totals is from COSMOS reports or from manual line and number reports from the LNA. Another source is a computerized monthly count based on service order activity. See Fig. 8 for an example traffic facilities count.

(d) Subtract the present working main stations in each switching entity from the current engineered capacity to determine the spare capacity of each switching entity.

[TM] ESS is a trademark of AT&T Technologies.

B. Determining the Need for a New Loading Plan

3.39 After gathering the data listed in the preceding paragraph, the NSA determines if a new loading plan is needed by reviewing growth forecasts, relief plans, and the current loading plans.

Reviewing Growth Forecasts

3.40 The procedures for reviewing growth forecasts are as follows:

(a) From the appropriate organizations, obtain the most recent forecasts for the following:

(1) Total main station growth, ie, MR, MB, PTY, flat rate (FR)

(2) Coin main station growth

(3) Centrex-CO growth

(4) Centrex-CU and PBX growth

(5) DTMF calling sales

(6) Custom calling sales

(7) Analog/digital growth.

(b) Review the growth forecasts to better understand the types of customer demand anticipated. Some of the items to be considered when reviewing the forecasts are:

(1) The overall quantity and type of the MS growth forecasted

(2) The expected characteristics of the new forecasted growth as best determined by such things as:

- Expected busy hours
- Geographic location
- Type of residence (private home, apartment)
- Subscriber line carrier
- Type of business (commercial, industrial)
- Other particulars (school dormitory, travel agency).

(3) Growth of existing heavy use subscribers.

3.41 The preceding information can be obtained from a wire center forecast (see Fig. 1 for an example). Forecasts can change many times and changes are the primary reason loading plans are revised. The NSA must be aware if Business/Residence Sales and Service are stimulating any or all of the wire center's services during the engineering period. The NSA must also be aware of new service offerings (ie, an OUTWATS rehome, a coin modernization program, etc).

Reviewing Relief Plans

3.42 In reviewing relief plans, the NSA must consider timing and sizing. The timing of relief can become critical as an entity nears its capacity limits.

3.43 The NSA and LNA must jointly determine if all forecasted demand can be accommodated (or if service levels can be maintained) through the end of the engineering period with existing capacity or if special interim relief is required. Additional relief includes:

- Increases in hardware (adding specialized trunks/service circuits to allow more capacity)
- Changes in digital or analog switch software (changing memory to handle new features or to serve larger quantities of existing features)
- Area cuts (moving groups of customers to another entity or a different wire center).

3.44 Job adequacy or the sizing of the relief job is another area with which the NSA should be concerned in reviewing of wire center relief plans. Normally, there is a considerable period of time between the writing of a job and its completion date. Many changes could occur during this time period that could shorten the life span or limit the adequacy of the job. The NSA should periodically check the trends of the

data in the existing office to ensure that the relief job is still adequate for the post job cut-over engineering period.

3.45 Several items that could affect the sizing or timing of a relief job are:

- A change in the type of customers to be served.
- A change in the characteristics of the working subscribers.
- An unexpected change in the forecasted growth. An interdepartmental meeting should be called if situations similar to this occur.

3.46 There are situations where the growth forecasted for an entity or entities will bring the wire center up to its capacity before the relief jobs are scheduled to be completed. An interdepartmental meeting should be held when this situation occurs. Decisions should be made on how best to utilize the remaining existing capacity. This might include items such as placing restrictions on allowable equipment levels, initiating an accelerated number assignment policy, or holding orders on special types of new subscriber demand.

Reviewing the Current Loading Plan

3.47 The next step in this loading plan stage is a review of the current loading plan. The review is done to reexamine the underlying assumptions behind the previous loading plan as it was prepared. Some of the key items to note during the review of the previous loading plan include:

- The limiting item(s) and capacity for each entity
- The line and number capacities
- The percentage of capacity reached
- CCS/MS by class of service
- Preferential assignment strategies currently in effect.

3.48 These items and quantities should be checked against the quantities identified and/or developed previously. The differences between the quantities will provide the NSA with some of the data for developing the new loading plan. This review should also identify any areas that require special attention.

C. Developing and Implementing the Loading Plan

3.49 This stage of the loading plan process consists of:

- Developing a new loading plan
- Communicating the loading plan
- Monitoring the progress of the loading plan.

Developing a New Loading Plan

3.50 The basic philosophy behind loading plan development is to move all the entities within a building toward exhaust (ie, 100 percent capacity) at the same time. This may require loading each entity within a building at different rates. It is also possible that this directed assignment procedure may have to be used within an entity to load various classes of service at different rates.

3.51 Figure 9 shows an example of a building with two entities that begin a year at different percent capacities but by the end of the year, through directed assignment, both reach the same percent capacity.

3.52 The loading plan is prepared from the general to the specific. The parts of the loading plan, listed in order of appearance in a loading plan, are:

- Wire Center Summary
- Entity Summary
- Wire Center Profile
- Entity Profile.

See Part 4 of this section for more details.

Communicating the New Loading Plan

3.53 The second step of this stage is communicating the new loading plan to other departments. A memo containing details of the new loading plan may be distributed to all involved departments. If necessary, an

interdepartmental meeting may be called and chaired by the NSA. Attendees should include, but not be limited to, the following:

- Business Service
- Business and Residence Marketing
- Public Telephone (coin)
- Engineering
- Central Office Maintenance
- Loop Assignment Center (LAC)
- Distribution Engineering.

3.54 If any member of the committee has any problem with the loading plan, it should be resolved at the meeting. Copies of the wire center loading plan should then be distributed to committee members. All committee members must comply with the loading plan. Should there be significant changes in an entity or building during the life of the loading plan, another committee meeting may be called to evaluate the problem.

Monitoring the Progress of the Loading Plan

3.55 The NSA begins implementing the approved loading plan by discussing this plan with the LNA and developing an ongoing assignment strategy. In order to ensure progress toward end-of-period loading objectives, the LNA must monitor the assignments of line equipment and telephone numbers for the wire center on a monthly basis.

3.56 With manual line assignment, lines (and numbers) available for service are released by means of assignment lists issued by the LNA. See Fig. 10 for an example Number Assignment List and Fig. 11 for a Line Assignment List. However, mechanized assignment systems provide direct line equipment selections based upon system controls input by the LNA.

3.57 In the case of manual assignment, the LNA supervises clerical personnel in actual assignment list preparation. With mechanized assignment, the NSA establishes and monitors operating parameters of the system. For more detailed information on line assignment administration and requirements, consult Practice 780-200-014.

3.58 The COSMOS provides several reports which can be used for the monitoring function. For example, summaries of line equipment are available by class of service and status (eg, spare, working, pending order). Also available are summaries of directory numbers by type and status. Such reports can be used to determine whether the loading plan objectives are being achieved. Refer to Practice 190-520-010 for information on COSMOS directory number reports and Practice 190-520-030 for information on COSMOS line equipment reports.

3.59 It is the responsibility of the LNA to enter the monthly actuals on the Entity and Wire Center profile forms and to ensure conformity to the loading plan. The LNA should also send copies of the forms monthly to the NSA for overall review. Figures 14 and 15 are examples of the Wire Center and Entity Profile forms. Part 4 contains the instructions for completing these forms.

