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Abstract: [This document presents the information about the WBAN channel characterization at UWB band]

Purpose: [To provide some measurement results for WBAN]

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WBAN Channel Characterization at UWB band

Noh-Gyoung Kang

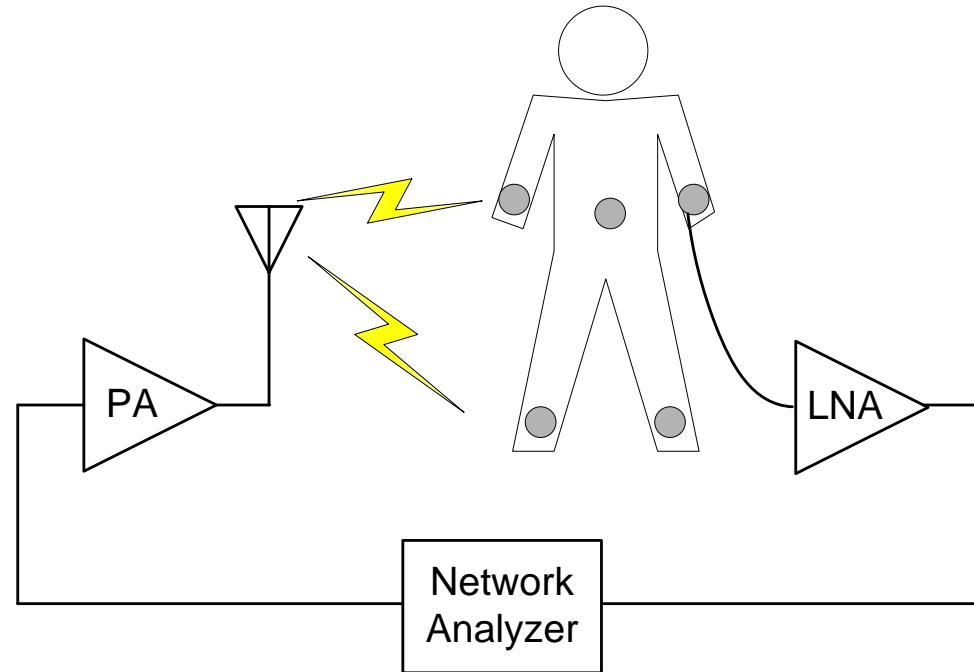
Samsung Electronics Co. Ltd.

Introduction

- UWB Band System
 - Full bandwidth : inefficient system
 - Divide lower and higher bands
 - Lower band : 3.1-5.1 GHz
 - Higher band : 6.0-10.6 GHz
 - Consider regional regulation

- The results of lower band measurements only in this presentation.

