Ultra Wideband (UWB) Antenna Progress Report January/February

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Bradley University

Outline of Presentation

- Summary on Antennas and UWB
  - Introduction to Antennas
  - Introduction to UWB
- Updated Block Diagram
- Picture of Reference Antenna
- Changes to be Made to Reference Antenna
- EE 409 (RF Comm Lab) Labs
- Simulations and Layouts
- Updated Equipment List
- New Information Received from Cunningham Graphics
- Revised Tentative Schedule and Progress

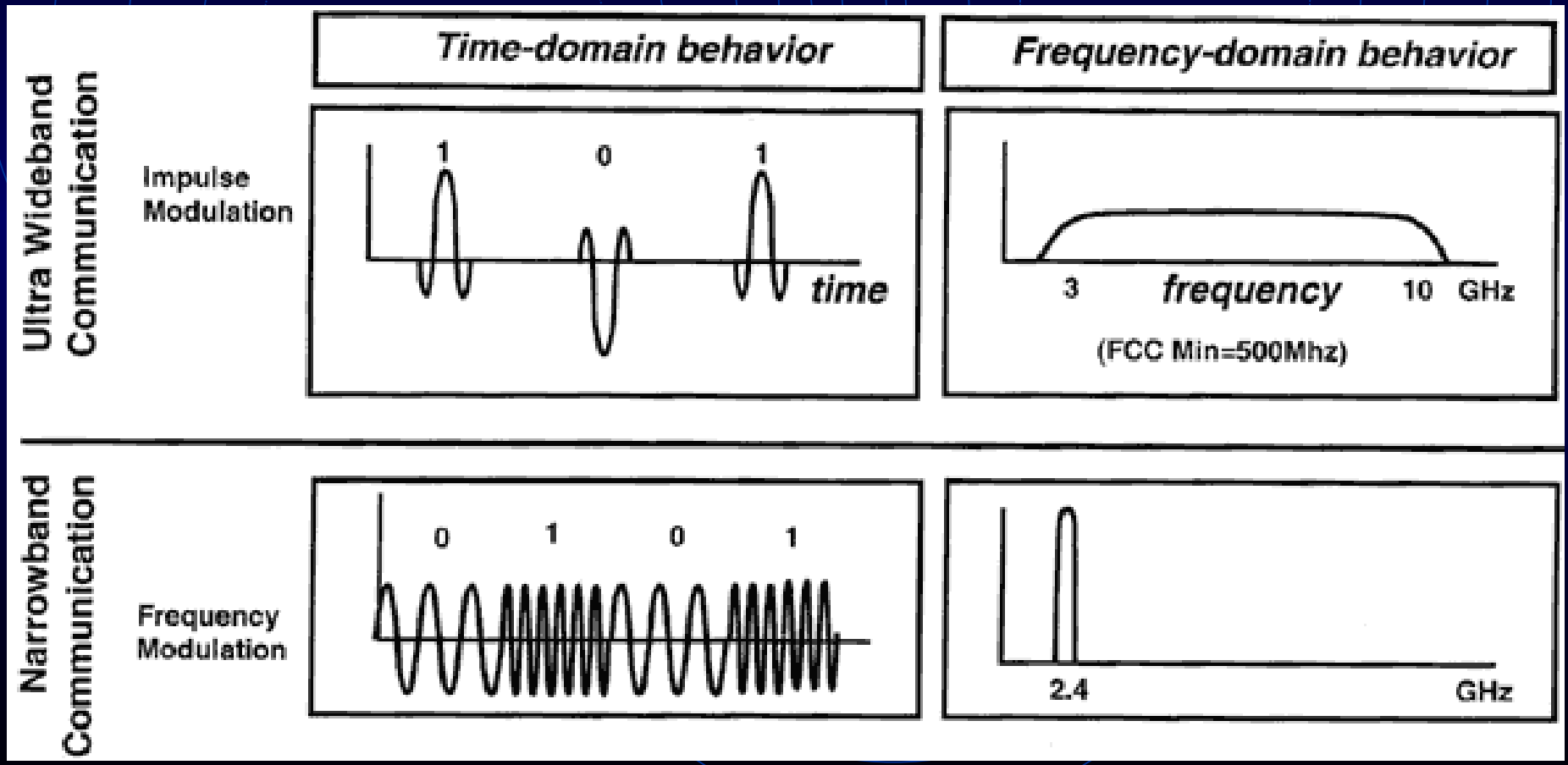
Intro to Antennas

- An antenna is a transducer between a guided wave propagating in a transmission line, and an electromagnetic wave propagating in an unbounded medium, like air.
- All antennas are both transmitting and receiving antennas.
- Car antenna mainly in receiving mode

Intro to UWB

- UWB is defined as a system having a bandwidth greater than 500 megahertz (MHz).
- UWB signals are pulse-based waveforms compressed in time, instead of sinusoidal waveforms compressed in frequency.