Corrective Action

3.60 Monitoring is necessary because inappropriate assignment practices may not be apparent at early stages. They may become apparent only after the loading plan objectives have deteriorated to a crucial point.

3.61 The objective of the loading plan is accomplished through routine line assignments (directed line assignments). The LNA assigns new connects to lightly loaded entities and allows disconnects to accumulate in heavily loaded entities. The normal attrition of lines allows selected types of service to be assigned into previously overloaded entities.

3.62 When too many orders for service are accepted, service for all customers can be impaired. This can be summarized as a conflict between:

- The short-term gain of providing service to all who request it at the risk of having worse trouble later

- The long-term gain of achieving end-of-period loading objectives even at the cost of holding orders for new service at certain times.

3.63 All subscribers should receive an equivalent level (or grade) of service, with the thrust being toward objective levels of service.

4. WORKSHEETS

4.01 This part contains descriptions of the worksheets the NSA may use in conjunction with loading plans. These forms are only examples of the various methods used to track load-related data. Companies using mechanized systems such as COSMOS or the Engineering and Administrative Data Acquisition System (EADAS) can generate reports containing up-to-date load balance data.

A. Assignment Lists

4.02 The LNA establishes assignment policies and gives directions to those actually doing the assigning in order to ensure that inward movement of customers is directed towards the most appropriate entity. The intent is to fully utilize, but not exceed, the capability and the working MS capacity of each machine (and the wire center).

4.03 Loading directions enforce the principles of good load balance. In order to control where in the wire center new customers will go, the LNA uses the Number Assignment List (Fig. 10) along with the Line Assignment List (Fig. 11). Refer to Practice 780-103-010 for more details on manual assignment procedures.

B. Wire Center Summary

4.04 The wire center summary (Fig. 12) is a narrative type overview of the general plans for the building or wire center. The content of the summary should be such that higher management will know the general loading plan for the wire center. Included in the wire center summary should be the following:

- Wire center name
- Number of entities
- General loading plan for the wire center
- Wire center and entity capacities
- Wire center forecasted growth
- Growth entity (if any)
- Statement of working main stations
- Statement of space capacity
- Statement on adequacy of planned relief jobs
- Statement of expected percentage of capacity at end of service year
- Areas of special concern, ie, area transfers, cutovers, new generics, additions, etc.

C. Entity Summary

4.05 The entity summary (Fig. 13) will add details to the general information provided on the wire center summary. The entity summary starts with the wire center name and entity. Included in the form should be items such as:

- Entity capacity
- Additions
- Limiting item(s)
- Area transfers
- Working main stations
- Spare capacities
- Growth expectations (by major class of service)
- Business-residence mix
- Expected disconnect rates
- Preferential assignment strategies that are, or will be, in effect.

The assumptions to be used in constructing the entity loading plans should also be included on this form.

D. Wire Center Profile

4.06 The wire center profile is a form capable of handling 1 year of activity for two classes of service. An average wire center may require several pages of this form. The wire center profile presents the wire center loading plan statistics in an orderly manner. It also provides a means for tracking these statistical details for the loading plan interval. Figure 14 is an example of the wire center profile form.

4.07 The wire center form is completed in two stages. The first stage is used for the upcoming year with the data presented in monthly intervals. The remainder of the entries are actuals and are obtained from the monthly main station counts posted by the LNA. The actuals are used to maintain the progress of the loading plan. Instructions for both stages are given in the following paragraphs.

4.08 *Stage 1:* Form entries for stage 1 are as follows:

(a) *Wire Center:* Enter the name or location of the wire center.

(b) *Analog/Digital:* For digital central offices, cross out the one that *does not* apply. The various classes of service can be provided by both types of equipment. Therefore, separate profiles will be created for each loading division.

(c) *Interval:* Enter the interval covered by the loading plan.

(d) *Page ___ of ___:* Enter the page number of this sheet. Pages should be numbered consecutively if more than one sheet is used.

(e) *Date:* Enter the month, day, and year the form is prepared.

(f) *Class of Service:* Enter the class of service for which this form is being prepared.

(g) *Line 1—Capacity:* Enter the current main station capacity for the building.

(h) *Line 2—Working Est.:* Enter the estimated number of working main stations. This is the sum of estimated working main stations for the previous month (line 2) and the estimated net change for the present month (line 11).

(i) *Line 4—% Capacity Est.:* Enter the anticipated percentage of capacity for the wire center. (Divide the estimated number of working main stations by the current capacity and multiply times 100.)

(j) *Line 7—Net Change Est.:* Enter the estimated net change (obtained from wire center forecasts).

4.09 *Stage 2:* Form entries for stage 2 are as follows:

(a) *Line 3—Working Act.:* Enter the actual number of working main stations (obtained from the monthly line and number count). This should equal the sum of the actual main stations for the previous month and the actual net change for the current month.

(b) *Line 5—% Capacity Act.:* Enter the actual percentage of capacity for the wire center. (Divide the actual number of working main stations by the current capacity and multiply the result times 100.)

(c) *Line 6—Pending Assignments:* Enter the quantity of pending assignments. This quantity becomes important as the building approaches capacity exhaust because it represents pending connects. This will also help when analyzing changes in the connect rate during the loading plan interval.

(d) *Line 8—Net Change Act.:* Enter the algebraic sum of the actual connects and the actual disconnects.

4.10 The bottom of the form is used for the second class of service. The entries for lines 1 through 8 are the same as for the top portion of the form.

E. Entity Profile

4.11 The entity profile is a form capable of handling two classes of service for a given entity. Some entities may require several pages of this form to be complete. This form aids in tracking the statistical details for the loading plan interval. Figure 15 is an example of this form.

4.12 The entity profile form is also completed in two stages. The first stage is used for the upcoming year with the data presented in monthly intervals. The remainder of the entries are actuals and are obtained from the monthly main station counts. Instructions for both stages are presented in the following paragraphs.

4.13 *Stage 1:* Form entries for this stage are as follows:

(a) *Wire Center:* Enter the name or location of the wire center.

(b) *Entity:* Enter the name or designation of the entity.

(c) *Interval:* Enter the interval covered by this loading plan.

(d) *Page ___ of ___:* Enter the page number of this sheet. Number the pages consecutively if more than one sheet is used.

(e) *Class of Service:* Enter the class of service for the entity specified in item (b).

(f) *Line 1—Capacity/Limiting Item:* Enter the current capacity of the entity above the diagonal line. Enter the limiting item below the diagonal line (ie, line equipment = LE, numbers = NMBRS, dial tone markers = DTM, line link network = LLN, etc).

(g) *Line 2—Line/Number Capacity:* Enter the line equipment capacity above the line and the number capacity below the line.

(h) *Line 3—Working Est.:* Enter the estimated number of working main stations.

(i) *Line 5—% Capacity Est.:* Enter the anticipated percentage of capacity for the entity. This is obtained by dividing the estimated number of working main stations by the current capacity. Multiply the result by 100.

(j) *Line 8—Net Change Est.:* Enter the net change. This is projected growth obtained from the wire center forecasts.

4.14 *Stage 2:* Form entries for this stage are as follows:

(a) *Line 4—Working Act.:* Enter the actual number of working main stations (obtained from the monthly line and number counts). This should be equal to the sum of the previous month's actual working main stations and the current month's actual net change.

