Status of the AI Architecture work in ISG ENI & the Service & Network management work in ISG ZSM

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For: **ETSI Summit on Artificial Intelligence**

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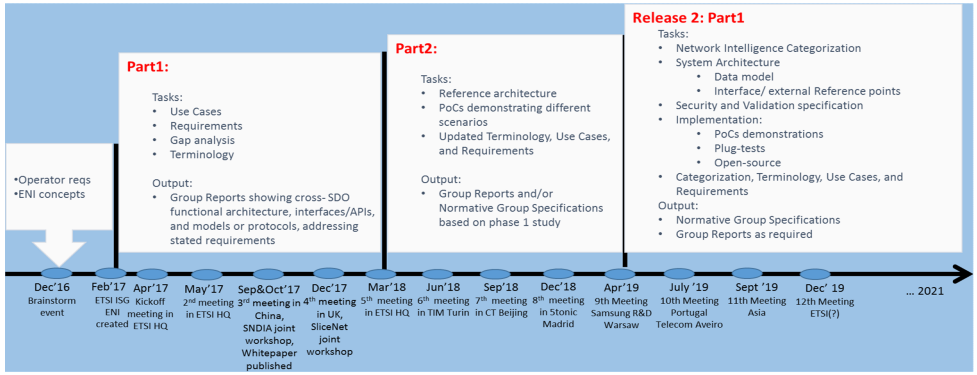
Network Intelligence Core Standard Group - ETSI ENI (Experiential Networked Intelligence)

About 50 companies，Including 12 T(VDF/TI/PT/CT/NTT...)

Progress： 17Q1 founded， Q4 WP，18Q1 UC/Req etc WIs



Release 1 focus on use case & requirements, started designing architecture and PoCs.
The ETSI Director-General advised by the ETSI Board approved in Feb. 2019 that ISG ENI is mandated to work on ENI release 2 for 2019-2021.
4 F2F meetings per year: 19Q1 Hosted by Samsung in Warsaw, 19Q2 Hosted by PT in Aveiro.
Online meeting every week https://portal.etsi.org/tb.aspx?tbid=857&SubTB=857#5069-meetings

UCs in 4 categories 13 sub-cats

	Level 1	Level 2	
Use Case	Network Operations	Policy-driven IP managed networks	
		Radio coverage and capacity optimization	
		Intelligent software rollouts	
		Policy-based network slicing for IoT security	PoC – PT
		Intelligent fronthaul management and orchestration	PoC -TLF
	Service Orchestration and Management	Context aware VoLTE service experience optimization	
		Intelligent network slicing management	PoC – CT
		Intelligent carrier-managed SD-WAN	PoC - TIM & Samsung
	Network Assurance	Network fault identification and prediction	
		Assurance of service requirements	
	Infrastructure Management	Policy-driven IDC traffic steering	
		Handling of peak planned occurrences	
		Energy optimization using AI	

Work Items

Name	Rapporteur	Company	Current Status (FEB-2019)	
Use Cases	Yue Wang	Samsung	Rel.2 begun (Rel.1 Published 2018-04)	
Requirements	Haining Wang	China Telecom	Rel.2 begun (Rel.1 Published 2018-04)	
Context Aware Policy Modeling	John Strassner	Huawei	Rel.1 Published	
Terminology	Yu Zeng	China Telecom	Rel.2 begun (Rel.1 Published 2018-06)	
PoC Framework	Luca Pesando Mostafa Essa	TIM Vodafone	Rel.2 begun (Rel.1 Published 2018-06)	
Architecture	John Strassner	Huawei	Early draft v0.0.20	Key WIs
Definition of Networked Intelligence Categorization	Luca Pesando	TIM	Early draft v0.0.9	

Leading Core Group: WP and 5 WIs Published are widely referred, 3 PoCs started and 1 proposed, and Intelligence Categorization WIs started

