

## Facing the Challenges of the 5G+AI Era through Innovation



DOCOMO Beijing  
Communications Laboratories  
President and CEO

Lan Chen

Under the theme of co-creation, NTT DOCOMO is using 5G and AI technologies to make the lives of its customers even more convenient and enjoyable while opening up new markets and developing industry. DOCOMO Beijing Communications Laboratories (hereinafter referred to as “Beijing Labs”) is contributing to this effort on a day-to-day basis as a powerful engine driving NTT DOCOMO innovation.

As in Japan, technology development and large-scale testing in China is progressing rapidly toward a 5G commercial launch by 2020 through a collaborative effort between operators and vendors under government guidance. In AI, the government is supporting collaboration among industry, government, and academia with the goal of becoming the world leader in AI by 2030. In addition, the number of highly competent, adaptive, and motivated personnel with technically advanced skills in 5G and AI is increasing yearly.

Blessed with a good location, good timing, and high-quality personnel, Beijing Labs has been ahead of the times in seizing many opportunities. In research, for example, we have made a transition from wireless communications as our single focus to wireless communications and AI as a two-pronged approach focused on “5G and beyond.” In this way, we have expanded our efforts from fundamental to applied research.

In wireless communications, we have been accumulating robust wireless technologies to support the ongoing development of NTT DOCOMO while promoting the standardization of technologies essential to future networks. For 3GPP Release 15 RAN1, Beijing Labs played a leading role in formulating elemental technologies such as Massive MIMO, channel coding, and control channel design contributing 40% of the RAN1 papers submitted by NTT DOCOMO.

Furthermore, with the aim of contributing to NTT DOCOMO’s “smart life” initiatives, we have been absorbing technologies quickly and producing results at breakneck speeds through joint research with universities and research institutions on cutting-edge natural language processing and computer vision.

At the same time, frequency band harmonization between China and Japan is extremely important for achieving a 5G global ecosystem. With this in mind, Beijing Labs has arranged meetings with high-level key persons of government institutions to exchange opinions, participated in the IMT-2020 promotion group led by the China Academy of Information and Communications Technology (a first for a foreign operator), and participated in 4.4 – 4.9 GHz verification tests with vendors. We have also been supporting the needs of relevant departments at NTT DOCOMO headquarters by providing them with advanced technologies from Chinese vendors.

To support these efforts, Beijing Labs puts innovation into practice in the following three ways.

### (1) Results-oriented innovation

“Be trustworthy in word and resolute in deed.”

Taking responsibility for committing to results is essential to success in research and development. For example, in a project we undertook on the analysis of drone images for infrastructure inspection, nothing was more important than producing results that met the needs of our customer. Consequently, to compensate for a shortage of personnel in the AI department, we involved researchers from the wireless department and conducted interdisciplinary brainstorming to come up with fresh ideas. In the end, we were able to produce high-quality results satisfying the customer’s order within one month.

### (2) Fast-track innovation

“Good work requires good tools.” At standardization meetings, it is essential that we provide facts (evaluation results) that can demonstrate the advantage of NTT DOCOMO’s proposal over that of our competitors. To this end, we use a simulation evaluation platform to expand functions rapidly while maintain accuracy in results. It is precisely this asset that enables us to submit technology proposals and evaluation results in time for standardization meetings held every two months.

### (3) Fearless innovation

“Pressing ahead without fear of difficulties.”

Prior to the standardization of uplink non-orthogonal multiple access (UL NOMA) technology, many companies made proposals resulting in more than ten technical solutions to be considered. Faced with such competition, we boldly applied radio communications theory to design optimal sequences targeting the generalized Welch-bound equality that exploited differences in transmission power thereby demonstrating the superiority of NTT DOCOMO’s technology.

“They who know the truth are not equal to those who love it, and they who love it are not equal to those who delight in it.” At Beijing Labs, the passion felt by our researchers for their work plays a big part in unending innovation.

To provide services that create a favorable response from our customers, that can induce them to say “After all, that’s NTT DOCOMO!” and convince them that NTT DOCOMO is their best choice now and into the future, Beijing Labs is committed to progressing from “very good” to “excellent” and even “absolute best.”