Measurement Systems

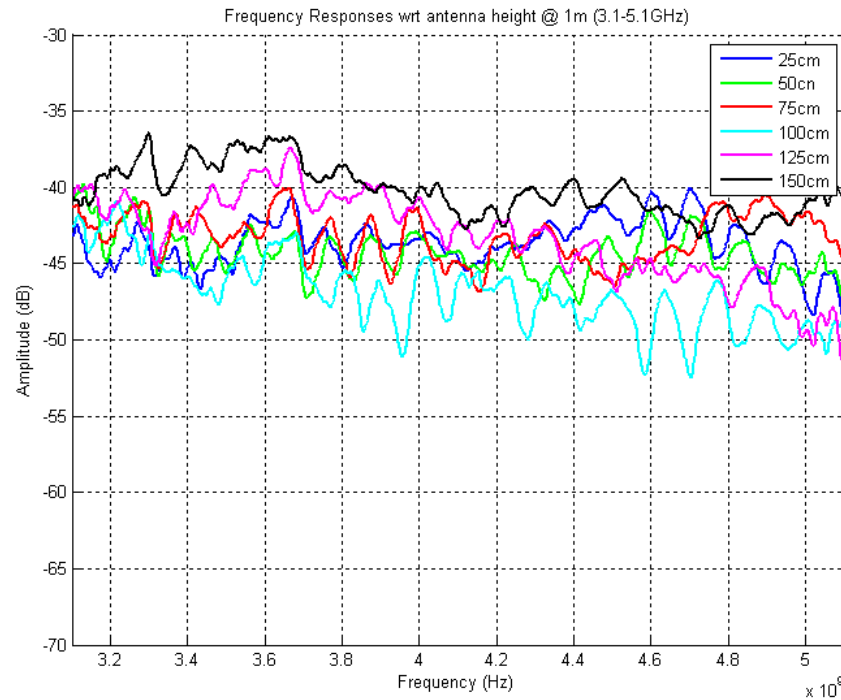


- Frequency sweep measurement
 - Antenna Types : Omni-directional antennas
 - Environments : Anechoic chamber (Office Environments)

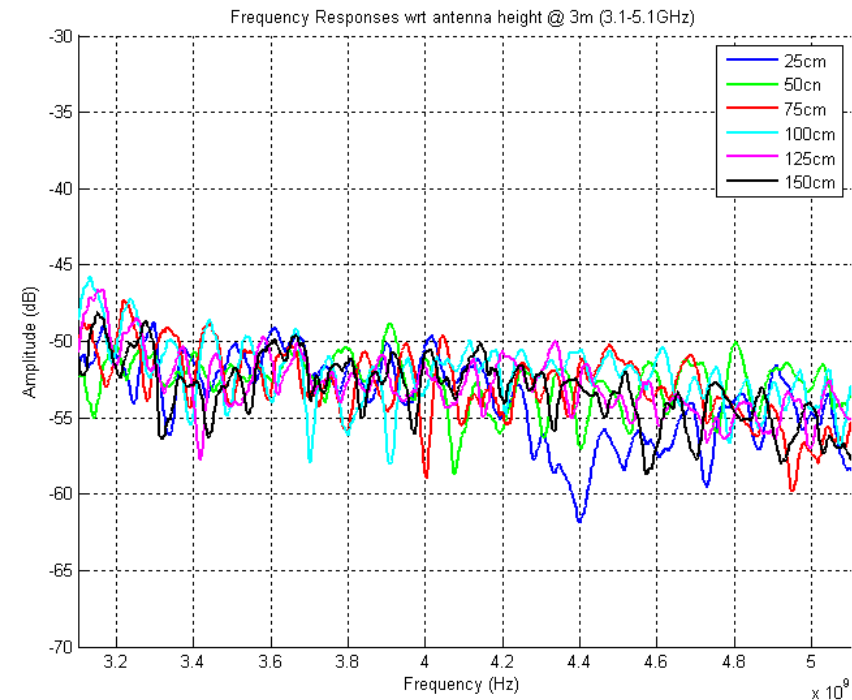
Measurement Scenarios

- Lower UWB band (3.1-5.1GHz)
- Anechoic Chamber
- Rx Position : Head, wrist, waist and ankle
- Standing / Sitting
- Body movements : Arms and legs
- Transmitter antenna height : 1m
- Receiver antenna height : 0.25~1.5m
- Antenna tilt and rotation angle

