ISG ZSM PoC Proposal

1 PoC Project Details

1.1 PoC Project

PoC Number:	4
PoC Project Name:	Autonomous network slice management
PoC Project Host:	DOCOMO Communications Lab., NTT Corp., NTT Communications, Corp., NTT DOCOMO, INC.
Short Description:	This PoC demonstrates the use-case of the autonomous network slice management. The use-case is based on ZSM framework reference architecture and implemented with the ZSM standards and NTT products. The PoC will demonstrate management services (defined in ZSM 002), network slice management (defined in ZSM 003) and cross-domain orchestration (defined in ZSM 008) on E2E management domain and TN, CN, DN management domain.

1.2 PoC Team Members

	Organisation name	ISG ZSM participant (yes/no)	Contact (Email)	PoC Point of Contact (*)	Role (**)	PoC Components
1	DOCOMO Communications Lab.	yes	Wenjing Chen wenjing.chen.bv@nttdocomo.com Shinsaku Akiyama akiyamashi@nttdocomo.com	X	Research center	In charge of the study and implement to integrate all these products with the PoC scenarios and standard specification.
2	NTT Corp.	yes	Aki Fukuda aki.fukuda.cd@hco.ntt.co.jp Shiku Hirai shiku.hirai.uk@hco.ntt.co.jp Sho Kanemaru sho.kanemaru.pw@hco.ntt.co.jp Takayuki Nakamura takayuki.nakamura.gy@hco.ntt.co.jp Hiroki Baba hiroki.baba.zp@hco.ntt.co.jp		Research center	Take over the "Multi-layer Transport Provisioning Engine", "HANMOC", "ACPE", "APIO", vGW/SLG and router.
3	NTT Communications, Corp.	no	Shoji Hashimoto shoji.hashimoto@ntt.com Senri Hiraba s.hirabaru@ntt.com Haruki Takahashi haruki.takahashi@ntt.com		Network operator	Take over the "Qmonus" as a PaaS for the implementation of E2EO MD.
4	NTT DOCOMO, INC.	no	Taisuke Omoto omoto@nttdocomo.com Shinichi Isobe isobes@nttdocomo.com		Network operator	In charge of the study and implement to integrate all these products with the PoC scenarios and standard specification.

(*) Identify the PoC Point of Contact with an X.
(**) The Role will be network/service provider, supplier, or other (universities, research centers, test labs, Open Source projects, integrators, etc…).

All the PoC Team members listed above declare that the information in this proposal is conformant to their plans at this date and commit to inform ETSI timely in case of changes in the PoC Team, scope or timeline.

1.3 PoC Project Scope

1.3.1 PoC Topics

PoC Topics identified in this clause need to be taken for the PoC Topic List identified by ISG ZSM and publicly available in the ZSM WIKI. PoC Teams addressing these topics commit to submit the expected contributions in a timely manner.

PoC Topic Code	PoC Topic Description	Related WI	Expected Contribution	Target Date
Cross-domain user-driven E2E services	Demonstration of the cross-domain orchestration and automation between the E2E MD and the TN, CN, DN MD	ZSM002, ZSM003 and ZSM008	Demos	Final May 2022

1.3.2 Other topics in scope

List here any additional topic for which the PoC plans to provide input/feedback to the ISG ZSM.

PoC Topic Code	PoC Topic Description	Related WG/WI	Expected Contribution	Target Date
A				
B				
C				
D				

1.4 PoC Project Milestones

PoC Milestone	Milestone description	Target Date	Additional Info
P.S	PoC Project Start	Jan 2022	
P.D1	PoC Demo 1	Mar 2022	Network slice instance creation based on ZSM002 ZSM framework with ZSM003 network slicing process and ZSM008 management service between E2E MD and MD.
P.D2	PoC Demo 2	Mar 2022	Network slice instance deletion based on ZSM002 ZSM framework with ZSM003 network slicing process and ZSM008 management service between E2E MD and MD.
P.C1	PoC Expected Contribution 1	Mar 2022	Contribution on the lessons from Demo 1 and Demo 2.
P.D3	PoC Demo 3	Apr 2022	Closed-loop automation due to the FM/PM notification related to ZSM002, ZSM003, ZSM008.
P.C2	PoC Expected Contribution 2	Apr 2022	Contribution on the lessons from Demo 3.
P.R	PoC Report	May 2022	
P.E	PoC Project End	May 2022	

NOTE: Milestones need to be entered in chronological order.

