Towards a Ubiquitous Society

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These days, “ubiquitous” is a popular concept. Its roots go back to 1988, when ubiquitous computing was proposed by Dr. Mark Weiser. Since then, with computers becoming smaller, lighter, and easier to carry and with the rapid spread of mobile phones, wireless local area networks, and the Internet, there has been a steady march towards a ubiquitous society in which communication networks can be used anytime, anywhere, and by anybody. The ubiquitous society is expected to help alleviate social problems such as the declining birth rate and aging population and environmental problems.

The mission of our research laboratories is to contribute to the establishment of this ubiquitous society by developing the advanced technologies needed for convenient and attractive ubiquitous network services. We are focusing on two main R&D fields: sensing functions that generate valuable information used in ubiquitous network services and interface functions that input/output this information to/from ubiquitous networks. The latter field includes devices for use with access networks to provide smooth broadband services and ubiquitous communication technologies that go beyond the traditional concepts of communication.

Sensing functions

Our main targets for sensing functions are related to human health/medicine and safety/security. In both cases, the detected information is extremely important, so sensors in these fields should lead to ubiquitous services that are valuable to customers. We are developing surface-plasma-resonance sensors designed to recognize biological molecules optically and sensors needed for preventative medicine. One of our safety/security products is a single-chip fingerprint identification LSI (large-scale integrated circuit) that can read a fingerprint, check it against previously registered fingerprints, and determine whether they match.

Devices for access networks

Making broadband services truly convenient will require the installation of fiber-to-the-home (FTTH) access networks. Although photonics plays the dominant role in FTTH technology, electronics is still important, especially in providing easy-to-use services at a low cost. We aim to achieve a synergy between photonics and electronics. Developments in this area include a high-speed CMOS (complementary metal oxide semiconductor) transceiver LSI with low power consumption and a 3D MEMS (microelectromechanical system) that switches optical paths by moving a micro-mirror.

Ubiquitous communication technology

To create attractive ubiquitous services, we need various types of communication interface. One that we are developing is near-field intrabody communication technology, which utilizes the human body as a transmission pathway. It will let us communicate with each other and with computers embedded in the environment through natural body movements and let portable devices worn on the body communicate among themselves.

Much of our R&D is focused on advanced device technology. Although most products resulting from it tend to be quite remote from customers, even such R&D should be based on clear scenarios of customer needs. We believe that our products will be widely accepted by the ubiquitous network service market and in this way we will contribute to the creation of a ubiquitous society.