Effects of Antenna Height and Distance



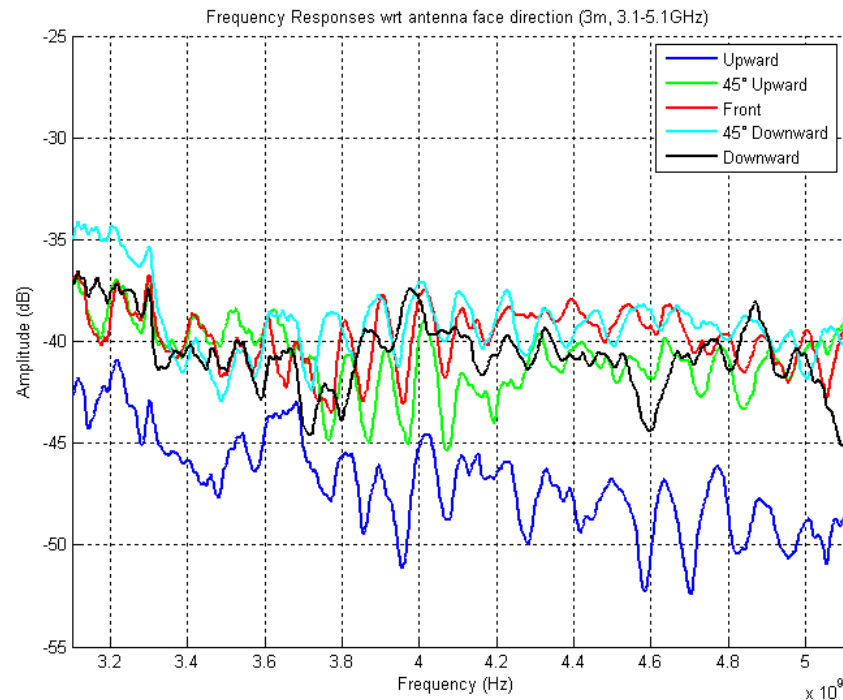
(a) Receiver at 1m



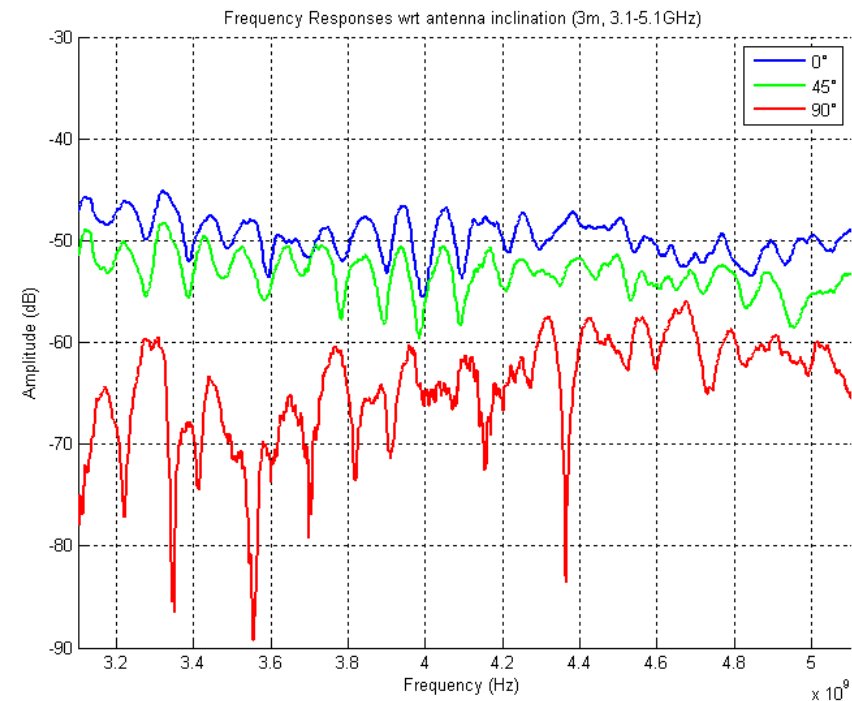
(b) Receiver at 3m

- Much variation with antenna height when the distance is 1m
- 10 dB additional loss at 3m distance