1.5 Additional Details

We prefer to present the demonstrations at ZSM's meetings (Demo 1, Demo 2 in ZSM-Interim#11e and Demo 3 in ZSM#19) and submit the contributions and report which include demo scenarios for public and ZSM members viewing in April and May.

2 PoC Technical Details

2.1 PoC Overview

2.1.1 Use-case Description

In the 5G-era, with the introduction of network slicing and other techniques, the network will be complex and layered and require more advanced and diversified operation processes. It is an issue for operators to perform network operation with 5G services at the same level as conventional 3G and 4G services with existing human resource.

Furthermore, operators also need to consider how to utilize standardizations with existing systems.

This PoC will combine ZSM assets with other standardizations, technologies, products and operator's existing environment to validate the feasibility of autonomous network slice management. The network slice instance is based on the 3GPP NRM defined in TS28.541. 3GPP and TMF operation which are referred in ZSM are also taken into account. About each management domain, ONF TAPI specifications are referred by TN, 3GPP is for CN and TMF open API is for DN.

This PoC is based on the ZSM framework as Figure 1 and covers E2E management domain and management domains. The latest version of GSMA GST (Generic Network Slice Template) v5.0 will be adopted to create the service order.
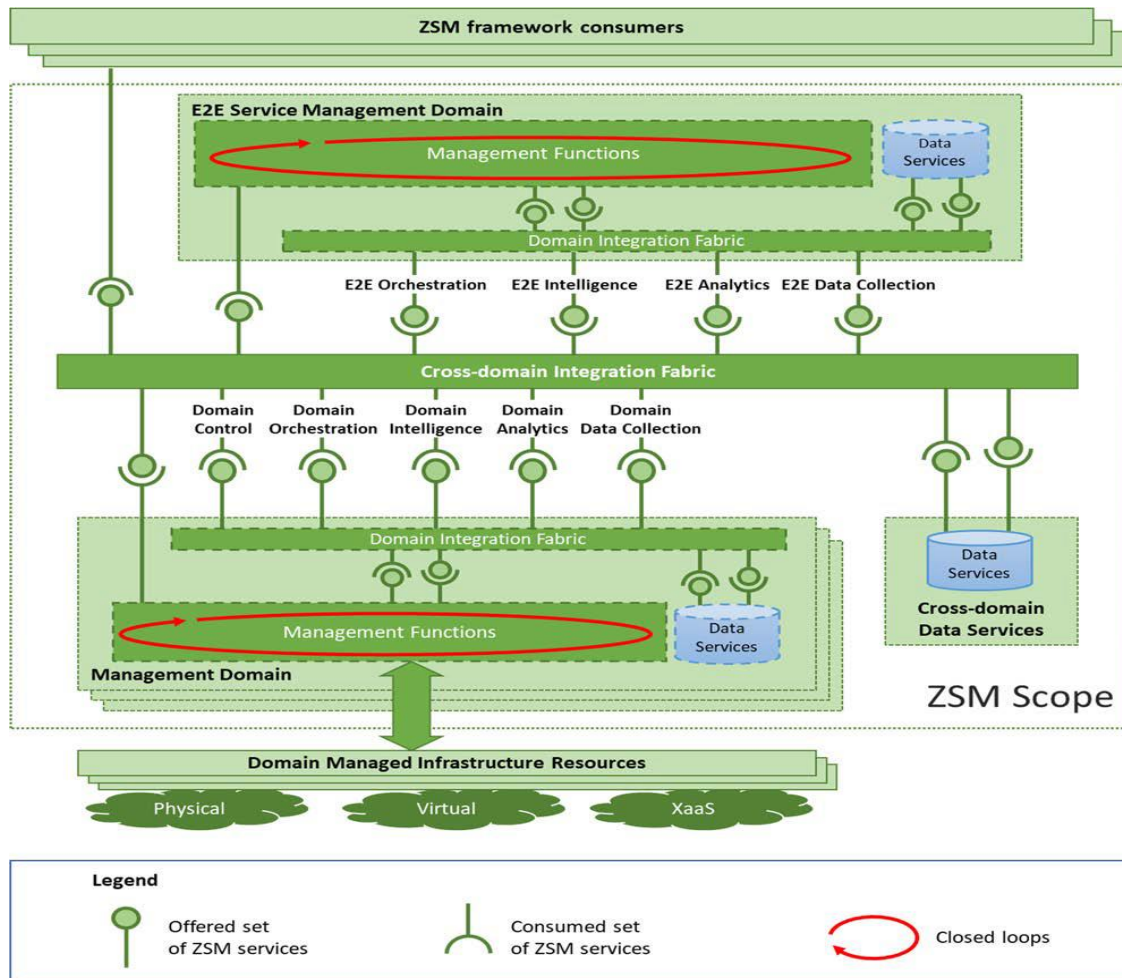
Figure 1 ZSM framework

