Senior Design I: Project Proposal

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Tourbillon Group circa 2009

Agenda

1. Introduction
2. Problem Definition
3. Design Requirements
4. Current Status of the Arts
5. Engineering Approach
6. Tasks & Deliverables
7. Project Management
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10. References

Introduction

Tourbillio

Intel

"As WiMAX … proliferate globally, network Operators and Device Vendors are increasingly challenged to characterize and quantify the performance and behavior under real world conditions of the radio devices and the systems …"

- **Methods** to understand systems performance under shifting conditions that impact the RF performance in the field.
- **Gain** a deeper understanding of how the radio performance affects the perceived end user experience.
- **How to** communicate this to the subscriber base.

MOBILE TECHNOLOGY

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Problem Definition

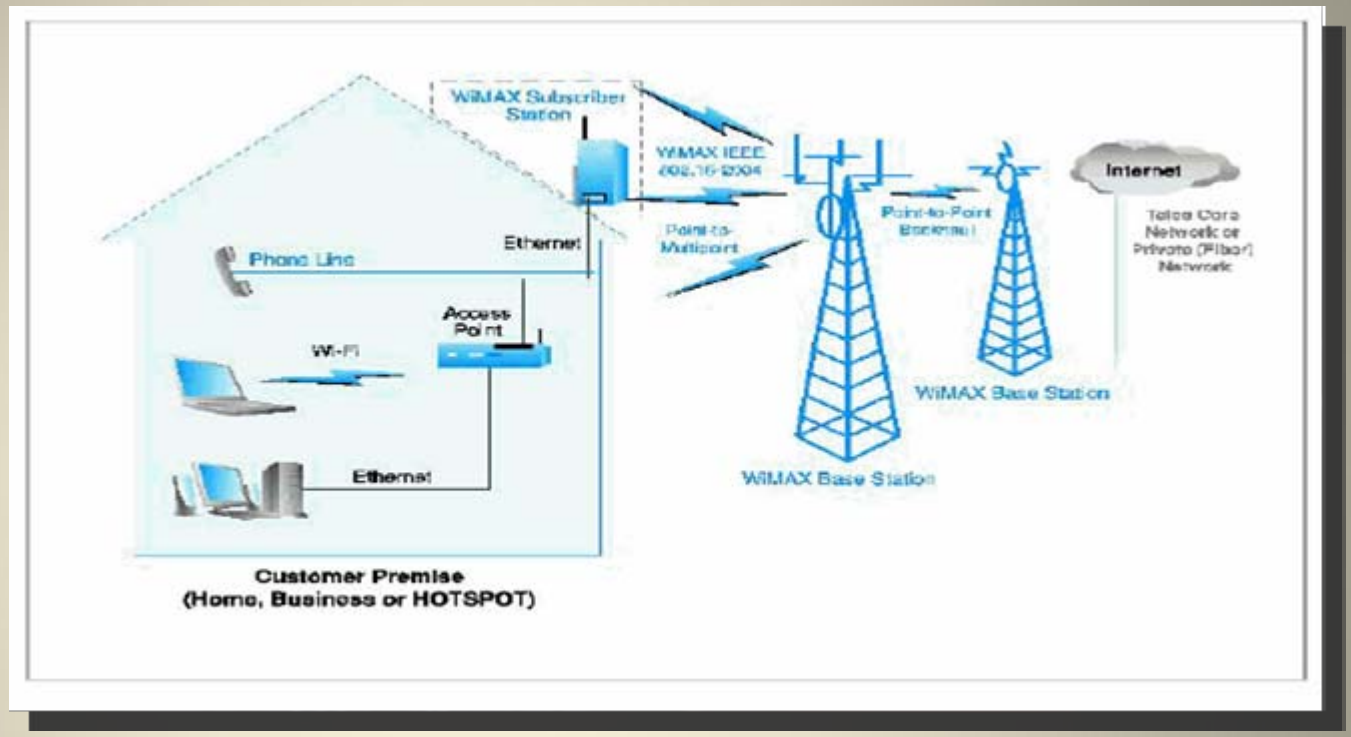
How should we best formulate and deploy a test method to evaluate emerging WiMAX consumer technology.