Intro to UWB (cont.)



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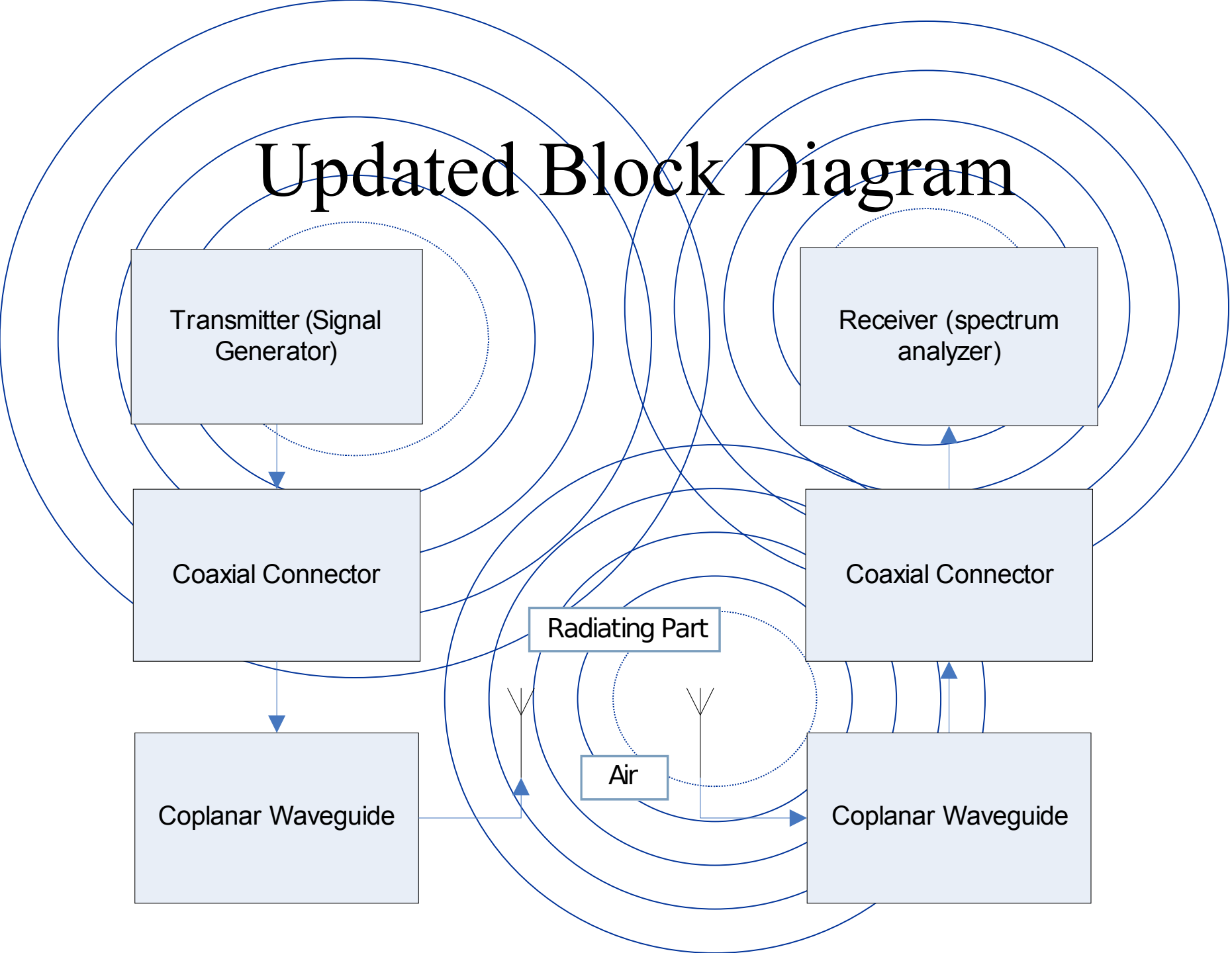
Updated Block Diagram



