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

Submission Title: [Proposed reference antenna models for each Usage Model Definition]

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Abstract: [This contribution describes reference antenna models for each Usage Model Definition]

Purpose: [Contribution to mmW TG3c meeting.]

Proposed reference antenna models for each Usage Model Definition

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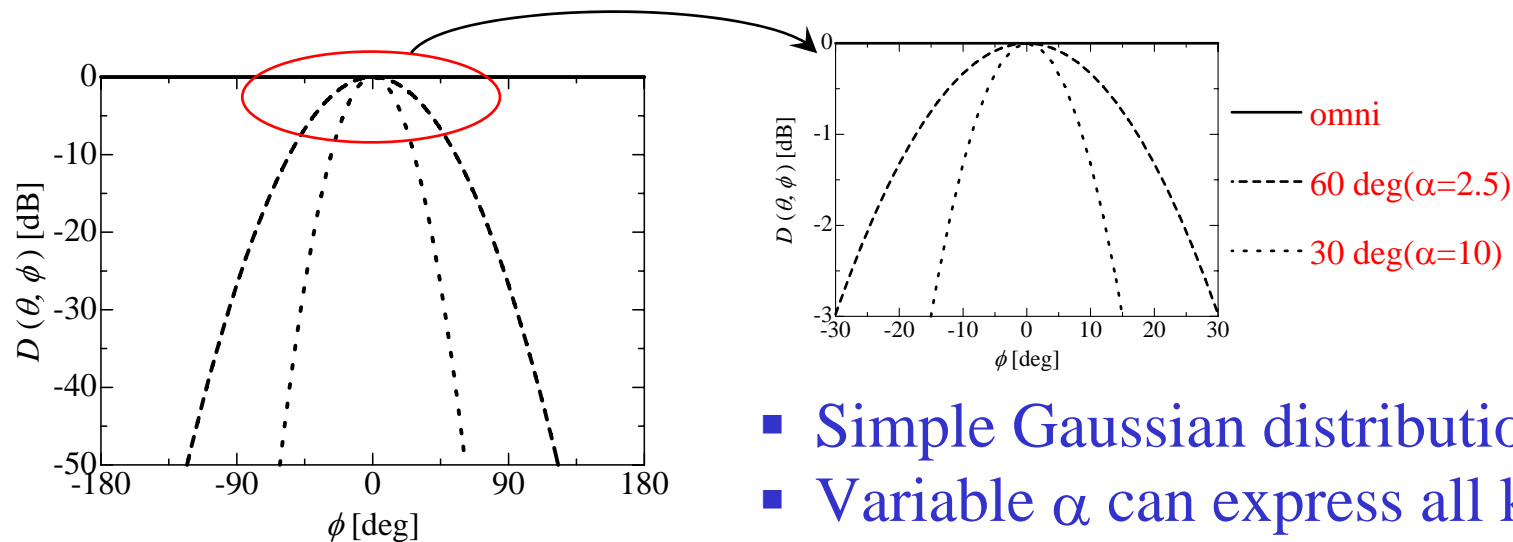Y.Oishi (FUJITSU)
K.Takahashi (Panasonic (Matsushita))