Design Requirements

Coverage & User-level Performance

Mobility (Handoff)

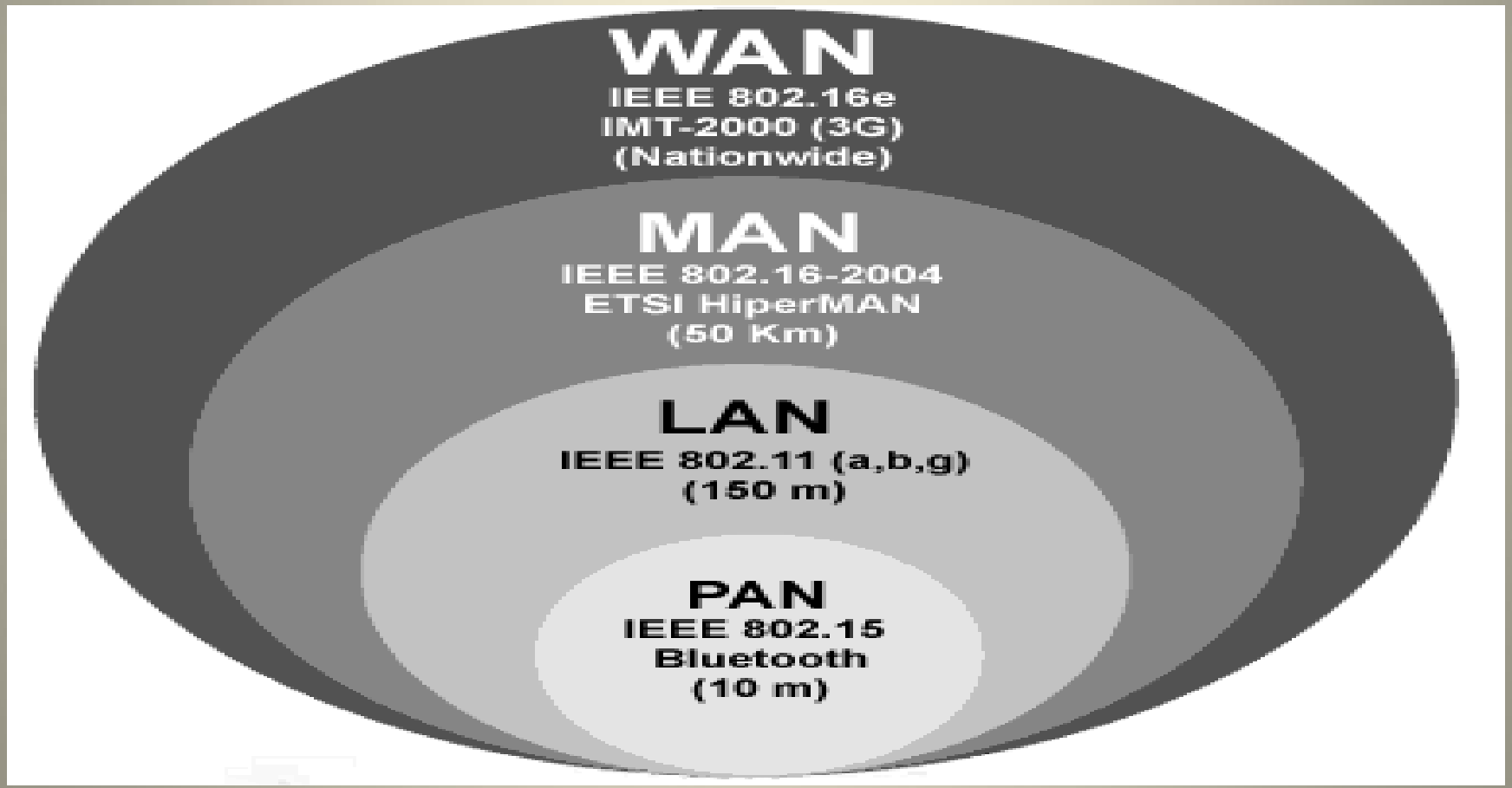
Indoor Penetration



Problem Definition

Compliance

IEEE 802.16



Current Testing Methods