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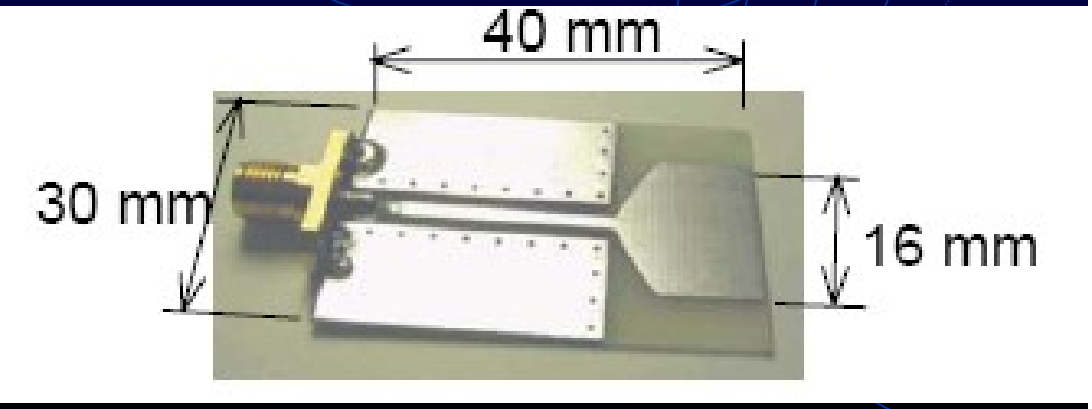
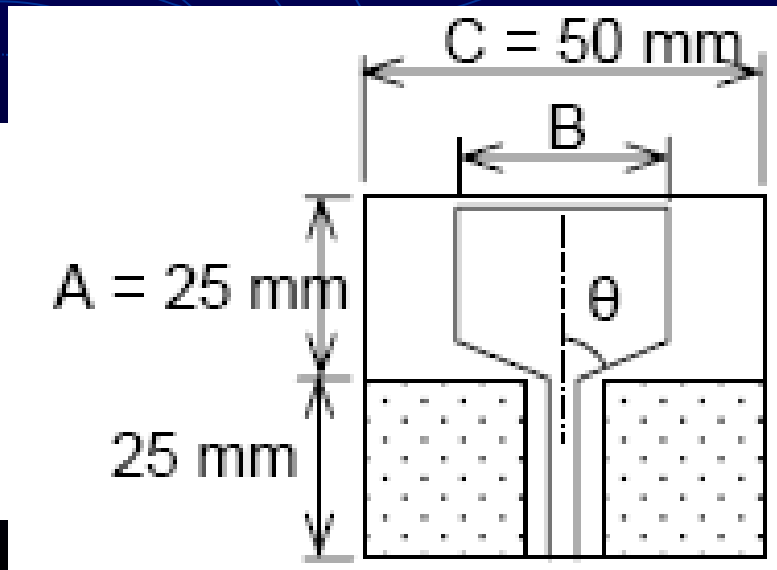
Reference Antenna

- Picture of a Monopole Antenna [Left = Final (Optimized) Result] [Right = Initial Set-Up
- Final Values: θ = 63° B = 16 mm
  A = 15 mm





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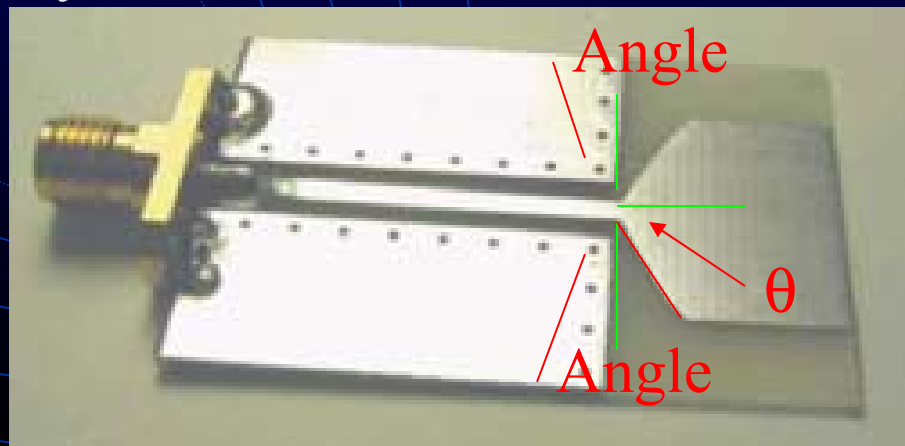
Changes to be Made to Reference Antenna

- Reference Antenna to be designed first
- ∀ θ = 63° (Original Value)
  - Will be changed to 0°, 30 °, 45 °, and 75 °.
- Change shape of Coplanar Waveguide
  - Trapezoidal (Angle = 90 - θ)
- Test Coplanar Waveguide by itself
  - At 0°, 30°, 45°, 63°, and 75°



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EE 409 (RF Comm Lab) Labs

- Network Analyzer
- ADS Lab
- Antenna Measurements (Not Finished!)
- Microstrip LPF Fabrication and Measurements (Not Finished!)