Background

- TG3c called for reference antenna model to perform PHY/MAC simulation

- Reference antenna models are required for each usage model definition

Basic reference antenna model

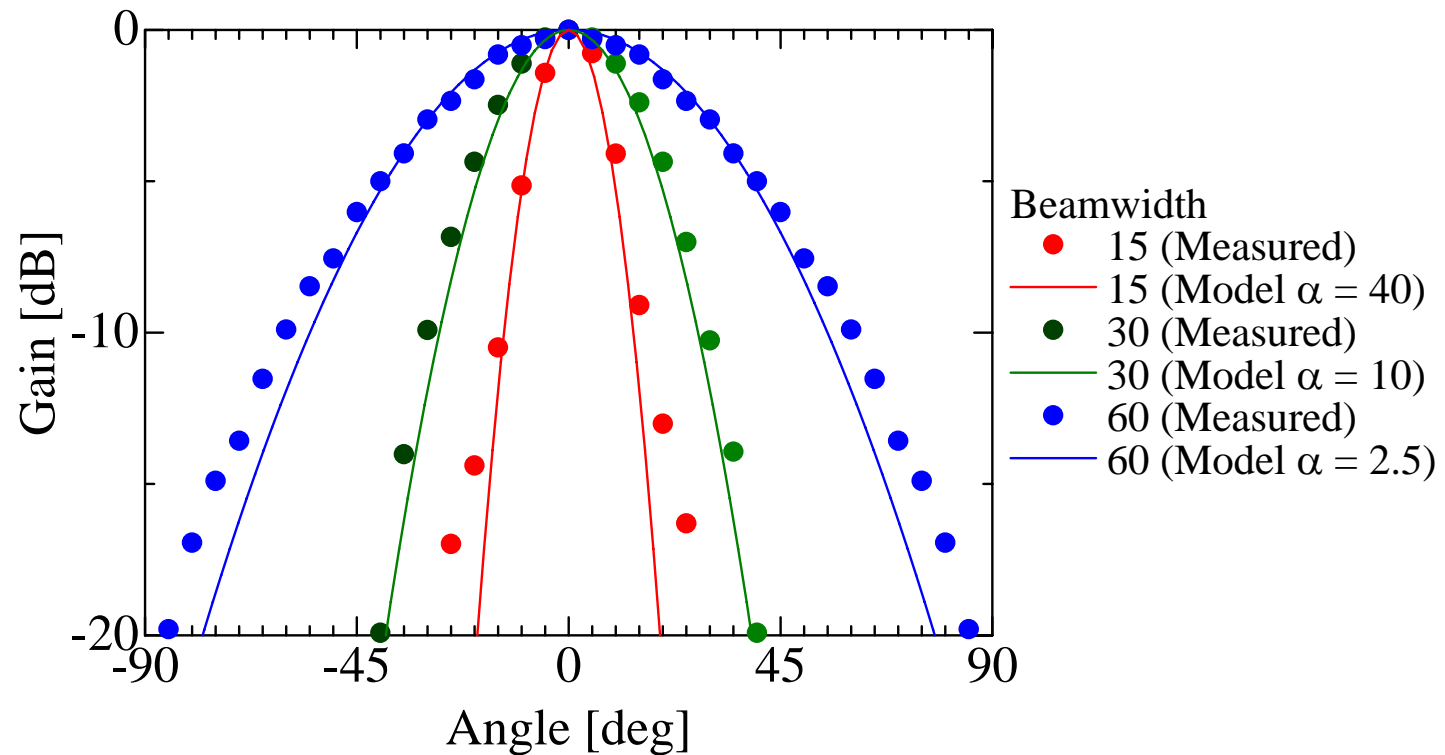Antenna gain: $G_r(\theta,\phi) = G\,D(\theta,\phi)$

- Omni directional antenna: $D(0,\phi)=1$
- Directional antenna: $D(0,\phi)=\exp(-\alpha\,\phi^2)$

- Simple Gaussian distribution
- Variable α can express all kinds of beam-width

Fitting results of antenna patterns

Gaussian distribution well agree with actual antenna pattern

Proposed reference parameters for each UMD

	Devices	Antenna beam-width factor (α)	Correspondent 3-dB beam-width [deg]	Maximum antenna gain [dBi]	Form factor [mm]※1	Bandwidth [GHz]
UM1	TV	40	15	22	20×40	9 [57-66 GHz]
	STB	40	15	22	20×40	
UM2	TV	40	15	22	20×40	
	STB	40	15	22	20×40	
UM3	PC	2.5	60	10	4×1	
	Peripheral	2.5	60	10	4×1	
	TV	40	15	22	20×40	
UM4	PC	2.5	60	10	4×1	
	Wireless bridge	2.5	60	10	4×1	
	TV	40	15	22	20×40	
UM5	Server（STB）	2.5	60	10	4×1	
	PDA	10	30	16	10×10	

※1: Conical horn antenna: Diameter × Length

Policy used in selecting antenna parameters

- The reference antenna should be selected from the antennas used to create the channel model

- The same type of device is assumed to use the same type antenna over all usage models

