

Network Design and Implementation

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Steps in Network Design and Implementation

1. Conduct a Feasibility Study

The purpose of a feasibility study is to determine the possibilities of improving the *current network* or developing a totally *new network*. A feasibility study defines the scope and dictates the *needs* of a data communication network. It proposes a solution to problems with existing networks and also for new networks, and it states the *purpose* or *objectives* of the network to be developed. There are several assessment *factors* that are used to determine these needs and objectives, and they fall under two main categories: *management issues* and *technical issues*. Examples of management issues include: need to increase level of service or quality of service, need for more timely access to information for decision making, and need for better exchange of information across international or regional locations. Examples of technical issues include: unreliability of current network, obsolete network hardware/software, need to interconnect computers, need for distributed data processing, inadequate security/privacy, and desire to take advantage of new technologies.

2. Prepare a Network Design Plan

A network design plan takes into account the technical, operational, and economic feasibility of the network in relation to the needs of the company/institution. This plan considers the managerial and technical requirements laid out in the feasibility study such that network is kept within budgetary limits, is useful for users who conduct their daily business using the network, and can be realistically implemented. The network is not designed as yet but rather a plan is laid out which lists the major, intermediate, and minor goals of the network. Tentative completion schedules, a preliminary list of the departments that are expected to use the network and a list of evaluation criteria for measuring the success of the network are included in the plan.

3. Understand the Current Network

This step provides a benchmark against which new network requirements are gauged. Understanding the current network (if any) provides a clear picture of the processing times, sequence of operations, existing costs, user/management needs, work volumes, security controls, and current network documentation (manuals, protocols, software, hardware)

4. Define the New Network Requirements

Here, the new network design is formulated with details on required circuit capacity for handling average and peak message volumes and ranges for acceptable processing times (data transmission and calculations) for users to complete their work-related tasks. The designer considers costs compared to response times when coming up with

a design in order to keep the network within budget whilst still meeting the managerial and technical requirements of the network. Factors that affect costs include speed and capacity of host computers, communication circuits, software and protocols. Matters related to response times include message input time (affected by transmission speeds, queuing at remote devices or hosts), application processing time (affected by database access times, message traffic, number of transactions being handled by a server or host), and messaging output time (affected by transmission time, internal queuing within the host computer).

5. Define Geographic Scope and Design Network Configuration

The list of applications that are expected to use the network and the location of each of these applications and their interconnectivity requirements are considered in this step. The geographic map of the network is drawn up here. There are four basic levels of geographic scope: international, country-wide, city-wide/state-wide, and local (one building or a series of buildings on the same property). Next, the hardware, software, and the type (wired, wireless, mixed etc) and placement of network circuits are considered. This is an iterative process. Hardware considerations include: terminals, microcomputers, file servers, database servers, gateways, bridges, routers, switches, smart or programmable terminals, models, LAN hubs, host computers etc. Software considerations include: traffic analysis, application processing, protocols, security software, network management software.

6. Implementing the Network

This step involves assembling the various pieces of hardware, protocol/software programs, network management/test facilities, and communication circuits into a working network. After management has agreed to install and finance the network, the implementation begins. An implementation plan specifies how this is done. It includes written procedures that specify how each task will be performed, training required, and complete documentation of the operating network. Four approaches can be used to implement the new network:

- Direct cutover: all computers are started up on the new network at the same time
- Chronological cutover: computers are converted in sequence through the network. Both old and new computers are in operation at the same time.
- Phased implementation: similar geographical areas within the network are started up at one time and then others later.
- Pilot operation: a test facility is established to ensure the operation is as expected before cutover is made.

Once the new network is in place, training of users can begin. This is done through individual user training and/or extensive written manuals, online help screens and so on. Testing of the network is ongoing in this stage.