



The Standards People

End-to-end service management

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Nokia | ETSI ZSM rapporteur

For: O-RAN – ZSM workshop
19 September 2022

The ZSM look at E2E service management

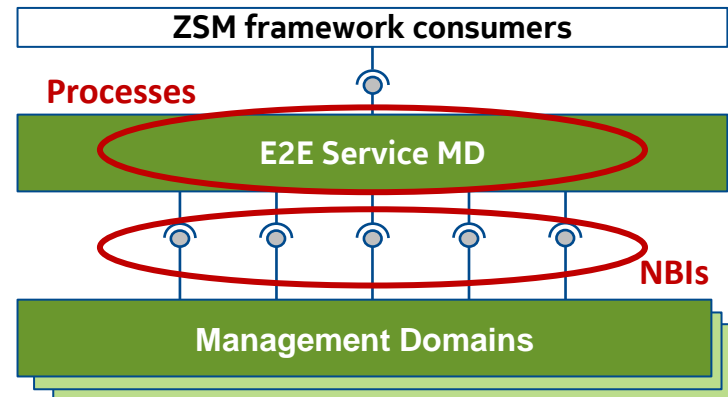
Two flavours

ZSM 003: E2E management of network slicing

- Scope: *E2E services that are network slices*
- Defines slice requirements (based on GSMA NEST), roles and typical scenarios / use cases
- Specifies related management solutions specifically geared towards network slices
- Specifies how network slice management services can be exposed to the network slice consumer along with the actual slice
- Defines mappings to activities/outputs/NBIs by other SDOs in the slice management area

ZSM 008: Cross-domain E2E service LCM

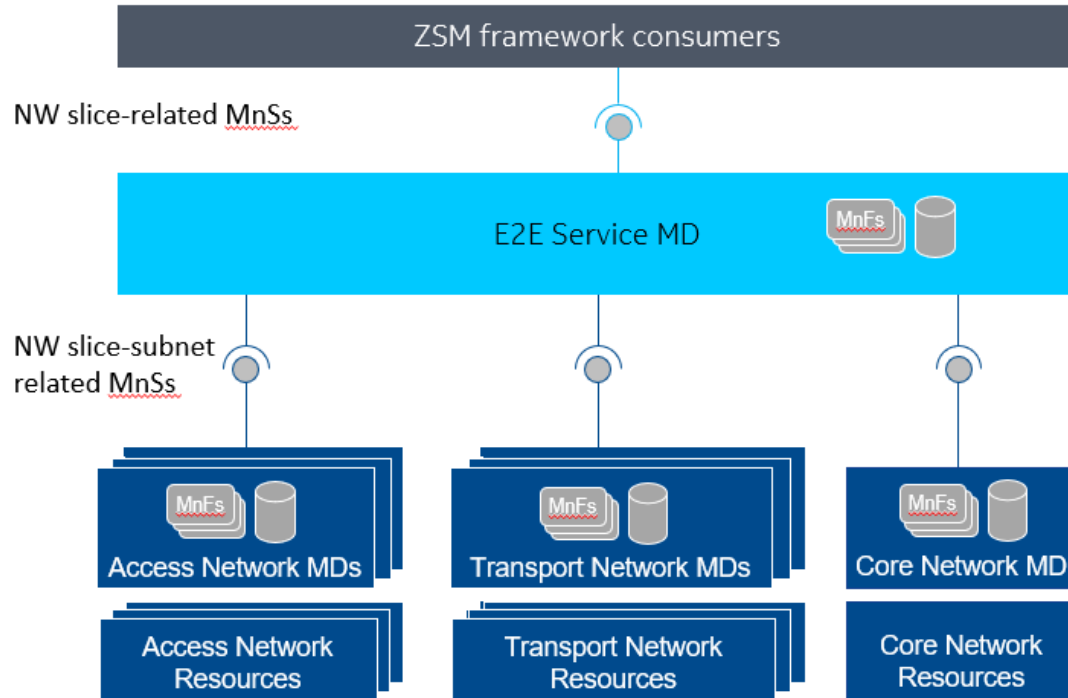
- Scope: *Any type of E2E service*
- Step 1: Defines cross-domain E2E LCM processes
- Step 2: Maps domain NBIs to management services used in the processes