Hardware Interface Only

Bit Error Rate Testers

Radio Frequency Vector Signal/Spectrum Analyzers

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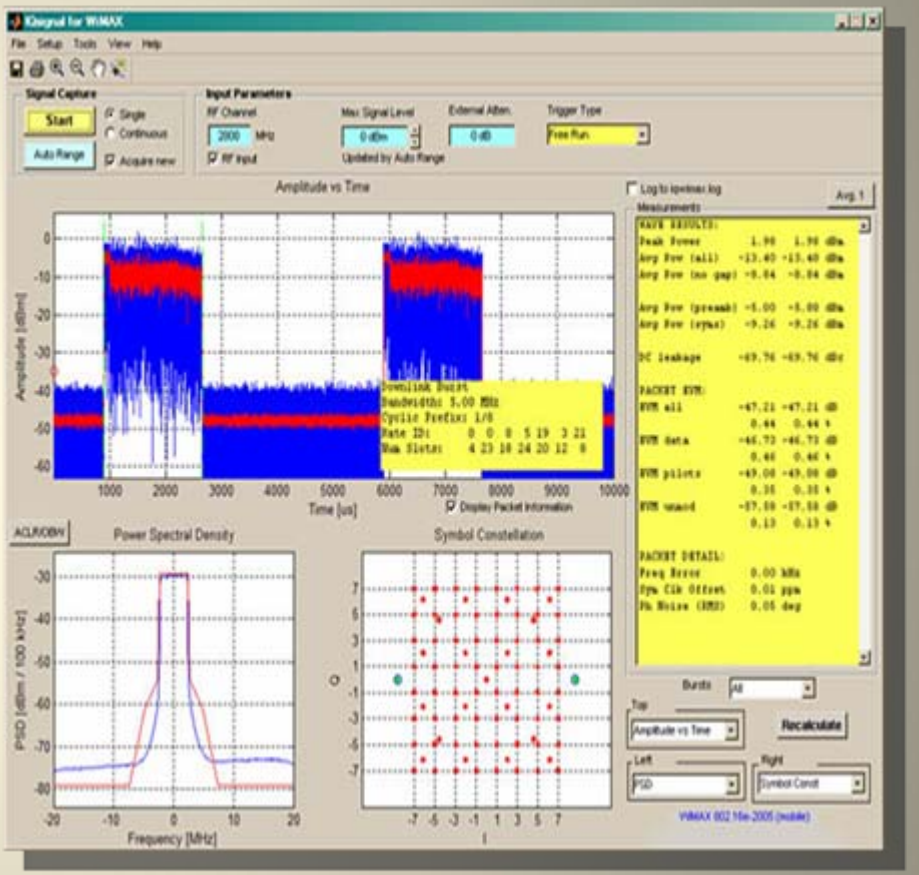
Current Testing Methods

