NEC Solutions for the Telecom Industry - Ready for a New Chapter of Change -

While usage of mobile phones and the Internet continues to grow and reach every corner of the globe, telecom carriers are facing an increasingly severe business environment. For telecom carriers around the world, reducing investment in facilities, cutting operation costs and maximizing profits as well as enhancing user satisfaction are becoming critical business challenges.
This article will provide a general overview of the directions for value creation that responds to these issues, and will introduce some of the key solutions provided by NEC in the domain of the telecom carrier business.

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1. Introduction

Global adoption of mobile phone and internet communications is connecting more and more people, enriching lifestyles, and transforming the way we work. Not only is our globally networked population forecast to reach 5.5 billion people by 2025, but also our communications networks themselves are expected to undergo even further advances in the coming years.

Amid these circumstances, the telecom carrier business environment has grown increasingly severe in recent years. For telecom carriers around the world, it is not simply an issue of responding to this absolute increase in users. Increasingly important challenges include reducing infrastructure investment, cutting operation costs, and boosting profits in an environment where global data traffic is exploding, driving by the widespread penetration of smart phones and the shift to cloud computing. In addition, the development of new services and applications is heating up, and in order to ensure their proper utilization by users, swift network response is demanded.

Solving these and other issues will require not only advances in IT and network technologies, but also viewing and meeting these challenges from a broad perspective with the innovative fusion of these technologies.

2. Value Creation through ICT

NEC believes that new value produced by the continuing evolution in the fields of computing, networks and software can be broadly divided into three types: "Real Time", "Dynamic" and "Remote" as shown in **Fig. 1**.

"Real Time" means the capability to overcome time

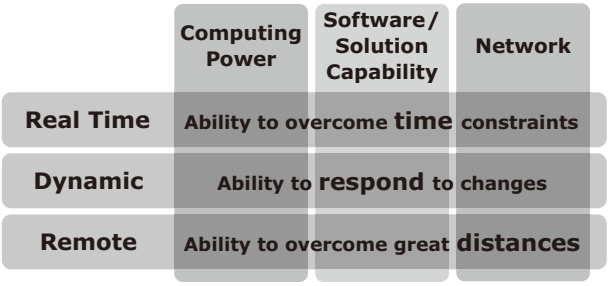

Fig. 1 3 values resulting from the evolution of ICT.

constraints. For example, when a disaster or other major event occurs and the volume of communications access spikes, the network configuration should adapt according to the circumstances and continuously provide the services that should be prioritized under those conditions. Also when disaster strikes, the situation is extremely complex and changing from moment to moment. In this situation, the rapid acquisition of information about the state of conditions can contribute to minimization of damage. It is necessary to predict the ways the effects of the disaster may spread and to provide evacuation guidance in real time. In the future, advances in ICT will enable the swift analysis of terabytes and even petabytes of data generated in a wide area, and do it in seconds or even milliseconds.

"Dynamic" is the ability to respond to every imaginable change in circumstances. In systems that watch for signs of possible plant failure, the application of Big Data analysis can provide the operation center with an early grasp of indications that differ from the norm, and enable targeted pre-emptive measures.

"Remote" is the power to conquer limitations imposed by space and distance. For example, advances in the field of telemedicine using ICT will empower doctors to diagnose medical conditions from a remote location, ensuring high-quality medical treatment regardless of location.

3. Overview of Solutions in the Business Domain of Telecom Carriers

Drawing on our rich experience and achievements in markets around the world, NEC answers the needs and demands of telecom carriers with "Real Time", "Dynamic" and "Remote" value provided by our proprietary carrier-grade technology in the form of 7 main categories of solutions: SDN (Software-Defined Networking)/NFV (Network Functions Virtualization), TOMS (Telecom Operations and Management Solutions), Core Networks, Metro Networks (optical and IP), Submarine Cable Systems, Wireless Access (wireless broadband access, mobile backhaul), and Service Platforms as shown in Fig. 2.

SDN/NFV is virtualization technology created by the integration of IT and network technologies. Applied on top of the overall network infrastructure layer of network and service nodes, our SDN/NFV Solution can help improve the profits of telecom carriers through more efficient usage of facilities, reduction of operational costs, and the creation of new services. TOMS is a solution that supports the advanced operation and management of telecommunications networks with a comprehensive offering ranging from our OSS (Operation Support System) to BSS (Billing Support System) for total and automatic service from charging to billing.

Recent years have witnessed the rapid growth of video- and message-streaming enterprises that provide smart phone-related services. Moreover, the advent of IoT (Internet of Things) is linking a variety of devices to the network, leading to the diversification of demands on the network including "Secure Networks" and "Bandwidth-assured Networks".