ZSM 003

E2E Management of network slices

Mapping slice management to the ZSM framework



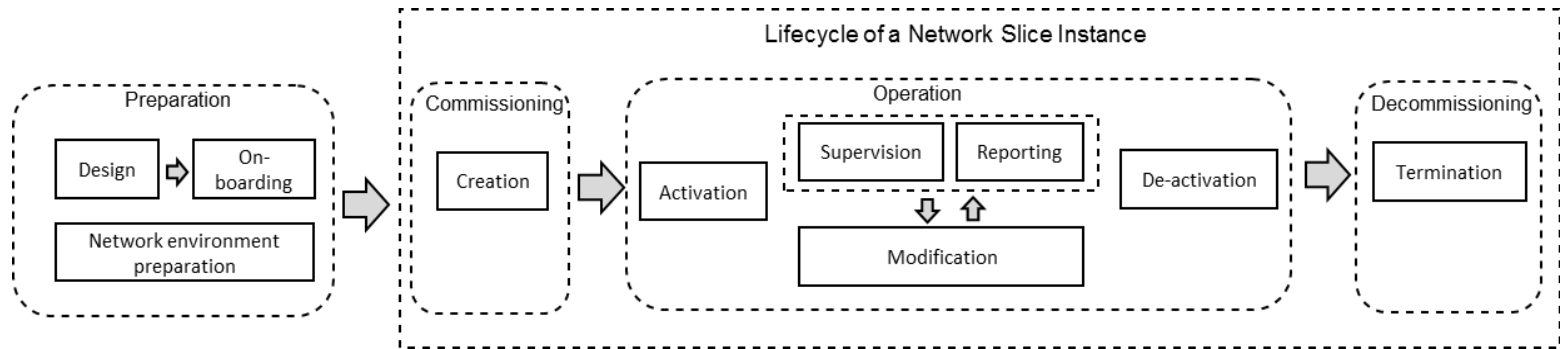
E2E service management domain manages network slice instances

Management domains manage individual network-slice subnets

- Access
- Transport
- Core

E2E network slicing solutions-Lifecycle management of network slice

- ✓ The management of network slice contains four phases: Preparation, Commissioning, Operation, and Decommissioning.
 - ✓ Preparation: Design, Onboarding, Network environment preparation
 - ✓ Commissioning: Creation of network slice instance
 - ✓ Operation: Activation, Modification (interaction with Supervision, Reporting), De-activation
 - ✓ Decommissioning: Termination



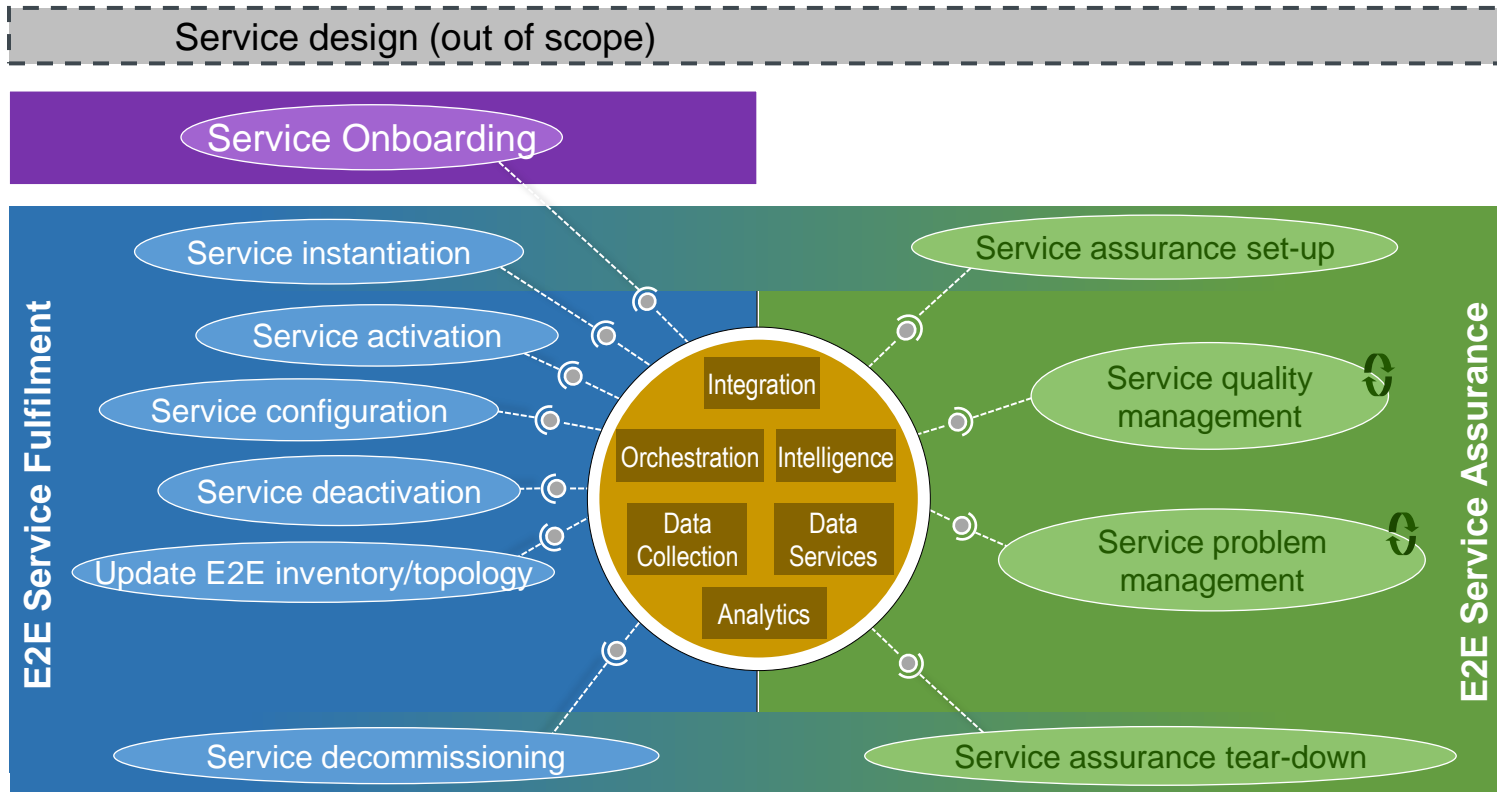
Slice management solutions covered by ZSM003

