



NTT Group's Activities in ONF

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Transform your business, transcend expectations with our technologically advanced solutions.

Transport SDN Goals in NTT Com

Dynamic and integrated management of transport network devices

Environment

Multi-layer
Multi-domain
Multi-vendor



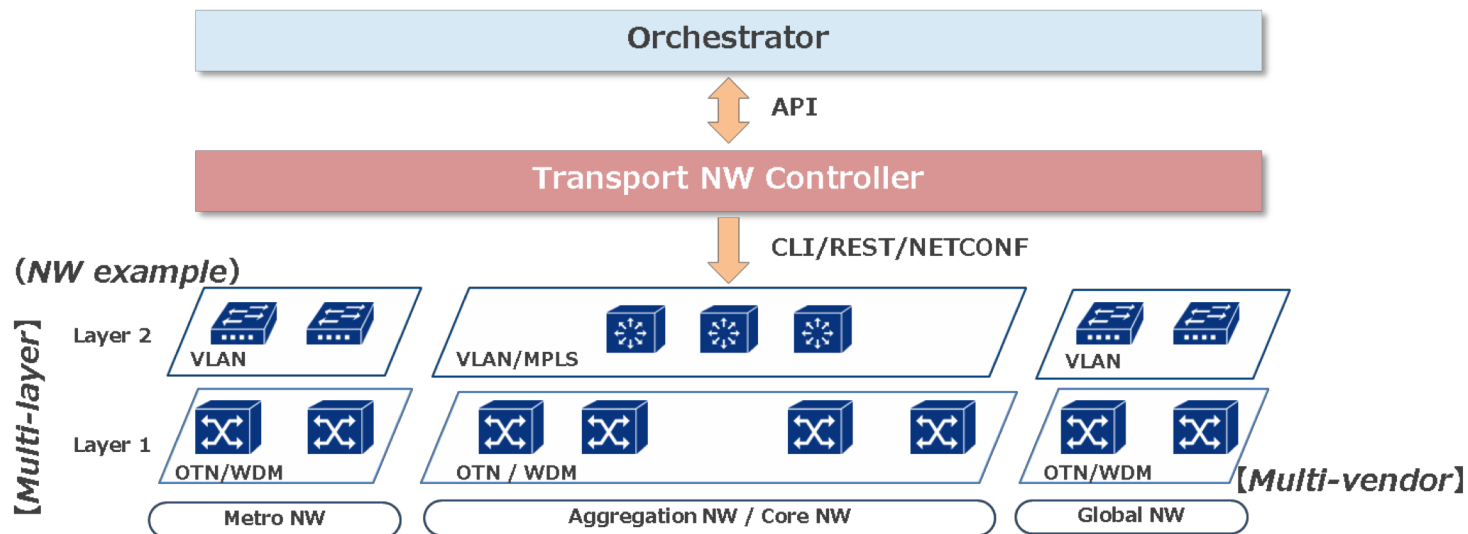
Functions (e.g.)

Dynamic Resource
Dynamic Bandwidth
Dynamic Routing



Merits

Shorten lead time
Optimize NW Quality
Simplify Operations



Next steps of Transport SDN in NTT Com

	A Few years ago	Current	Technical challenges
App lead time	6 - 12 months	3 months	< 3 months
Device upgrade	3 - 5 years		< 1 year
Operation	Manual with GUI/CLI	Automated with APIs	
Architecture			
Ctrl vendor	Same as devices		Device agnostics
App developer	Vendor		Service Provider, 3 rd party
Interface	TL1, CLI, SNMP		NETCONF/YANG
Approach	Scratch, Procedure base		Framework, Model base
Controller	Proprietary		Open Source
Data Model	Proprietary		Open and Common
Device	All-in-one		Disaggregation
Motivation	Vendor-guaranteed qualities	Automated and Unified operations using SDN	Device integrations optimized for targeted domains

