

Executive Summary

In September 2021, the Japanese government launched its new Digital Agency. The Digital Agency's website^{*1} says that it will rapidly build Japan's public-private infrastructure over the next five years to create a society in which the benefits of digitalization reach everyone. The agency's organizational chart also bears out its keen focus on digitalizing public services as well as the services of government ministries and agencies.

We might not give too much thought to government services until our own time comes to use them, and indeed, when I moved a few years ago, I was at times struck by the sheer amount of paperwork I had to complete and how inconvenient it all was. And amid the current COVID-19 pandemic, the popular press has been critical of the government, claiming that the payment of government handouts and the rollout of vaccines could have proceeded more smoothly if greater progress had been made on the use of information & communication technology (ICT) in government services.

How does the Japanese government's use of ICT stack up against the rest of the world? The United Nations' global e-government rankings^{*2}, released in July 2020, put Japan in 14th place out of the 193 UN Member States, while the "International Digital Government Rankings"^{*3} released by the Institute of Digital Government at Waseda University in September 2020 have Japan in seventh place out of 64 leading ICT nations. No doubt it depends on the evaluation methodology, but it seems fair to say that while the Japanese government does not have a commanding lead over the rest of the world when it comes to digitalization, it is not as far behind as public criticism might suggest.

That said, promoting the use of ICT and pursuing digital transformation initiatives across society as a whole will be key to improving the lives of all. The Internet is crucial infrastructure for making this happen, and at IIJ, we hope to contribute toward such digital transformation efforts through our role in supporting 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.

Our periodic observation report in Chapter 1 provides our analysis of IIJ's fixed broadband and mobile traffic. We are now in the second year marked by major changes in Internet traffic due to the COVID-19 pandemic. The results of this analysis elucidate how changes in Internet traffic reflect societal developments and changes in technology, including the impact of behavioral restrictions on traffic, the shift from PPPoE to IPoE in fixed broadband, the shift from HTTP to HTTPS, and the rise of the QUIC protocol, as also discussed in Chapter 3.

The first focused research report, in Chapter 2, looks at Verifiable Credentials (VCs), which lie at the core of self-sovereign identity (SSI), and discusses BBS+ signatures, which make VCs possible. As digital transformation initiatives advance, SSI is likely to become increasingly important as it allows users to independently manage their own digital identities. We also discussed SSI in IIR Vol. 43 (<https://www.ijj.ad.jp/en/dev/iir/043.html>), and the development of technologies to enable SSI has progressed in the two years since then. The report in Chapter 2 also touches on the differences between traditional digital certificates and VCs, VC implementations from Japan and abroad, standardization, and future challenges.

The second focused research report, in Chapter 3, discusses an effort to implement QUIC, which was recently standardized in RFC 9000, in Haskell. As well as participating in the discussion of new protocols, the author actually implements them and tests interoperability with other implementations, putting a lot of effort into ensuring a high level of completeness when it comes time to use those implementations. Many implementations use event-driven programming, but by taking advantage of Haskell's features and adopting a threaded programming approach, the author has been able to test the specifications from a different perspective than other implementers. The specific implementation points covered in this chapter help to provide a deeper understanding of the QUIC protocol.

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.



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Mr. Shimagami is a Managing Director 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.

*1 Digital Agency, "What is the Digital Agency?" (<https://www.digital.go.jp/en>).

*2 Department of Economic and Social Affairs, United Nations, "UN E-Government Survey 2020" (<https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020>).

*3 Institute of Digital Government at Waseda University, "International Digital Government Rankings" (<https://idg-waseda.jp/ranking.htm>).