

NTT Docomo delivers flexible, scalable 5G Standalone service



Software and services

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NTT Docomo, Japan's largest telecommunications service provider, sought to launch a 5G Standalone (SA) service to millions of business and consumer customers. To support this new service, NTT Docomo chose NEC Corporation's (NEC) 5G Core for SA, based on a cloud-native architecture and running on Red Hat OpenShift, an enterprise container platform for developing and running modular, efficient services. With this foundation, NTT Docomo can easily scale its network services as needed and deliver new capabilities to internal users and customers. Ongoing, collaborative support from NEC and Red Hat Consulting not only helps the service provider overcome performance challenges and issues but also plan for future network and business needs.



Telecommunications

7,903 employees (as of March 2023)

Benefits

- ▶ Improved network resource use and scalability
- ▶ Simplified 5G service development
- ▶ Enhanced container adoption with expert strategic support

“Moving from VMs [virtual machines] to containers lets us standardize implementation of updates and scale more smoothly than before, without any service disruption or the need to perform individual procedures for each type of VNF [virtual network function]. The update process is also more efficient for our teams as well.”

Kenzo Okuda
5G Core Lead,
Network Development Department,
R&D Innovation Division,
NTT Docomo, Inc.



Pictured, from left:
Mr. Yoshimura (NEC),
Mr. Egashira (NEC)
Mr. Okuda (NTT Docomo), and
Mr. Tanaka (NTT Docomo)

“Red Hat has strong ties with the open source community and the ability to strategically deploy open source platforms. While the quality of individual services is important, there is a significant advantage to incorporating Red Hat Consulting. Having them as a partner has been a driving force for the project.”

Kazuhiro Egashira
Director,
Network Solutions Business Division,
NEC Corporation

Delivering 5G Standalone service to support modern mobile users

With more than 80 million customers, NTT Docomo is Japan’s largest telecommunications service provider. As part of its goal to build a new communication culture, centered on positioning cellphones as integral to daily living, NTT Docomo uses modern IT infrastructure and technologies to improve its services.

“We want to create a world where all types of networks are available for business and individual users,” said Yuta Tanaka, 5G Core Lead, Network Development Department, R&D Innovation Division, NTT Docomo, Inc. “So we need a flexible infrastructure to meet a variety of needs today and in the future.”

In 2021, the service provider started to provide a 5G Standalone (SA) service, or cellular service that operates on a 5G Core (5GC) network without support from existing 4G infrastructure.

“5G SA enables the provision of ultra-low latency and highly reliable communications, high-speed and high-capacity communications, and massive simultaneous connections in a single core network,” said Kenzo Okuda, 5G Core Lead, Network Development Department, R&D Innovation Division, NTT Docomo, Inc.

Balancing enterprise stability and open source flexibility with Red Hat and NEC

To build its new 5G SA service, NTT Docomo chose NEC’s 5G Core for SA, a flexible network service based on a cloud-native architecture and running on Red Hat OpenShift, an enterprise open source container platform.

“NEC Corporation possessed an innovative originality in applying new solutions and existing technology to find the best answers,” said Mr. Tanaka. “Their 5G Core solution uses Red Hat OpenShift, the de facto standard for enterprise container solutions.”

Building on years of collaboration between NEC and Red Hat on network functions virtualization (NFV) system integration, the 5G Core for SA running on Red Hat OpenShift meets the robust availability and performance standards for large-scale telecommunications networks while providing innovative enterprise Kubernetes capabilities for container-based application development and operation.

“We needed a 5G platform that telecommunications providers and service companies could use flexibly to support their digital transformation efforts, so one of our requirements was an open architecture,” said Kazuhiro Egashira, Director, Network Solutions Business Division, NEC Corporation. “We had decided to use Kubernetes and found the application modernization capabilities and flexibility of Red Hat OpenShift compelling, especially for NTT Docomo’s requirements.”

With collaborative guidance from NEC and Red Hat Consulting, NTT Docomo launched its 5G SA service for businesses in late 2021 and consumer customers in mid 2022.

Orchestrating a brighter world

NEC

About NEC Corporation

NEC Corporation has established itself as a leader in the integration of IT and network technologies while promoting the brand statement of “Orchestrating a brighter world.” NEC enables businesses and communities to adapt to rapid changes taking place in both society and the market as it provides for the social values of safety, security, fairness, and efficiency to promote a more sustainable world where everyone has the chance to reach their full potential.

nec.com

Optimizing network performance and features to deliver reliable 5G service

Improved network scalability with CUPS and containers

In addition to efficiently allocating resources to address specific uses or user needs with network slicing, NTT Docomo has used the new Control and User Plane Separation (CUPS) capabilities introduced by the NEC and Red Hat 5G Core for SA solution to build a mobile core network. This approach helps optimize performance and resource use of its 5G SA service, including individual scalability of the control and user planes.

