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

Submission Title: [Shadowing effect in the human body communication]
Date Submitted: [15 Mar, 2008]
Source: [Hwang, Jung Hwan / Kang, Sung Weon] Company [ETRI]
Address: [161, Gajeong-Dong, Yuseong-Gu, Daejeon, South Korea]
Voice:[+82-42-860-1176], **FAX:** [+82-42-860-5236], **E-Mail:**[jhhwang@etri.re.kr]

Re: [ ]

Abstract: [Introduction of shadowing effect in the human body communication]

Purpose: [To introduce the channel characteristics of the human body communication]

Shadowing effect in the human body communication

2008. 3. 19.

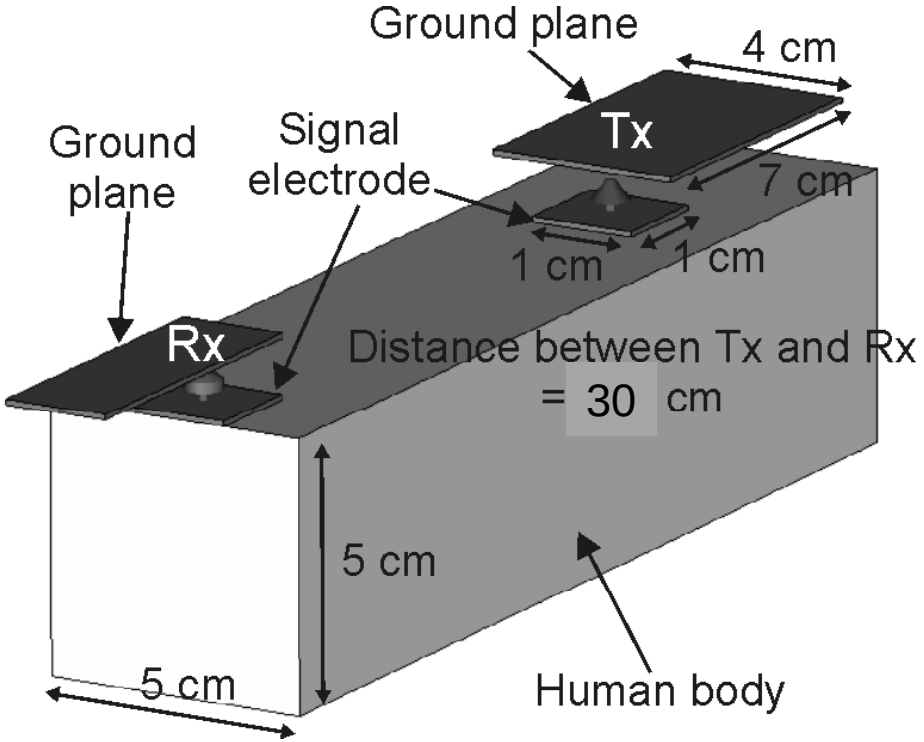
Human Body Communication SoC Team

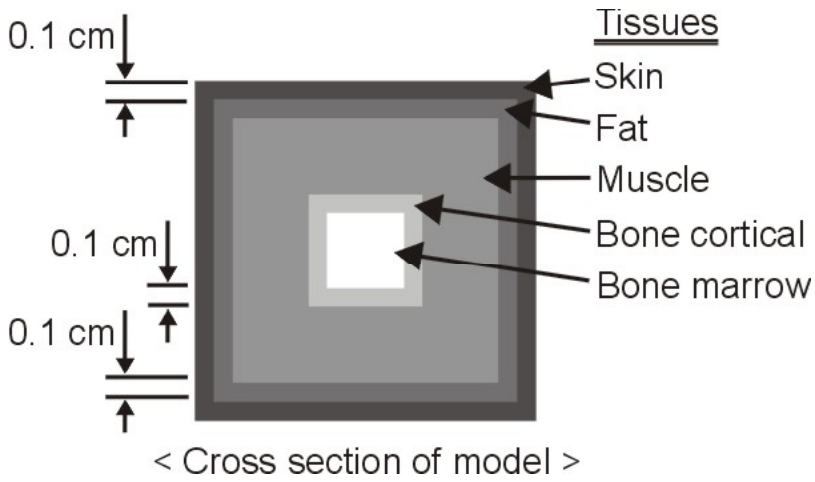
Hwang, Jung Hwan / Kang, Sung Weon

ETRI

Simulation model

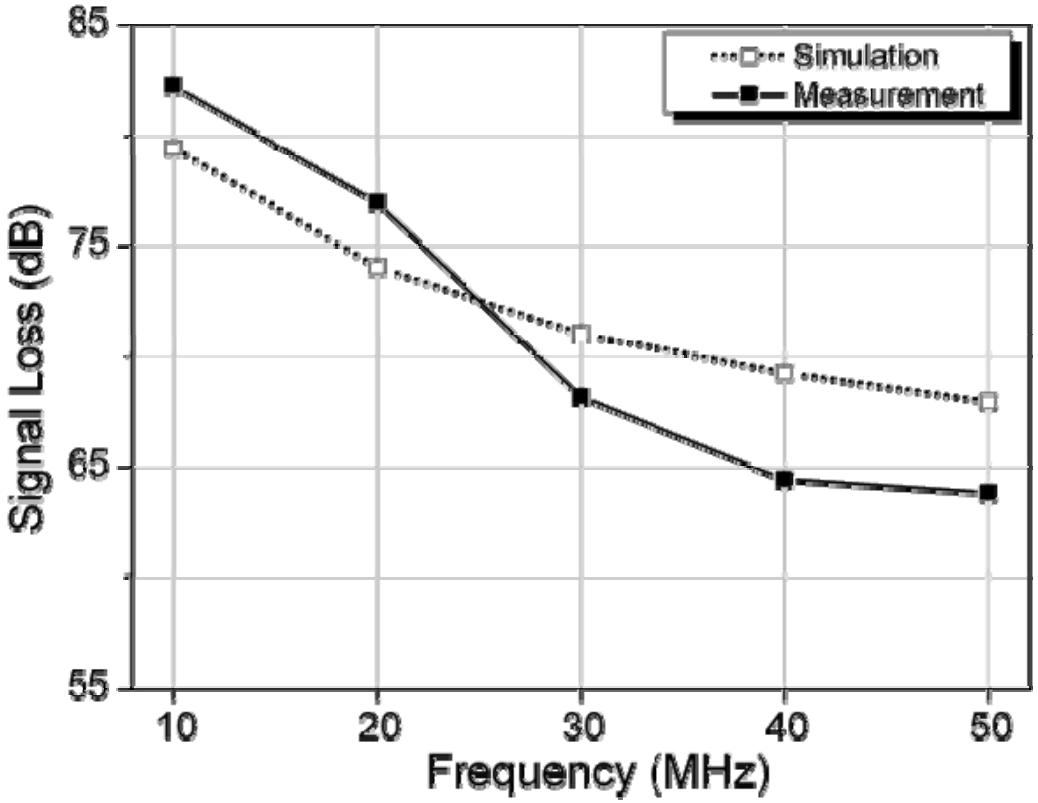
- The arm has been modeled simply as the rectangular parallelepiped with 5 tissues.