Effects of Antenna Tilt and Rotation



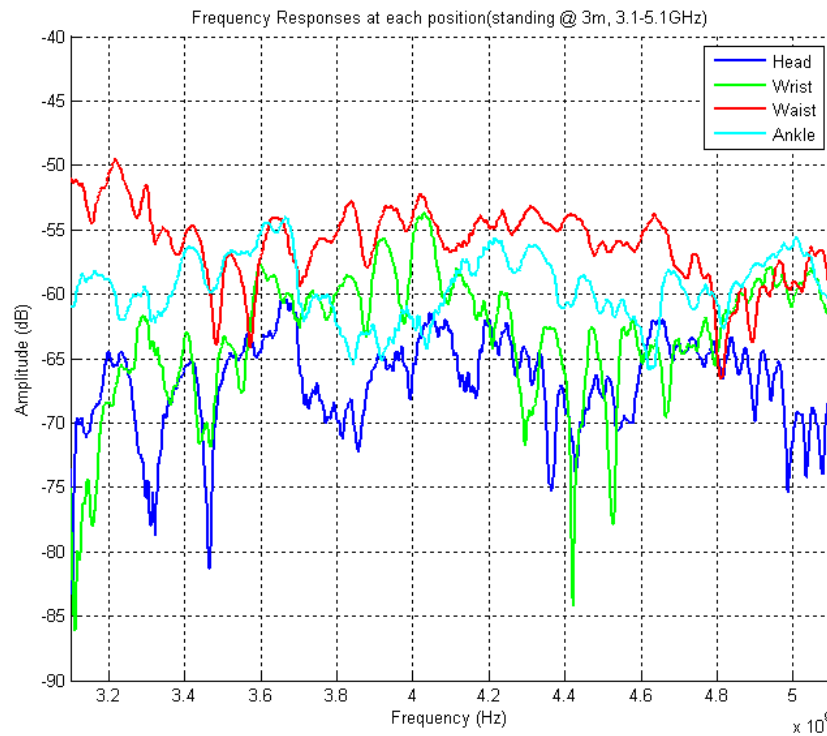
(a) Antenna tilt



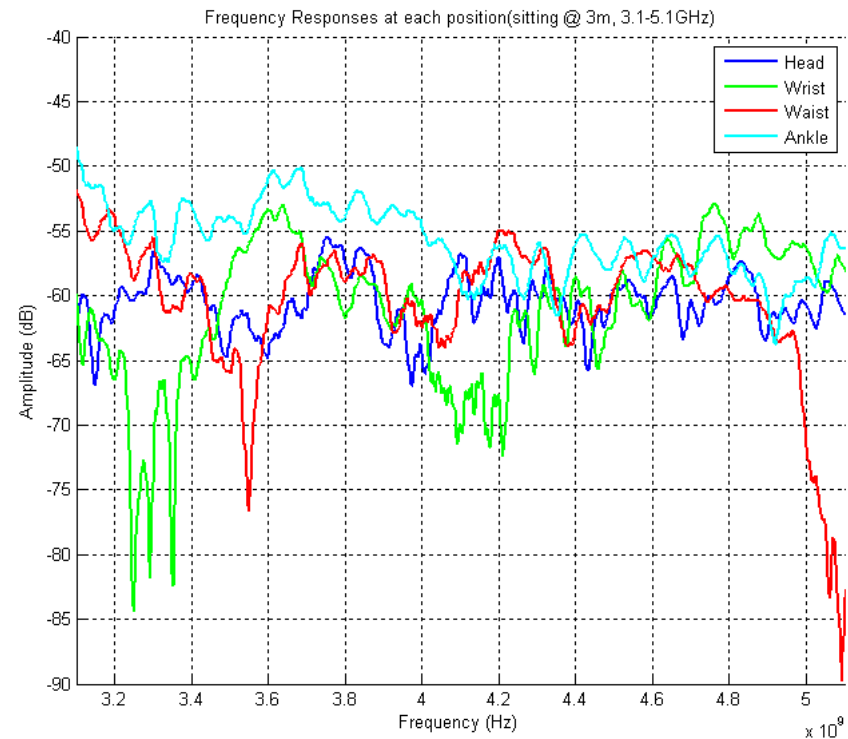
(b) Antenna rotation

- Antenna tilting has little impact on RSS except upward direction
- Antenna cross polarization effects exist