ENI PoC List

Title	PoC Team Members	Main Contact	Start Time	Current Status (13-Feb-2019)
Intelligent Network Slice Lifecycle Management	**China Telecom** Huawei,CATT,DAHO Networks,Intel,China Electric Power Research Institute	Haining Wang	Jun-2018	Stage 1 finished
Elastic Network Slice Management	**Telecom Italia S.p.A.** Universidad Carlos III de Madrid, CEA-Leti, Samsung R&D Institute UK, Huawei	Marco GRAMAGLIA	Nov-2018	Started
Securing against Intruders and other threats through a NFV-enabled Environment (SHIELD)	**Telefonica** Space Hellas, ORION,Demokritos (NCSR)	Diego R. Lopez Antonio Pastor	Jan-2019	Started
Predictive Fault management of E2E Multi-domain Network Slices	**Portugal Telecom/Altice Labs** SliceNet Consortium (Eurescom,University of the West Scotland,Nextworks S.R.L,Ericsson Telecomunicazioni SpA,IBM,Eurecom,Universitat Politècnica de Catalunya ,RedZinc Service Ltd.,OTE – The Hellenic Telecommunications Organisation, SA,Orange Romania / Orange France,EFACEC,Dell EMC,Creative Systems Engineering,Cork Institute of Technology)	António Gamelas Rui Calé	NA	To be Proposed early 2019

ENI PoC Example: project #1 - Intelligent Network Slice Lifecycle Management

AI-based predictor:

- For generating new scale up/down and converting the intent to suggested configuration.
- LSTM is used for traffic prediction.

TNSM:

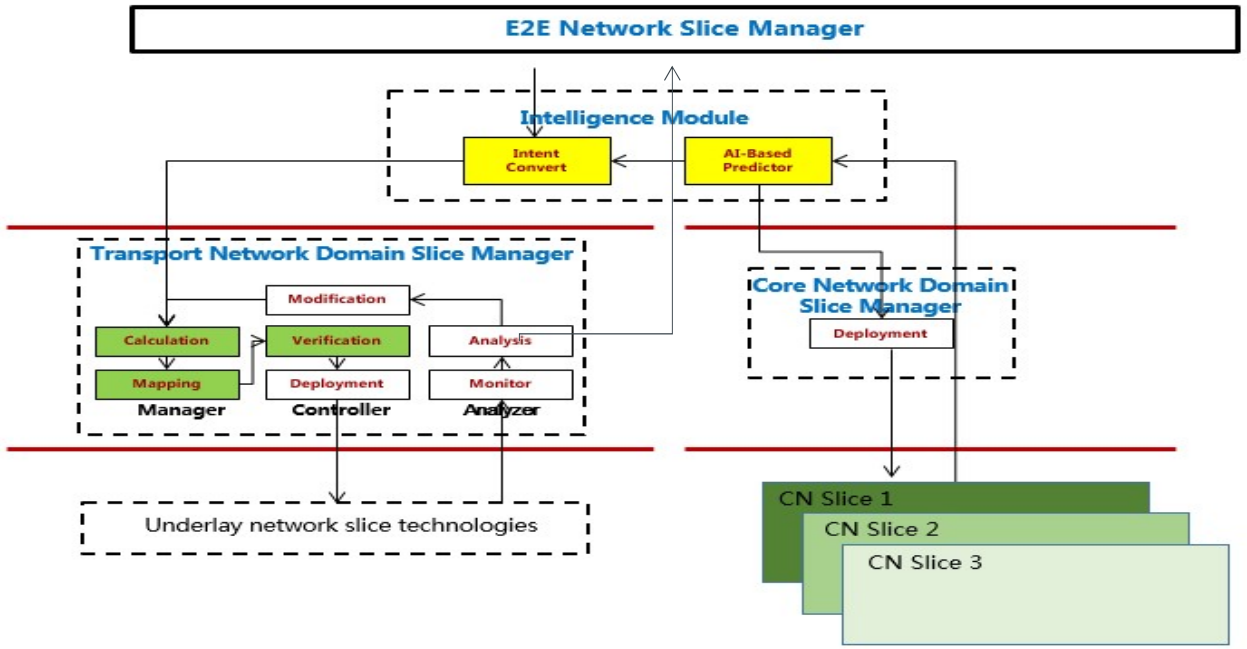
- Provides underlay network control to satisfy the network slice requests.
- FlexE and a FlexE-based optimization algorithm are used for underlay network slice creation and modification.

CNSM:

- Provides core network control to satisfy the network slice requests

Host/Team Leader: 中国电信 CHINA TELECOM

Team members: HUAWEI, intel, 国家电网 STATE GRID 中国电力科学研究院有限公司, DTT 大唐电信, DAHO 大河云联



✓ PoC Project Goal #1: Demonstrate the use of AI to predict the change of traffic pattern and adjust the configuration of network slice in advance.

- PoC Project Goal #2: Demonstrate the use of intent based interface to translate tenant requirements to network slice configuration and intelligent network slice lifecycle management on demand.
- