Step 7

Establish Service Quality Objectives

In addition to the types and amount of service required, the quality of service should be considered and documented as part of the needs analysis. Figure 7.1 shows the factors that determine basic service quality.

To ensure that basic objectives are adequately served, fundamental plans and policies must be consulted when setting objectives for each of these factors. Although rural objectives should be consistent with urban objectives, some allowances might be made considering the need for low cost, subscribers' possibly higher tolerance to impairments, and the fact that future improvements are anticipated or planned.

Some typical objectives for subscriber access systems are given in the following subsections. Objectives for trunk systems should be higher, because more subscribers would be affected by any single system problem. Trunk objectives are part of the administration's policy; they are covered extensively in the CCITT and CCIR recommendations and reports.

7.1 Grade of Service

Grade of service is usually expressed in terms of the probability that a call request will be blocked or not satisfied because of lack of network resources during the normal busy hour.

If calls blocked by a lack of resources are cleared from the system (not held), then typical grade of service objectives range from $P = 0.01$ to $P = 0.05$ (that is, the probability of a call being blocked equals 1 to 5 per cent, respectively). The higher probabilities are often applied to small trunk groups and might be suitable for rural conditions where channel capacities are limited.

Higher probabilities should not be used as design objectives without careful consideration. Calls that are not eventually placed represent lost revenue and cause customer dissatisfaction. As the probability of blocking exceeds about 10 per cent ($P = 0.10$), network congestion can increase rapidly with recurring call attempts. A high proportion of customers may be turned away.

When blocked calls are held until the necessary network resources become available, the grade of service objective is often stated as an average waiting time expressed as a ratio of the average call holding time. A ratio of 1:10 is typically used (often expressed as a percentage; i.e. 10 per cent). This corresponds to an average waiting time of 12 to 18 seconds if call holding times are averaging 120 to 180 seconds.

Alternatively, when blocked calls are held, the grade of service objective can be stated as the probability that delay will exceed some set time. For example, with a probability of 1 per cent, blocked calls will be delayed more than 10 seconds. In other words, 99 per cent of all calls delayed will be satisfied within 10 seconds.

Because the grade-of-service objective along with the traffic estimates governs dimensioning and because dimensioning has significant cost implications, the grade-of-service objective must be chosen with care. If confidence in the traffic forecasts is low, a conservative grade-of-service objective, which allows some margin, is probably a good idea.

7.2 Equipment Availability

Equipment availability is usually expressed as a probability that the system will not be degraded by an equipment-related problem or failure. Degradations may be circuit quality impairments or service outages. The objective for this factor must be set based on the exact definition chosen.

For example, the equipment availability for a rural subscriber access system could be defined as "the probability (with a 90 per cent confidence level) that all necessary equipment connecting any subscriber is functional and operating within maintenance limits".