

Development of Dependable Wireless System and Device

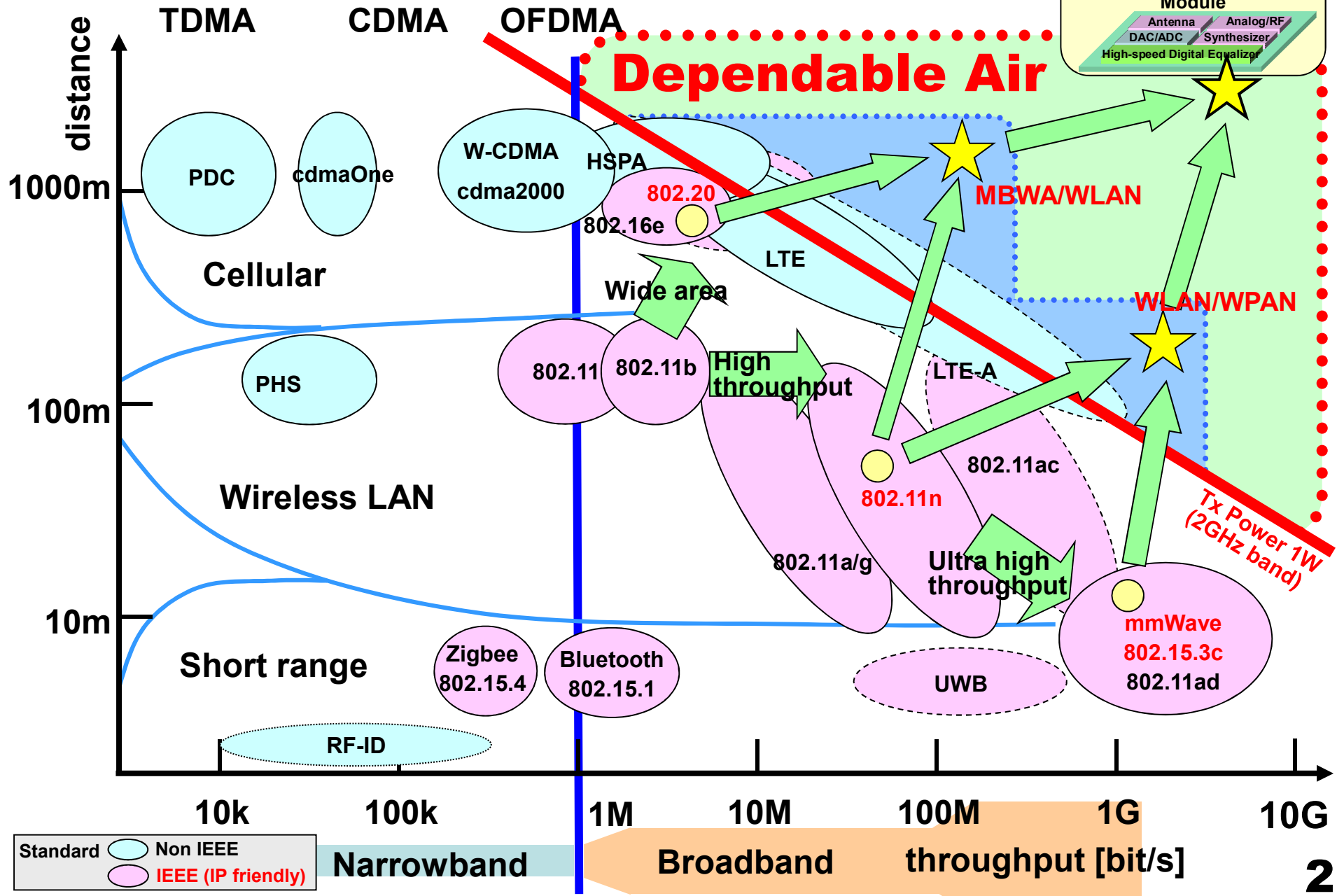
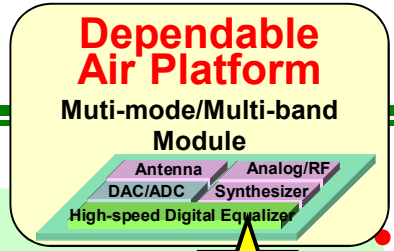
Research Director:

