

## Executive Summary

I'm writing this executive summary in Tokyo less than two months before the Tokyo Olympics are set to commence after being postponed for a year. The Tokyo Olympics will feature 339 events representing 33 different sports, with over 10,000 athletes likely to compete. The number of spectators and event staff was expected to exceed 10 million, and while this figure may be heavily reduced under current circumstances, the Olympics remain a rare global spectacle and will still be a truly special competition for the athletes.

Information and communications technology (ICT) is a key supporting element behind huge events like this. The smooth running of the Games rests on a whole range of systems that provide support including measuring athletes' performances, conveying event results to media outlets and the like, authentication and venue admittance for athletes, staff, and spectators, and the online distribution of data and imagery that provide a vivid picture of the athletes' endeavors. The athletes give amazing performances that are broadcast around the world, bringing excitement to people everywhere, and all the while ICT is making a huge contribution behind the scenes.

Although the impact of COVID-19 prevents the Games from being held in their originally conceived form, everyone involved is still no doubt hard at work preparing for the event. And so too in the case of ICT. With people's movements restricted across the globe, ICT continues to help people connect with one another and enjoy their leisure time. My hope is that the Olympics can be held safely under these difficult circumstances, and that as many people as possible are able to enjoy the athletic performances and excitement via the Internet.

The IIR introduces the wide range of technology that IIJ researches and develops, comprising periodic observation reports that provide an outline of various data IIJ obtains through the daily operation of services, as well as focused research examining specific areas of technology.

In our periodic observation report in Chapter 1, we summarize trends in the messaging space over the past year, with a focus on email. One notable finding comes from the analysis of spam arriving at honeypots run by IIJ during the first half of the previous fiscal year (April 2020 – March 2021), which shows an unprecedentedly large volume of spam being received. Other topics covered include the peculiar Japanese practice of attaching encrypted ZIP files to emails and the use of online conferencing systems for phishing, which created a stir last fiscal year.

The first focused research report in Chapter 2 discusses IIJ's efforts in the area of 5G NSA (non-standalone) and SA (standalone). In the 4G space, IIJ provides services as a full MVNO with some of the features of a core network. 5G NSA involves making enhancements to the 4G core network to provide high-speed 5G communications. With 5G SA, a new 5G core network is used to provide 5G services. In the case of both NSA and SA, we have tested the technologies in-house and performed proof-of-concept work at our Shiroi Wireless Campus testbed, and we are using some of the results gleaned from this work to provide regional BWA and local 5G in the cable television industry.

The second focused research report in Chapter 3 introduces Barry, an in-house system we use when dealing with system faults at IIJ. As systems become larger and more complex, demands for reliability are only increasing, and whenever a system incident occurs, it is extremely important for IIJ, as a provider of ICT services, to detect the issue, provide accurate information to the necessary personnel, and swiftly enact a response. Instead of relying on third-party tools to support this incident response process, we made the decision to develop a system in-house with an eye to improving our own workflow and creating new technologies. The report also describes the background to Barry's development, which was informed by feedback from engineers actually involved in IIJ's operations.

Through activities such as these, IIJ strives to improve and develop its services on a daily basis while maintaining the stability of the Internet. We will continue to provide a variety of services and solutions that our customers can take full advantage of as infrastructure for their corporate activities.



**Junichi Shimagami**

Mr. Shimagami is a Senior Executive Officer and the CTO of IIJ. His interest in the Internet led to him joining IIJ in September 1996. After engaging in the design and construction of the A-Bone Asia region network spearheaded by IIJ, as well as IIJ's backbone network, he was put in charge of IIJ network services. Since 2015, he has been responsible for network, cloud, and security technology across the board as CTO. In April 2017, he became chairman of the Telecom Services Association of Japan MVNO Council.