(b) *Line 6—% Capacity Act.:* Enter the actual percentage of capacity for the wire center. (Divide the actual number of working main stations by the current capacity and multiply the result times 100).

(c) *Line 7—Pending Assignments:* Enter the quantity of pending assignments. This number becomes important as the entity approaches capacity exhaust because it represents pending connects. This also helps in analyzing changes in the connect rate during the loading plan interval.

(d) *Line 9—Net Change Act.:* Enter the actual net change.

4.15 The bottom portion of the form is used for a second class of service. Line entries are the same as the top portion of the form.

F. Status Summary Form

4.16 An additional method of summarizing loading plan data is through the use of the Status Summary Form. This form tracks monthly activity from the beginning of the engineering period until exhaust.

4.17 The Status Summary Form contains such information as:

(a) Specific capacities by capability

(b) Forecasted demand

(c) Working MS at the beginning of the engineering period

(d) Loading plan progress

(e) End of engineering period loading objectives

(f) Capacity change

(g) Monthly net MS change (forecasted and actual).

See Fig. 16 for an example.

5. ABBREVIATIONS

5.01 The following is a list of abbreviations used throughout this section:

ABBREVIATION	DEFINITION
CCS	Hundred Call Seconds
CEU	Customer Equipment Usage
COEES	Central Office Equipment Engineering System
COSMOS	Computer System for Main Frame Operations
D and F Chart	Demand and Facility Chart
DBS	Data Base System
DTM	Dial Tone Marker
DTMF	Dual Tone Multifrequency
EADAS	Engineering and Administrative Data Acquisition System
FR	Flat Rate
GPF	General Planning Forecast
LAC	Loop Assignment Center
LBS	Load Balance System
LE	Line Equipment
LET	Line Equipment Transfer
LLF	Line Link Frame
LLN	Line Link Network
LNA	Line and Number Administrator
LRE	Loop Range Extension
MB	Message Business
MDF	Main Distributing Frame
MR	Message Residence
NMBRS	Numbers
NSA	Network Switching Administrator
OUTWATS	Outward Wide Area Telecommunications Service
PBX	Private Branch Exchange
POTS	Plain Old Telephone Service
PTY	Party
RCF	Remote Call Forwarding

ABBREVIATION	DEFINITION
RCMA	Recent Change Memory Administration
RSS	Remote Switching System
SCC	Switching Control Center
SPCS	Stored Program Control System
TAA	Translation Area Analysis
TNDS	Total Network Data System
TRIMS	Translation Repack to Implement Memory Savings
TRR	Translations Retrofit and Repack
TXA	Translation Administration

6. REFERENCES

6.01 The following practices contain additional information relating to loading plans. See Practice 780-100-ZZZ for a complete list of recommended documents.

PRACTICE	TITLE
190-520-010	Telephone Number Management
190-520-030	Line Equipment Management
190-520-032	Entity Loading—Line Equipment Management
231-070-425	Translation Spare Word Administration
231-070-427	Memory Administration
231-070-430	Call Store Items
231-070-740	Load Balance
232-070-110	Load Balance
232-070-234	Program Store Spare Word Administration
232-020-120	Assignment Administration—Recommendations
780-103-010	Telephone Number Assignments
780-125-009	Network Administration Center—Job Description
780-125-027	Translations Administration
780-125-028	Network Administration Center Operational Standards—Line and Number Requirements
780-200-014	Line and Number Requirements
780-350-050	Load Balance Index Plan
780-400-260	Demand and Facility Chart—End Office

PACIFIC TELEPHONE
WIRE CENTER FORECAST
*** COMPANY CONFIDENTIAL ***

FORECAST MONTH: JANUARY — WIRE CENTER NO: 66362337 — APRIL

TYPE OF FORECAST: BASIC

SEC: SOUTHERN ARA: DIV: METRO DIS: DOWNTOWN EXH: WIRE CENTER:

ALL DATA IN SERVICE FIRST OF FORECAST MONTH EXCEPT GAINS

	CATEGORY	1-1-80	1-1-81	1-1-82	1-1-83	1-1-84	1-1-85	1-1-90	1-1-95	1-1-00
BUSINESS										
100	1 PTY FLAT	21055	22006	23001	24596	26291	27986	34100	38100	40600
110	1 PTY MEAS									
120	2 PTY FLAT	239	244	249	254	259	264	280	285	290
130	BUS ANS LINES	1747	1752	1792	1822	1871	1920	2120	2290	2460
140	COIN (PUB & SEMI)	7	27	67	97	132	167	182	197	212
150	TOTAL URBAN BUS	23048	24029	25109	26769	28553	30337	36682	40672	43562
RESIDENCE										
200	1 PTY FLAT	13841	14322	14654	15155	15740	16324	18036	19288	20791
210	1 PTY MEAS	2839	2728	2896	2995	3110	3226	3564	3812	4109
220	2 PTY FLAT									
230	2 PTY MEAS									
240	4 PTY FLAT									
250	SUBURBAN (BUS & RES)									
260	FARMER LINES (BUS & RES)									
270	TOT RES, SUBN. & FL	16680	17050	17550	18150	18850	19550	21600	23100	24900
BUS & RES LINES AND MAIN STAS										
300	1 PTY LINES	39728	41079	42659	44919	47403	49887	58282	63972	68462
310	2 PTY URBAN LINES									
320	4 PTY URBAN LINES									
330	SUBURBAN LINES (B + R)									
340	FARMER LINES (B + R)									
350	TOT BUS & RES LINES	39728	41079	42659	44919	47403	49887	58282	63972	68462
360	TOT BUS & RES MN STAS	39728	41079	42659	44919	47403	49887	58282	63972	68462
TWX, CTX, & ENFIA SW HERE										
400	TWX ACCESS LINES									
410	CTX CO LINES	13137	15332	17895	21574	23094	24474	32600	39600	46600
420	ENFIA LINES	339	639	889	1139	1389	1639	3000	4250	5500
TOTAL MN STAS SW HERE LESS WATS										
500	TOT LNS LESS WATS	53204	57050	61443	67632	71886	76000	93882	107822	120562
510	TOT MN STA LESS WATS	53204	57050	61443	67632	71886	76000	93882	107822	120562
INFORMATIONAL ITEMS										
600	INTER IN WATS LOC HERE	49	53	71	92	126	160	330	500	670
610	INTER OUT WATS LOC HERE	84	102	125	149	185	221	401	581	761
620	INTRA IN WATS LOC HERE	52	54	72	92	126	160	330	500	670
630	INTRA OUT WATS LOC HERE	97	109	127	146	182	218	398	578	758
640	TOTAL WATS LOC HERE	282	318	395	479	619	759	1459	2159	2859
650	BUSINESS TOUCH TONE	10427	13500	16500	19400	22300	25200			
660	RESIDENCE TOUCH TONE	6281	8300	10300	12050	13800	15550			
670	TOTAL TOUCH TONE	16708	21800	26800	31450	36100	40750			
680	HUNTING LINES	11507	12150	12800	13550	14350	15150			
690	COMPUTER PORTS	142	155	175	205	245	285			
700	CALL WAITING	1359	24975	27675	34245	39788	46110			
710	CALL FORWARDING	965	16233	17988	22259	25862	29971			
720	3 WAY CALLING	509	7492	8302	10273	11936	13833			
730	SPEED CALL 8	348	5467	6480	8447	9987	11745			
740	SPEED CALL 30	98	1822	2160	2815	3328	3915			
750	HOTEL-MOTEL DODS	39	45	50	55	60	65			
760	TOTAL DODS LESS H-M	1289	1300	1310	1320	1330	1340			
770	ORTS									
780	MEASURED BUS & RES SVCS	23894	24734	25897	27591	29401	31212	37664	41912	44709
790	DID PBX STATIONS	392	892	1392	1992	2592	3192			
800	IOD PBX STATIONS	118	618	1118	1718	2318	2918			
ANNUAL GAIN OR LOSS FORECAST		1-1-80 IN-SERV	1980 GAIN	1981 GAIN	1982 GAIN	1983 GAIN	1985 GAIN	85-89 AVG GN	90-94 AVG GN	95-99 AVG GN
900	TOTAL URBAN BUS	23048	981	1080	1660	1784	1784	1269	838	538
910	TOT RES, SUBN. & FL	16680	370	500	600	700	700	410	300	360
920	TOT BUS & RES MN STAS	39728	1351	1580	2260	2484	2484	1679	1138	898
930	TWX ACCESS LINES									
940	CTX CO LINES	13137	2195	2563	3679	1520	1380	1625	1400	1400
945	ENFIA LINES	339	300	250	250	250	250	272	250	250
950	TOT MN STA LESS WATS	53204	3846	4393	6189	4254	4114	3576	2788	2548
960	TOT WATS LOC HERE	282	36	77	84	140	140	140	140	140

