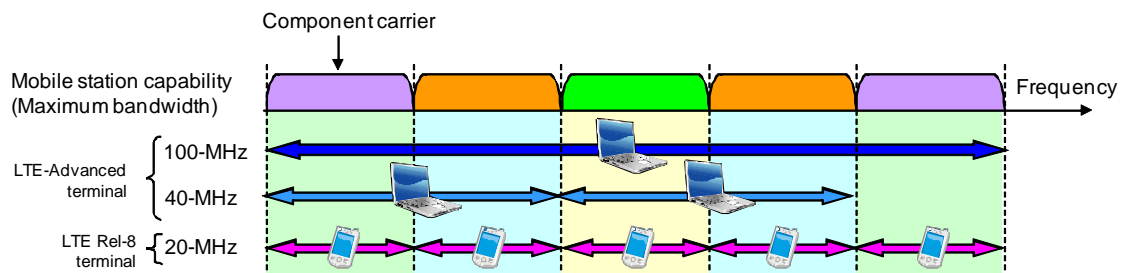


Attachment

LTE-Advanced Key Technologies Implemented in DOCOMO's Experimental Equipment

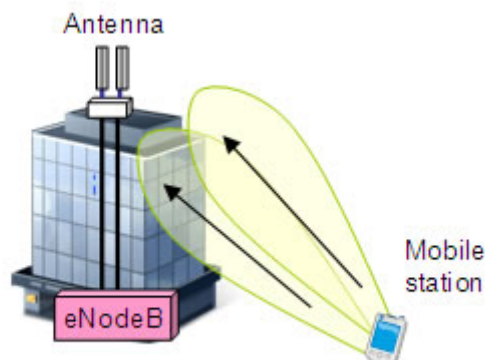
1. Bandwidth extension based on carrier aggregation

Carrier aggregation achieves extra-wide frequency bandwidth transmission by bundling multiple 20 MHz-wide bands, i.e., component carriers, for the uplink and downlink. By using link adaptation and channel coding, as well as hybrid automatic repeat-request, for each component carrier, the transmission data rate can be increased efficiently. The experimental equipment allows up to five component carriers to be aggregated to extend the transmission frequency bandwidth to 100 MHz for the downlink, and two can be aggregated to achieve a 40 MHz bandwidth for the uplink.



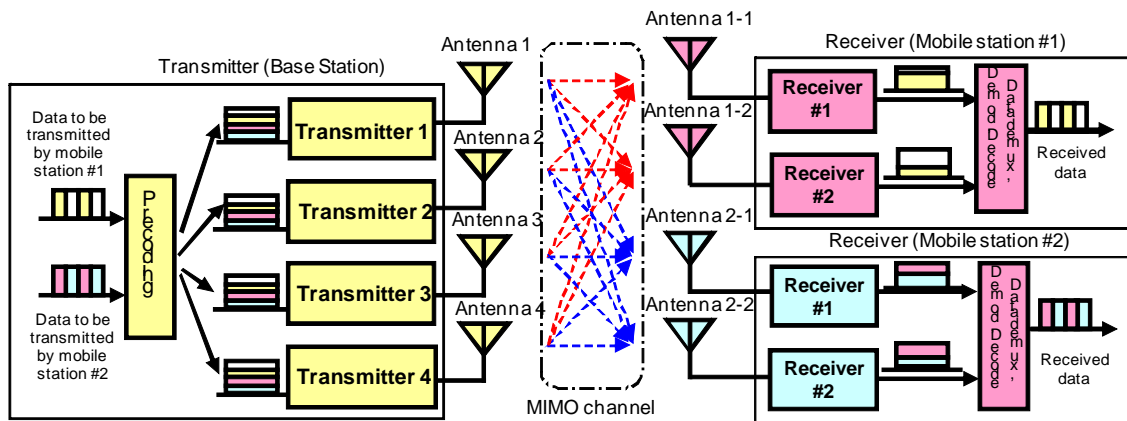
2. Uplink MIMO transmission

Uplink MIMO in LTE-Advanced is categorized into multiple-input and multiple-output (MIMO) multiplexing and closed loop transmit diversity. Under good radio conditions, MIMO multiplexing increases spectral efficiency and the transmission data rate. Under bad radio conditions, closed loop transmit diversity improves the received signal quality. In the field experiment, DOCOMO aims to achieve a data rate of approximately 200 Mbps in the uplink using two transmit and two receive antennas, combined with carrier aggregation.



