

Device Development for the 5G Era and Beyond

The excitement generated by the rugby international tournament held throughout Japan in the fall of 2019 no doubt created a lasting impression in many people. It was exactly on the opening day of this international tournament that NTT DOCOMO launched its 5G pre-commercial service.

While it can be said that the 5G era has already begun, I would like to introduce two key points of device development at NTT DOCOMO with a view that extends even beyond 5G. These are “edge AI” and “xR^{*1} devices.”

Let's begin with edge AI. Here, the word “edge” refers to devices rather than the “edge” of a network as in Multi-access Edge Computing (MEC)^{*2}. Why then is edge AI becoming so important? I would like to touch upon this here. A major social issue enveloping Japan at this time is the declining birthrate and aging population. It is said that Japan's working population will fall by about 6.44 million workers by 2030. This shrinking of the working population is making it all the more important to automate various types of manual work through a process called Digital transformation (DX)^{*3}. Here, an indispensable technology for promoting DX will be AI. This is because work performed by human hands can be reduced by accumulating various types of on-site information on the cloud, analyzing that information and predicting optimal behavior by AI, and feeding back the results of that analysis to the work site. However, problems remain with collecting data on the cloud. In addition to privacy issues, these include latency and unstable communications. In the face of these problems, edge AI has been attracting much attention. One example of a field in which edge AI could be applied is video analysis by surveillance cameras. Video captured by a surveillance camera includes various type of personal information that should be kept private. However, if AI could analyze this personal information on a surveillance-camera device (edge) without sending that information to the cloud, such privacy issues could be resolved. In this way, there are cases applicable to processing on the edge side and cases applicable to processing on the cloud side. Looking forward, I would like NTT DOCOMO to develop technical expertise in finding optimal allocations of AI processing on the cloud side and edge side in accordance with on-site needs with the ultimate aim of solving problems.

Turning now to xR devices, we can look back at the evolution of devices up to now and see that progress has been made not only in increasing transmission speeds as communication methods evolved but also in increasing the size and resolution of display screens. A device screen can be thought of as a window that allows people in the real world to take a peek inside all sorts of cyber worlds. It stands to reason as a basic human desire that people would like to have a broader view of these cyber worlds and take a



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peak into cyber worlds of higher quality, so I think this is why screens have become progressively larger with higher resolution. However, regardless of basic human desire, there are limitations as to how large a device that people always carry around with them can be. It can probably be said that current smartphones are already bumping up against this portability wall. On thoroughly examining how to go about overcoming this portability wall, we might come to the conclusion that a better idea than one of peeking into a cyber world from a device screen would be to leap over the screen and immerse oneself in that cyber world. How could this be done? Well, focusing on the five senses through which humans obtain various types of information, it is said that approximately 95% of that information is obtained through the sense of sight and the sense of hearing. In other words, if we can control these two key senses, we should be able to greatly enhance this sense of immersion in a cyber world. With this in mind, it would seem that glass-type devices would be the inevitable form of post smartphones. For this reason, I would like to aggressively ramp up our efforts in the development of technologies related to xR devices.

Going forward, NTT DOCOMO will continue to focus its efforts on providing real-world devices that inspire and move its customers.

^{*1} xR: A generic term for VR, AR, MR, etc.

^{*2} MEC: A system that installs servers at locations near users. Standard servers are typically placed on the Internet, but MEC servers are installed within the carrier network to reduce latency. This scheme greatly improves response speeds.

^{*3} DX: The changes that the digital technology causes or influences in all aspects of human life.