Challenging for the 5G Era Devices

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NTT DOCOMO is developing a fifth-generation mobile communications system (5G) as a company-wide effort for launch in 2020. The Communication Device Development Department that I belong to is part of this effort, and in addition to the development of 5G mobile communications, we are conducting ongoing studies on devices and services for the 5G era.

I was first assigned to the Communication Device Development Department more than ten years ago, and since that time, I have been in charge of developing NTT DOCOMO's first terminal for each new generation of the mobile communications system. The first of these was a hard-key, flip-type feature phone for the W-CDMA HSDPA system. We then moved on to terminals for the LTE system such as USB-dongle-type, data-centric devices as well as mobile phones featuring a large-screen touch panel, that is, today's widely popular "smartphones." After this, we continued our development efforts toward the further evolution of the mobile communications system, but for the time being, device form stayed pretty much the same as that of the smartphone. What kind of form, then, will devices take on in the 5G era?

As is often said, 5G will feature many enhancements of currently commercialized technologies such as high-speed/large-capacity operation, low-latency transmission, and massive device connectivity. But no less important in my mind are higher speeds in the uplink, network evolution with connection to Internet of Things (IoT) devices, and power-saving technologies.

We can associate higher speeds in the uplink with the trend toward transmitting video and other types of data-intensive information from devices whose main role has traditionally been to receive information. This feature reflects the expectation that ways of communicating will be changing, which is strongly related to "Creating a new future through diverse means of connection" as declared by NTT DOCOMO R&D. However, achieving higher speeds in the uplink presents many problems on the device side. These include finding ways of dealing with higher power consumption, developing technologies for enhancing antenna performance, and creating ways of improving the User eXperience (UX). Being responsible for terminal development, we are focusing our efforts on solving these problems by leveraging the technologies, skills, and know-how that we have so far developed and accumulated.

Furthermore, while the coming of the "Internet of Things" has long been proclaimed, it is no exaggeration to say that 5G is exactly suited to IoT. Of course, many and varied things equipped with communication functions have already been deployed in the real world, but issues such as limited network capacity, battery life, and cost still remain. As a result, we have not yet reached a state in which any and all devices are possible. Fortunately, 5G can solve these problems so that IoT can be deployed in a full-scale manner. With this in mind, we are working to develop devices that match diverse usage scenarios and needs by combining new and rapidly advancing technologies with the technologies that we have nurtured in our development of feature phones and smartphones.

By the way, our approach to development has changed greatly over these past ten years that I have contributed to device development. In the beginning, NTT DOCOMO would formulate detailed common specifications up to packaging requirements and each vendor would then develop devices in line with those specifications. However, I think the launch of the LTE system in 2010 marked a turning point in that process. For example, communication modems shifted from vendor-specific to the use of overseas vendors, terminal form factor changed from feature phones to smartphones, and areas of differentiation shifted from hardware to software and upper-layer applications. In short, NTT DOCOMO's stipulations changed from packaging specifications to service descriptions and requirements. We think this trend toward service-oriented specifications is accelerating. In particular, devices in the 5G era will not continue on the same evolutionary path—they will not simply be an extension of today's smartphones and tablets. Instead, we can expect many new devices to appear, and we plan to play a role in creating these devices. As I mentioned, a shift occurred from an era of outsourcing manufacturing to domestic vendors to an era of using the terminal platforms of overseas vendors. However, I believe we are now entering an era of free and creative development of both devices and services without being captive to a domestic or overseas industry framework. In other words, I think the time has come for "value co-creation activities with borderless partners" as described in NTT DOCOMO's Medium-Term Strategy 2020 "Declaration beyond."

The period that we are now entering is sometimes called the Fourth Industrial Revolution. With this in mind, we will take up the challenge of creating new value for our customers by introducing 5G and developing compelling 5G devices in collaboration with a wide variety of domestic and overseas partners. In doing so, we hope to create a new and exciting chapter in our history marked by a high level of collaboration.