- Slice instance provisioning across domains
 - with or without transport coordination
 - parameterization of network slices based on GSMA GST / NEST
- Slice performance management (file-based, stream-based)
- Slice fault management (fault notifications, alarm list access)
- Slice topology information
- SLA management
- Optional management exposure

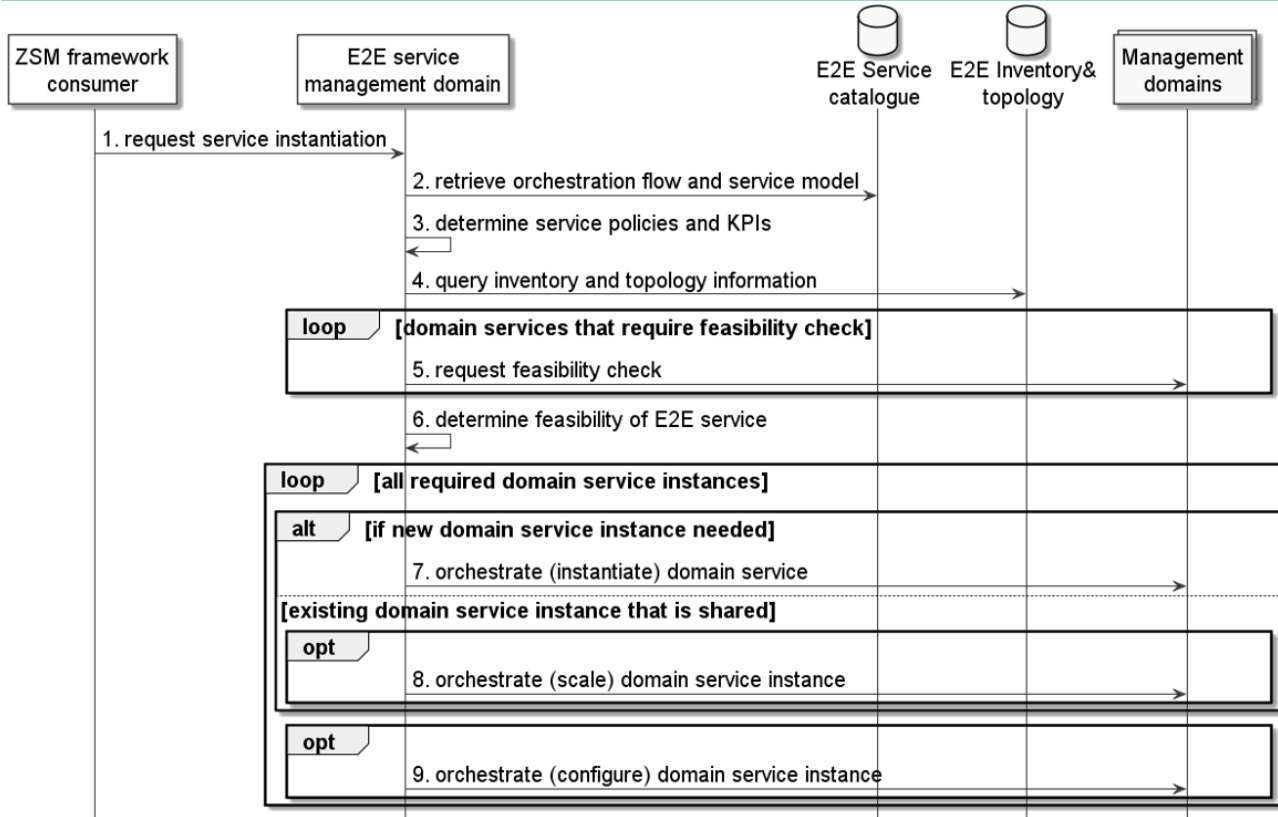
ZSM 008

Cross-domain E2E service lifecycle management