Comparison with measurement results

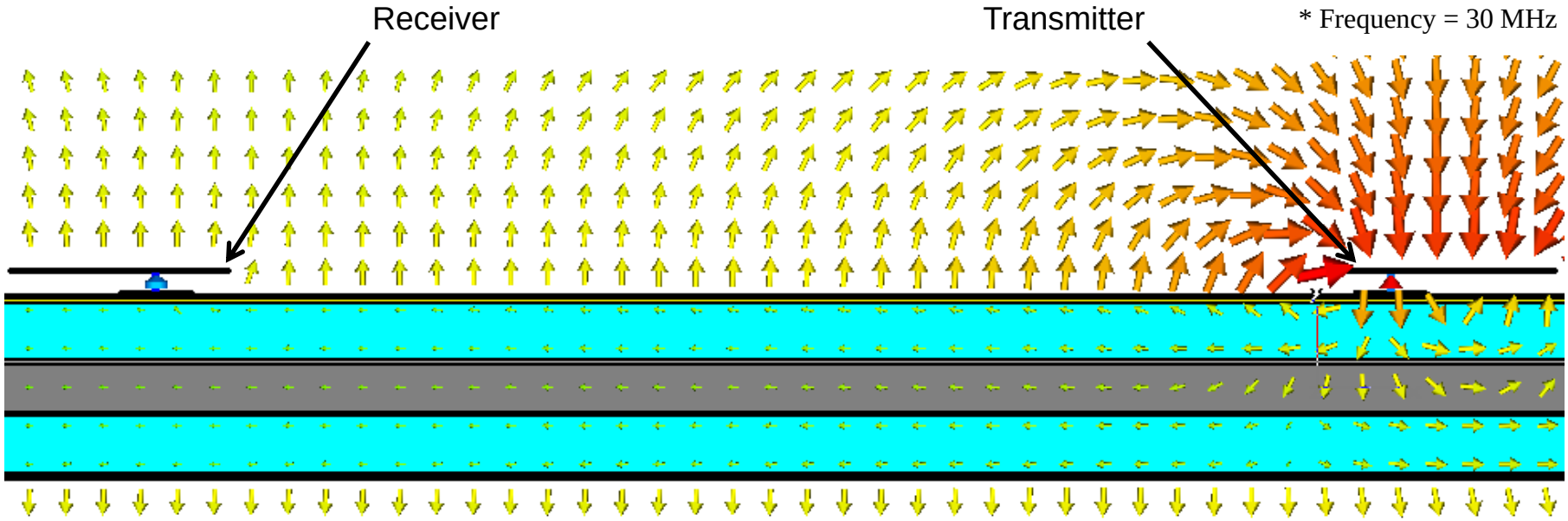
- The simulated signal loss is almost the same as the measured one.



