favour of localizing all transaction oriented services into the missions, the operations implications weight the data architecture in favour of regionalizing data bases and implementing transaction oriented services across the wide area subnetwork.

e. The approach to implementing the optimum solution will have to take into consideration the specifics of delay, expected traffic volumes, and availability on at least a per region basis, and perhaps on a per mission basis where experience has shown unreliable and poor quality service in "the last mile". In general, a hybrid approach will lead to the optimum balance between quality service perception from the end users and maintainability of centralized information and human resources.

4.4 Internetwork Device Repair Rates and Sparing Levels

a. The availability of SIGNET is affected by the Mean Time to Repair of a failure and in turn by the ready access to spare components. Determination of spare levels takes into account the rate of failure of components in the network, the rate at which the failure can be resolved, and the availability objective for the particular component. The availability equations, Section 4.2 paragraph a., may be re-stated as:

$$\text{Availability} = \frac{\mu}{\lambda + \mu}$$

where

$$\lambda = 1 \ / \ \text{MTTF}$$
$$\mu = 1 \ / \ \text{MTTR}$$

which are the failure rates and repair rates of components of interest respectively.

b. Given a population of n components, the effective failure rate in the population is $n \lambda$. Given a repair rate of μ to resolve a failure, the required sparing level, m, can be determined from:

$$m = \frac{A \ n \ \lambda}{\mu \ (1-A)}$$

where

A = availability objective for the component.

c. As an example, consider a population of 120 mission routers. The Mean Time to Failure is stated by the manufacturer to be 36 months which equates to a failure rate of one failure per 26,280 hours. Given the general dispersive geography of the missions, the spares are to be located in such a fashion that the Mean Time to Repair is 24 hours. Finally the overall availability of SIGNET requires that the