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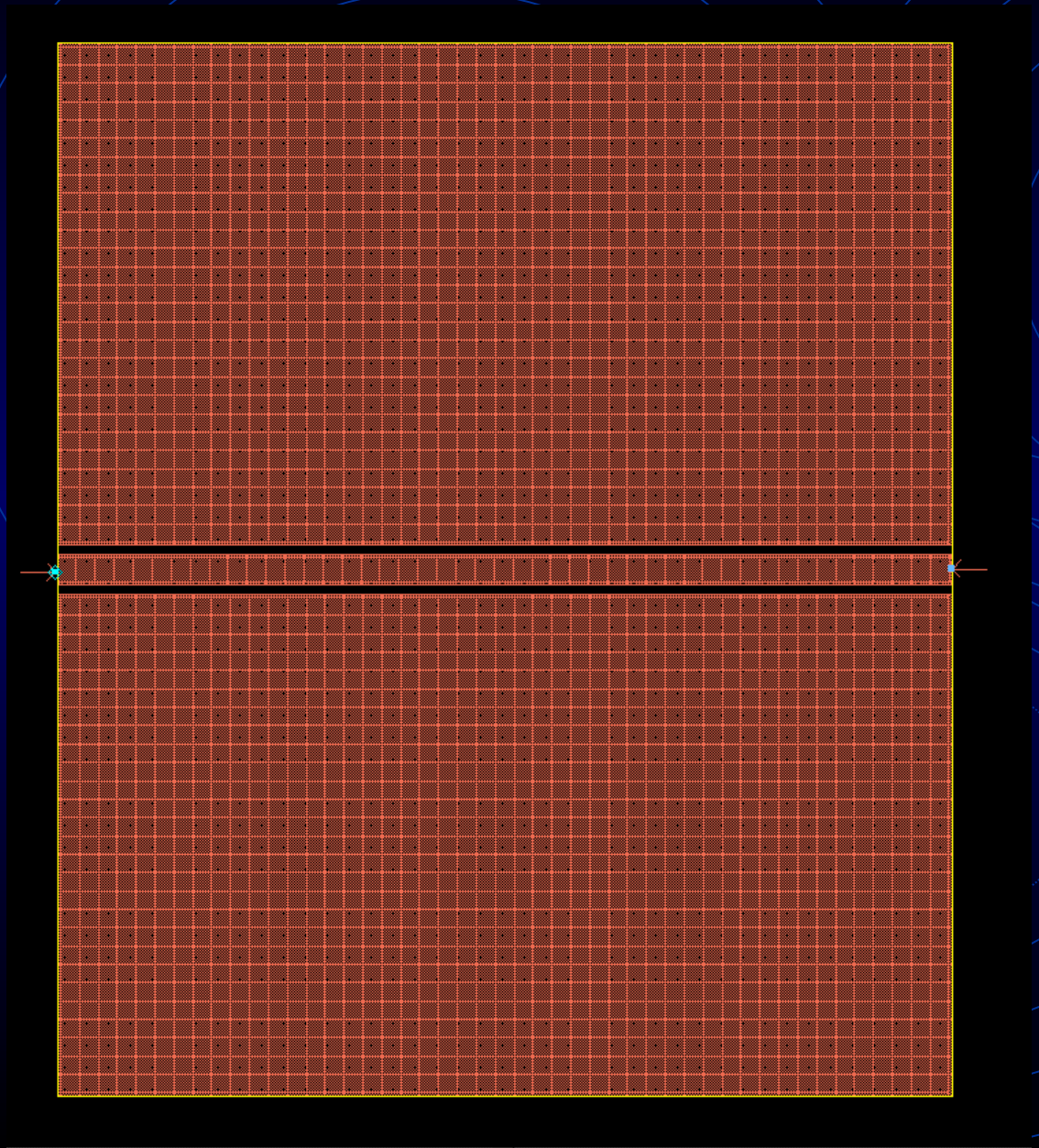
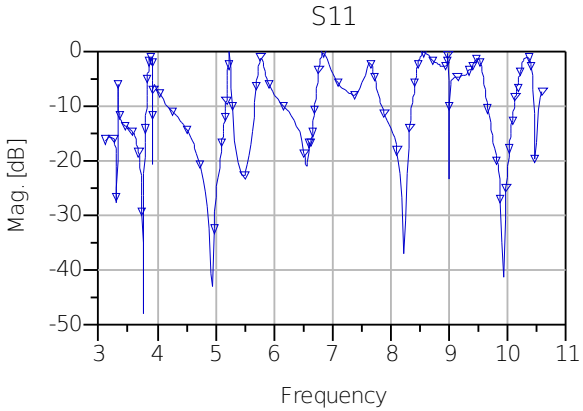
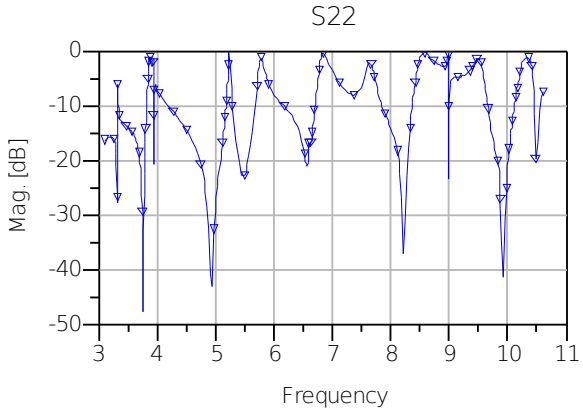
Simulation and Layouts

