



DESIGN, DEVELOPMENT AND DEPLOYMENT OF VOICE COMMUNICATION NETWORK

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Abstract : The voice communication is used in communication networks. These networks are wide area network, which utilizes packet switching techniques. These voice packets are multiplexed, encrypted and sent through wireless or leased line links. The link can be wireless link or leased line link. Wireless link uses VHF Radio and line link uses modems. These Voice networks are deployed as per the requirement.

Key words: FEC, LOS, MUX, DEMUX

Introduction : In any scenario Voice communication is very important. Since voice need to be real time , the delays in the channel is tried to keep minimum, but it can not be avoided as channel always adds noise .Leased line do not give delays but there is always possibilities to Tap the lines , hence trade off between near real time and delays.

Design and Development :The voice communication is in near to real time environment, the maximum delay in the longest link is less than one second. Error control schemes are also employed so as to receive correct information without waiting for the acknowledgement or negative acknowledgement by reverse channel. The main issues are delays in packetisation / encryption and error control coding. The communication is bursty and non-continuous in nature. The designed network covers deployment area of 100 km x 90 km.

The voice conversation is bursty in nature, there is silence areas in between the talk areas, hence packet switching technique is used. At source these packets are transmitted and at destination the received packets are buffered and then played out with some delay.

These voice packets travels through various modes hence there is some delay and also some packets may arrive with error or some packets may be ever lost One link gives delay of 250-

320ms, encryption/ decryption of voice packets with DES accounts for delay of a second. Some amount of delay is attributed to channel coding schemes. Because of diverse nature of channel, Concatenated Forward Error Correction (FEC) scheme is used. FEC uses Reed Solomon (RS) coding and convolution coding with interleavers. At receiver RS decoder and Viterbi decoder along with deinterleaver is used.

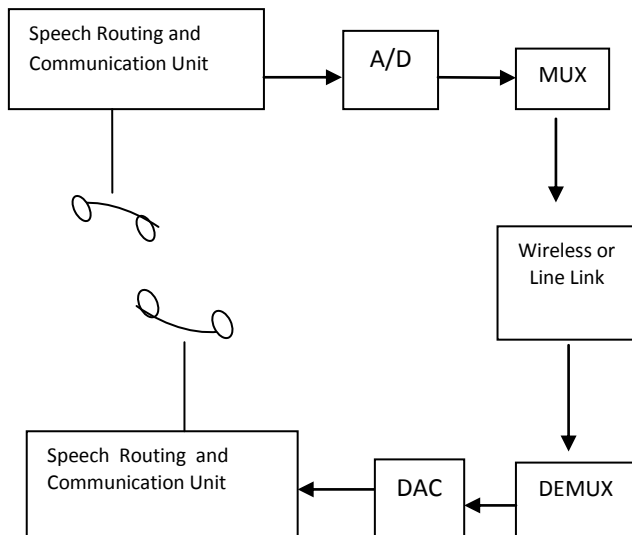


Fig 1: Voice Communication Unit

Voice Communication Unit: Voice Communication Unit consists up of Speech Routing and Communication Units, Multiplexer (MUX) and DeMultiplexer (DEMUX), Analog to Digital Convertors (A/D) , Digital to Analog Converter (DAC) and Wireless / Line Links.

The Speech Routing and communication units are with switching digital exchange and special telephone equipment which can route audio to different users in any hierarchy and simultaneously communicate with other users through telephone equipment.

Analog speech is digitized by PCM encoders and voice codes. Many speeches are multiplexed and packets are buffered. These packets are then transmitted. If wireless links are used the channel coding with encryption is applied, which accounts for less data throughput and more delays. In line links there is no encryption and no channel coding is employed, hence the delay is only attributed to leased line delay. The digital, non-blocking type of exchange are used for voice routing.

The multiplexers used are TDM and AT&T modems are used. The normal telephone cables are used. And if OFC connectivity is available in some existing networks, it can also be used.

Deployment : The connectivity shown in fig. 2 represents the different levels of hierarchy and **types** A, B, C & D. Each hierarchy is in WAN network and each **type** is internally having their own LAN network. The maximum distance between each **type** and its hierarchy is 20 kms based on the Line Of Sight between stations. If the required distance between two hierarchies is more than 20 kms then Repeaters are used. These repeaters receive the signal, process, boost and retransmit the signal to the desired direction. There are other parameters are also considered while carrying out the deployment namely geographic and climatic condition to arrive its viability. A same meticulous deployment process is repeated for all the stations. Finally the effective coverage is measured and re-adjusted till the required overall deployment is achieved.