Step 1: Define E2E lifecycle management processes



Management process example: E2E service instantiation 1/2

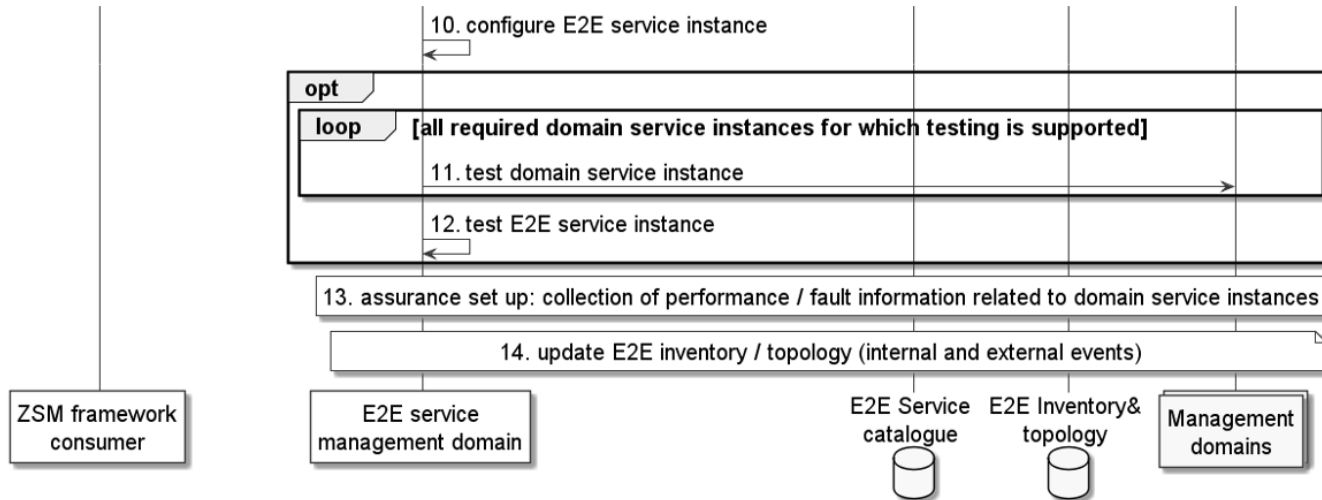


This process creates a new E2E service instance.

Part 1:

- Prepare
- Check feasibility
- Set up domain service instances
 - Create new domain service instances
 - Handle sharing of domain service instances

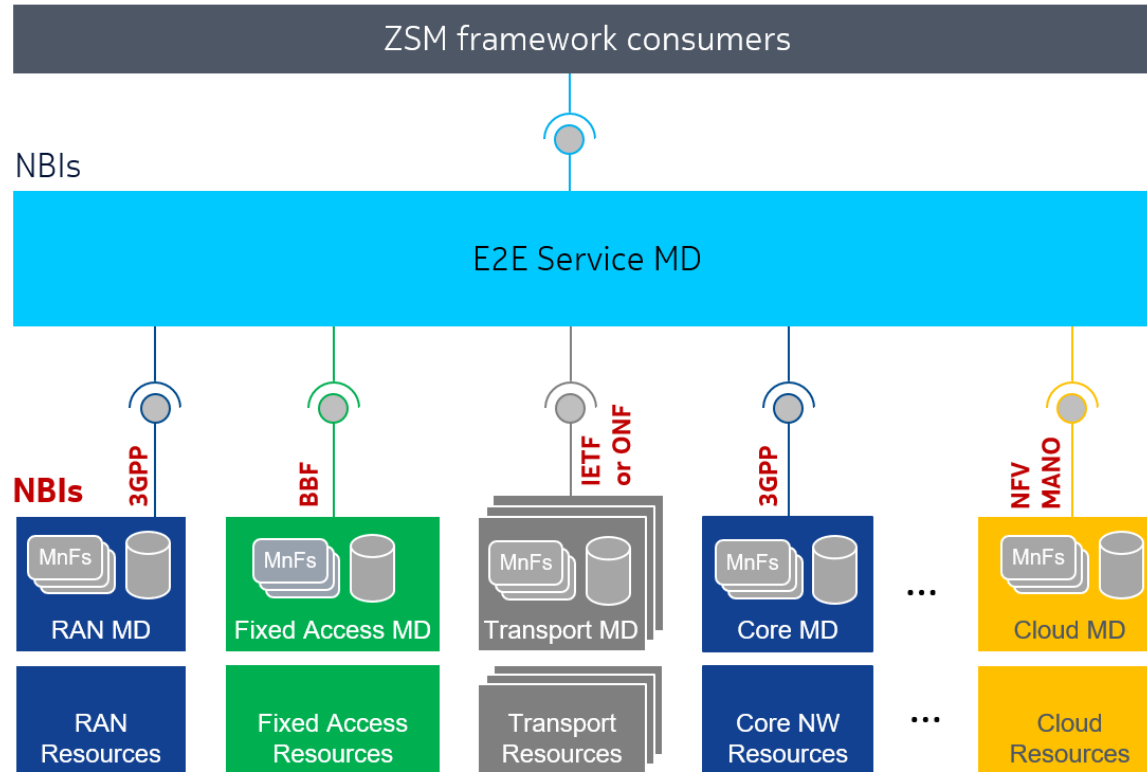
Management process example: E2E service instantiation 2/2