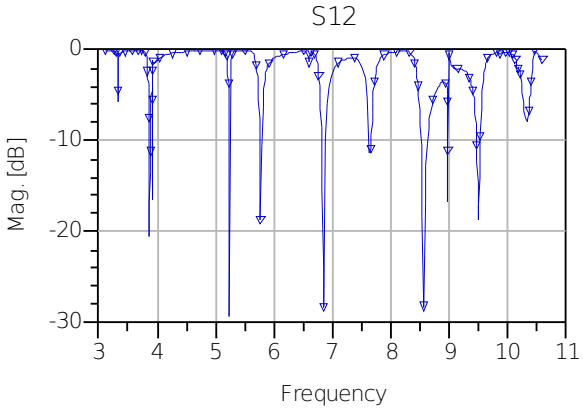


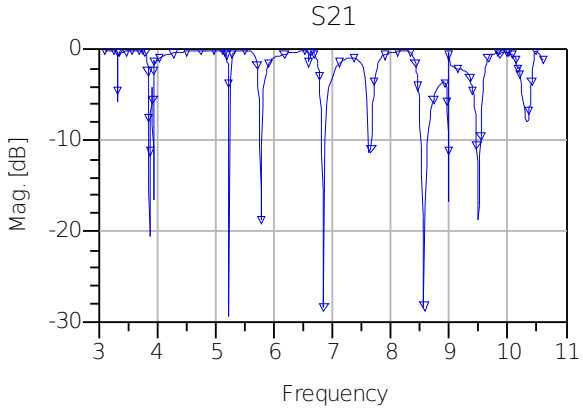
Coplanar Waveguide

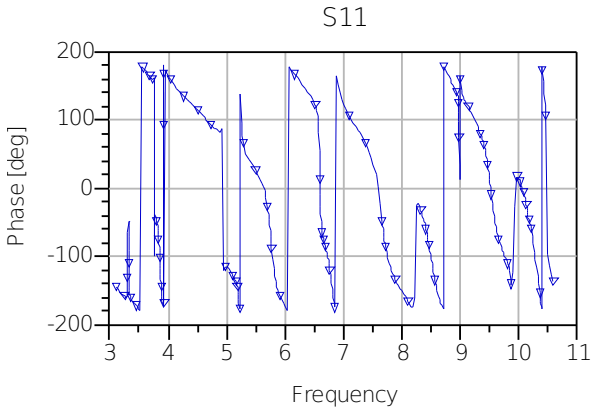
Fri Feb 22 2008 - Dataset: cpwg_mom_a

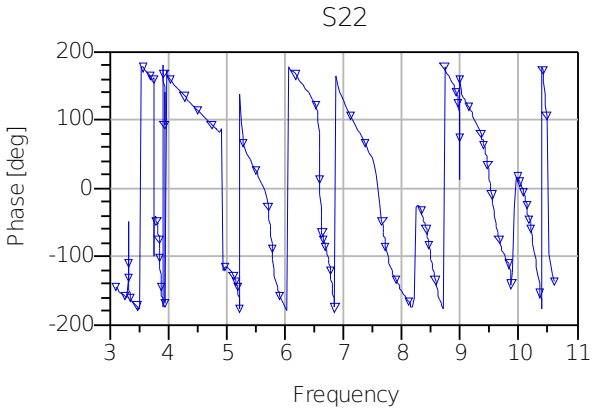




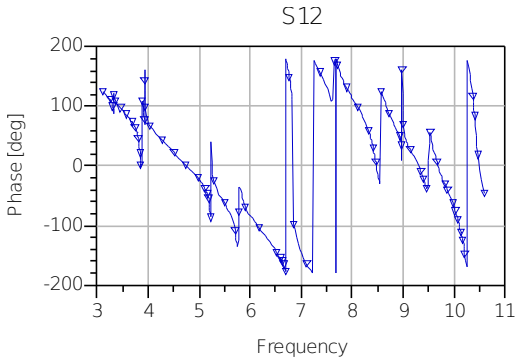


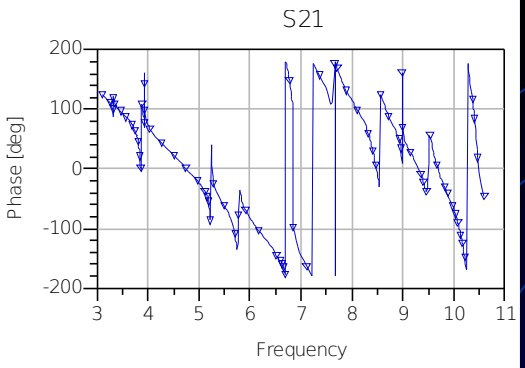


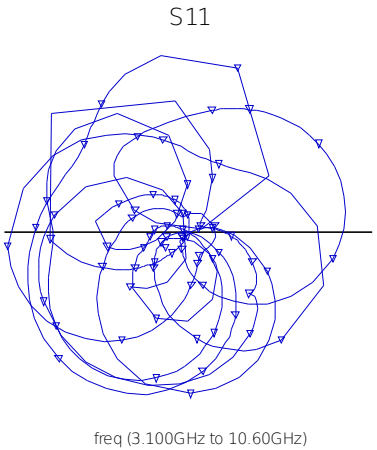


