

Overview of Smart OPS

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Toward 5G and diverse IoT services, a revolution in high speed, high capacity and diversification of communications systems is happening on mobile networks as they become social infrastructure for everything from methods people use to communicate with each other through to wide-ranging industries and social lifestyles. Additionally, OPS, which are responsible for stable network operations, are also becoming increasingly important. Hence, NTT DOCOMO has made dramatic steps to advance the efficiency and enhancement of OPS with its “Smart OPS.” This article describes Smart OPS.

1. Introduction

Operation systems (OPS)^{*1} are critical systems used to collectively monitor operating states of the equipment that comprises the network and situations in which warnings have occurred, and make settings for such equipment to maintain stable operation of mobile networks.

As the mobile network advances to become a

social infrastructure supporting diverse industries and social lifestyles, superior OPS are required to achieve efficient operations for individual services with different Service Level Agreements (SLA)^{*2} on increasingly expansive and complex networks.

Hence, NTT DOCOMO has taken dramatic steps to advance the efficiency and enhancement of OPS with its proposal of the Smart OPS concept. The Smart OPS concept includes three general phases

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^{*1} OPS: A general name for systems used for maintaining and operating communications networks.

^{*2} SLA: A guarantee of the quality of a provided service.

of technical innovation to advance OPS. This article describes an overview of these technical innovations.

2. The Smart OPS Structure

With the aim of providing a stable and uninterrupted mobile service, NTT DOCOMO has developed and introduced commercially the OPS used in its network operations. Circumstances surrounding the increasingly complex and diversified mobile networks of recent years have led to increasing demands on network operations for even greater efficiency, agility and enhancement. To satisfy these demands on the network and enable provision of high quality mobile services, NTT DOCOMO has been revolutionizing OPS with the so-called “Smart

OPS.” Smart OPS implementation consists of three phases (Figure 1).

1) Phase 1: Virtualization

As well as shifting the OPS operating environments from physical environments to OpenStack*³ virtualized cloud environments*⁴, Phase 1 includes improved continuity of operations in disasters by distributing OPS facilities across geographically separated locations. This has given OPS facilities greater efficiency, agility and flexibility in their operations, and has achieved a high level of reliability.

Please refer to past articles introducing Phase 1 in this journal for more details [1].

2) Phase 2: Automated Operations (Fulfillment*⁵)

In Phase 2, the Fulfillment Operation Support System (OSS)*⁶ was introduced to further automate