Part 2:

- Configure E2E service
- Test service
- Set up assurance
- Update inventory

Step 2: Analyse NBIs of technology domains and map them to ZSM services



Define mappings of ZSM services to technology domains

3GPP SA5

3GPP TS 28.532 V16.7.0 (2021-03)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Management and orchestration;
Generic management services;
(Release 16)

Mappings



Gaps



ETSI NFV

ETSI GS NFV-SOL 005 V3.3.1 (2020-09)

GROUP SPECIFICATION

Network Functions Virtualisation (NFV) Release 3;
Protocols and Data Models;
RESTful protocols specification for
the Os-Ma-nfv Reference Point

Mappings



Gaps



ZSM management services used in the E2E management processes

Domain data collection

- Event notification services
- Performance measurements streaming service
- Performance measurements collection service
- Log collection service

Domain analytics

- Analytics services

Domain intelligence

- Health issue reporting service

Domain orchestration

- Domain orchestration service
- Feasibility check service
- Managed services catalogue management service
- Testing service
- Domain inventory information service
- Domain inventory management service
- Domain topology information service

Domain control:

- Virtualized resource lifecycle management service

Integration fabric

- Management communication service

Data services

- Data persistence service

Mappings



Gaps



broadband forum
Technical Report

TR-411
Definition of interfaces between CloudCO Functional Modules

Issue: 1
Issue Date: April 2021

BBF CloudCO

Mappings



Gaps



ONF
Open Networking Foundation

TAPI Reference
Implementation Agreement

TR-547

ONF TAPI

Mappings



Gaps



Internet Engineering Task Force (IETF)

Request For Comments: 8466
Category: Standards Track
ISSN: 2070-1721

B. Wen
Concast
G. Floccola, Ed.
Telecom Italia
C. Xie
China Telecom
L. Jallil
Verizon
October 2018

A YANG Data Model for
Layer 2 Virtual Private Network (L2VPN) Service Delivery

Abstract
This document defines a YANG data model that can be used to configure a Layer 2 provider-provisioned VPN service. It is up to a management

IETF

Example mapping

Map ZSM fault events service to 3GPP RAN / Core domain



Domain data collection: Fault events service			
Configure monitoring	ETSI TS 128.532 [6]	createMOI modifyMOIAttributes deleteMOI	<p>Subscriptions to alarm notifications are provisioned as MOIs, using operations defined in ETSI TS 128.532 [6], based on the "NtfSubscriptionControl" NRM control fragment defined in ETSI TS 128.622 [12]. They route the generated alarm notifications to the subscribers</p> <p>A management domain may choose to pre-create default subscription control fragments.</p>
Provide notifications	ETSI TS 128.532 [6]	notifyNewAlarm notifyChangedAlarmGeneral notifyChangedAlarm	<p>Subscriptions are needed to receive notifications.</p> <p>"notifyNewAlarm" informs about a new alarm.</p> <p>"notifyChangedAlarmGeneral" informs about changes in the perceived severity of an alarm.</p> <p>"notifyChangedAlarm" specifically informs about changes in the perceived severity of an alarm, other than clearing the alarm.</p> <p>The set of applicable alarm attributes is defined in clause 12.2.1.2.2 of [6].</p>

Snippet from the ZSM 008 gap analysis

Group	Service	Capability	3GPP	Fixed	Transport				NFV	TMF
					OTN IETF	OTN ONF	L2/L3 VPN	T-Slices		
Domain Orchestration	Managed services catalogue management service	Manage service models	-	x	-	(3)	-	-	x	x
		Provide catalogue change notifications	-	x	-	-	-	-	x	x
		Request missing service catalogue entry	-	-	-	-	-	-	-	-
	Domain orchestration service	Manage service lifecycle (instantiate)	x	x	x	x	x	x	x	x
		Manage service lifecycle (scale)	x	-	x	-	x	-	x	x
		Manage service lifecycle (configure)	x	x	x	-	x	x	x	x
		Manage service lifecycle (activate)	x	x	x	(4)	x	x	-	x
		Manage service lifecycle (deactivate)	x	x	x	(4)	x	x	-	x
		Manage service lifecycle (terminate)	x	x	x	x	x	x	x	x
		Execute workflow	-	-	-	-	-	-	-	x
Manage subscriptions to lifecycle changes	x	x	x	x	x	x	x	x	x	
Provide notifications about lifecycle changes	x	x	x	x	x	x	x	x	x	
Domain Data Collection	Performance events service	Configure monitoring	x	-	-	x	-	-	x	x
		Provide notifications	x	-	-	x	-	-	x	x
	Performance measurements streaming service	Configure measurements	x	-	-	-	x	x	-	-
		Provide streaming measurements	x	-	-	-	x	x	-	-
	Performance measurements collection service	Configure batch measurements	x	-	-	-	-	-	x	x
		Provide batch availability notifications	x	-	-	-	-	-	x	x
Get batch measurements		x	-	-	(5)	(6)	-	x	x	

Conclusion

ZSM 003 focuses on the E2E aspects of network slice management.

