NEWS RELEASE

NTT

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MIMO-OFDM technology field test for over-100 Mbit/s broadband wireless access

To increase the communication capacity of hot-spots and new generation mobile communication services

Nippon Telegraph and Telephone Corporation (NTT, headquartered in Chiyoda-ku, Tokyo. President and CEO is Norio Wada) will carry out field tests of MIMO (*1)-OFDM (*2) technology from December 2004 until March 2005 in the Yokosuka city area, Kanagawa, Japan. MIMO-OFDM technology can provide data-rate services of 100 Mbit/s for wireless LAN in office/home environments and 'hot-spot' areas, such as airports or conference centers. Furthermore, we expect MIMO-OFDM to be a key technology that can be applied to new generation mobile communication systems.

<Background>

Due to the expansion of broadband services, 100 Mbit/s LANs (based on fast Ethernet) are mainly used in office/home networks now. Since networks can easily be built without wiring, wireless LANs are expected to be the network infrastructures of the future. However, the transmission data rate and communication quality are lower than those of wired LANs.

NTT Network Innovation Laboratories (Yokosuka, Kanagawa) has developed MIMO-OFDM technology that combines MIMO (multiple input multiple output) and OFDM (orthogonal frequency division multiplexing) technologies (Fig. 1). MIMO technology uses multiple sets of antennas, both in the transmitter and the receiver. Theoretically, it can achieve N times the transmission bit rate of a single-input single-output (SISO) channel by using N sets of antennas without expanding the signal bandwidth. We adopted a space division multiplexing (SDM) technology (*3) as a MIMO technology in order to realize the transmission rate of more than 100 Mbit/s.

OFDM technology is effective for mitigating the effects of frequency selective fading (*4), and is already in use in wireless LAN and digital terrestrial broadcasting systems. MIMO and OFDM technologies are combined to achieve a large capacity, high frequency utilization efficiency, and good performance against frequency selective fading.

NTT has developed a prototype to examine the feasibility of MIMO-OFDM technology. We will evaluate the performances of the developed MIMO-OFDM prototype through field tests and complete MIMO-OFDM technology for wireless LAN and new generation mobile communication systems.

Moreover, MIMO-OFDM is also being investigated as a core technology for the next generation wireless LAN standard, "IEEE802.11n" that is being studied by the IEEE 802 committee, which is the American standardization organization.

<Overview> (Fig. 2)

(1) Test sites
A field test will be carried out in the Yokosuka city area in Kanagawa, Japan in:
- The Yokosuka Research Park (YRP) area
- The area around Yokosuka City Hall

(2) Test period
December 1, 2004 to March 31, 2005 (4 months)

(3) Major tests
-Evaluation of the transmission performance in short-range environments, such as conference rooms, lobbies, and passages (assuming private wireless LANs and home networks)
-Evaluation of the transmission performance in long-range environments, such as streets and open spaces (assuming public wireless LAN services)

<Future plans>
NTT will confirm the transmission performance of MIMO-OFDM technology through these field tests and examine the increase in the data transmission rate and the communication capacity of public wireless LAN services. Moreover, NTT will also consider applying this MIMO-OFDM technology to new generation mobile communications and next generation fixed wireless access (FWA) systems.

< Glossary >
*1 MIMO (Multiple Input Multiple Output) technology
MIMO technology is a transmission technology that uses multiple transmit and receive antennas. This technology is currently the most attractive option for realizing large data rate transmission and large communication capacities without expanding the signal bandwidth.

*2 OFDM (Orthogonal Frequency Division Multiplexing) technology
OFDM is a kind of modulation scheme used in radio communications and has excellent performance against frequency-selective fading. This technology is also used in digital terrestrial television broadcasting systems.

*3 SDM (Space Division Multiplexing) technology
SDM is a kind of MIMO technology. In SDM, the transmitter transmits different signals from multiple antennas at the same time and at the same frequency. Ideally, it can achieve N times the transmission data rate of single input single output (SISO) systems over richly scattered wireless channels by using N transmit and N receive antennas on both sides of the communication links without expanding the signal bandwidth.

*4 Frequency selective fading
Frequency selective fading is one of the degradation factors in radio communications. This is a type of fading where a lot of delayed waves overlap due to the multipath effect between the transmitter and the receiver (like the ghost phenomenon in common television broadcasting).

- Fig. 1 MIMO-OFDM technology
- Fig. 2 MIMO-OFDM system experiment

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