

## Special Articles on Fourth- Generation Wireless Access Technology —Toward Next-Generation Mobile Communications Systems—

In Japan, mobile communications have been upgraded to a new generation of wireless access about every 10 years. With the launch of Third-Generation (3G) services in 2001, the switchover from Second to Third Generation technology (IMT-2000) is now in progress. The lead-time for development of next-generation services is about 10 years, however, which means that primary thinking and research on Fourth-Generation (4G) targets and elemental technologies have already begun with a move into the system-development phase now in progress.

Previous switchovers from one generation of wireless access to another have featured conversion from analog to digital communications and evolution to broader bandwidths and greater capacities. The change to 4G technology, however, will be of a slightly different nature. In the world of international standardization, next-generation mobile communications systems are called “Systems Beyond IMT-2000” reflecting a comprehensive view of various wireless access systems that interconnect and interact over the network. In this regard, Wireless Laboratories treats 4G technology as that part of Systems Beyond IMT-2000 that will provide new and exciting capabilities. Research and development of these functions is now under way with the aim of launching 4G services around 2010.

In terms of speed, capacity, and economy of use, 4G wireless access must be far superior than 3G technology. Current mobile users feel burdened and constrained by the usage environment with regard to fees, speed, service areas, and terminals, but nevertheless put up with it feeling that it can't be helped with mobile communications. DoCoMo would like to do better with 4G making communications feel like the air we breathe but never think about. This vision goes beyond the narrow meaning of cellular systems in 3G technology. In addition to providing high-speed, high-capacity, and low-cost communications in a mobile cellular environment, 4G means a seamless communications environment providing optimal communications even for “hot spots” and offices currently served by wireless LAN. As multimedia communications continue to progress and as voice calls come to be Internet protocol (IP) based, it is essential that the wireless link be completely packetized to achieve good affinity with IP. It will also be important to control and guarantee Quality of Service (QoS) in order to provide users with a wide variety of services. At the same time, the service provision side must be able to expand services efficiently and perform operations with ease. These needs call for radical changes in access-network architecture and network-control methods.

This special article describes 4G system targets to meet the above needs, reports on 4G standardization efforts, and introduces key elemental technologies.

Anticipating how 4G would impact on our way of life and society and what our future world consequentially would be, we will continue our steady efforts to develop 4G technologies as well as to promote further discussions on 4G mobile communications on a global basis.

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