Figure 1 - Wire Center Forecast (2.02, 3.41)

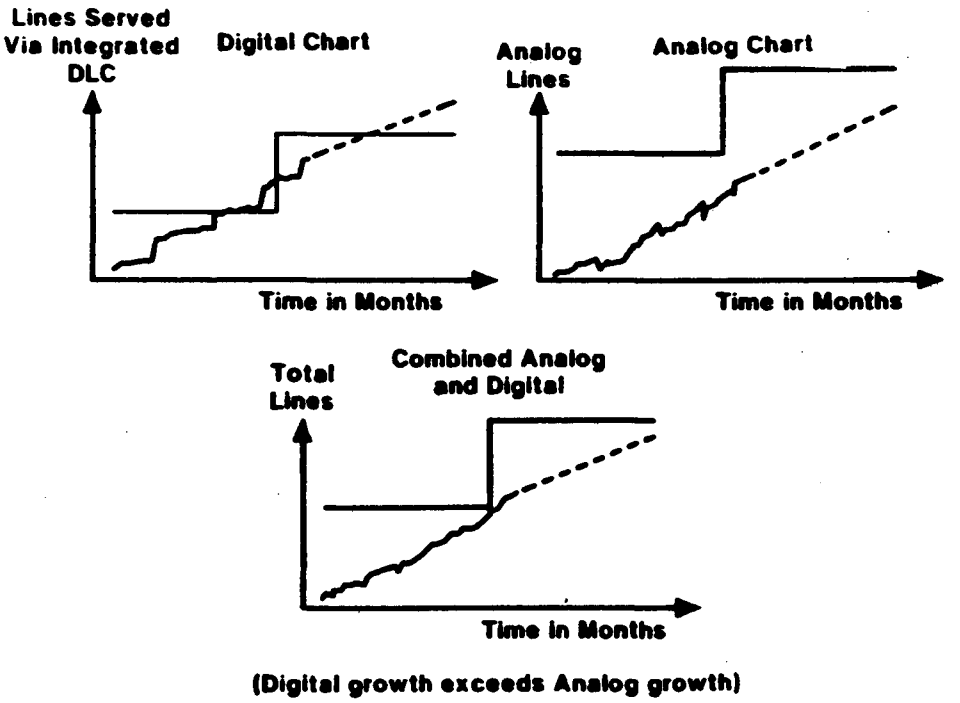

Figure 2. Digital, Analog, and Combined Digital/Analog Growth Charts (2.14)

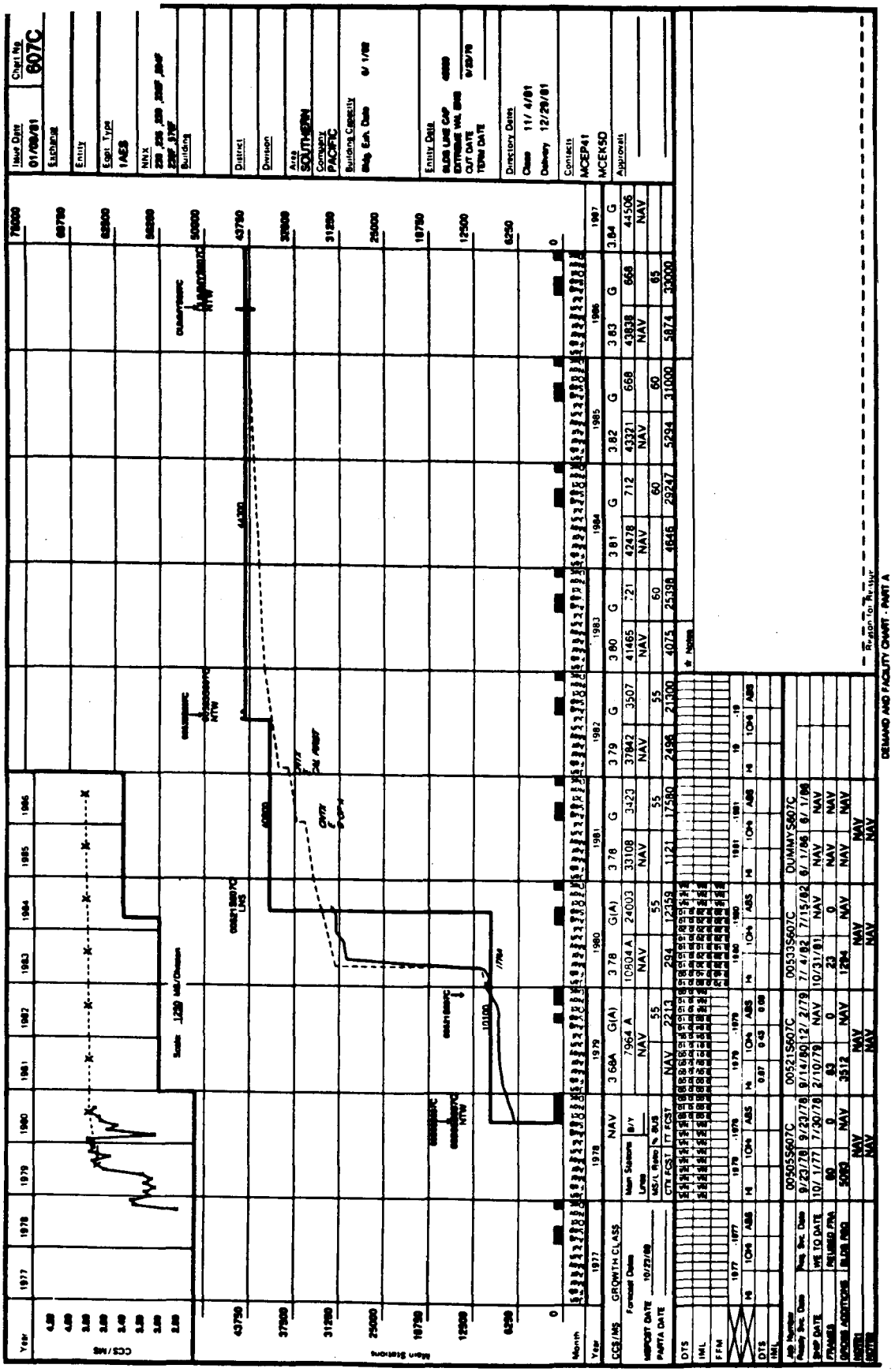

Figure 3 - D and F Chart Graphics Page (2.14)