Kazuo Tsubouchi, Tohoku University

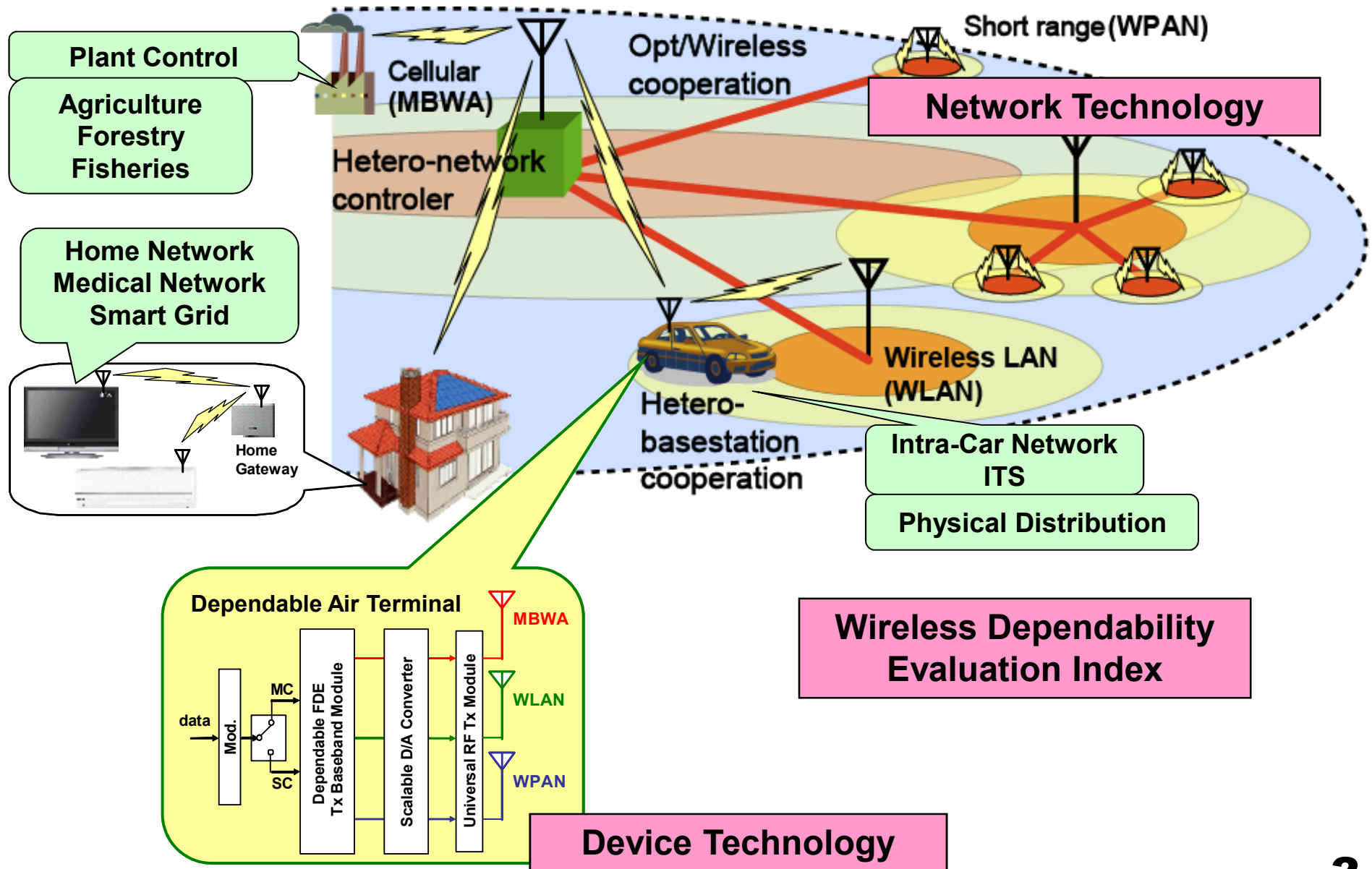
Members: **Akira Matsuzawa**, Tokyo Institute of Technology
Makoto Iwata, Kochi University of Technology
Minoru Fujishima, Hiroshima University
Hiroshi Oguma, Toyama National College of Technology
Mitsubishi Electric Corporation