The PoC will demonstrate management services (defined in ZSM 002), network sling management (defined in ZSM 003) and cross-domain orchestration (ZSM 008). Table 1 summaries the content of the PoC.

Table 1 Content of the PoC

Demo No.	Use-case Scenario	ZSM Management Service/ Sequence	Details
1	Network Slice Management	- Managed services catalogue management service (Creation) - Network Slice Instance Creation - E2E services inventory management - Domain inventory management	- Catalogue creation to create E2E services - Network slice instance creation according to service order - Inventory management with E2E services/slices information
2	Network Slice Management	- Network Slice Instance Deletion	- Network slice instance deletion according to service order
3	Service Operation	- Network Slice Modification	- Network slice modification(e.g. due to FM/PM notification or service order) or network slice instance scaling/healing

*: The use-case scenarios may be included in other scenarios.

2.1.2   Scope and Content of the PoC

The scope of the PoC is as the red part in Figure 2. The PoC covers the E2E management domain and TN, CN, DN* management domain to demonstrate the end-to-end orchestration with multi management domians.

RAN is not in the scope, however, a gNB simulator is used to provide call signal.*In this PoC, DN management domian not only provides management function to the DN, but also to the multi-domain (TN and CN) as described in 2.2. Hence, "DN management domain" is named as "interwork management domain" here.
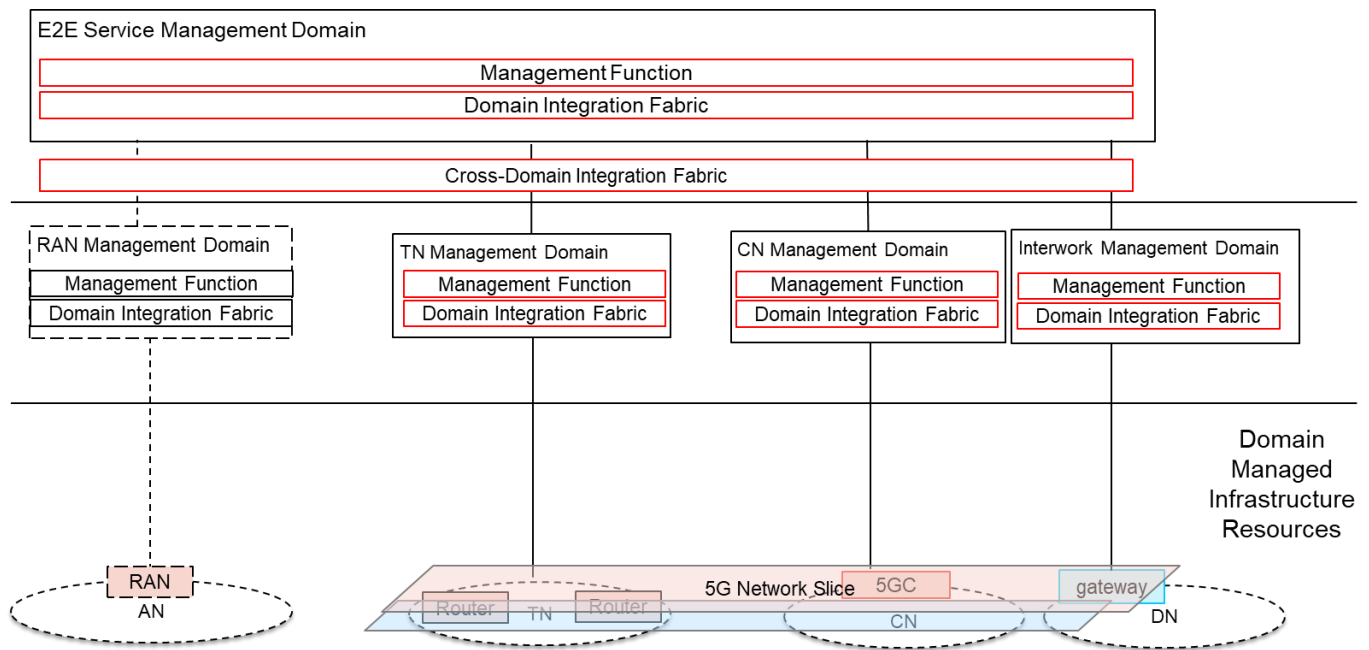
Figure 2 Scope of the PoC