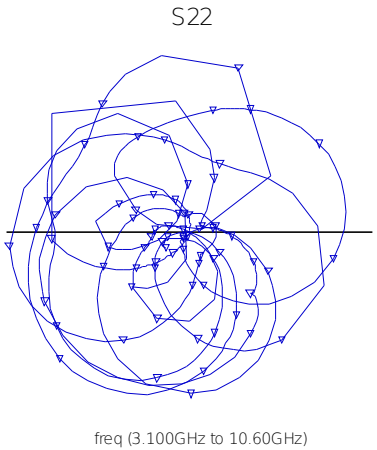


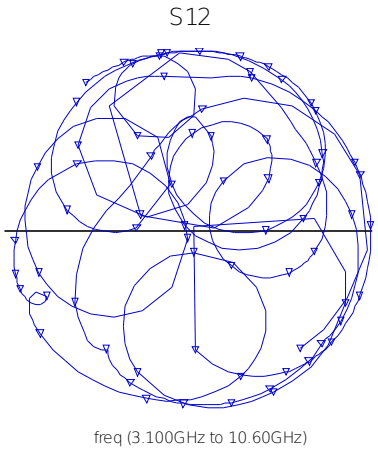
Simulation and Layouts

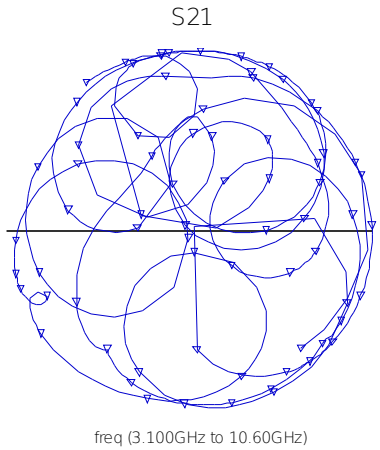












Simulation and Layouts

Simulations have bad data. Need to re-simulate

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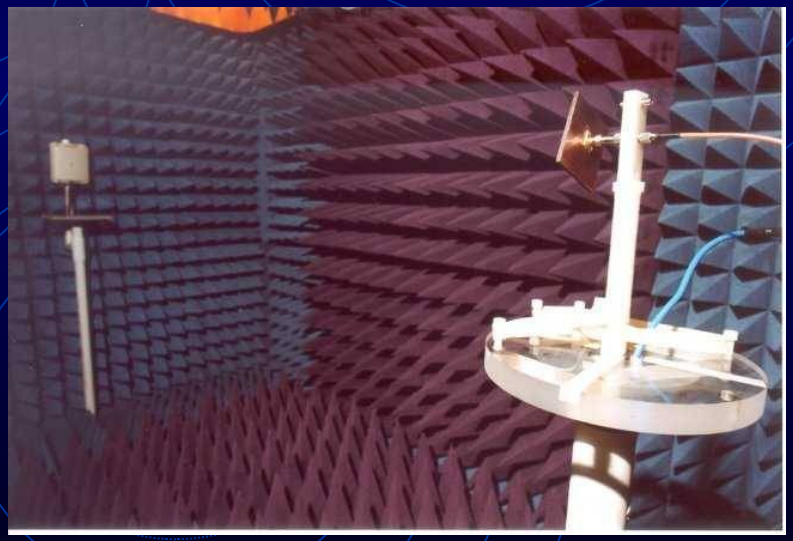
Equipment List

