Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [The Channel Characteristics of 2.4 / 5.8GHz ISM Bands]
Date Submitted: [17 Mar. 2008]
Source: [Noh-Gyoung Kang, Seung-Hoon Park, and Eun Tae Won]
Company: [Samsung Electronics Co. Ltd.]
Address: [416, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Korea]
Voice: [+82-31-279-7325]
FAX: [+82-31-279-5130]
E-Mail: [gyoung.kang@samsung.com]

Re: [ ]

Abstract: [This document presents the information about the channel characteristics of 2.4 / 5.8GHz ISM bands for non-medical BAN systems]

Purpose: [To provide some channel characteristics of 2.4/5.8GHz ISM bands]

The Channel Characteristics of 2.4 / 5.8GHz ISM Bands

Noh-Gyoung Kang, Seung-Hoon Park,
and Eun Tae Won

Samsung Electronics Co. Ltd.

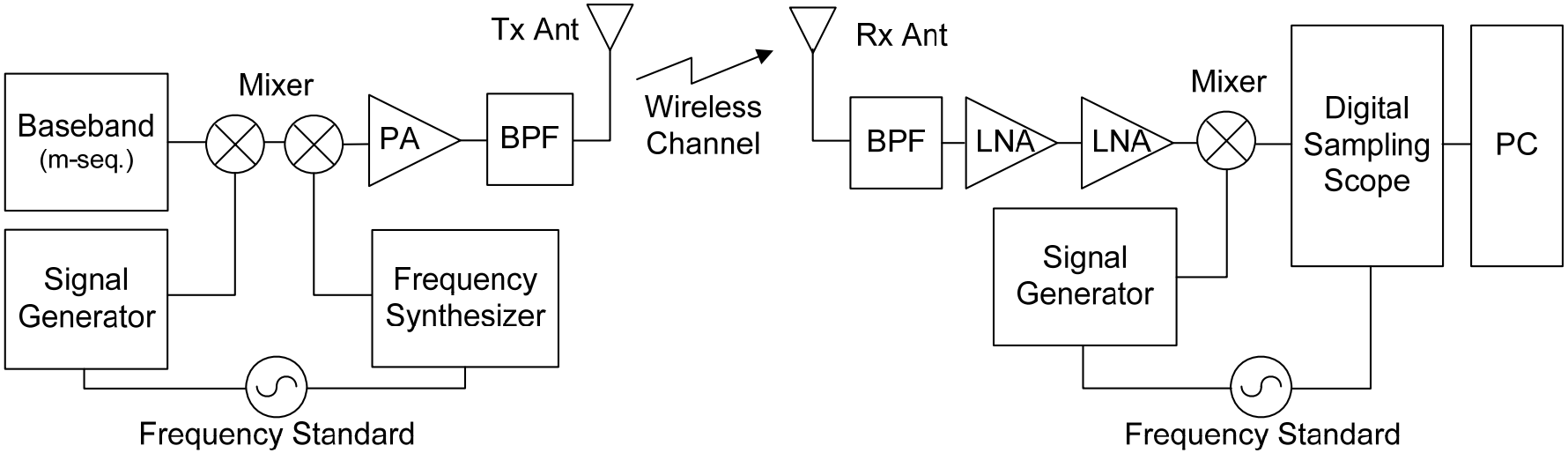
Introduction

- Need the frequency band for non-medical BAN applications
  - High speed
  - Broad bandwidth

- Possible ISM bands for communication*
  - 918-926 MHz (12MHz)
  - 2,400-2,500 MHZ (100MHz)
  - 5,725-5,875 MHz (150MHz)