Cooperators: **NEC Corporation**
SOFTBANK TELECOM Corp. *etc.*

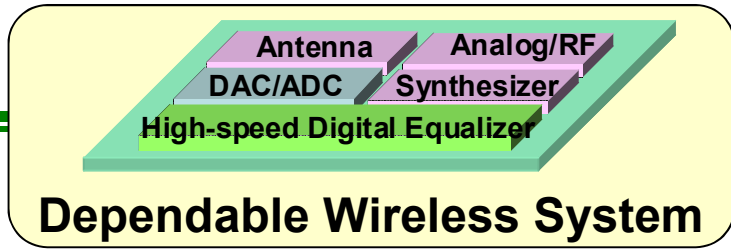
Dependable Air: Heterogeneous and High-Reliable Wireless Network and Devices



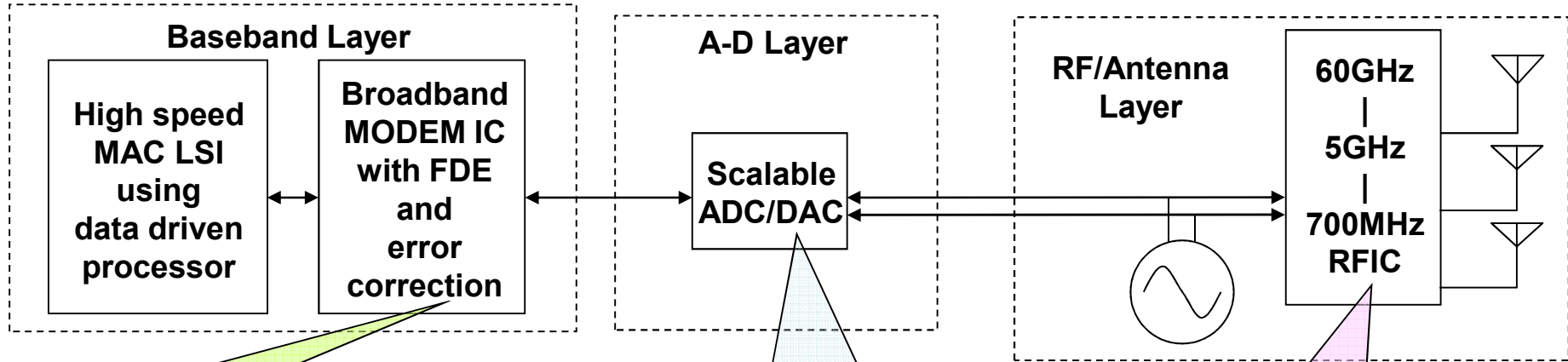
Dependable Air: R&D



Research Area: Devices



All Si-CMOS Broadband SC/MC FFT/IFFT



2) Frequency Domain Equalization (FDE)

Tohoku Univ., Kochi Univ. of Tech.,
Toyama National College of Tech.,
Softbank Telecom

3) Scalable ADC/DAC

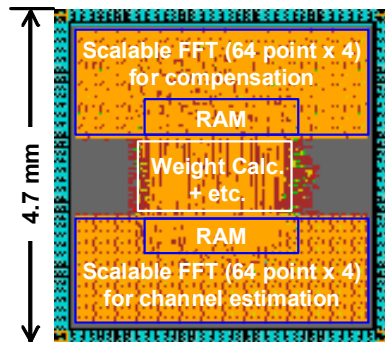
Tohoku Univ.,
Tokyo Institute of Tech.