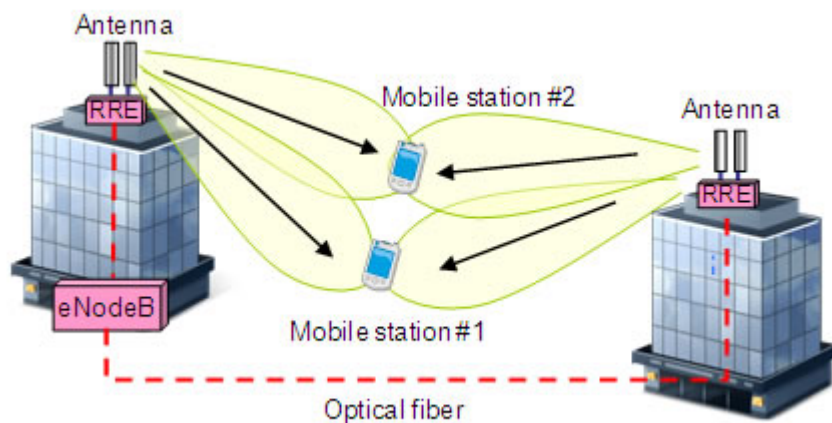
3. Downlink multiuser MIMO transmission

Spectral efficiency is improved by simultaneously transmitting signals from one base station to multiple mobile stations via MIMO multiplexing. The experimental equipment supports four transmit antennas in the base station and two antennas in each of the two mobile stations. Using multiuser MIMO and carrier aggregation, DOCOMO hopes to achieve a 1 Gbps data rate in the downlink.

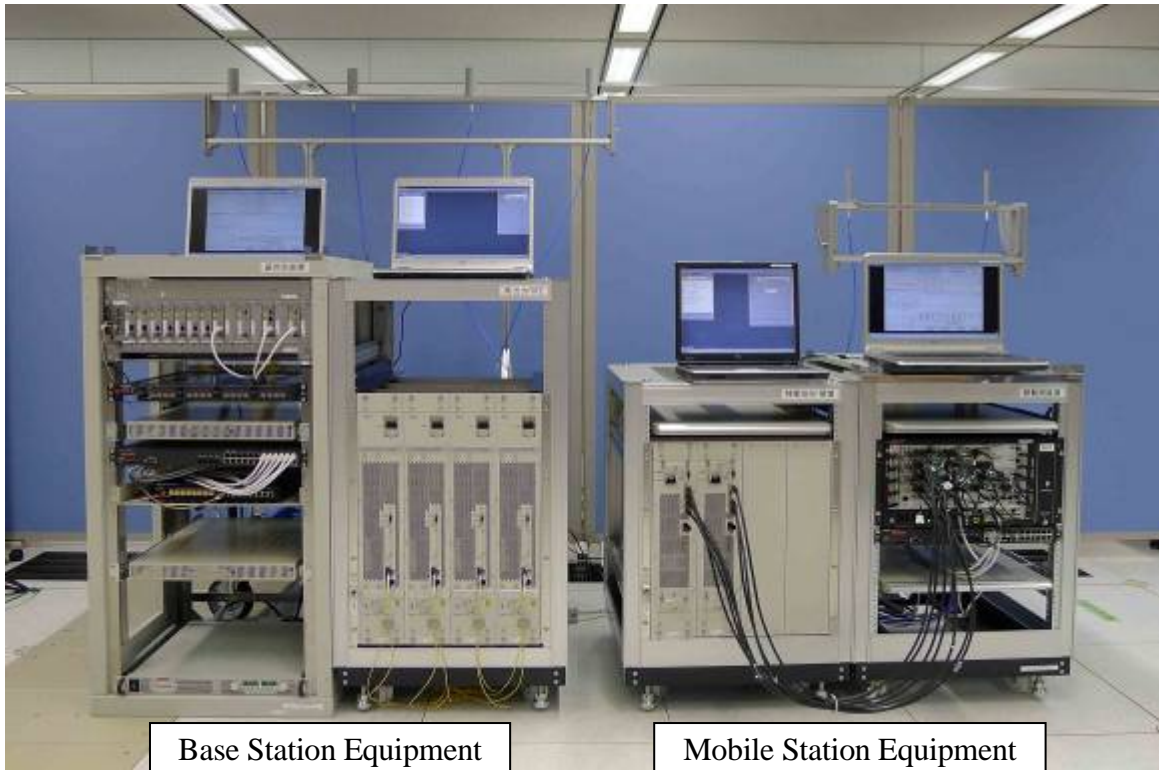


4. Downlink coordinated multi-point (CoMP) transmission

CoMP improves the transmission data rate between a base station and mobile stations that are located near cell edges. The base station's centralized control of multiple remote radio equipment (RRE) units in different locations helps to reduce interference between radio cells, resulting in transmission at a higher data rate.



Wireless Stations for Field Experiment



Note: In outdoor trials, the mobile station equipment will move around in a motor vehicle.