DEMAND AND FACILITY CHART ... PART B

BUILDING: ENTITY: EQ TYPE:1AE8

JOB ADJ OR TRANSF	00505S607C	AT1	00521S607C	AT1	AT1	00533S607C
READY SVC DATE	9/23/78	3/ 8/80	9/14/80	7/18/81	1/23/82	7/ 4/82
REQUIRED SVC DATE	9/23/78	**/**/**	12/ 2/79	**/**/**	**/**/**	7/15/82
SHIP DATE	10/ 1/77	**/**/**	2/10/79	**/**/**	**/**/**	10/31/81
JOB DESCRIPTION	REPL		REPL			GA
B.S. PRIOR EXHAUST	80		81			86
MS TRANSFERRED		20300		1175	1332	
TRANSF ENTITY				B OF A	CAL FIRST	
CENTREX STATUS				E	E	
USER1 JOB/ADJ DESC	GROWTH		GROWTH			DCT
USER2 JOB/ADJ DESC	51882		51882			52595
LIMITING SE ITEM	NTW		NTW			NTW
MS CAP ADD/TOT SE	10100		30800 40900			3400 44300
TC	10100		30800 40900			3400 44300
LINES	11700		29200 40900			3800 44700
NOS	10200		35500 45700			4100 49800
MOST LIM	10100		30800 40900			3400 44300
AT OR ADJ REASON		ITRA		CNTX	CNTX	
CENTREX CAP ADDED	2000		4000 6000			0 6000
CRCFU ML	0		0			500
CRCFU TC	0		0			500
NUMBERS INSTALLED	12300		42700 55000			5000 60000
UAV ASSGN	0		0 0			0 0
% D FILL	83.000		83.000			83.000
LINES INSTALLED	12288		30720 43008			4096 47104
UAV ASSGN	0		0 0			0 0
% D FILL	95.200		95.100			95.000
CAP IN LINES	0		0 0			0 0
MS CAP ADD/TOT TT	10100		25300 35400			8900 44300
. COIN	0		0 0			75 75
. SP8	174		4049 4223			
. SP30	49		1358 1407			
. CONFC	254		4882 5136			
. CWAIT	679		16443 17122			
. CFWD	482		10647 11129			
. RCFWD	0		0 0			0 0
PROCESSOR CAP(%)	25		75			80
LOAD SVC RELATION	1.000		1.000			1.000
LOAD SVC CCS	44160		154560			169280
CURRENT CCS/MS	4.370		3.780			3.820
JOB CCS/MS	4.370		4.370			0.0
GEN ISS/LLF SIZE-1	1AE4		1AE5			1A10
GEN ISS/LLF SIZE-2						
CON RATIO/ITPR	3-4:1R		10+1/2-4:1R			11+1/2-4:1R
TLF APP	4096		11776			14592
EQ TLF APP	3017		8780			10440
TLN CONC RATIO	1.50:1		1.50:1			1.50:1
COEES DATE	1/ 7/77	**/**/**	2/ 7/78	**/**/**	**/**/**	5/20/80
GROSS ADDITIONS	5093		3512			1294
FRAMES/SHELVES	60		83			23
REUSED FRAMES	0		0			0
TYPE OFFICE DISP	SXS		SXS			
EQUIP LINES DISP	0		28550			
WORKING LINES DISP	7600		22544			
NOTE1						
NOTE2						

Figure 4. D and F Chart Data Page (2.15)

Date: July 29, 1982

Exchange: DXTQ XX BL CGO Office: 411-8-3,550 Division: Central

Equipment: No. 1 ESS SP-CTX-8 Traffic Order No: 74-123
Project No: 9-876

RECOMMENDATION:

Provide the following equipment in the Anytown ESS Switch Office:

1 Line Link Network
1 Trunk Link Network
3 Call Stores (8K)
1 Program Store
Trunks for AID

BASIS FOR RECOMMENDATION:

The present capacity of the Anytown No. 1 ESS switch office is 26500 main stations, of which 3500 are Centrex CO stations. The equipment provided with this order increases the capacity to 28583 main stations, including 5807 Centrex CO stations. Based on the Commercial Wire Center Forecast dated April 9, 1982 (adjusted), this capacity is sufficient to last until January 1, 1985.

Capacity is provided for four new Centrex CO's:

Jones & Jones, Inc.
Southwestern Hospital
Knotty Twine Corp.
State Government - FTS

The generic program will be updated to SP-CTX-8 with this order.

Call Store worksheets will be provided at a later date.

Refer Questions to:
Jennifer Johnstone
201-55-4321

Service Date: September 12, 1982
End of Period: January 1, 1985

Recommended	Approved
_____ 19	_____ 19 _____
_____ 19	_____ 19 _____
_____ 19	_____ 19 _____

Figure 5 - Traffic Order Statement (2.21)

```
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FOLLOWING INCLUDES:

                      QUANTITY                                              %TRAF
ITEM                  MTCE      TRAF          TRAF CAP        DEMAND        CAP

CPC                                           46760 MS      38065 MS       81
CCD
   NET(  LLN      )                           38079 MS      38065 MS      100
   SVC CKT (RCVR-DP    )                     38065 MS      38065 MS      100
TAN(BH=0+T: ABS)                              1776 CCS      1776 CCS      100

PROGRAM STORE              9 FRAMES
         TRANSLATION      25 MODS                        21.37 MODS
   UNDUPLICATED:  SPARE= 29764 WD          204800 WD     175036 WD       85

CALL STORE
            CC-CS         9-32K UNITS
   UNDUPLICATED:  SPARE= 13044 WD          147456 WD     134412 WD       91
            SP-CS         2-32K UNITS
   UNDUPLICATED:  SPARE=  5526 WD           32768 WD      27242 WD       83
NETWORK COMPONENTS

  LLN(LJR=4.0R)          10.00( 40 LSC)    147200 CCS    110389 CCS      75
    (HOST OFFICE ONLY)                     147200 CCS    110389 CCS
    LOAD(BH=0+T:ABS)                        50758 MS      38065 MS       75
     (HOST OFFICE ONLY)                     50758 MS      38065 MS
    LLN TERM                                37944 L1      37930 L1      100
    LINES(M/L=1.004)(HOST OFC ONLY)         37944 L1      37930 L1      100
     (HOST OFFICE ONLY)                     38079 MS      38065 MS      100
  TLN(TJR=1.50,%OC=47) 7.00( 42 TSC)       120438 CCS    120233 CCS    100
    TAN(BH=0+T:ABS)                          1776 CCS      1776 CCS      100
    MS                                      38132 MS      38065 MS      100
    TERMINALS                 10107                        9147         91

  JUNC(TAN/MS GR=    0.00)
    LL+IAO(BH=IAO:ABS)                      10902 CCS      8703 CCS      80
                                            47678 MS      38065 MS      80
      IAO TKS                  144   .      2592 CCS
                 F-F F-S  FR-F FR-S
      LL SGP      1   2     0    0
         CAP    162 102     0    0         8310 CCS

                 F-F F-FR FR-F FR-FR
      LT SGP      4    0    0    0
         CAP   1392    0    0    0        97440 CCS     97218 CCS
```