1) All Si CMOS RFIC (500MHz~70GHz)

Tohoku Univ., Hiroshima Univ.,
Mitsubishi Electric Corp., NEC

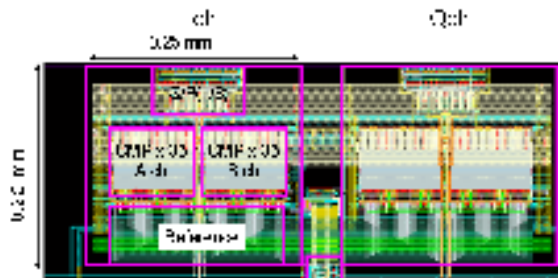
■ ASIC Implementation of Scalable FDE

180nm CMOS
Core size 17.6 mm²



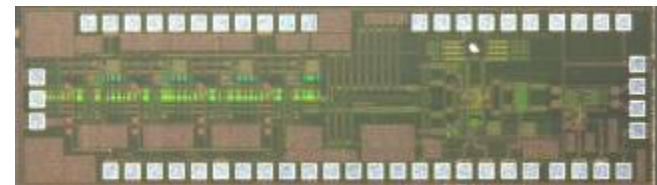
■ Flash ADC for 60GHz-Band Communication System

5bit, 2.3GSps, 12mW



■ 60GHz-Band Receiver Front-End CMOS IC

Chip size: 2.85mm x 0.82mm



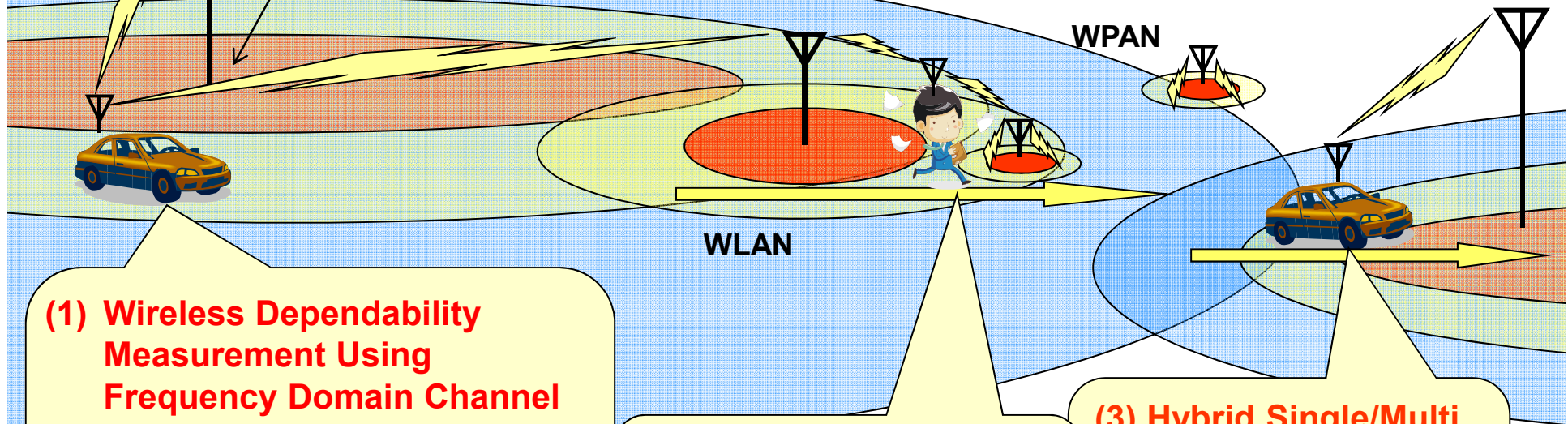
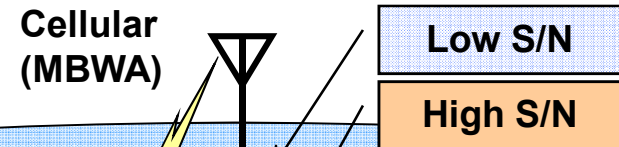
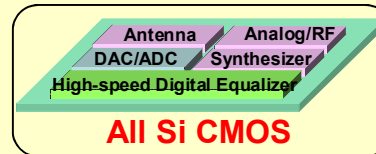
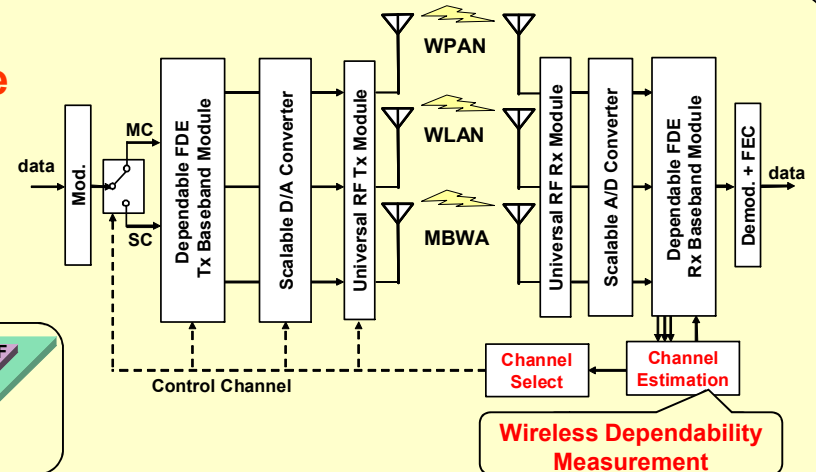
90nm CMOS