NEC's SDN/NFV Solutions can dynamically use the overall network system to efficiently allocate the resources necessary to respond to these diverse demands. NEC has pioneered the development and application of SDN/NFV, and is recognized as a leader in this field with an impressive record of being the first to introduce solutions to the market. MANO (Management and Orchestration) Solutions that support the integrated operation of SDN/NFV are also vital. NetCracker Technology Corp., a

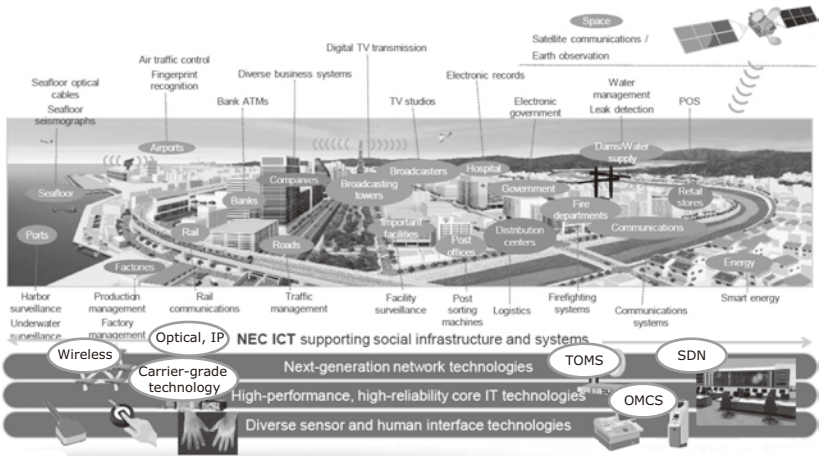

Fig. 2 Solutions in the business domain of telecom carriers.

wholly owned subsidiary of NEC Corporation, is moving forward with the development of MANO Solutions that work in close concert with the trusted TOMS solutions. NetCracker is already providing them to telecom carriers around the globe.

In the domain of Core Networks and Metro Networks, NEC provides reliable and economical Transport Network Solutions that are designed to support the transport of high-speed, high-volume data traffic via fixed line and mobile communications services, and are built using our acclaimed suite of network products ranging from routers and switches to optical transport devices.

Optical submarine cable networks are the trunk lines of the global telecommunications network, crisscrossing the ocean floor, carrying vast amounts of data and communications over trans-oceanic distances, and connecting people around the world. NEC's submarine cable systems not only serve as the heart of these networks, but also are used as part of a seafloor seismograph solution that provides early detection of ocean bottom earthquake activity. As these and other solutions in this field become more advanced and more exacting in detail, NEC is moving forward with the development of the 100 Gbps+ high speed, high bandwidth technology and devices necessary to transport these data. There is also demand for solutions that accelerate and simplify the response to a business environment influenced by today's dramatically changing markets, and for networks that feature improved flexibility and scalability. NEC has responded to these challenges by being on the forefront of standardization of technologies such as Openflow, and through our development of innovative devices. From the manufacture of the terminal equipment for the terrestrial landing stations, submarine optical cable, and submarine repeaters to provision of complete turn-key facilities, NEC is a leading "one stop" supplier in the submarine cable system market with cumulative projects totaling over 200,000 kilometers of submarine cable networks – a length that would circle the earth 5 times.

Mobile communications services are facing the fast increasing demand for speed and fulfillment of diversifying needs. NEC's Wireless Broadband Access Solution responds by providing a wireless broadband environment that supports stress-free indoor and outdoor utilization via 3G, LTE and other standards. Our Mobile Backhaul Solution supports the transport of the ever-growing volume of mobile data traffic fueled by the rapid and widespread adoption of smart phones, tablet PCs and other mobile terminals. This highly advanced fusion of NEC's wireless and optical IP technologies efficiently transports these communications and data between the microwave communications systems and the core network.

The seemingly insatiable demand for more speed and bandwidth demanded by mobile communications services in recent years has led to the deployment of Carrier Aggregation that combines multiple carrier data streams to create a fatter pipe; Small Cells at so-called hot spots where heavy traffic is locally concentrated; and the introduction of HetNets (heterogeneous networks) that enable the operation a mix of cells that serve a wide area to increase cellular capacity and coverage.

In our long history in the domain of wireless communications, our high-quality PASOLINK high-quality microwave radio system stands out for its proven record of performance. In over 150 countries around the world, PASOLINK transport solutions are contributing to increased mobile backhaul capacity. With the aim of helping telecom carriers fully exploit the limited bandwidth spectrum, NEC is continuing to refine and develop technology to further increase transport capacity.

NEC's Service Platform Solution is a total solution that facilitates the provision of diverse communication services that support the usage of smart phones, tablets and various IoT device terminals; acquires communication circuits, sensors and other resources from the network service platform; and can even provide consulting services.

4. Conclusion

"To be a leading global company leveraging the power of innovation to realize an information society friendly to humans and the earth." With this declaration as the NEC Group Vision 2017, we are focusing on Solutions for Society that utilize the strengths of ICT and advance the social infrastructure with the aim of "Orchestrating a brighter world".

In the future, the digital networks that link people, things and services will continue to evolve, and the importance of information and know-how will grow with advances in our society. NEC will respond with continued advances in telecom carrier solutions that enable both private individuals and enterprises around the globe to safely, securely and equitably access and use information and knowledge through information and communications assets that stretch from the sea bottom to the heavens above.

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* OpenFlow is a trademark or registered trademark of Open Networking Foundation.

* LTE is a registered trademark of European Telecommunications Standards Institute (ETSI).

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Vol.10 No.3 Special Issue on Telecom Carrier Solutions for New Value Creation

Vol.10 No.3
July 2016

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