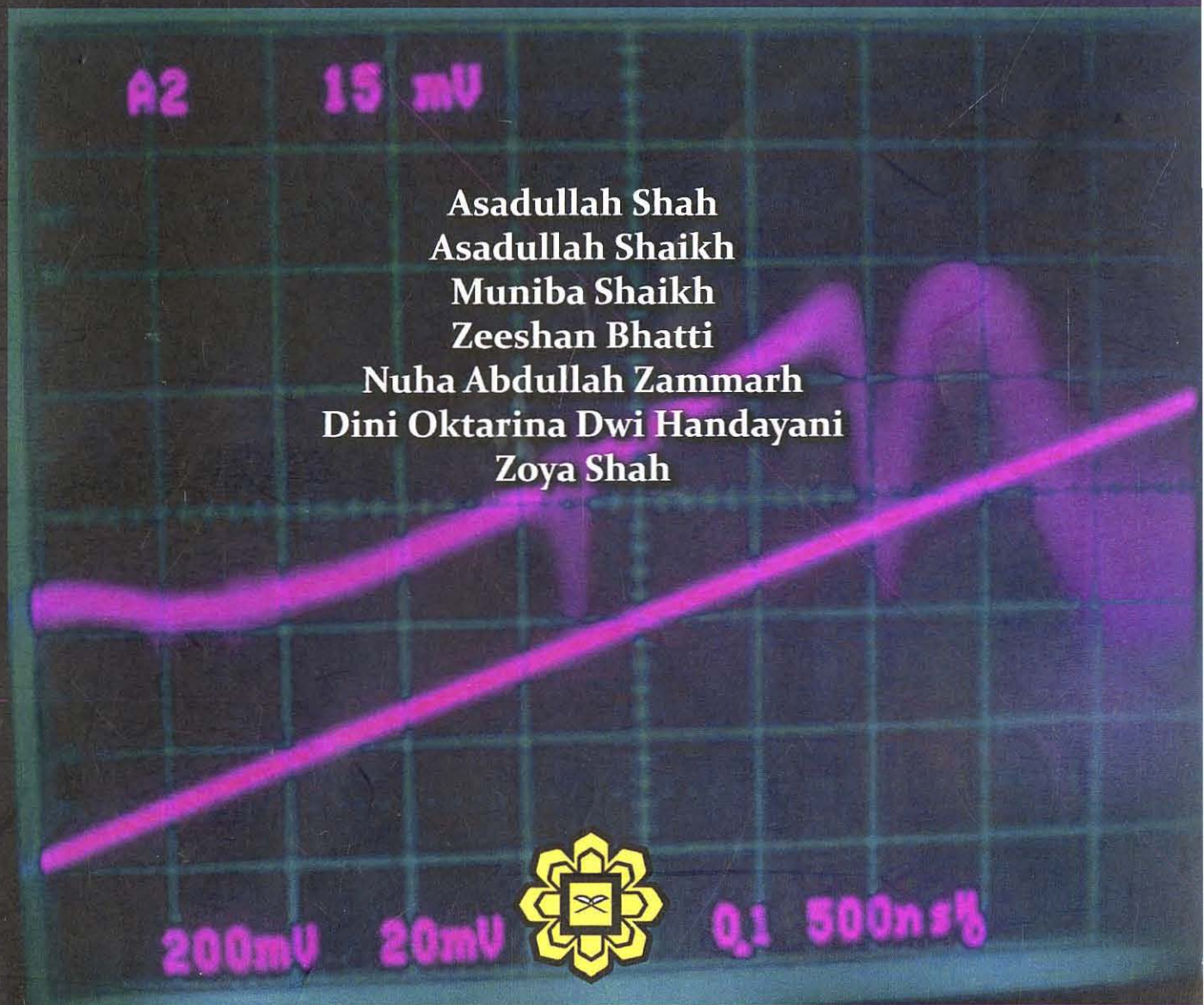
STATISTICAL TIME DIVISION MULTIPLEXING ARCHITECTURES AND DESIGN



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2. Digital Multiplexing Techniques

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2.0 Abstract

Multiplexing techniques are broadly classified as analogue and digital, digital being the latest. Time Division Multiplexing (TDM) and Statistical TDM are most commonly used digital multiplexing techniques. The TDM is a deterministic method of multiplexing various sources in pre-determined fixed slots. Statistical TDM, (STDM) uses dynamic method of allocating time slots to only the active users. The dynamic nature of slot allocations enhances bandwidth utilization better than TDM however this property of STDM is always suitable for non-delay sensitive systems. For real-time and delay sensitive systems the TDM approach is the better option.

The era of digital communications started in the 1960s, networks gradually started to carry digital coded bits instead of analogue signals. Simultaneously the analogue to digital speech representations Pulse Code Modulations (PCM) 64 kb/s were introduced. Meanwhile two multiplexing standards, North American PCM-24 and European PCM-30 systems were introduced as primary multiplexing standards for digital telephone communication adopted for Public Switched Telephone Networks. The number of circuits supported by these multiplexing systems was still limited to the capacity of the systems, which is 24, and 32 channels including the signalling channels by North American and European systems respectively. The maximum throughput is N/C = 1 i. e., the ratio of the number of circuits supported to the number of channels within these systems, can be attained only during higher traffic intensity periods.

These systems divide the total transmitting time of the outlet channel into small Time Slots (TS), equal to the transmission time required for an individual source multiplexed on the link. The bit streams are (synchronously) taken from each tributary bit by bit or byte by byte and are placed into a TDM frame. Each frame starts with a synchronisation bit pattern, to indicate to the receiver end two things: the start of each frame, and each user's location within the TDM frame. This enables the receiver to correctly detect the user's data for routing to the directed destinations.

2.1 Digital Speech Interpolation