RSS wrt Position in Human body



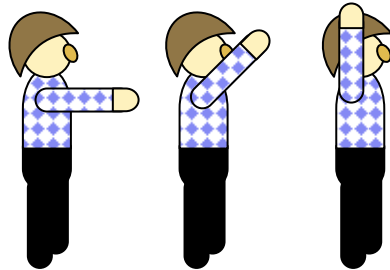
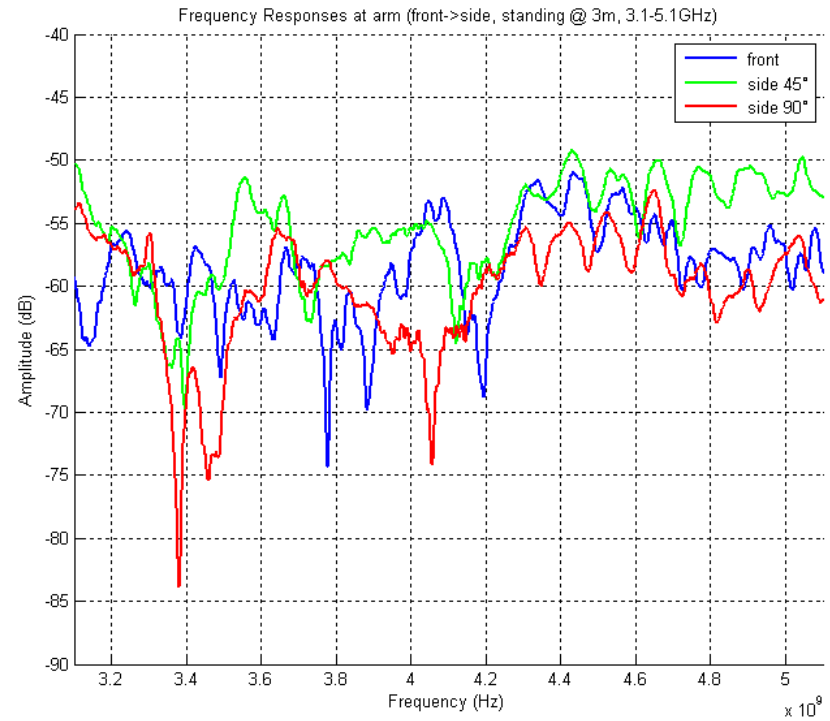
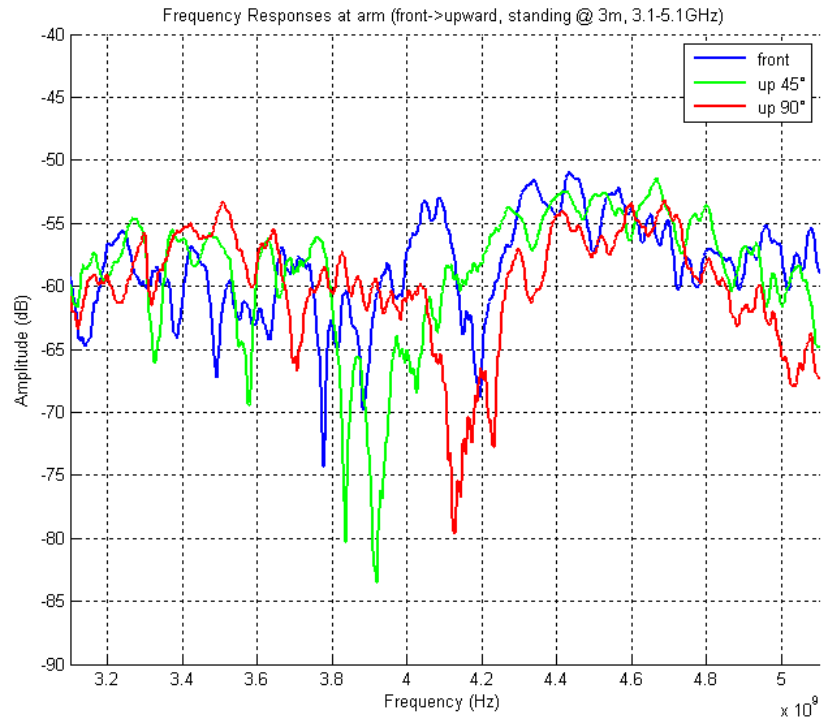
(a) Standing Position



