

Ultra-wideband Propagation Measurements
and Modeling
Final Report

DARPA NETEX Program
Virginia Tech

Principal Investigators

R. Michael Buehrer

Ahmad Safaai-Jazi

William Davis

Dennis Sweeney

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Contributing researchers

- Ahmed Attiya
- Jeff Reed
- Brian Donlan
- Swaroop Venkatesh
- Jihad Ibrahim
- David McKinstry
- Joseph Noronha
- Stani Licul
- Vivek Bharadwaj
- Liu Yang
- Ahmet Bayram
- Tim Bielawa

1. Chapter 1: Executive Summary

1.1. Introduction

This report details the work for DARPA-NETEX program by Virginia Tech. The report summarizes the results for each of four major tasks. Specifically, the project can be broken into

- Task 1 - Antenna Characterization
- Task 2 – Indoor Measurements and Deterministic Channel Modeling
- Task 3 – Outdoor Channel Measurements
- Task 4 – Channel Modeling and Analysis

This report is broken down into a manner consistent with these four tasks. Specifically, Chapter 2 details the antenna characterization work done in Task 1. Chapter 3 details the indoor measurements including material characterization, time domain measurements, and frequency domain measurements. The measurement systems are described as well as some basic characterizations. Additionally, Chapter 3 details work done in the area of deterministic modeling of UWB signals. Outdoor measurements are described in Chapter 4. These were specifically time domain measurements. The section describes the measurement systems used and the basic statistical analysis. Chapter 5 details the channel modeling effort which is based on the measurement campaigns described in Chapters 3 and 4. It should be noted that there is some overlap in the channel characterization done in Chapter 3 and Chapter 5 for the indoor channel. Care should be taken when comparing these results because (a) the data sets are slightly different, and (b) the approach is slightly different. The assumptions are carefully stated in each Chapter to reduce confusion. In general Chapter 5 presents the more general set of statistics and is what is used in the modeling efforts.

1.2. Organization of the report

In order to facilitate the perusal of report in a convenient fashion, the entire report has been split in such a way that logically related tasks have been placed in separate chapters in different files. Due to the size of the report, it was divided into separate files. Specifically the following files are:

File

[Chapter1_ExecutiveSummary.pdf](#)

[Chapter2.pdf](#)

[Chapter3.pdf](#)

[Chapter4.pdf](#)

[Chapter5.pdf](#)

Contents

An overview of the report contents and organization.
(The current document)

Antenna characterization work.

Indoor channel measurement campaign.

Outdoor channel measurement campaign.

Channel modeling work.

Click on the hyperlink associated with each file to open that document. For easy reference, each chapter has its own table of contents placed at the beginning of each chapter.