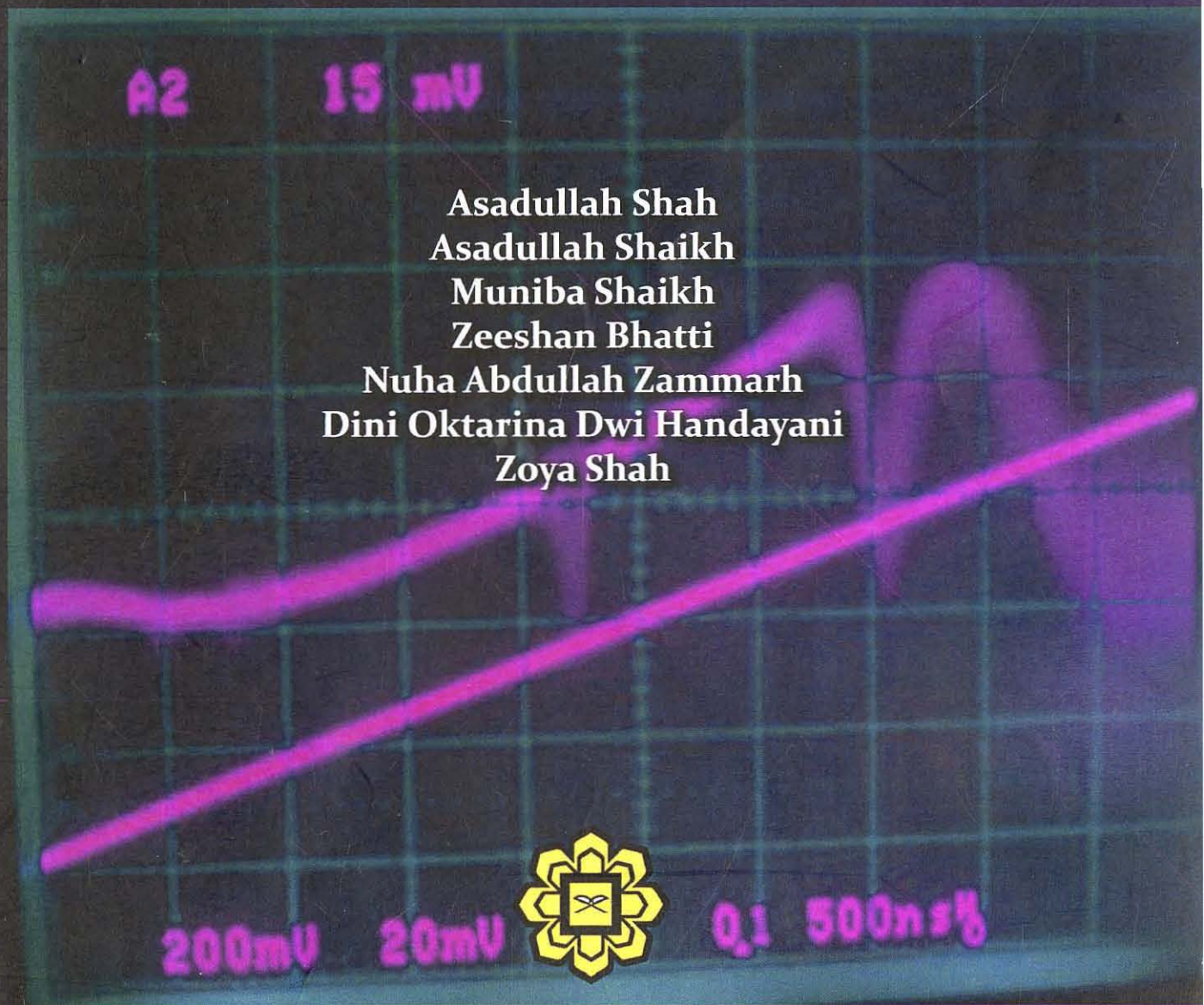
STATISTICAL TIME DIVISION MULTIPLEXING ARCHITECTURES AND DESIGN



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IIUM Press
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Published by:

IIUM Press

International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Asadullah Shah

Statistical Time Division Multiplexing Architecture and Design / Asadullah Shah ... [et al.].

ISBN: 978-967-418-190-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by:
IIUM PRINTING SDN. BHD.
No.1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

9. Low Bit Rate Speech Multiplexer Tools

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9.0 Abstract

In multiplexing many sources are combined in a common channel to maximise the bandwidth of the system. There can be many components of the STDM such as compressed speech sources at lower rates, voice activity detectors and lost frames reconstruction. This chapter briefly explains all three major components for the under lying multiplexer architectures.

9.1 Introduction

For a thin route multiplexing link optimisation, three factors are considered (a) low bit rate speech coding that is already covered in 3, (b) Voice Activity Detection (VAD) and (c) Lost Frame Reconstruction (LFR). The bandwidth of any link, without employing VAD is limited to the maximum number of circuits connected to the link. For example, in a 64kb/s link, a single PCM 64 kb/s source can be accommodated, but through the same link at least 9 users, each of 64 kb/s, can be multiplexed excluding the signalling information. The capacity of such a link can be further increased by exploiting the activity of speech signal and statistically multiplexing users on link. Thus, further increase in bandwidth can be achieved by the proportion of silent periods detected. In a statistical multiplexing environment the load variations at the multiplexer input change dynamically. Since none of the users are allocated fixed slots, as is the case of conventional Time Division Multiplexing (TDM), the sudden demand for bandwidth can exceed the capacity of the link. Sudden surge of users and bandwidth requirement can be tackled by two alternative approaches: either buffering incoming data for any time period until the link is free, this may lead to a potential increase in delay which cannot be afforded for a delay sensitive, real time speech service; or by forcing excessive number of users to withdraw from their small segments of speech (frames), a similar concept is employed for congestion control in voiced multiplexer traffic smoothing. Such a forced frame discard could cause a varying degree of distortion in speech. The compensation of distortion can be performed by activating LFR for the relevant segments of speech.

9.2 Speech Database