Hardware Interface with Software Analysis

Network and Service Analyzer



Real-Time Spectrum Analyzer

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Current Testing Methods

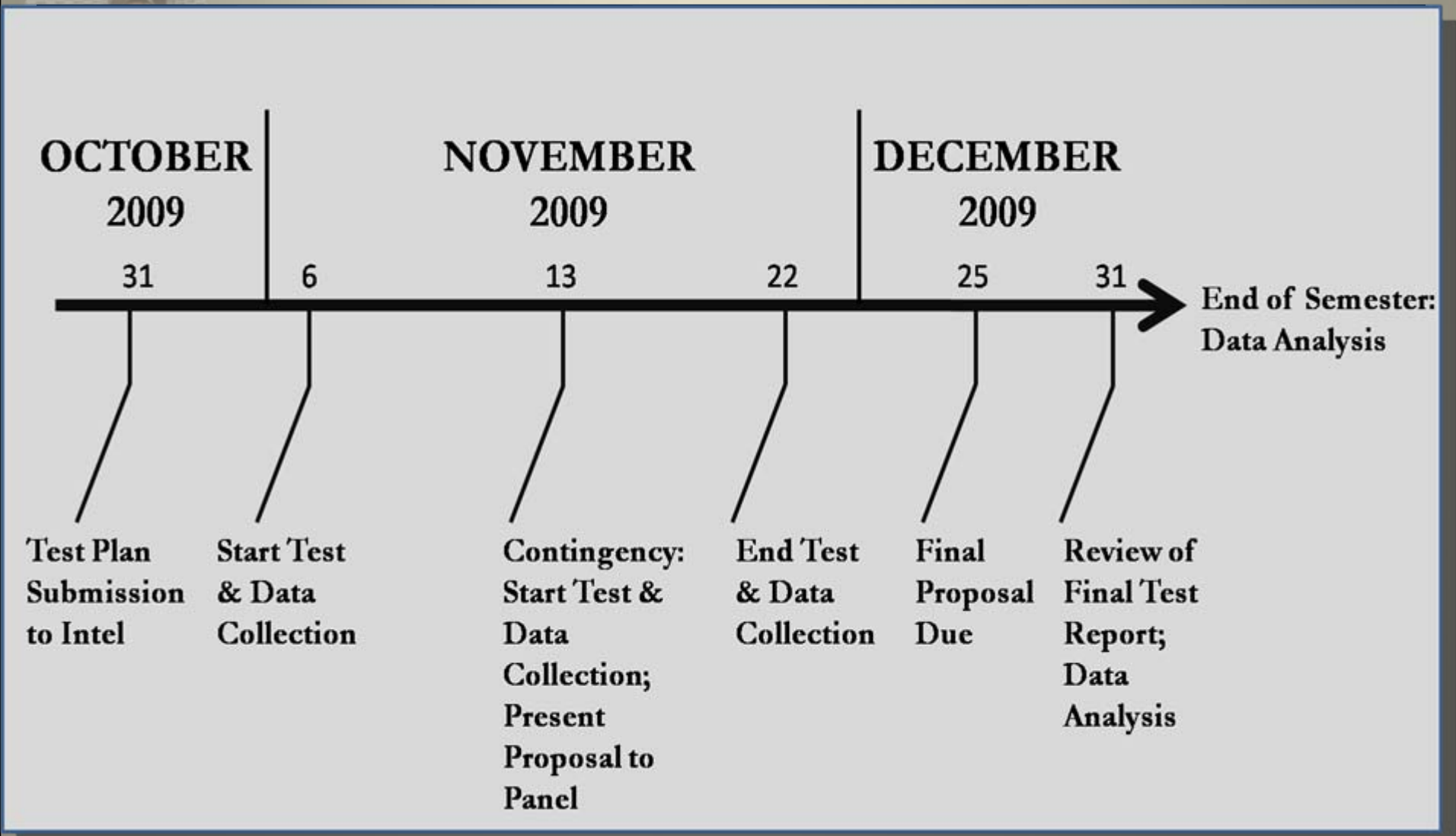
Design Team's Method: Software Analysis Only

Intel's FIDO Software

- Records performance of device's with Intel's embedded WiMAX chipset
- Completely Digital Approach
- No Additional Hardware Required
- Interface is within the device to be tested

