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## Executive Summary

In the afternoon of August 23, Amazon Web Services (AWS) experienced an approximately 6-hour outage in the Tokyo region. The incident caused major global cloud services to go offline, and this impacted systems and services at a great many companies, making those companies' services unavailable to general users. While the Internet is the ultimate distributed network, the rise of cloud computing means that data processing is becoming increasingly centralized. That an incident at a single company (AWS in this case) could have such a far-reaching impact is a stark reminder of this centralization on the Internet. Then on August 29, a number of ISPs reported Internet faults thought to stem from the sharp increase in traffic caused by a Microsoft Windows Update. This was also a notable event in that the activities of a single company had a major impact on the Internet infrastructure.

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.

Our periodic observation report for this issue, in Chapter 1, is our usual rundown of broadband traffic. This report has been part of the IIR every year since 2009, and we are proud to present this valuable data tracking trends in Internet traffic over more than 10 years. This year, although we observed increases in both fixed broadband and mobile services similar to what we saw last year, the results indicate that usage volumes at the individual user level have not changed much over the past few years.

Our focused research report in Chapter 2 looks at DNS, one important part of the Internet's foundations. Since May this year, IIJ has been providing the IIJ Public DNS Service, which performs name resolution via DNS over TLS (DoT) and DNS over HTTPS (DoH). The service is available to anyone, not just IIJ users. The report explains technical aspects of DoT/DoH and how they differ from DNSSEC and then discusses the IIJ Public DNS Service implementation and the customizations we made.

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 designed to serve the full needs of the infrastructure that underpins companies' business endeavors.



**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..