* Load impedance = 50 ohm

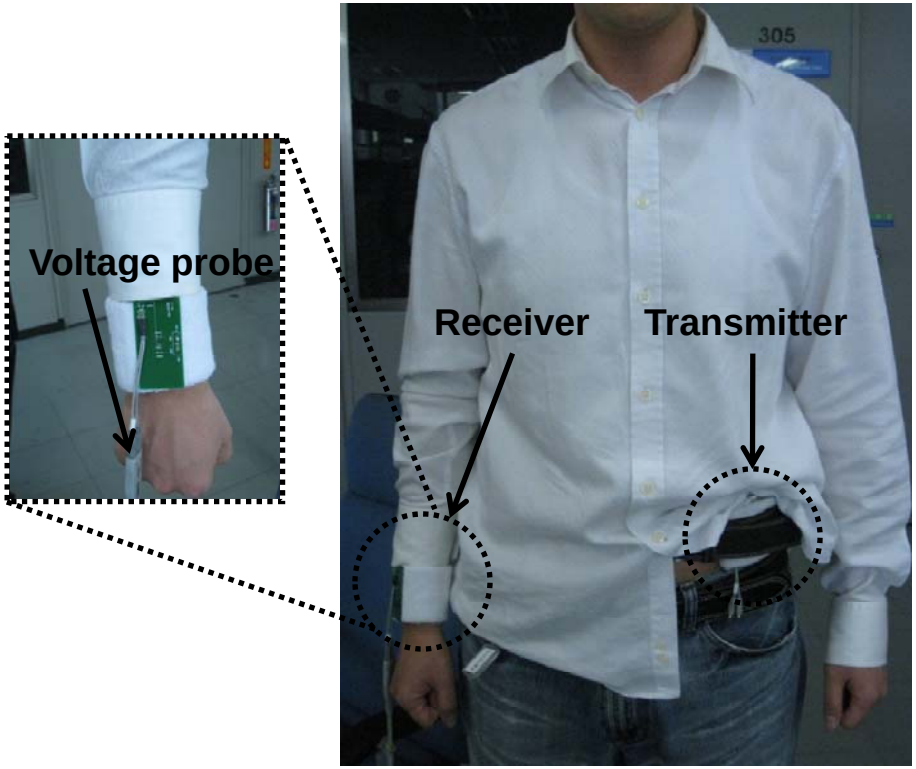
Distribution of electric fields

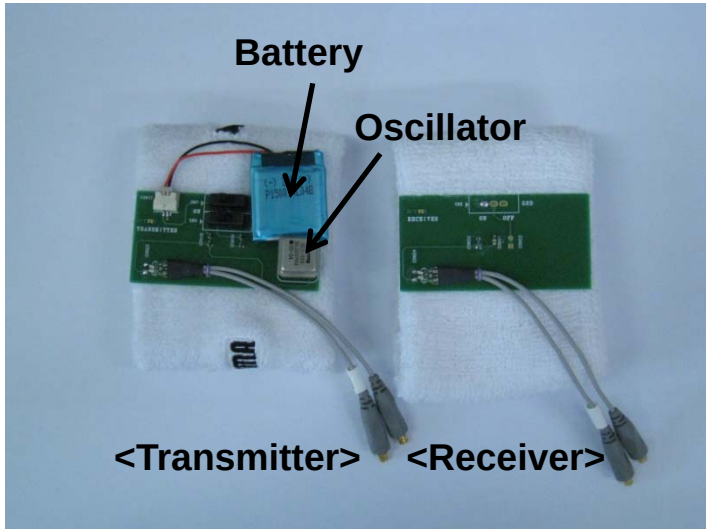
- The electric fields generated from the signal electrode are coupled to the ground plane through the body and the air.



Measurement for the shadowing effect

- The change of signal loss according to body's posture has been measured between the waist and the wrist.

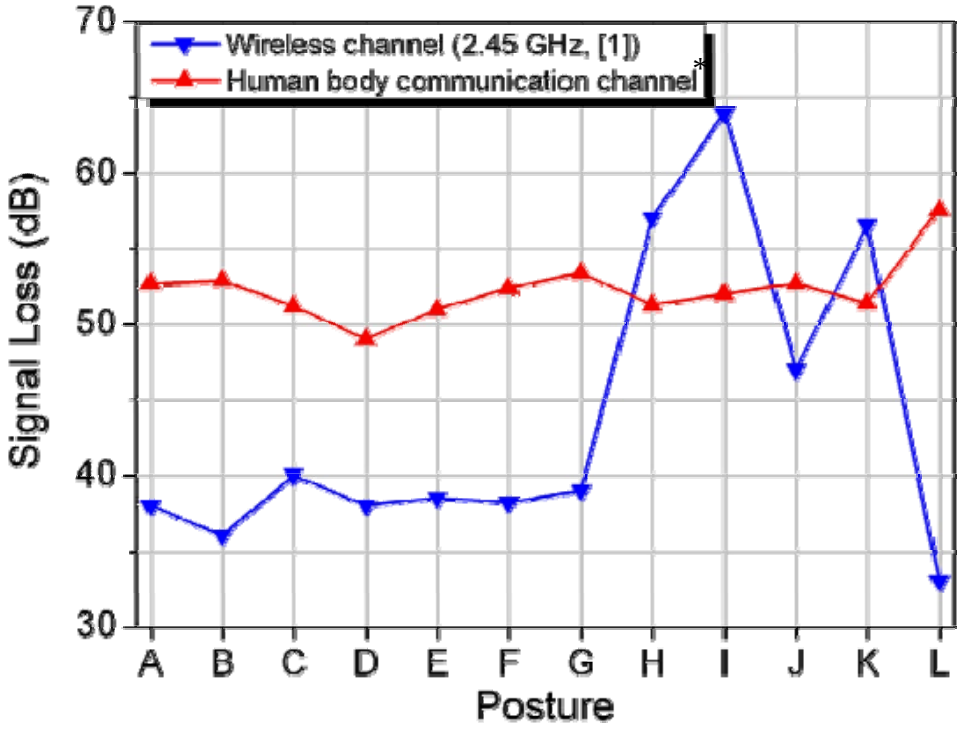




Measurement results

- In the case of wireless channel, the 2.45 GHz monopole antennas have been used at the transmitter and the receiver.