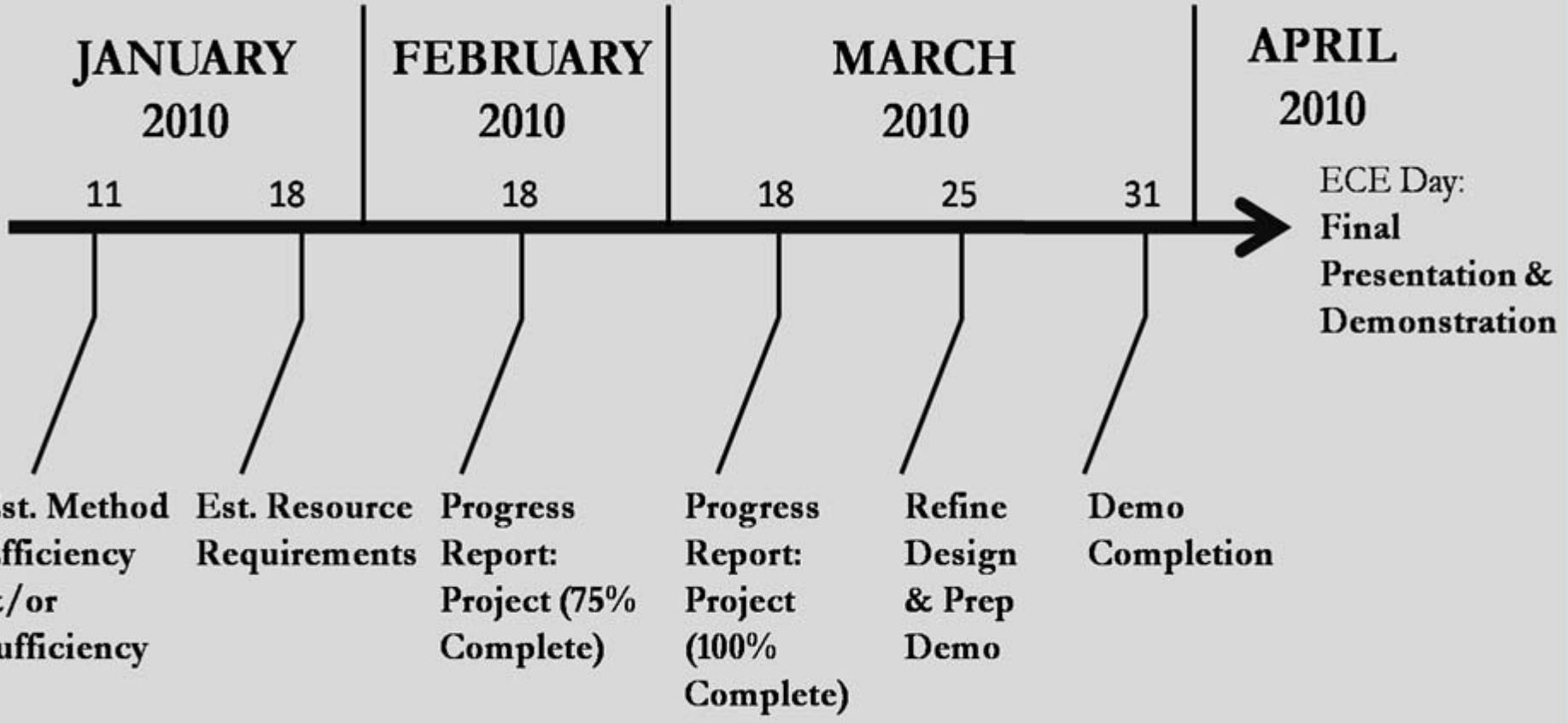
Engineering Approach

Phase I: Testing and Data Collection



Engineering Approach

Phase II: Data Analysis/Focus Projects



Tasks & Deliverables

Name	Function	Individual Task(s)	Team Task(s)	Deliverable(s)
Charlery, Jonathan	Research - Technical	WiMAX Testing & Performance Research; Assist in Current Status of Art Research	Familiarity with WiMAX and all relating standards. Design a solution to the problem statement derived from Intel's need by April 2010. Full-fill design requirements.	Project Specification Document Presentation of Final Solution Working Demo for ECE Day
Gomes, Cesar	Team Lead	Maintain Design Team Focus on Agenda; Document Consolidation		
Mongomery, Brandon	Team Records; Research - Current Status	Document Design Team Meetings; Current Status of Art Research; Assist in WiMAX Testing & Performance Research		
Paulos, Abeeku	Compliance & Safety Coherence	Leader (Intel Design Challenge Team Liason); Specifications of Engineering Approach		

Project Management

Safety & Ethics

Safety

Logistical Safety: Maryland Traffic Codes

- MD Transp. Code section 21-902
- MD Transp. Code section 21-901.1
- MD Transp. Code section 21-901.1

Technical Regulations

- WiMAX held to FCC, IEEE, ANSI standards
- No true testing safety standards

Ethics

National Society for Professional Engineers Code of Ethics dictates how we conduct our research and design.

"Perform services only in areas of their competence."

"Act for each employer or client as faithful agents or trustees."

Conclusion

Immediate Objectives:

- Completion of Testing in Baltimore, MD
- Establish Current Method's efficiency & sufficiency with Phase I Data Analysis
- Preparation for Phase II and solution design

Questions & Answers

References

Tektronix, *Network Diagnostics Network and Service Analyzer (NSA)*
communications/index.php?command=defaultPage&operation=displayDataSheet&catid=&id=442

Keithley, *Model 2820A RF Vector Signal Analyzer*
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C. Mathias, *Analyze this: Low-cost wireless spectrum analyzers do the trick*
http://www.networkworld.com/reviews/2009/032309-wlan-test.html

GlobalSpec, *Spectrum Analyzers and Signal Analyzers*
Data_Acquisition/Spectrum_Analyzers_Signal_Analyzers

Laser 2000 of Germany *Bit Error / Timing Analysis*
http://www.laser2000.de/index.php?id=362921&L=1

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Communications_Networking/Networking_Equipment/Bit_Error_Rate_Testers

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http://www2.tek.com/cmswpt/psdetails.lotr?ct=PS&cs=psu&ci=13397&lc=EN

National Society of Professional Engineers (NSPE)
http://www.nspe.org/Ethics/CodeofEthics/index.html