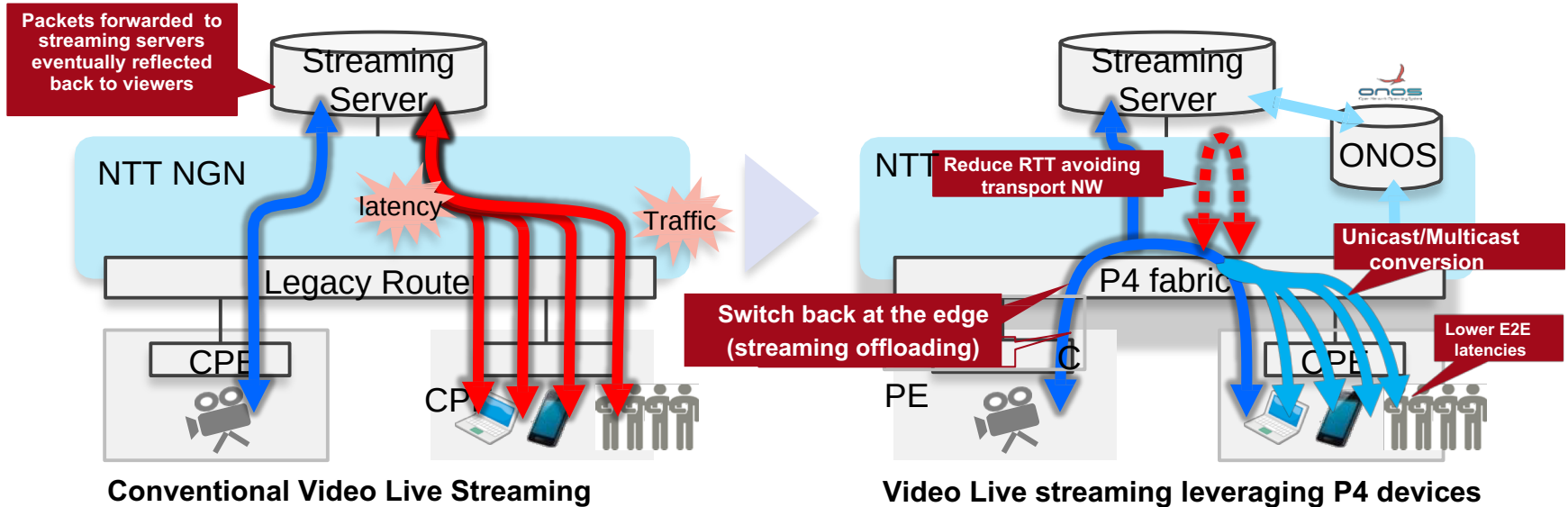
P4, Stratum and UPAN

- As a member of UPAN project, NTT East with NTT Labs are actively investigating applicable use cases for cost reduction and value-added service offering, brought by the power of data plane programmability.

#	Cost effective network	Value add network
Issue	In the current virtualized network, we need much more COTS server to perform as fast as dedicated router.	In the current network, it is difficult to manage strict traffic quality such as low latency services.
Use case	Disaggregate BNG c/u-plane function	Platform for ultra low latency service

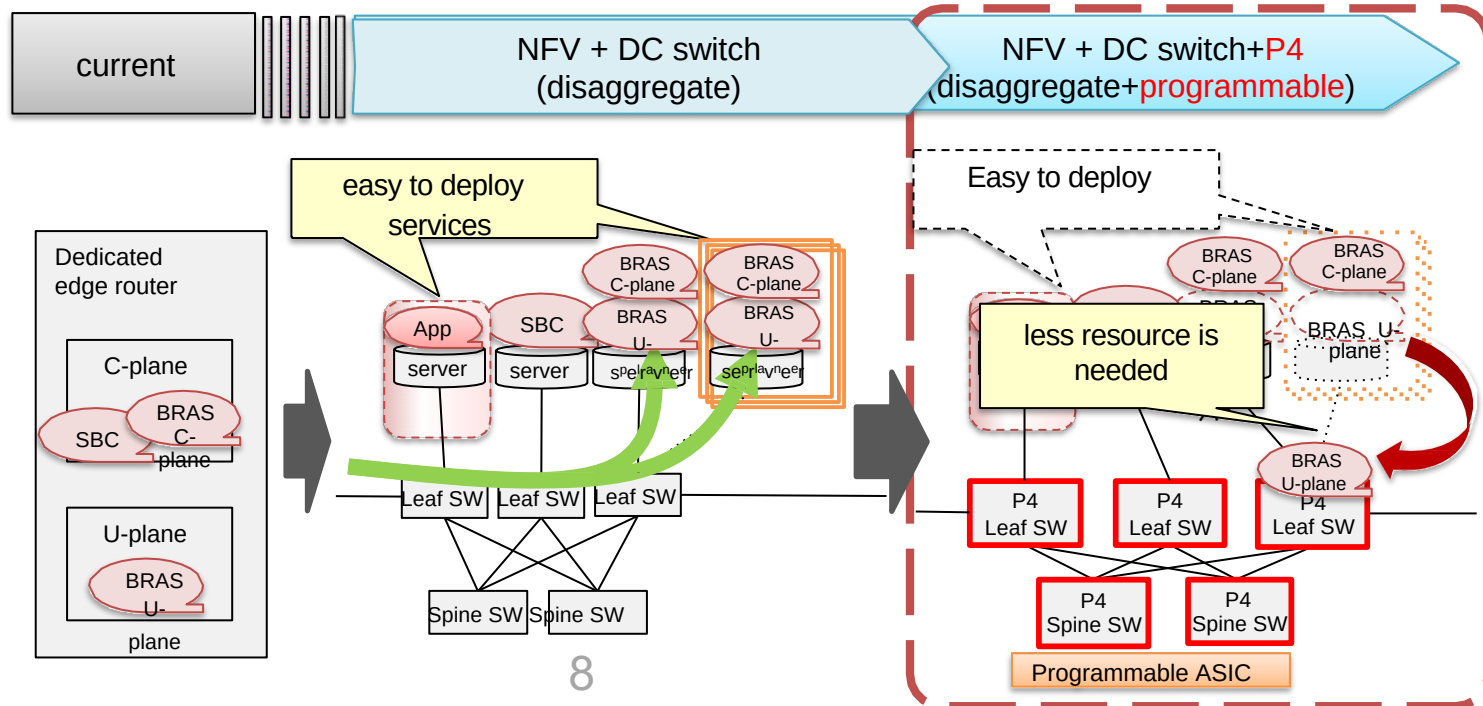
Use Case I: Video Server Offloading

- Using P4 switches as edge router to offload video live streaming protocol handling to improve viewer experience
- Programmable ASICs enables some of streaming protocol handling typically handled by streaming server side to be offloaded to the network at the edge, which enables improved viewer experience reducing E2E delays and reducing traffic in the transport network.



Use Case II: Disaggregate BNG with Programmable Switches

- Disaggregated BNG enables us to fit proper resources as we just need.
- With programmability, we can improve resource efficiency and implement value-add function.



Mini-Pon in SEBA

- NTT Labs implemented Mini-PON based on SEBA, in which
 1. SDN controller (ONOS/VOLTHA) can manage a pluggable module-type OLT
 1. Softwarized OLT functions (e.g. DBA & PON-OAM) can be decoupled from H/W, and switched in accordance with the service requirement.