- ✓ Based on network slice scenarios and use cases to support verticals.
- ✓ Defines solutions and interface mappings for E2E network slice management.
- ✓ Considers slice requirements (parameters e.g. SLA) based on GSMA NEST templates.

ZSM 008 defines how to manage the lifecycle of cross-domain E2E services.

- ✓ Identifies management processes for onboarding, fulfilment and assurance built from the ZSM management services.
- ✓ Maps the management services to the NBIs of technology domains (RAN, Fixed access, Core, Transport, Cloud).

Thank you.

Author's contact

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More information on ETSI ZSM

ZSM Cross-domain E2E Service LCM specification: [ETSI GS ZSM 008](#)

ZSM E2E Management and Orchestration of Network slices: [ETSI GS ZSM 003](#)

ZSM Technology Page: <http://www.etsi.org/zsm>

ZSM Wiki: <https://zsmwiki.etsi.org/>

Published ZSM specs: <https://www.etsi.org/committee/1431-zsm>

ZSM Open Area (Draft specs): <http://docbox.etsi.org/ISG/ZSM/Open>

ZSM Portal (members' working area): <http://portal.etsi.org/zsm>

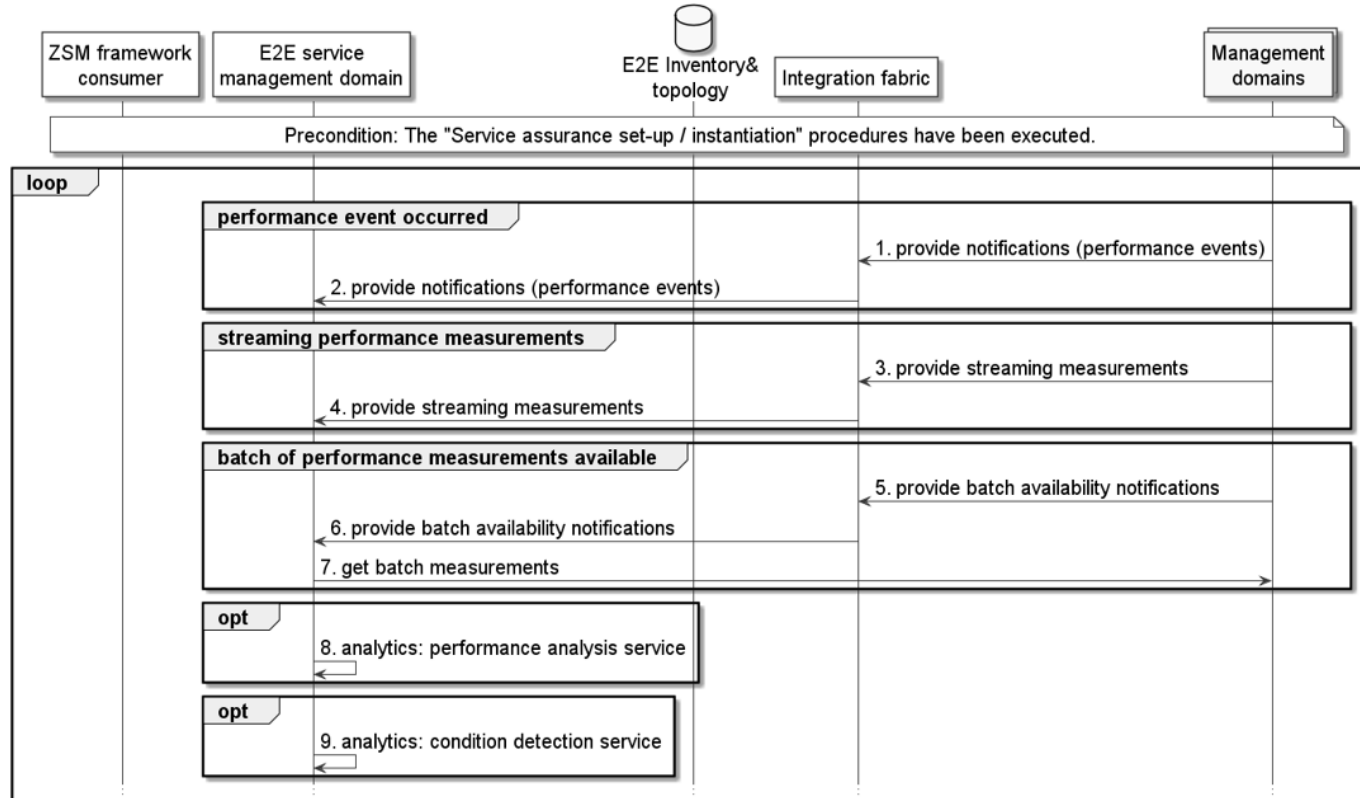
The E2E lifecycle processes

The ZSM008 E2E LCM processes cover three parts of the E2E service lifecycle:

