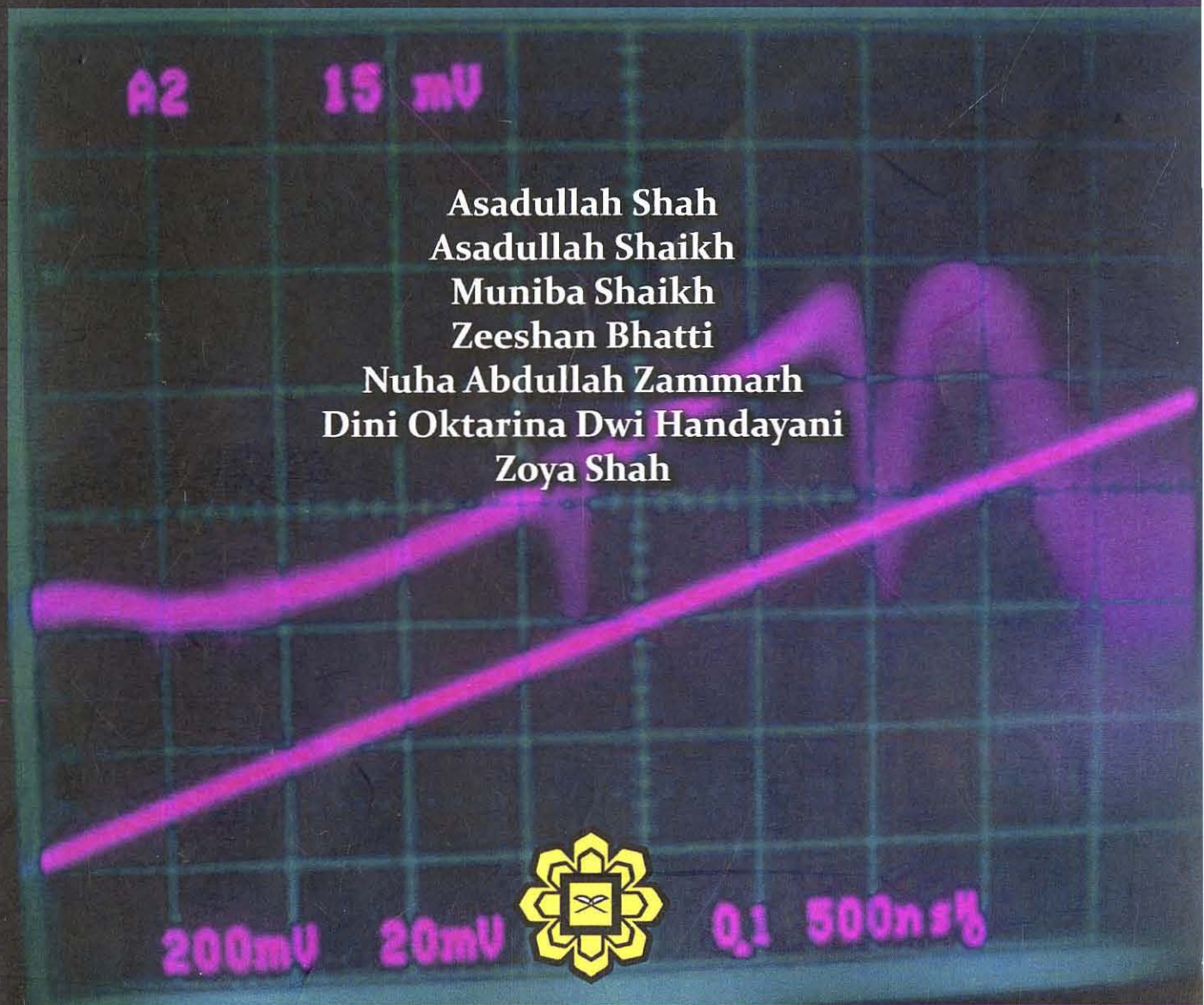
STATISTICAL TIME DIVISION MULTIPLEXING ARCHITECTURES AND DESIGN



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1. Transmission Bandwidth Efficiency Enhancement Techniques

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1.0 Abstract

All communication channels transmit information form one user to another using channel bandwidth mostly measured in bits/second. With the advent of latest technological tools, the bandwidth efficiency of all the channels may be enhanced beyond their normal transmission capability; mean more bits can be transmitted through the same channel. Techniques such as low bit rate encoding, variable bit rates, compression of source data, digital speech interpolation, discontinuous transmission and lost frame reconstruction are some of those signal processing techniques that can be exploited to enhance bandwidth efficiencies of the channels. In this chapter bandwidth efficiency techniques are detailed.

1.1 Introduction

Techniques such as frequency reuse, multi beam systems, sophisticated modulation schemes, demand assignment protocols, multiplexing, low bit rate coding and DSI have great potential of bandwidth savings. Among multiplexing techniques, Statistical Time Division Multiplex-ing is a powerful technique for bandwidth savings.

Speech, and video signals are characterised as having most bandwidth saving capability because these signals can be compressed and transmitted at much lower bit rates. The intro-duction of low bit rate speech compression techniques, such as Adaptive Differential Pulse Code Modulation at 32 kb/s, and Linear Predictive Coding based techniques have proved to be most successful in maintaining a speech quality acceptable to customers. Low bit rate coders have the potential of bandwidth savings ratio of many times greater than Pulse Code Modulations systems; although speech quality cannot be maintained up to the degree of the pulse code modulations.

In normal conversational speech in telephony each user is inactive for about 60% of the time; only 40% of the time are users using the channels. Ideally, other users can utilize bandwidth during periods of non-activity by the users only if efficient Activity Detection algorithms are