- Network analyzer - HP8722C or HP8410C
- Spectrum analyzer - HP8593E or HP8559A
- Signal generator - HPE4433B (May be used)
- Agilent Advanced Design System - ADS
- Sonnet 10.52 (Not Going to be Used! – Time Constraint)
- Anechoic Chamber
- Agilent VEE pro (Not Going to be Used!)
- Pulse Generator – HP8011A (New! – Possibility the Signal Generator)

Some Pictures of Equipment

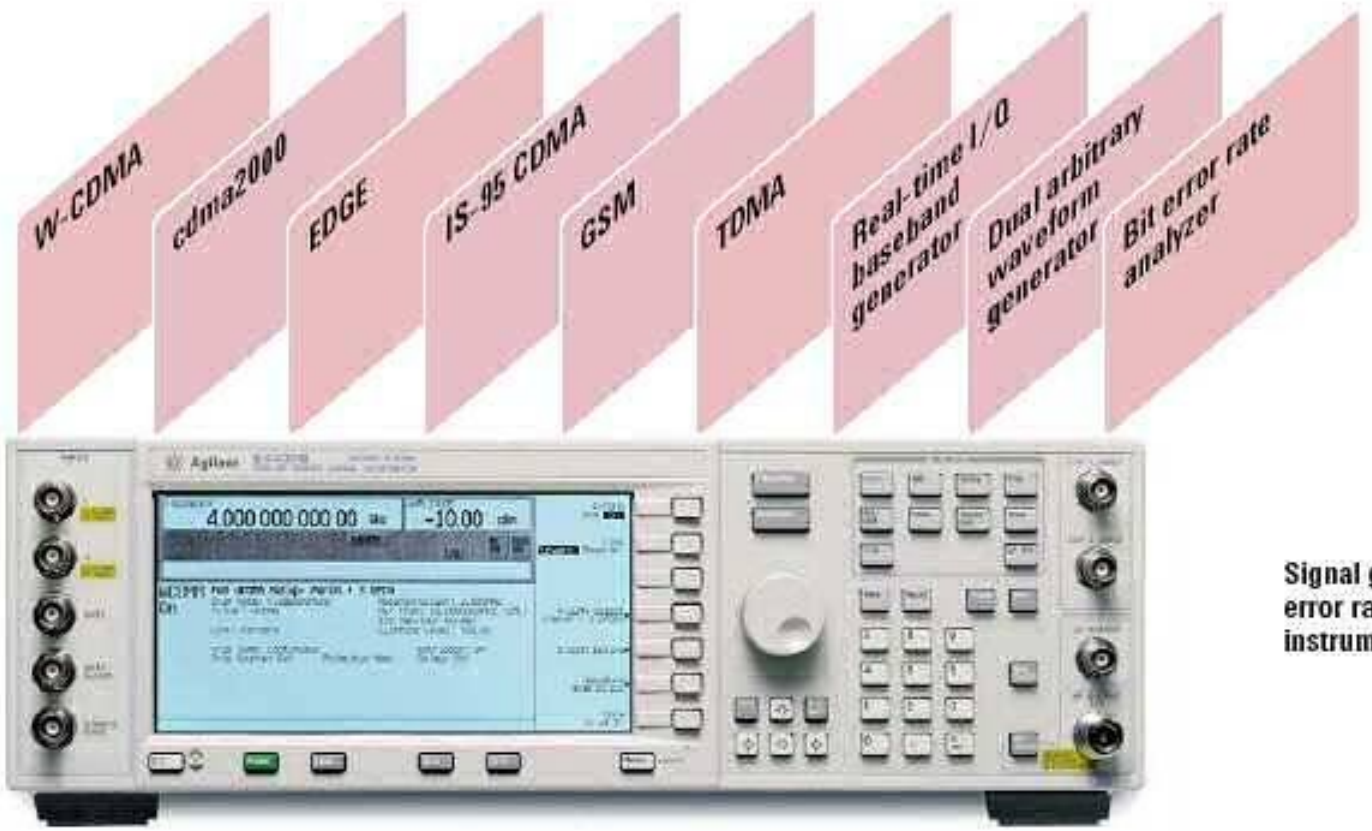
Spectrum Analyzer

Anechoic Chamber



Some Pictures of Equipment

Signal Generator



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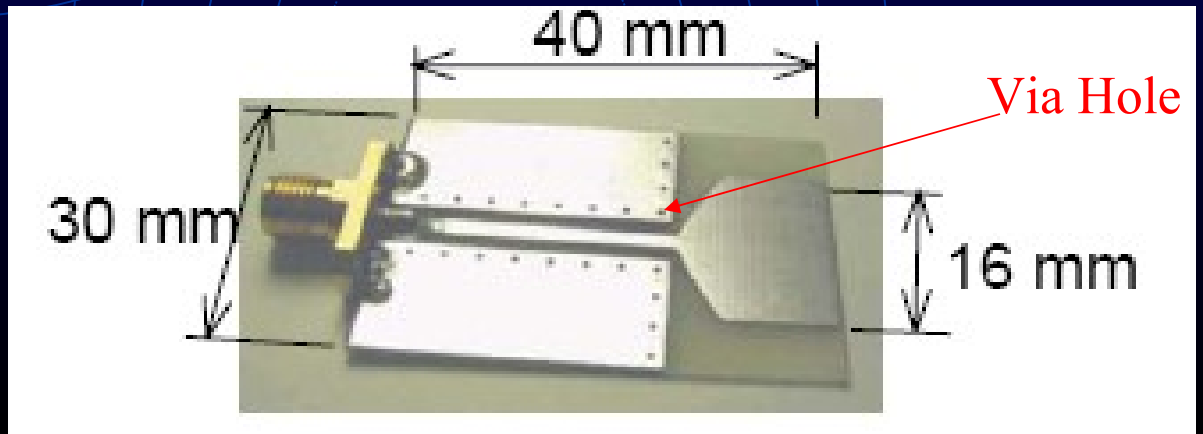
New Info from Cunningham Graphics

- Printed Circuit Board – 31 mil thickness
- 1 Oz. Copper thickness [Will increase due to electro-platting which was necessary due to via holes (platted-through holes)]
- Where antennas will be fabricated (with via holes)
- Via holes are used to connect the ground plate to upper conductor plate so it wouldn't create a T-line



New Info from Cunningham Graphics

- Telephone Conference with Bob Modica
- Possible Problem because of glass fiber amount
  - Each Company uses a different amount of glass fiber and epoxy
  - Just because the printed circuit board is a FR-4, does not mean it is exactly the same
  - Loss, dielectric constant can change

New Info from Cunningham Graphics

- From Cunningham Graphics, actual specs:
  - FR-4 Printed Circuit Board will have a 30 mil core, 4.6 dielectric constant, copper plating of 2.6 mil, 100 micro-inches of electroless nickel, 3-5 micro-inches of immersion gold