Figure 6 - Sample Capacity Summary (Sheet 1 of 3) (2.22)

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**************************************************
THE STAND-ALONE NETWORK MODULE IS RECOMMENDED FOR
ENGINEERING THE NETWORK; THEREFORE THE NETWORK PORTION
OF THE SERVICE CHECK REPORT IS INVALID

**************************************************

SERVICE CIRCUITS
CDPR(%TT= 32.3)                          14508 MS    13571 MS      94
     TT              1        23         4722 MS     4377 MS      93
     DP              2        68         9787 MS     9194 MS      94
     OVL                      27
RCVR
     MF  (10HD)      1         6           65 CCS      49 CCS      76
                                        18130 MS    13571 MS
     DP  (10HD)      1         3           16 CCS       9 CCS      57
                                        24920 MS    13571 MS
XMTR
     MF  (HD  )      1        10          149 CCS      82 CCS      56
                                        24924 MS    13571 MS
     DP  (HD  )      1        11          172 CCS      70 CCS      41
                                        33610 MS    13571 MS
RING
     REG (HD  )      2       109         2864 CCS    2769 CCS      97
                                        14039 MS    13571 MS
     SPL (HD  )      1         5           27 CCS      18 CCS      67
                                         5185 MS     3424 MS
COIN
     CONT(HD  )      1         7           55 CCS      47 CCS      86
                                          624 MS      529 MS      86
3PT CONF (ABS )      2        38          783 CCS     646 CCS      83
                                        16469 MS    13571 MS
TONE
     BUSY(HD  )      1        20          323 CCS     313 CCS      97
                                        14043 MS    13571 MS
     REG (HD  )      1        26          469 CCS     448 CCS      96
                                        14212 MS    13571 MS
     COM (HD  )      1        16          231 CCS     218 CCS      95
                                        14437 MS    13571 MS
     HIGH(HD  )      1         3            7 CCS       5 CCS      72
                                        23000 MS    13571 MS
     LOW (HD  )      1         4           16 CCS       6 CCS      30
                                        38500 MS    13571 MS
     ROH (ABS)       4        77         1898 CCS      55 CCS       3
                                       474500 MS    13571 MS
     REV (ABS)       1         4           30 CCS      95 CCS     317
                                          896 MS     2853 MS
     CL WT(ABS)      1         3            7 CCS       5 CCS      72
                                         1468 MS      942 MS
     AUD R(HD )      2       127         3420 CCS    3304 CCS      97
```

Figure 6 - Sample Capacity Summary (Sheet 2 of 3) (2.22)

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                                          14048 MS      13571 MS
TIE LINE CUT THRU
     LO (ABS)       1          1           1 CCS         1 CCS   100
     DO (ABS)       1          1           1 CCS         0 CCS     0
     TTIT(ABS)      1          1           1 CCS         0 CCS     0
 RECORDED ANNC
RA 1   VACANT CODE                  6      64 CCS        46 CCS    72
RA 2   ACC CD D I E                 4      29 CCS         4 CCS    14
RA 3   ACC CD N D                   4      29 CCS        10 CCS    34
RA 4   P TO P NOT AL                4      29 CCS         5 CCS    17
RA 5   DTF ANNC                     3      15 CCS         0 CCS     0
RA 7   PARTIAL DIAL                 6      64 CCS        36 CCS    56
RA 8   ROH                          8     105 CCS        88 CCS    84
RA 9   SP SVC ERROR                 4      29 CCS         5 CCS    17
RA 6   COIN OUT                     4      29 CCS         7 CCS    24
RA11   10 D CALL MD                 3      15 CCS         2 CCS    13
RA13   CAMA AC CD E                 3       6 CCS         0 CCS     0
RA12   COM ITC CTX                  3      15 CCS         2 CCS    13

S=DONE

REQUEST=GO EOL


   N. D. ORD. NO.     03204                          SECTION
    PROJECT NO.        12176                          PAGE
    CENTRAL OFFICE     716-372      ISSUE  5.02       DATE     04/27/82

                        EDIT AND OVERRIDE LIST

MNEMONIC         DESCRIPTION                    PRIOR VAL  EDIT VAL OVRRD VAL

M3PT CONF        MINI 3 PORT CONF CKT     04302        35        40
MRNMH TONE       MINI TNE TRK-REV NO M-H  07800        11         5
XMTR-MF          TRANSMITTERS MF          06670         8        11
XMTR-DP          TRANSMITTERS DP          06970         8        12
MCDPR-OV         MINI OVFL CUST DIGIT RCVR06401        26        28
TLCTD02870       TIE LN CUT THRU-D O ORIG 02870         0         2
TTITC            TT & INC TIE TRK COMB    02970         0         2
PS256            256K PROGRAM STORE                     6         6
CS256            256K CALL STORE                        4         5
MROH TONE        MINI TNE TRK-ROH TNE     07800         8         9        81
MIAO             MINI IAO TRK             07400        90        96
MRGRING13        MINI RNG CKT-REG ZONE 13 06101       108       111
MAUD RING        MINI RNG CKT-AUD         07800       126       129
RA2              RAYY2 ACCSS CDE DIALED IN ERR           2         4
RA3              RAYY3 ACCESS CODE NOT DIALED            3         4
RA4              RAYY4 PRSN TO PRSN NOT ALLOWED          3         4
```

Figure 6 - Sample Capacity Summary (Sheet 3 of 3) (2.22)

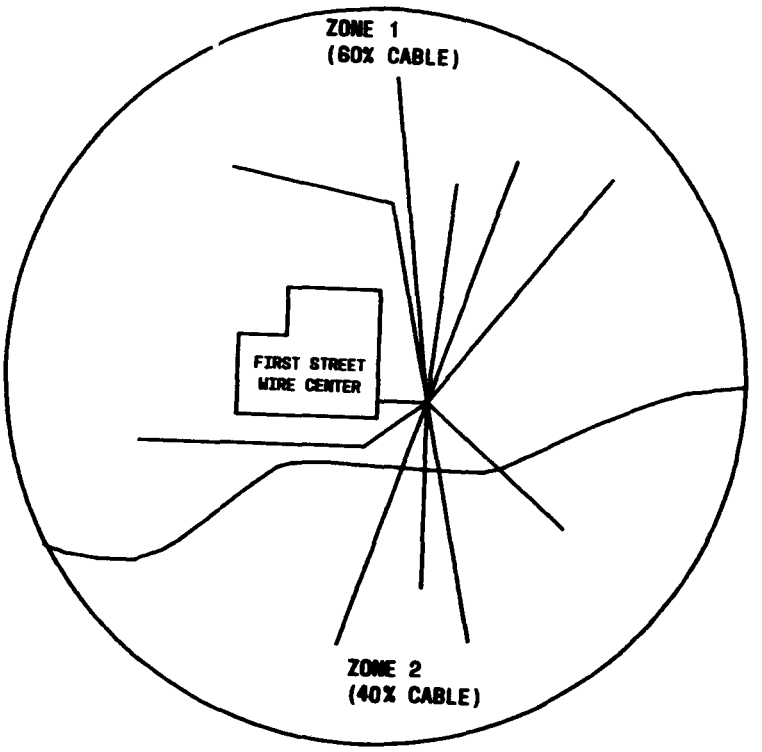

Figure 7. Wire Center Rate Zone Boundary (3.18)