- **Onboarding processes** support importing service models (resulting from service design) into the ZSM framework and setting up the ZSM framework for creating instances of these services.
- **Fulfilment processes** support the management of the lifecycle of E2E service instances including their instantiation, activation, de-activation and decommissioning.
- **Assurance processes** ensure that an E2E service instance is free of issues (E2E service problem management) and meets its service level (E2E service quality management). Assurance set-up and tear-down is part of LCM.

These processes consume management services from the management domains.

Management process example: E2E service quality management 1/2

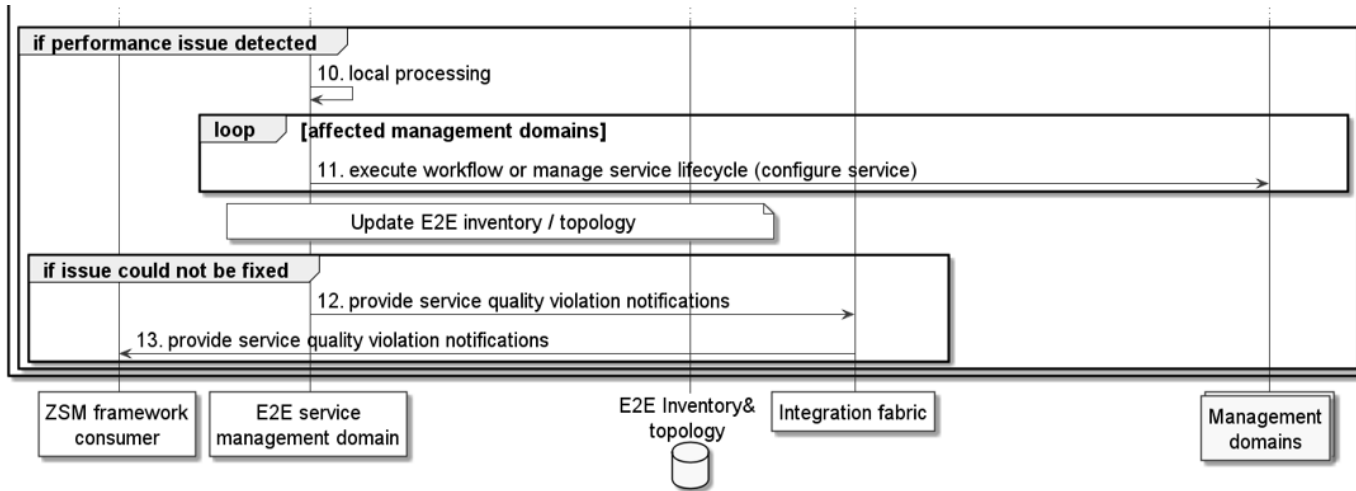


This process assures the E2E service meets its service level.

Part 1: Monitor

- Monitor domain services
- Run analytics

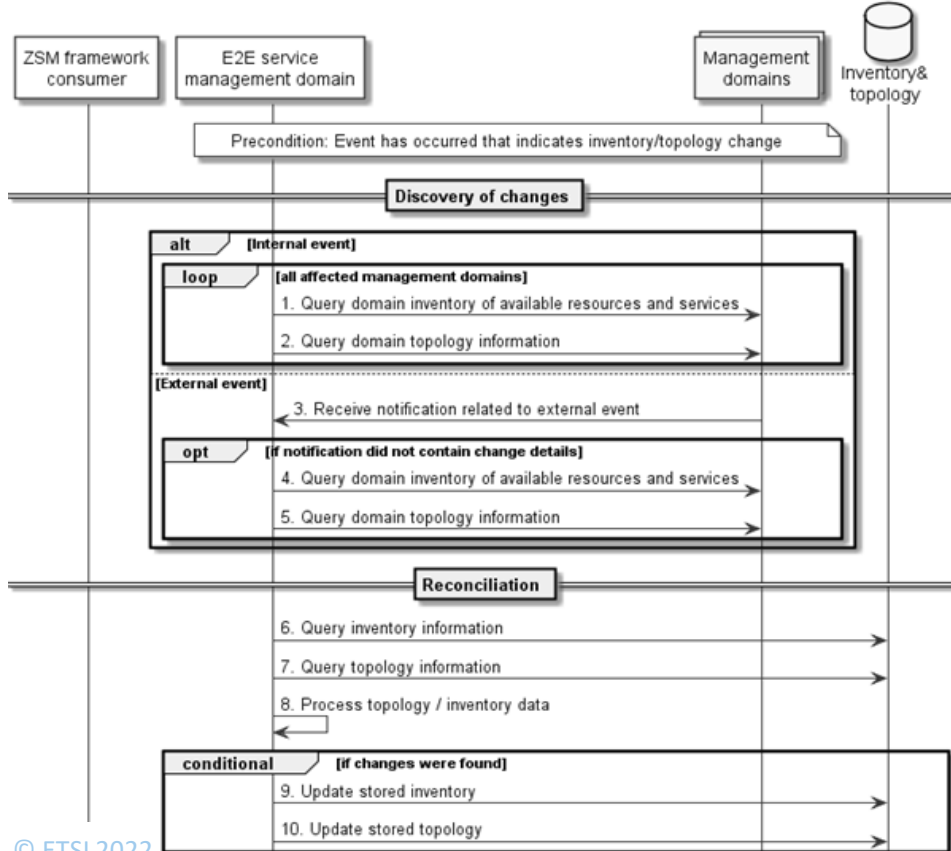
Management process example: E2E service quality management 2/2