* 15-08-0034-02-0006-ieee-802-15-6-regulation-subcommittee-report.doc

Measurement Systems



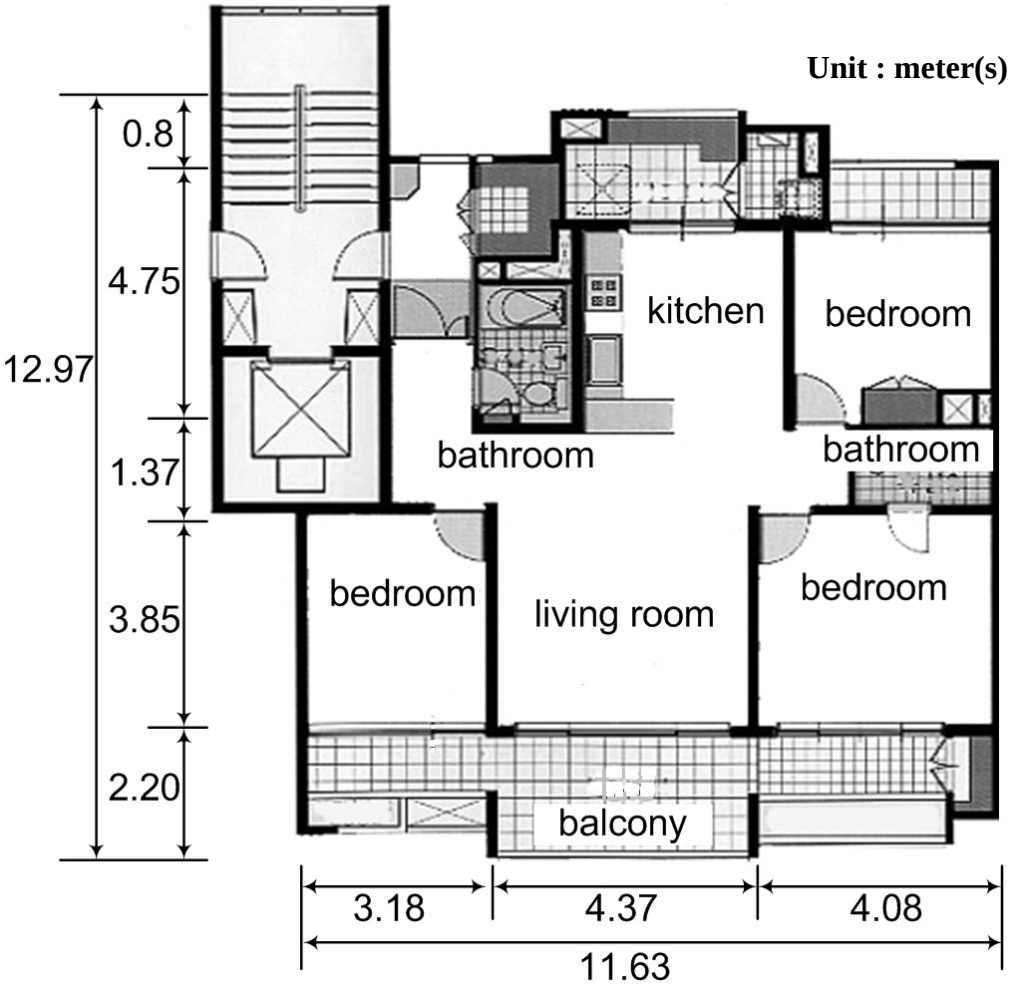
*** Transmitter** *** Receiver**

- Wideband measurement systems
  - Pseudo random noise correlation method

Measurement Systems

Center frequency	2.45GHz	5.8GHz
Antenna	8.15dBi dipole	4.6dBi dipole
Antenna height	1.7m @floor	
Transmitting power	20dBm max (100mW)	
PRN sequence	12th order M-sequence	
Sequence length	4095 ($2^{12}-1$)	
Bandwidth	100MHz	

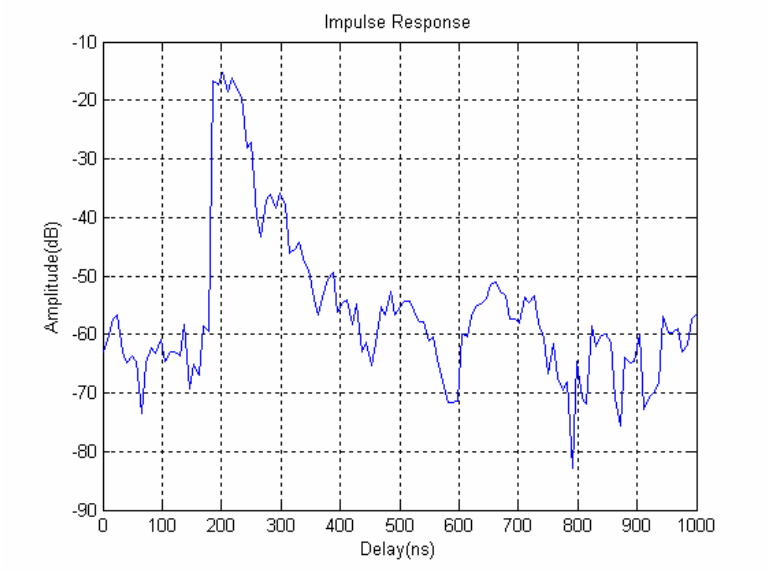
Measurement Sites



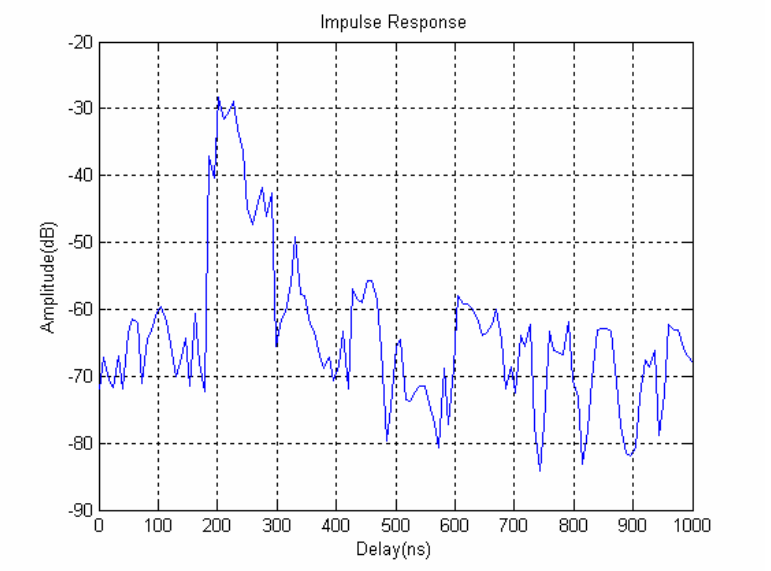
- ✓ One dwelling unit in apartments.
- ✓ There may be little difference compared to office environments in using BAN systems (short range).
- ✓ Consider LOS case in BAN systems.
- ✓ Not consider human body effects, but consider pathloss only.