TRAFFIC FACILITIES COUNT—CUSTOMER SWITCHED BASIS

SEPT 82 PAGE 321

SECTOR SOUTH WIRE-CENTER NPA ENTITY PREFIX

CATEGORY	ACTUAL IN-SERVICE LINES	ACTUAL IN-SERVICE MN STAS	CATEGORY	ZONE	ACTUAL IN-SERVICE LINES	ACTUAL IN-SERVICE MN STAS	CATEGORY	ACTUAL IN-SERVICE LINES	ACTUAL IN-SERVICE MN STAS
BUSINESS			INTERSTATE				INFORMATIONAL		
1 1-PTY MES	18784.	18784.	OUTWATS	ZONE			POTS		
2 1-PTY FLT	26.	362.	32 FBD	1			68 CALL WTG		1118.
3 2-PTY FLT			33 FBD	2			69 CALL FWG		800.
			34 FBD	3	3.	3.	70 3WY CALL		443.
			35 FBD	4			71 SPDCL 8		212.
DIDS			36 FBD	5	15.	15.	72 SPDCL 30		86.
6 PBX	668.	668.	37 FBD	6			73 TOUCH-TONE		15917.
7 CTX-CU	570.	570.	38 FBD	7					
8 H/M LOCAL	39.	39.	39 MES	1	2.	2.	CENTREX CO		
9 H/M TOLL	117.	117.	40 MES	2			74 CALL WTG		
			41 MES	3			75 CALL FWG		5039.
DIDS			42 MES	4			76 3WY CALL		9575.
1 CTX-CU	514.	514.	43 MES	5	57.	57.	77 SPDCL 8		
			44 MES	6			78 SPDCL 30		
MISCELLANEOUS			45 MES	7			79 TOUCH-TONE		9155.
15 COIN PUB	1393.	1393.	INWATS						
16 COIN SP	356.	356.	46 FBD	1					
17 NON COIN SP	8.	8.	47 FBD	2			81 RCF	287.	287.
18 BUS ANS LN	255.	255.	48 FBD	3			82 ORTS		
19 SUB 4-PTY			49 FBD	4			83 HUNT LNS		11283.
20 SUB 8-PTY			50 FBD	5			84 CO BUS	2600.	2600.
21 FARMER			51 FBD	6			85 OCMS		27.
22 DIAL MOB			52 FBD	7			86 MAN MOB		585.
23 TWX			53 MES	1					
24 CTX-CO	12463.	12463.	54 MES	2			COMPUTER PORTS		
			55 MES	3			88 LONG HT-T		56.
RESIDENCE			56 MES	4			89 SHORTHT-T		32.
25 1-PTY FLT	13804.	13804.	57 MES	5			90 POLLING-Q		16.
26 2-PTY FLT			58 MES	6					
27 4-PTY FLT			59 MES	7			91 ENFIA		336.
28 1MR-60	716.	716.							
29 1MO-20	2078.	2078.	INTRASTATE						
30 2MR-60			OUTWATS						
31 2MO-20			60 FBD	0	4.	4.			
			61 FBD	8	3.	3.			
			62 MES	0	22.	22.			
			63 MES	8	57.	57.			
			INWATS						
			64 FBD	0	2.	2.			
			65 FBD	8	20.	20.			
			66 MES	0	33.	33.			
			67 MES	8	17.	17.			

TOTAL MAIN	39328.	39664.
TOTAL EQUIV	12698.	12698.
TOTAL MAIN&EQV	52026.	52362.
TOTAL BUS&COIN	35076.	35412.
TOTAL RESIDENCE	16598.	16598.
TOTAL FLAT	15845.	16181.
TOTAL MEASURED	23483.	23483.

Figure 8. Computerized Count of Working Main Stations (3.38)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Entity A – Capacity	22,000	→	→	→	→	→	→	→	→	→	→	22,000
Actual Working	17,600	17,800	17,950	18,300	18,500	18,700	18,950	19,200	19,300	19,500	19,700	19,800
% Capacity	80	81	82	83	84	85	86	87	87	88	89	90
Entity B – Capacity	21,750	→	→	→	→	→	→	→	→	→	→	21,750
Actual Working	18,922	18,950	19,100	→	→	→	→	→	19,250	19,325	19,450	19,575
% Capacity	87	87	88	→	→	→	→	→	88	89	89	90

Figure 9. Directed Loading (3.51)

NUMBER ASSIGNMENT

SERIAL # _____ DATE _____ EXCHANGE _____ PREPARED BY _____ TELEPHONE _____

	NXX	XXXX	SERVICE ORDER#	DUE DATE		NXX	XXXX	SERVICE ORDER#	DUE DATE
1					16				
2					17				
3					18				
4					19				
5					20				
6					21				
7					22				
8					23				
9					24				
10					25				
11					26				
12					27				
13					28				
14					29				
15					30				

REMARKS:

CENTRAL OFFICE _____ ZONES _____ CLASS OF SERVICE _____

Figure 10 - Number Assignment List (3.56, 4.03)

LIST OF LINE EQUIPMENT–AVAILABLE FOR ASSIGNMENT

WIRE CENTER _____ LIST NUMBER _____

ENTITY TYPE _____

ENTITY NUMBER _____ DATE _____

NXX(S) _____ BY _____

CLASS OF SERVICE _____ TELEPHONE _____

MDF LOCATION		LINE EQUIPMENT				LINE EQUIPMENT FEATURES				SERVICE ORDER NUMBER	ASSIGNED TELEPHONE NUMBER	DUE DATE	LONG JPR
ZONE	VERT	LTN LLN LLF LFG	CG LSF BAY CON VG BNK	CON SW HG LVL	SW-LVL LVL VF TER	DP OR DTMF	ESL	SLV	GRD START				
VERT	SIDE	CH BAY	OC SHELF	COL PACK	SW V UNIT								
MOD	SHLF	LM FRM & BAY	LD	LC	PTY								

Figure 11 - Line Assignment List (3.56, 4.03)

Page 1 Of 1
Dated: 1/3/83

WIRE CENTER SUMMARY

Building: Main Street

Wire Center Name: Worrytown

No. of Entities: 3

General Loading Plan:

New growth should be taken in ESS switch. Begin new coin modernization program. Canvass customer to find those who will accept telephone number changes into the new equipment.

Wire Center and Entity Capacities: 28,000 lines

Forecasted Growth: 5000 lines

Growth Entity: ESS Switch

Working Main Stations: 18,000

Planed Relief: Scheduled for Sept. 1, 1985

Expected % Capacity at end of service year: 90%

Area of special concern: Memorial Hospital centrex cutover (1200 main stations).