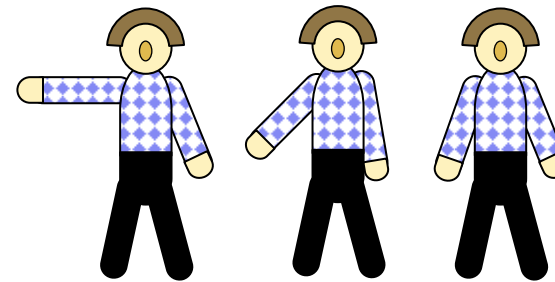
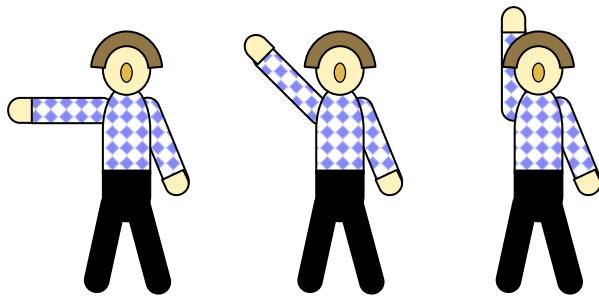
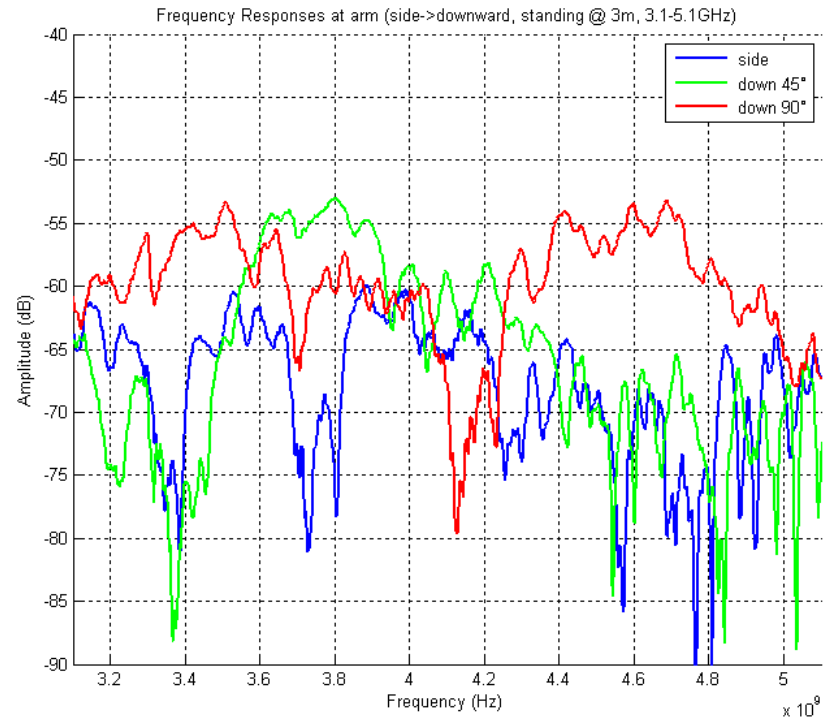
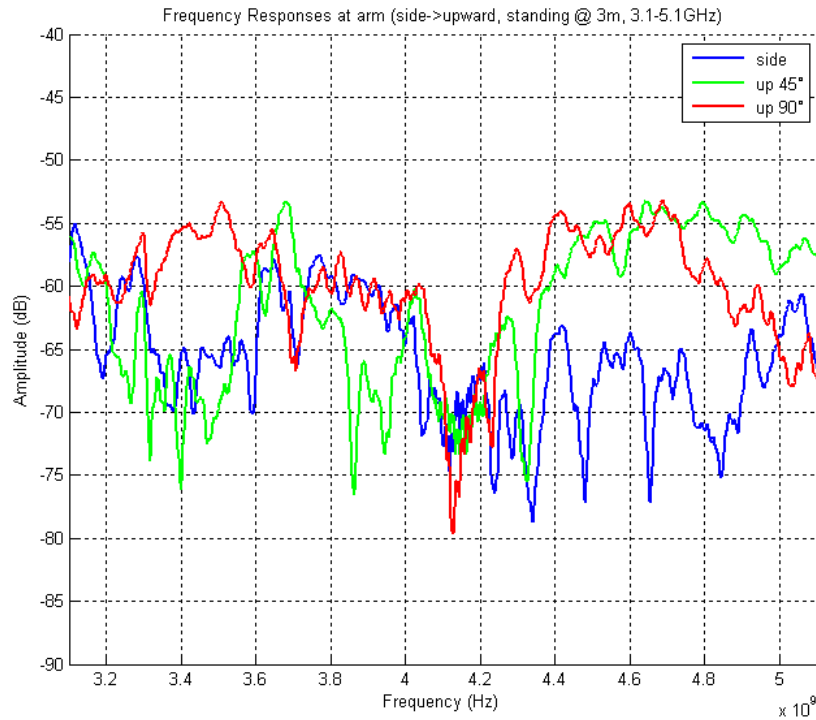
(b) Sitting Position