“By centralizing the control plane or C-Plane in our hybrid cloud and distributing the user plane or U-Plane across the 5G service area, we can control and scale each separately,” said Mr. Okuda. “That approach has helped us build our network and achieve efficiency with flexible, on-demand scalability.”

Additionally, gradually transitioning from a virtual machine (VM)-based approach to containers has helped NTT Docomo maintain service availability while completing more frequent security updates and other changes with a continuous integration and continuous delivery (CI/CD) approach.

“Moving from VMs to containers lets us standardize implementation of updates and scale more smoothly than before, without any service disruption or the need to perform individual procedures for each type of VNF [virtual network function]. The update process is also more efficient for our teams as well,” said Mr. Okuda.

Simplified 5G service development

NTT Docomo’s development team uses Red Hat OpenShift to not only maintain existing network capacity and services but also to easily develop and provide extensible 5G SA functionality.

“Whenever we had this kind of project in the past, we had to customize all the related functions and rebuild the system. By using an enterprise open source platform, our development team can release new system extension functionality a lot faster than before and at lower cost,” said Mr. Tanaka.

The combination of Red Hat and NEC technology will help NTT Docomo also meet future development needs.

“Deploying NEC’s proposed container-based architecture significantly contributed to faster development and deployment. Going forward, NEC’s 4G/5G combination nodes are expected to run in a container environment to efficiently support our network transition on a single platform,” said Mr. Okuda.

Enhanced container adoption with expert strategic support

To ensure its new container environment was optimized for the unique needs of telecommunications networks, NTT Docomo’s teams worked closely with NEC and Red Hat Consulting during and after deployment.

“When we encountered a resource mismatch while installing Red Hat OpenShift, NEC and Red Hat’s consultants customized the installation to meet specialized telecommunications requirements,” said Mr. Tanaka. “Their responsiveness has also extended to our ongoing operations with the 5G Core for SA solution, including meeting requests to add new functions to our platform.”

NEC takes advantage of Red Hat’s expertise and connection to open source technology communities to continue refining NTT Docomo’s 5G SA deployment.

“In decisions on how to operate with limited resources, we have refined our proposals to NTT Docomo while relying on Red Hat’s extensive knowledge and diverse use case experience,” said Yuki Yoshimura, Assistant Manager, Common Platform Department, Network Solutions Division, NEC Corporation. “Red Hat has strong ties with the open source community and the ability to strategically deploy open source platforms. While the quality of individual services is important, there is a significant advantage to incorporating Red Hat Consulting. Having them as a partner has been a driving force for the project.”

Expanding collaboration to new business challenges

NTT Docomo plans to continue collaborating with Red Hat and NEC to refine its 5G SA network and other services. Additional use cases include network slicing, improving storage efficiency through containerization of legacy protocols, and transitioning from Internet Protocol version 4 (IPv4) networking to IPv6.

“IPv6 and IPv4 coexisting might create some challenges, but finding the right balance between existing networks and new technologies is how we can achieve the future-oriented flexibility the telecommunications industry needs,” said Mr. Yoshimura. “We’ll be working with Red Hat to find the right solution, as well as continuing to look for new ways like automation, power-efficient cloud servers, and other advancements to help NTT Docomo and other organizations operate more efficiently.”

About NTT Docomo

NTT Docomo, Inc. is Japan’s largest mobile telecommunication services provider, and has contributed to the popularization and spread of cellphones, while expanding the potential of cellphones as IT infrastructure by incorporating a diverse array of functionalities. Under the slogan of “Changing worlds with you,” NTT Docomo is positioning cellphones as an integral part of “smart life” in daily living and accelerating their evolution. Affiliations and titles are as of time of interview (March 2023).






About Red Hat Innovators in the Open

Innovation is the core of open source. Red Hat customers use open source technologies to change not only their own organizations, but also entire industries and markets. Red Hat Innovators in the Open proudly showcases how our customers use enterprise open source solutions to solve their toughest business challenges. Want to share your story? [Learn more.](#)



About Red Hat

Red Hat is the world’s leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. [A trusted adviser to the Fortune 500](#), Red Hat provides [award-winning](#) support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

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