Figure 12 - Wire Center Summary (4.04)

Page 1 Of 1
Dated: 1/3/83

ENTITY SUMMARY

Building: Main Street

Entity: SXS

Entity Capacity: 8000 lines

Additions: 2000 lines

Limiting Item(s): Lines and numbers

Working Main Stations: 7575

Spare Capacity: 425

Sensitivity Analysis — (Assumption used, disconnect rate, DTMF dialing demand, business, residence mix, etc.)

DTMF demand expected to increase 75% during the service year. Forecasted disconnect rate is not high enough to accommodate this demand. Assign all new growth into the ESS switch.

Figure 13 - Entity Summary (4.05)

LOADING PLAN
WIRE CENTER PROFILE

WIRE CENTER _____

INTERVAL _____ **TO** _____

Page ____ of ____
Dated: ___/___/___

LINE NO.	CLASS OF SERVICE_____		DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	CAPACITY														
2	WORKING	EST													
3		ACT.													
4	% CAPACITY	EST													
5		ACT.													
6	PENDING ASSIGNMENTS														
7	NET CHANGE	EST													
8		ACT.													
	CLASS OF SERVICE _____														
1	CAPACITY														
2	WORKING	EST													
3		ACT.													
4	% CAPACITY	EST													
5		ACT.													
6	PENDING ASSIGNMENTS														
7	NET CHANGE	EST													
8		ACT.													

Figure 14 - Wire Center Profile (3.59, 4.06)

WIRE CENTER _____

LOADING PLAN
ENTITY PROFILE
ENTITY _____
INTERVAL _____ TO _____

Page ____ of ____
Dated: ____/____/____

LINE NO.	CLASS OF SERVICE		DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	CAPACITY / LIMITING ITEM														
2	LINE / NUMBER CAP.														
3	WORKING	EST													
4		ACT.													
5	% CAPACITY	EST													
6		ACT.													
7	PENDING ASSIGNMENTS														
8	NET CHANGE	EST													
9		ACT.													
	CLASS OF SERVICE _____														
1	CAPACITY / LIMITING ITEM														
2	LINE / NUMBER CAP.														
3	WORKING	EST													
4		ACT.													
5	% CAPACITY	EST													
6		ACT.													
7	PENDING ASSIGNMENTS														
8	NET CHANGE	EST													
9		ACT.													

Figure 15 - Entity Profile (4.11)

STATUS SUMMARY FORM

WORRYTOWN WIRE CENTER — **ENGINEERING PERIOD 7/80 TO 12/81**

LINE	COLUMN: → (A) TOTAL WIRE CENTER:		(B) CURRENT SERVING CAPACITY	(C) FCST'D DEMAND BY E-O-P	(D) B-O-P ACTUAL M.S. 7/80	(E) QUANTITIES → 8/80	(F) (ETC) 9/80	(X) E-O-P LOADING OBJECTIVES	(Y) CAPACITY CHANGE 12/81	(Z) NOTES
(1)	TOTAL MAIN STATIONS		28,000	27,100	20,715	21,225	21,635	24,850	+5,000	
(2)	TOTAL POTS (DP)	M.S.	18,500	12,000	13,500	13,550	13,600	11,600	−2,000	
(3)	TOTAL POTS (DTMF)	M.S.	10,000	10,500	5,300	5,500	5,650	10,000	+5,825	
(4)	TOTAL POTS	M.S.	23,600	22,500	18,800	19,050	19,250	21,600	+3,825	
(5)	TOTAL COIN	M.S.	2,300	1,250	1,100	1,105	1,110	1,250	−1000/+200	
(6)	TOTAL CO-CTX (DTMF)	M.S.	1,250	1,700	700	810	950	1,150	+550	
(7)	TOTAL OTHER	M.S.	850	1,650	115	260	325	850	+425	
(8)	MONTHLY NET MS CHANGE			+ 355	–	+510	+410	+230		
(9)	S-X-S: TOTAL	M.S.	10,000		10,200	10,075	9,950	9,000		
(10)	POTS (DP)	M.S.	9,000		9,100	9,075	9,050	9,000		
(11)	COIN (DP)	M.S.	1,000		1,100	1,000	900		−1,000	
(12)	MONTHLY NET MS CHANGE				–	−125	−125	−66		
(13)	SERVICE: % POTS	D.T.D.			2.2	2.1	2.1	≤ 2.0		
(14)	% COIN	D.T.D.			2.5	2.0	2.0	≤ 2.0		
(15)	POTS	L.B.I.			93	94	94	≥ 96		
(16)	COIN	L.B.I.			94	92	90	≥ 96		
(17)	5XB: TOTAL	M.S.	10,000		10,100	9,950	9,825	7,900	–	
(18)	POTS (DP)	M.S.	4,500		4,400	4,350	4,300	2,500	−2,000	
(19)	POTS (DTMF)	M.S.	4,800		5,300	5,175	5,075	4,800	+2,000	
(20)	TOTAL POTS	M.S.	9,300		9,700	9,525	9,375	7,300	–	
(21)	CO-CTX "A" (DTMF)	M.S.	500	400	300	310	325	400		
(22)	OUTWATS	M.S.	200	250	100	115	125	200	+100	
(23)	MONTHLY NET MS CHANGE				–	−150	−125	−122		
(24)	SERVICE: (DP/DTMF)	%D.T.D.			1.5 / 2.5	1.4 / 2.3	1.2 / 2.2	≤ 2.0		
(25)		%I.M.L.			2.4	2.3	2.2	≤ 2.3		
(26)		L.B.I.			93	94	95	≥ 96		
(27)	"ESS" SWITCH: TOTAL	M.S.	8,000		415	1,200	1,860	7,950	+3,825	
(28)	POTS (DP)	M.S.	3,000		–	125	250	100	–	
(29)	POTS (DTMF)	M.S.	5,200		–	325	575	5,200	+3,825	
(30)	TOTAL POTS	M.S.	5,300		–	450	825	5,300		
(31)	COIN (DTMF)	M.S.	1,300		–	105	210	1,250	+ 200	
(32)	CO-CTX "B" (DTMF)	M.S.	750	1,000	400	500	625	750	+ 250	
(33)	CO-CTX "C" (DTMF)	M.S.	–	300	–	–	–	–	+ 300	
(34)	PBX/CU-CTX GR. ST.	M.S.	150	300	15	25	35	150	+ 75	
(35)	CUSTOM CLG. CFD	M.S.	100	200	–	25	35	100	+ 50	
(36)	CWT	M.S.	100	200	–	20	25	100	+ 50	
(37)	TWC	M.S.	100	200	–	25	30	100	+ 50	
(38)	SC1/SC2	M.S.	50 / 50	100 / 100	– / –	10 / 5	15 / 10	50 / 50	+25 / +25	
(39)	RCF	M.S.	100	300	–	35	50	100	+ 50	
(40)	MONTHLY NET MS CHANGE				–	+785	+660	+418		
(41)	SERVICE:	% D.T.D.			0	0	0.2	≤ 2.0		
(42)		% I.M.L.			0	0	0.2	≤ 2.3		
(43)		L.B.I.			99	99	98	≥ 96		

Figure 16 - Status Summary Form (4.17)