  - Fabrication Process 2 weeks
  - Fit 25-30 antennas on one sheet

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Tentative Schedule

Schedule for UWB Antenna Senior Project					
Week	**Date**	**Objective**		**% of Project**	**Completion**
Pre-work	14-Jan-08 to 18-Jan-08	Network Analyzer Lab (EE 409 Lab)		5.00%	100%
1	24-Jan-08	Obtain Reference Paper and Learn about Signal Generator		5.00%	100%
2	31-Jan-08	Learn about Signal Generator		4.00%	100%
3	7-Feb-08	ADS Lab (EE 409 Lab)		5.00%	100%
4	14-Feb-08	ADS Lab (EE 409 Lab)		5.00%	100%
5	21-Feb-08	Design and Simulate Coplanar Waveguide in ADS		5.00%	20%
6	28-Feb-08	Give Monthly Presentation and Build Many Antennas on a Microstrip		5.00%	0%
7	6-Mar-08	Build Many Antennas on a Microstrip		5.00%	0%
8	13-Mar-08	Build Antennas and Send Antennas Out to Fabricated and Do Antenna Testing Lab (EE 409 Lab)		5.00%	0%
9	20-Mar-08	Spring Break		1.00%	0%
10	27-Mar-08	Testing and Recording (Anechoic Chamber)		7.50%	0%
11	3-Apr-08	Testing and Recording (Anechoic Chamber)		7.50%	0%
12	10-Apr-08	Possible Design Changes		5.00%	0%
13	17-Apr-08	Send Design Changes to be Fabricated		7.50%	0%
14	24-Apr-08	Testing and Recording (Anechoic Chamber)		7.50%	0%
15	1-May-08	Final Report and Presentation		10.00%	0%
16	8-May-08	Final Report and Presentation		10.00%	0%
16	8-May-08	Project 100% Completed		100.00%	25%

Special Thanks

- Special thanks to Bob Modica(Cunningham)
- Suresh(Validus) and Bala(Validus)
- Divya(Grad Student)

Questions ?

- I’m sorry; you did not answer in the form of a question.