Index	Posture
A	Standing
B	Standing and body turned left
C	Standing and body turned right
D	Standing and body bent forward
E	Standing and head bent forward
F	Standing and head turned left
G	Standing and head turned right
H	Standing and arms stretched out to side
I	Standing and arms above head
J	Standing and arms forward
K	Sitting and arms hanging
L	Sitting and hands on laps

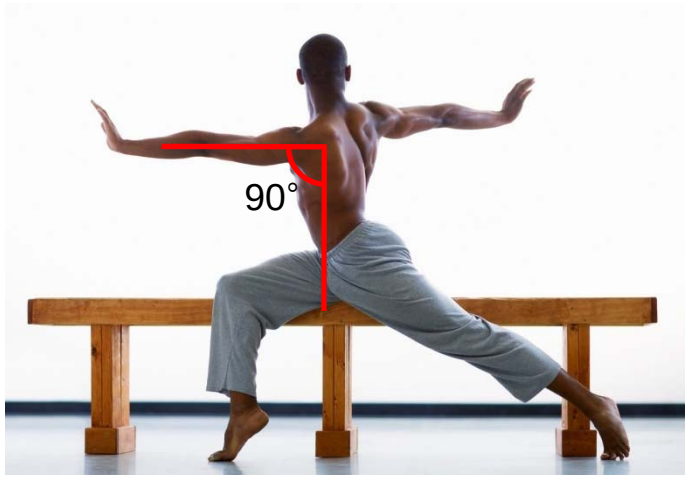


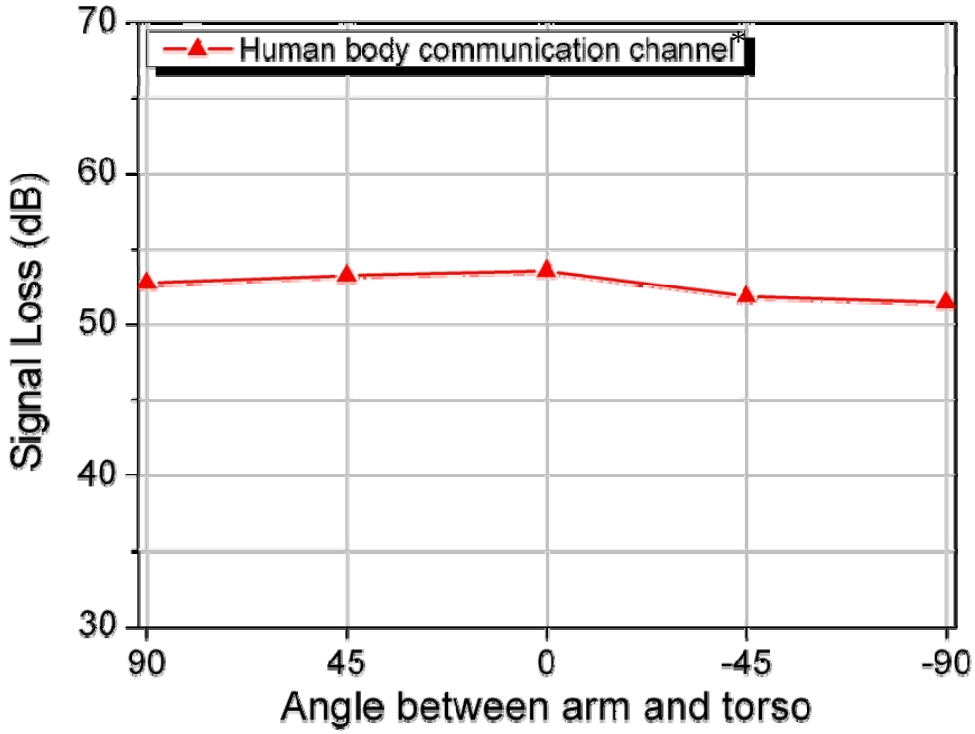
[1] Performance of antennas in the On-Body environment, IEEE APS, 2005.

* Frequency = 30 MHz, Load impedance = 10 Mohm

Measurement results (Continued)

- The signal loss has been measured while swing the right arm.





* Frequency = 30 MHz, Load impedance = 10 Mohm

Summary

- In the human body communication, the signal transmission is achieved by the field coupling between the transmitter and the receiver.

- There is no severe change in the signal loss by the variation of body's posture and the shadowing effect because

    1. Very low frequency band is used.

    2. The body functions as the wire channel.