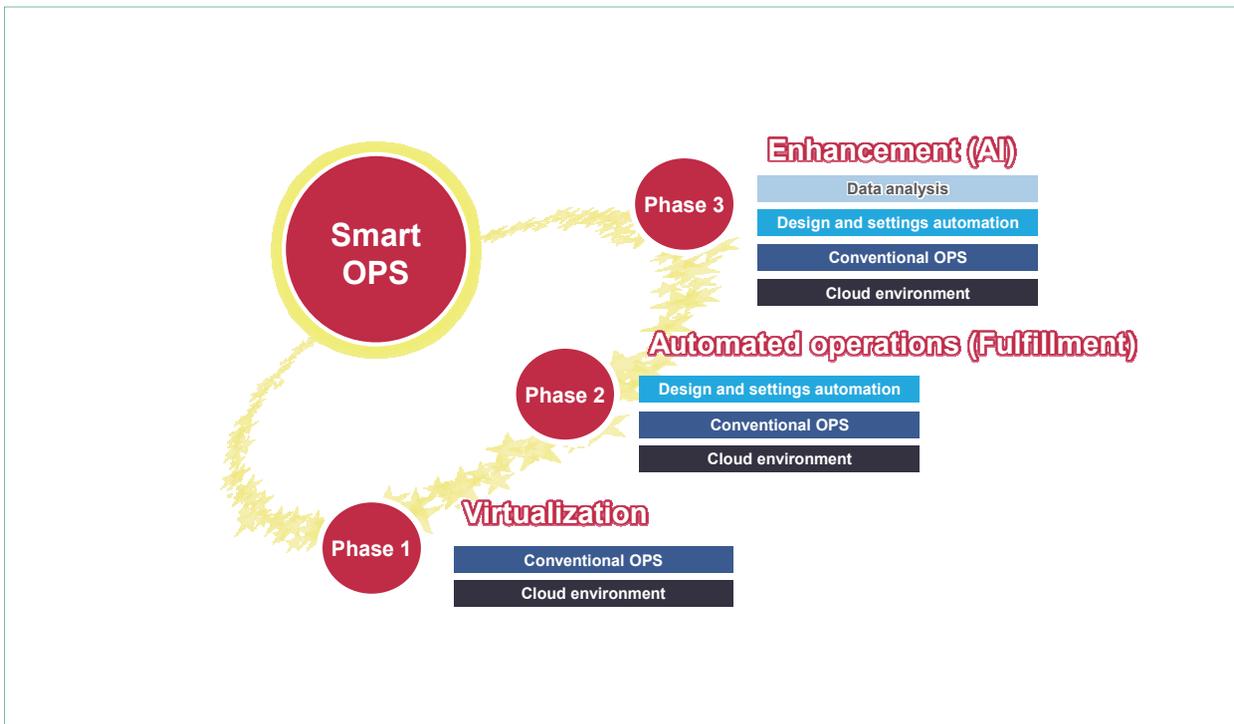


Figure 1 Smart OPS overview

*3 OpenStack: Cloud-infrastructure software that uses server virtualization technology to run multiple virtual servers on a single physical server. It can allocate virtual servers to different cloud services in use. OpenStack is open source software.
 *4 Cloud environment: A virtualization platform such as VMware and OpenStack for achieving virtualization.

*5 Fulfillment: Construction (design and setting) of network facilities to provide communication services.

operations. The expansion and diversification of 5G and the Internet of Things (IoT) services will put even greater demands on network facilities for rapid construction and settings changes. In addition, high quality networks in both construction and operations must be maintained as the network becomes more complex.

To address these issues, NTT DOCOMO introduced a new OPS called “Fulfillment OSS” to combine speed and high quality with operational automation. Fulfillment OSS realizes automated design and settings by centrally managing resource information such as network facility IP addresses^{*7} and equipment numbers, etc. as well as design rules and policies. Phase 2 is described in detail in another special article in this journal [2].

3) Phase 3: Enhancement (AI)

Phase 3 achieves enhancement of network operations using AI and big data to maintain provision of high-quality services even as the network becomes more complex.

This includes real-time analysis using AI of information required for monitoring, analysis and countermeasures from big data such as alerts, equipment statuses, and traffic data gathered from the network. This enables more detailed and proactive network operations than conventional systems, based on prediction and forecasting. Phase 3 is also described in detail in another special article in this journal [3].

3. Conclusion

This article has described “Smart OPS,” which is supporting the advance of DOCOMO’s network. Phase 1: Virtualization achieved improvement of economy and reliability of OSS, Phase 2: Automated operations (Fulfillment) achieved automation of operations that were conventionally performed by people, and Phase 3: Enhancement (AI) achieved enhanced and detailed network analysis that is impossible for people to perform.

As described above, Smart OPS enables uninterrupted network operations that are more efficient and enhanced than the conventional OPS. In combination with further expansion and variation of networks and the services provided on them, improved expanded areas of application and accuracy of OPS functionality will continue to contribute to the maintenance of DOCOMO’s high-quality network.

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^{*6} OSS: Enterprise operational support systems. For communications operators, this can include some or all of the fault management, configuration management, charging management, performance management and security management for the networks and systems used to provide services.

^{*7} IP address: A unique identification number allocated to each

computer or communications device connected to an IP network such as an intranet or the Internet.