Part 2: Handle issue

- Local processing to analyse the issue
- Reconfigure consumed services
- Update inventory
- Escalate if not fixed

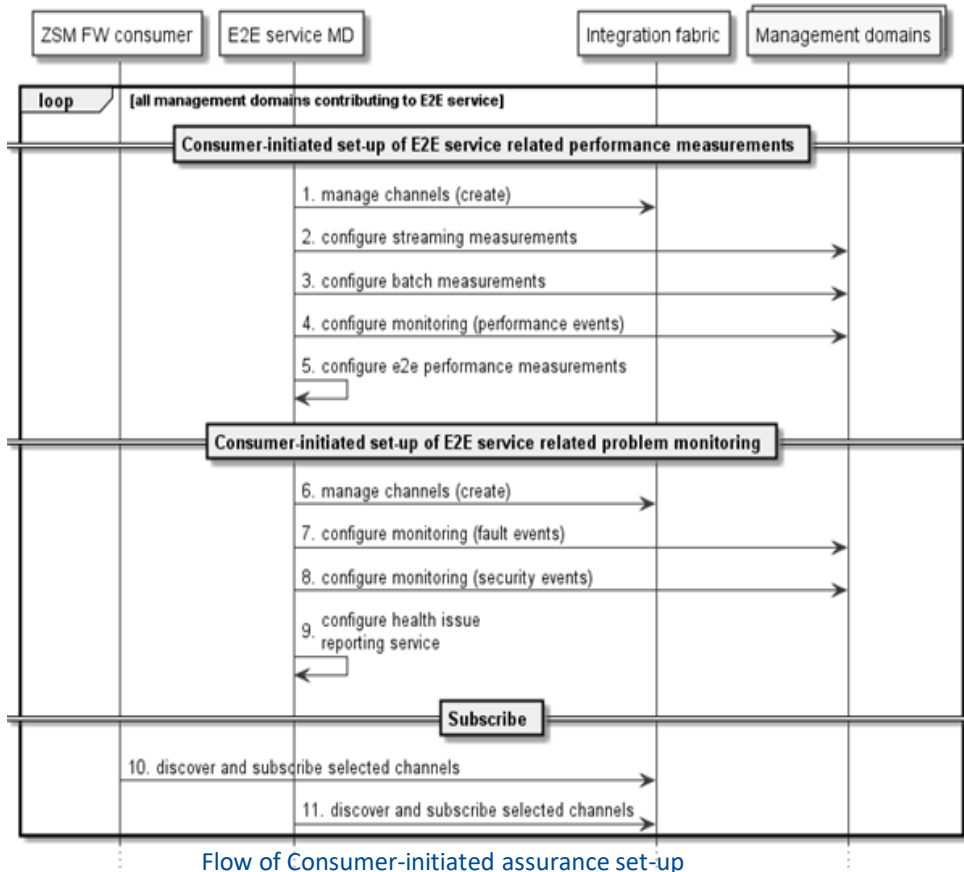
Management process example: Update E2E service inventory/topology



This process keeps up to date the E2E inventory that provides a consolidated view of all involved MDs.

- Support determining the feasibility of operations
- Supports closed loops and root cause analysis
- Driven by **internal events** (changes in E2E SMD) and **external events** (changes in MDs)
- **Discovery of changes**
 - Obtain information about modifications
- **Reconciliation**
 - Find deltas and update inventory

Management process example: Assurance set-up



Flow of Consumer-initiated assurance set-up

This process sets up the collection of assurance-related information from the MDs.

- **Consumer-initiated assurance set-up:** The E2E service management domain sets up collection of assurance information from the MDs upon E2E service instantiation or activation, based on knowledge of the assurance needs of the E2E service.
- **Producer-initiated assurance set-up:** In addition, the management domains can provide „basic“ performance measurement and problem information on their own initiative.
- Assurance information is typically provided using the **integration fabric**.