- The antenna beam width should be practically reasonable

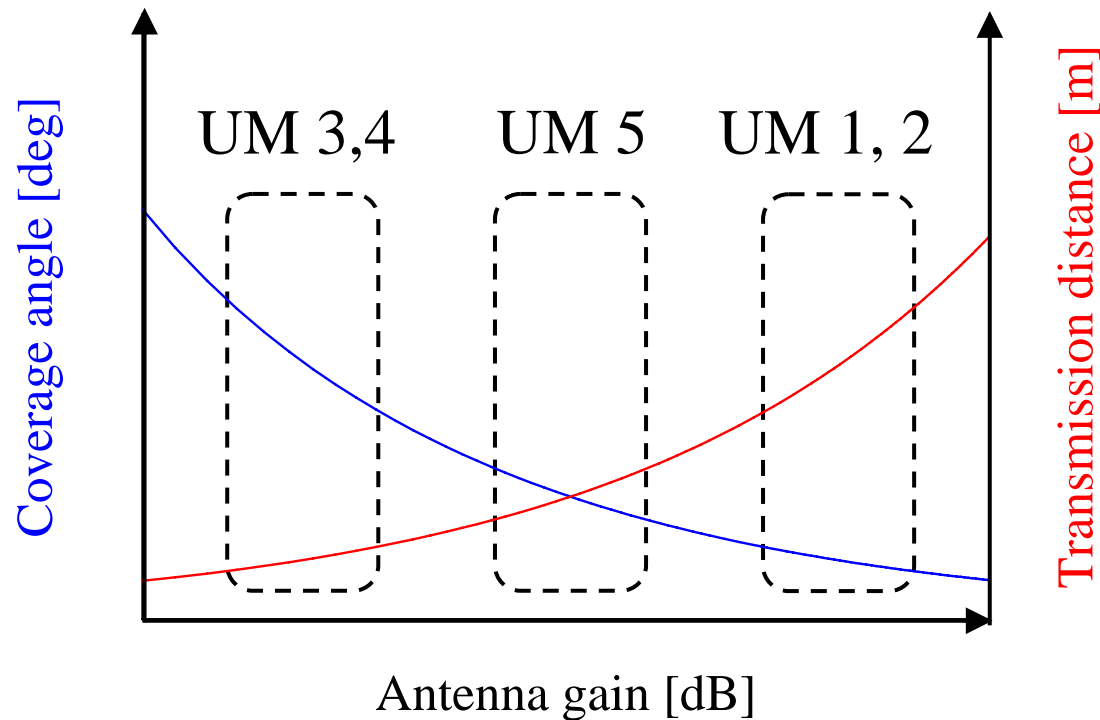# Policy used in selecting antenna parameters (cont')

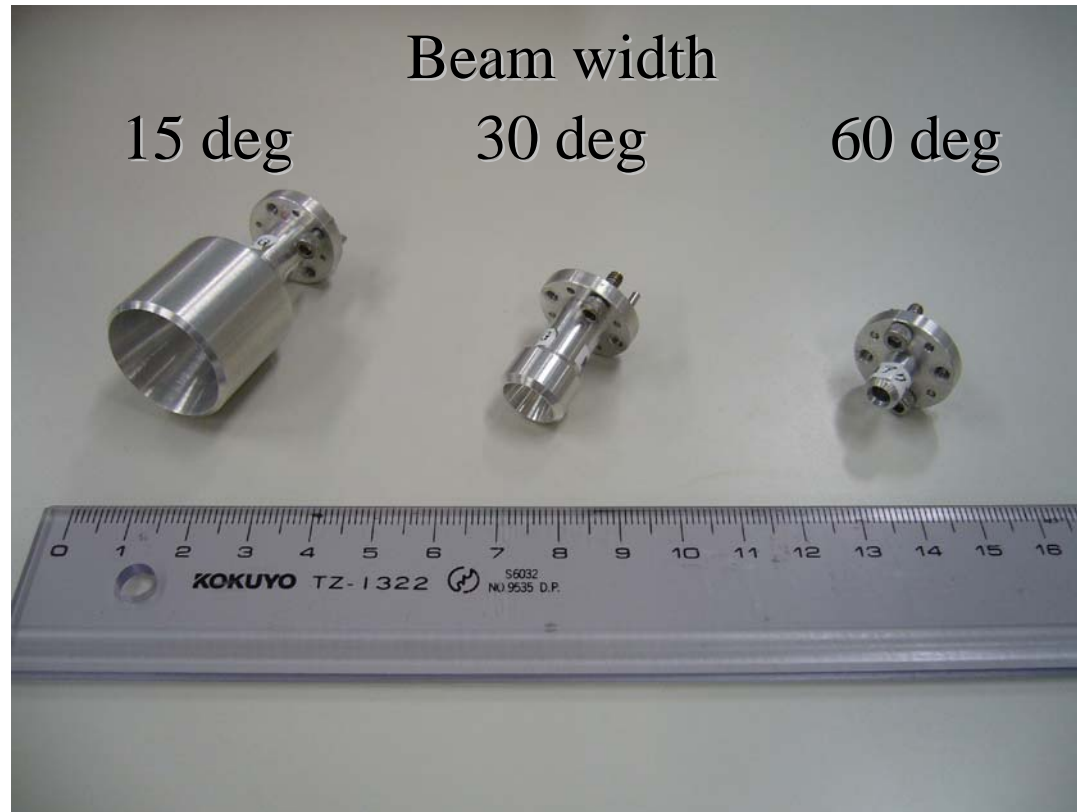Fig. Coverage angle and transmission distance vs antenna gain

- UM 1,2 require long distance transmission
- UM 3,4 require wide coverage angle
- UM 5 requires moderate gain antenna to tolerate PDA jitter

Summary

- Gaussian pattern was proposed as reference antenna model

- Reference antenna parameters for each UMD were proposed

Hirokazu Sawada, NICT

Appendix: Conical horn antennas

Beam width

15 deg   30 deg   60 deg

These antennas were used in channel measurement