Performance of Miniaturized 6-port MIMO Antenna Using Orthogonal Polarization
Kazuya TAKAHASHI*, Naoki HONMA*, Kentaro MURATA*, Yoshitaka TSUNEKAWA*
(*Iwate University, Japan)
(*) School of Science and Engineering, National Defense Academy, Japan

Introduction
High performance of wireless communication

Need to implement many antennas into small terminal

Increase in demand of high wireless communication quality

Proposed design can offer both miniaturization of antennas and improvement of the channel capacity

Conventional decoupling method

Complexity of the circuit

Narrow band

Increasing the number of elements

Decoupling mechanism

T-shaped PIFA: Vertical E-field in near field

Notch antenna: Horizontal E-field in near field

Low mutual coupling characteristic is achieved

MIMO antenna suitable for small terminal is needed

PIFA: Planar Inverted-F Antenna
PTFE: Polytetrafluoroethylene

Configuration

- 6-port MIMO antenna (PIFA×3, Notch antenna×3)
- Implementation size: 13.5×60×5 mm³

Miniaturization of element

- PIFA: Miniaturization by T-shaped conductor (T-shaped PIFA)
- Notch antenna: Miniaturization by loading reactance

The fabricated antenna

- Center frequency: 2.4GHz
- Fabricated on PTFE substrate

Decoupling mechanism

T-shaped PIFA: Vertical E-field in near field

Notch antenna: Horizontal E-field in near field

MIMO characteristic (Channel capacity)

- Channel is calculated by scattering ring model using measured radiation patterns in xy plane
- Monopole array consists of 6 elements
- Aperture width of monopole array is same as proposed antenna

Proposed ant. measurement

Improved by 2.62 Bits/s/Hz compared with monopole array at 50% value

Conclusion

Proposed design can offer both miniaturization of antennas and improvement of the channel capacity