Executive Summary

The Telecommunications Business Act, which govern the telecommunications business in Japan, was revised in 2015. It was stipulated that three years from when the revisions took effect, a review of post-revision implementation status would be carried out and measures taken if necessary. Accordingly, this past August 23, Japan's Ministry of Internal Affairs and Communications consulted the Information and Communications Council regarding a "Comprehensive Examination of Competition Rules and Other Considerations for the Telecommunications Business Field", and work on this with a view out to around 2030 will now begin in earnest.

The scope of this work is wide-ranging and includes the vision for communications networks as a whole, the state of communications infrastructure development, the state of network neutrality, the state of efforts to deal with issues related to platform services, the state of efforts to ensure a competitive environment in the mobile communications market, and the state of consumer protection rules.

The development of technologies and services by a diverse array of players is ongoing in the Internet arena, driven in part by the advance of technologies such as network virtualization and software control. And with the use of AI, IoT, and 5G technologies set to ramp up ahead, not only will technology development bear close watching, so too will the development of legal frameworks and other considerations.

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.

The periodic observation report in Chapter 1 is a broadband traffic report. This report, which we have provided every year since 2009, presents an analysis of traffic over the broadband access services operated by IIJ. The Ministry of Internal Affairs and Communications' "Summary/Estimate of Internet Traffic in Japan" (in Japanese) provides an overall tally of traffic, but in our report, we present an analysis of the distribution of daily traffic volume and the volume of traffic by port. Our results indicate that although traffic growth is slowing, traffic itself continues to rise, and that HTTPS, which has expanded considerably since around four years ago, is also on the rise. With web browsers displaying messages saying that HTTP is unsafe and HTTP-only sites being pushed down in search engine rankings, traffic looks likely to increasingly shift from HTTP to HTTPS ahead.

Chapter 2 is our first focused research report, in which we describe natural language processing techniques for dealing with unstructured information and our experiments with topic modelling. In the area of information security, structured information that is amenable to automated processing, such as IP address blacklists and SCAPs, is widely used in support systems, but challenges remain when it comes to making use of information that does not easily lend itself to automated processing, such as images and documents written in natural languages. With that in mind, we developed a prototype recommender system to make use of this sort of unstructured information in security tasks. Although our results were less than satisfying, we did come away with a real sense that unstructured information could be used under certain conditions.

Chapter 3, our second focused research report, looks at Kubernetes. Two names that increasingly come up when collecting information related to cloud computing are Docker and Kubernetes. Both are at the core of the latest container technologies. In this volume, after going over the functions and roles of Docker and Kubernetes and explaining the rationale for using Kubernetes with IaaS and hybrid cloud services, we then introduce the IKE (IIJ Container Engine for Kubernetes) system built by IIJ. We explain what sort of environment a Kubernetes container cluster actually is and what it aims to achieve, so the discussion is likely to be useful for anyone looking to work with one.

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..