- Much variation at standing position

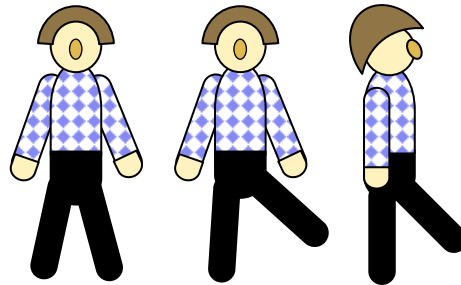
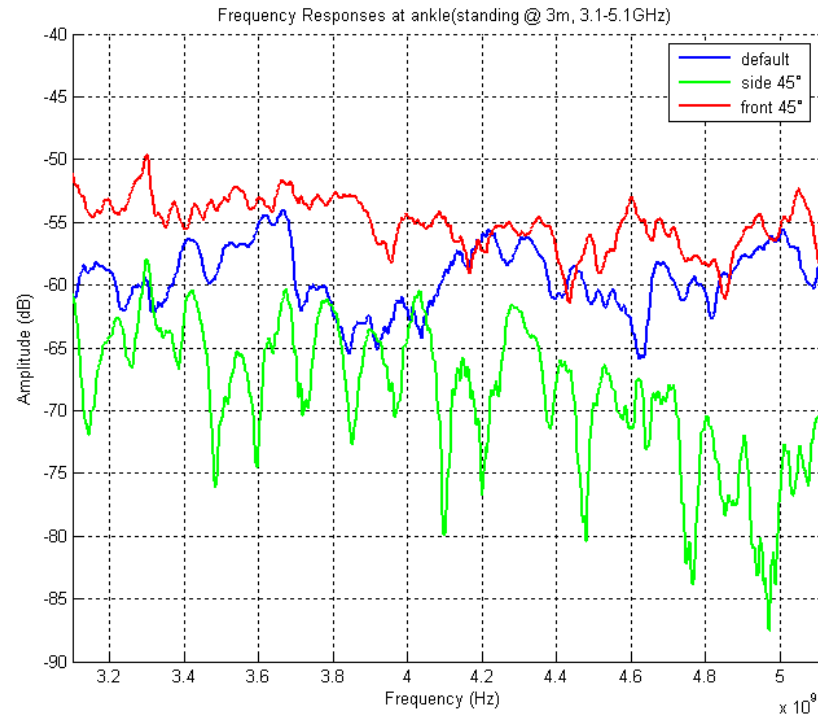
Body Movement Effects : Arms



Body Movement Effects : Arms



Body Movement Effects : Legs



Conclusion

- UWB Channel Measurements
 - Lower band : 3.1 – 5.1 GHz
 - Higher band : 6-10.6 GHz
 - Frequency sweep measurement using VNA
 - Measure human body shadowing effects
 - Antenna types : Omni-directional antennas
 - Environments : Anechoic chamber (Office environments)

- Results
 - Effects of receiver antenna height, distance, and tilt angle
 - RSS wrt position in human body
 - Body movement effects : arms, legs

- Channel measurements at higher UWB band are under working
- The results and channel models will be reported by the end of September.

Thank You !!!

Q & A