2.2 PoC Architecture

Figure 3 depicts the PoC architecture. It is bases on the ZSM framework and adopts some commercial products.
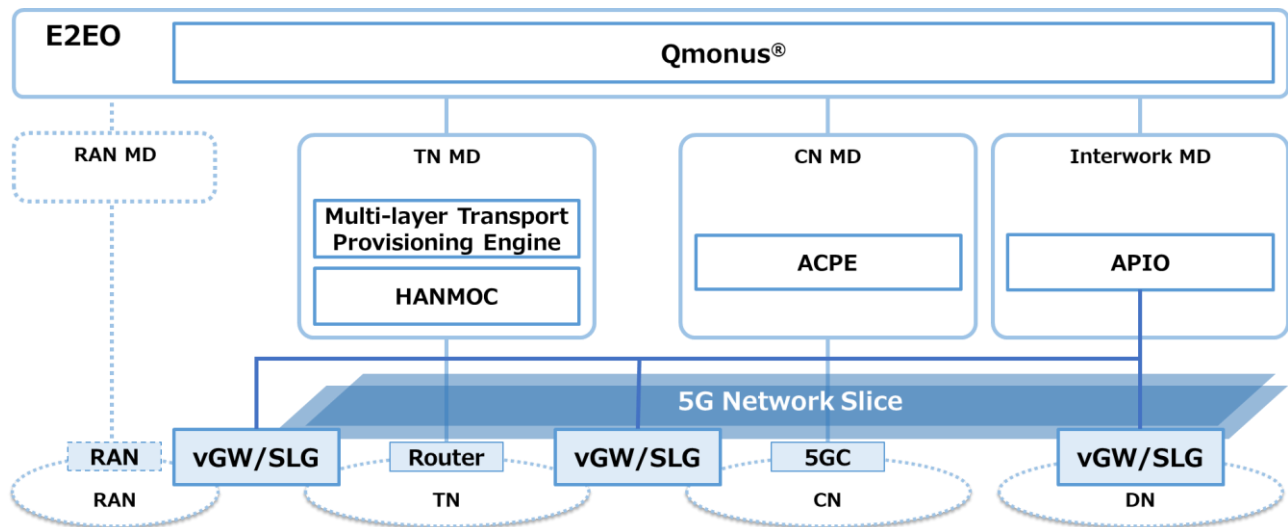

Figure 3 PoC Architecture

Qmonus, which is a PaaS for advanced cloud-native application development, delivery and management, is adopted to the implementation of E2EO management domain.

Multi-layer Transport Provisioning Engine provides transport slice resource optimization engine configuring both of optical and packet transport networks dynamically.

HANMOC realizes the simulation of the latency and manages the network domain with network routing technology.
ACPE is a server resource design optimization engine for 5G cloud-native network capabilities.
One-stop construction agent technology (APIO) realizes one-stop provisioning of multi-domain services through coordinating APIs.

vGW/SLG provides a virtual gateway function that provides 5G network slice connectivity by connecting paths between domains and network quality control.

2.3   Additional information

The information about Qmonus is available at the following link (Japanese only):

https://axis-edge.github.io/qmonus-developer-portal/#/

The information about HANMOC is available at the following link.

https://www.rd.ntt/e/research/NIC0008.html

The information about this PoC is available at the following link.

https://openhouse.docomo.ne.jp/en/main/exhibition/080