Research Area: Network

Hetero-Network Joint
H2H, H2M, M2M
Information network &
Control network

Dependable Air Interface

- (1) Universal RF
- (2) FDE
- (3) Scalable A/D & D/A



(1) Wireless Dependability Measurement Using Frequency Domain Channel Estimation Method

- + Measuring multi channel functions simultaneously: distance, S/N, BER
- + Selection of optimum channels after channel compensation

(2) Hetero-Network System Handover

- + High mobility
- + Optimum channel selection

(3) Hybrid Single/Multi Carrier Modulation

- + Optimum modulation for distance, S/N, BER
- + Improving connectivity

Members

Devices and Circuits for Dependable Air

(1) All Si CMOS
RFIC
(500MHz ~ 70GHz)

Tohoku Univ.

**Hiroshima Univ.
(Prof. Fujishima)**

(2) Broadband
FDE

Tohoku Univ.

**Kochi Univ. of Tech.
(Prof. Iwata)**

(3) Scalable
ADC/DAC

Tohoku Univ.

**Tokyo Institute of Tech.
(Prof. Matsuzawa)**

Tx LSI : Tohoku Univ. (with NEC)

Rx LSI : Tohoku Univ. Mitsubishi Electric Corp.

(Extended 1) Beam Forming Antenna: Tohoku Univ.

Discussion

**Agreement
(NDA and patent)**

**Tohoku Univ.
Mitsubishi Electric Corp.
NEC
Softbank Telecom**

Network for Dependable Air

(Extended 2)
Dependable Network
Processor

**Tohoku Univ.
Kochi Univ. of Tech.
(Prof. Iwata)**

(Extended 3)
Dependable
Heterogeneous Network
for Big Disaster

**Mitsubishi Electric Corp.
Toyama National College of Tech.
(Assoc. Prof. Oguma)
(with Softbank Telecom)**

Extended Dependable Air: Joint Terrestrial & Satellite Communication

