Appendix

Abstract

DOCOMO and NEC launched their proof-of-concept test of a 5GC hybrid cloud environment leveraging AWS in March 2022[1]. Last September, they confirmed a 5GC deployed on the predecessor Graviton2 processor succeeded in reducing 5GC power consumption by an average of 72% as well as completing the deployment of a 5GC hybrid-cloud environment leveraging AWS and DOCOMO's on-premises infrastructure. [2]

DOCOMO's commercial network is designed to switch to backup network equipment in the case of system failure to ensure the provision of uninterrupted network service. DOCOMO and NEC have been working on a design that enables switching to a backup 5GC in a hybrid cloud leveraging DOCOMO's on-premises and AWS. The companies completed the basic design after solving various connection matters involving DOCOMO's on-premises infrastructure and switching method to enable the incorporation of AWS functions.

In order to onboard an Edge UPF on the new Graviton3 processor, various issues needed to be resolved due to the UPF's method of processing user communications and its use of various technologies including acceleration, which made it difficult to port the device to different CPU architectures. Performance tests of the Edge UPF deployed on the Graviton3 confirmed that throughput per CPU improved by 20% compared to a UPF running on conventional architecture. [3]

Verification Test of edge UPF on Graviton3

Throughput performance was quantified by running NEC's UPF software on an AWS Graviton3 processor to simulate commercial operation. The experimental UPF was implemented on two Amazon Elastic Compute Clouds (Amazon EC2s), one using the AWS Graviton3 and the other a sixth-generation x86 processor. Throughput was measured by gradually transmitting more user packets of typical commercial size to the UPF in each 5GC.
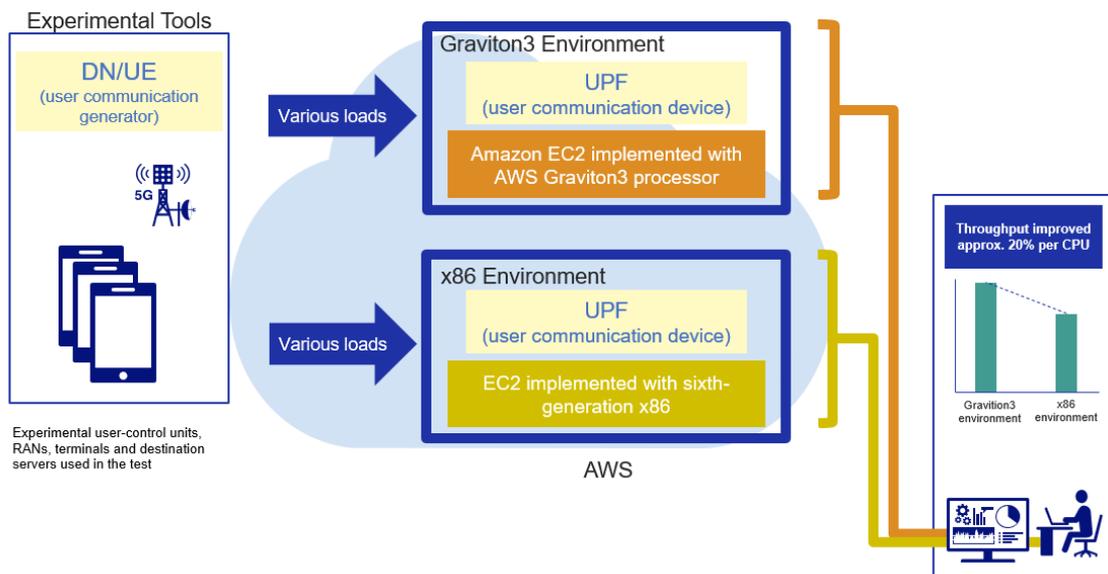
(1) NTT DOCOMO and NEC are Onboarding 5G SA Core Using Energy-efficient and High-performance AWS Cloud Computing Services
https://www.docomo.ne.jp/english/info/media_center/pr/2022/0301_00.html
https://www.nec.com/en/press/202203/global_20220301_03.html

(2) NTT DOCOMO and NEC Reduce Power Consumption for 5G SA Core by an Average of 72% Using AWS Graviton2, followed by a Successful Onboarding of 5G SA Core on Hybrid Cloud
https://www.docomo.ne.jp/english/info/media_center/pr/2022/0929_00.html
https://www.nec.com/en/press/202209/global_20220929_03.html

(3) This press release is based on results obtained from "Research and Development Project of the Enhanced Infrastructures for Post-5G Information and Communication Systems" (JPNP20017), commissioned by the New Energy and Industrial Technology Development Organization (NEDO).