

Featured Topic: Challenge for the Next-Generation Communications

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1. Trends in the Information and Communication Market

Information and communication services as well as the technologies that underpin these services have been developing rapidly. We have observed such developments as a user and a supplier. This paper aims to study the trends in the information and communication market based on relevant data to understand them correctly.

According to white papers published by Cisco Systems, Inc., global IP traffic will nearly triple during the five-year period between 2016 and 2021 from 1.15 zettabytes (i.e. 1.15×10^{12} gigabytes, equivalent to about 250 billion single-sided single-layer DVDs) in 2016 to 3.34 zettabytes in 2021 (see Fig. 1).

Table 1. Breakdown of global IP traffic/devices

Item	2016	2021
Total IP traffic (zettabytes/year)	1.15	3.34
• Mobile data traffic	7%	21%
• Traffic of fixed networks/company WANs, etc.	93%	79%
• Traffic from mobile/wireless devices	49%	63%
• Traffic from wired devices	51%	37%
Video traffic in the total IP traffic	73%	82%
Total number of devices (unit: 100 million devices)	171	269
Mobile devices in the total number of devices	47%	43%

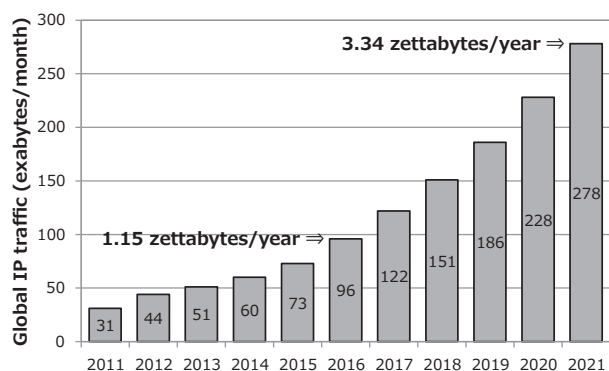


Fig. 1. Growth in global IP traffic

Table 1 shows the main breakdown, and indicates that the increase in global IP traffic is attributed to the spread and enhanced functionality of smartphones and increased video data traffic. In 2016, video data distribution accounted for more than 70% of the traffic. Mobile devices

(e.g. smartphones) account for nearly 50% of all devices that use the data. More than half of smartphones will support 4G by 2021. The traffic utilized and generated by 4G devices will quadruple compared to that of 3G devices.

The traffic has been increasing in the following cycle. Enhanced device functionality and increased network capacity facilitate the spread of advanced applications, resulting in increased traffic, which then promotes the development of advanced devices and network services.

It should be noted that mobile data traffic accounts for only 7 percent of the entire traffic. Although it is attributable not only to the volume of mobile data transmission but also to the billing system, mobile traffic accounts for only a small proportion of the data that is used by mobile devices including Wi-Fi-only devices. Most of the traffic is off-loaded to the fixed network via Wi-Fi, etc. That is, the spread of smartphones has accelerated the increase in traffic, which has driven the capacity expansion of both mobile and fixed networks. Wired and wireless communications have been used appropriately and integrated seamlessly while complementing one another to achieve ubiquitous connectivity, leading to services being upgraded.

From 2016 to 2021, the ratio of video and mobile data will further increase, while the ratio of mobile devices will decrease. This is attributable to the slowdown in smart-

phone growth and an increasing number of machine-to-machine (M2M) devices.

Traffic is expected to increase further due mainly to the enhanced functionality of smartphones and an increase in M2M (e.g. IoT) and video data.

Meanwhile, storage cost per capacity has been decreasing in inverse proportion to the increase in traffic. This has helped the expansion of cloud services. Already, cloud traffic is almost four times greater than IP traffic, and is expected to increase faster than IP traffic (3.6 times over the next five years).

2. Challenges of Sumitomo Electric and Papers in This Special Issue

In 1909, Sumitomo Electric Industries, Ltd. started the fabrication of prototype copper communication cables. Subsequently, the Company expanded the business to meet the development of communication networks, primarily for fixed phones. In the 1970s, it started the development of optical fiber cables and their connection technologies as well as optical devices, transmission equipment, and systems. Thus, Sumitomo Electric has built the foundation for the current information and communication business.

In 1968, the Company entered the traffic control system business, and developed it into the present intelligent transport systems (ITS)-related business. In terms of electronic wiring materials, the demand for high-speed transmission cables used with PCs has been expanding recently. The advanced electrical wire technology in this area has been increasingly combined with high-speed transmission technology to develop new products.

Future keywords based on market trends include the following:

- ◆ Increased network capacity (fixed, mobile [5G])
- ◆ Increased M2M (e.g. IoT & AI, big data, connected cars, connected health)
- ◆ Development of video services (e.g. 4K, VR/AR, real-time video transmission)
- ◆ Further growth of cloud services and data centers that serve as the platform

Sumitomo Electric will identify customer and market needs, predict changes, and continue to develop technologies and products in these fields with specific targets in mind by taking full advantage of its competitive edge.

This special issue presents part of these efforts. The papers included in this issue are summarized in Table 2 and categorized by keywords.

We are at the threshold of the Fourth Industrial Revolution where new economic development and changes in the social structure are induced by the development in digital technology and IoT. Notably, the information and communication infrastructure is considered to be extremely important in bringing about changes and creating new value, as automation and electronics technologies did previously.

Sumitomo Electric will respond to the changes and seize new business opportunities to continuously develop its business so that their value is highly recognized by society and stakeholders. We wish to embody the Sumitomo Spirit by helping facilitate social development and solve social issues.

(References)

- (1) Cisco Visual Networking Index: Forecast and Methodology, 2016–2021
- (2) Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016–2021
- (3) 2017 White Paper on Information and Communications in Japan

Table 2. Titles of papers in this special issue

Keyword	Title
Increase of network capacity	The First 0.14-dB/km Ultra-low Loss Optical Fiber
	Multi-Core Optical Fibers for the Next-Generation Communications
	History and Vision of Optical Fiber Fusion Splicing Technology
	Integrated TOSA with High-Speed EML Chips for up to 400 Gbit/s Communication
	Integrated ROSA with High-Sensitivity APD Chips for up to 400 Gbit/s Communication
	40 Gbps High-Speed Interface Cable “Thunderbolt 3”
	Distributed PON Architectures for North American MSO’s Next-Generation Access
M2M	GaN HEMTs for Wireless Communication
	Quantum Well Infrared Imaging Sensor with High-Sensitivity in the Wavelength Range of up to 15 μm
	Multi-Hop Wireless Network for Industrial IoT
	RF Module for High-Resolution Infrastructure Radars
Cloud	76-GHz High-Resolution Radar for Autonomous Driving Support
	Ultra-High-Fiber-Count Optical Cable for Data Center Applications
	Multi-Fiber Connectors for Data Center Applications
	High-Density Optical Cabling Solution for Data Centers

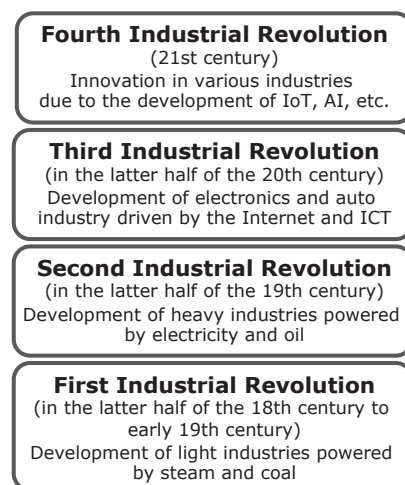


Fig. 2. Progress in Industrial Revolutions