Channel Impulse Responses

- Sample snap shot at same position



*** 2.4 GHz Band**

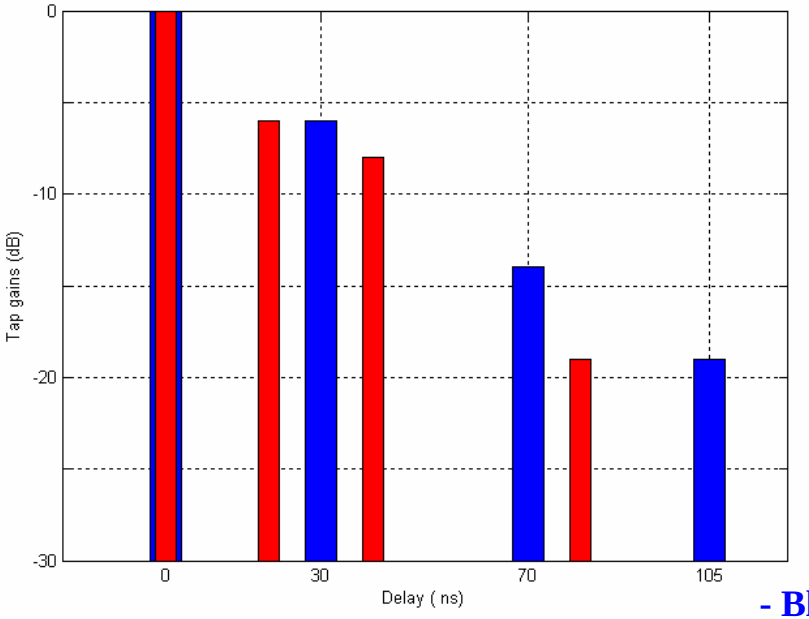


*** 5.8 GHz Band**

✓ There is a difference of 10 dB in path loss between 2.4GHz and 5.8GHz.

✓ Different propagation losses for different frequencies.

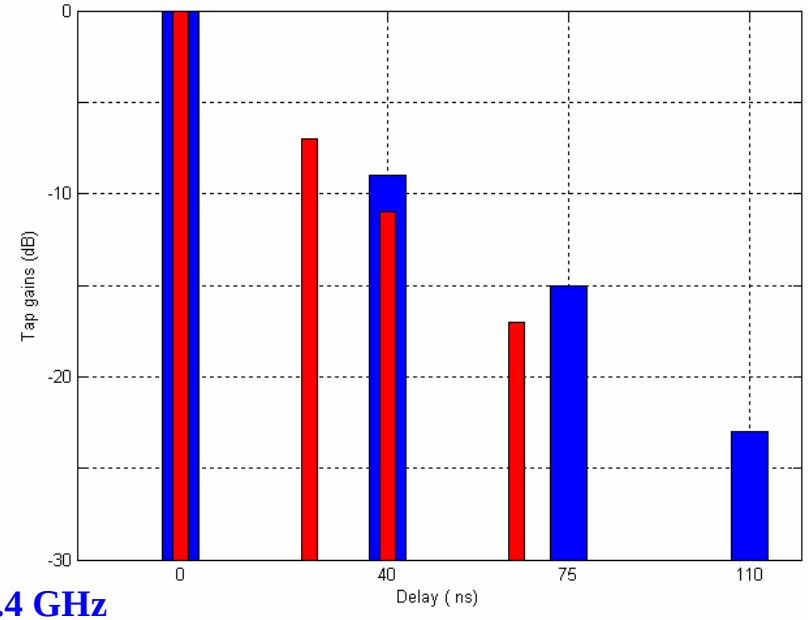
Tapped Delay Line Model



*** LOS case**

- Blue : 2.4 GHz

- Red : 5.8 GHz



*** NLOS case**

- ✓ 4 taps are shown (Normalized power)
- ✓ Fast decay in 5.8GHz band

Comparison & Analysis

	2.4 GHz	5.8 GHz
Path loss	Low	High
Decay as distance	Slow	Fast
Coverage	Far	Near
Usage	Large	Small
RF part size	Large	Small

Thank You !!!

Q & A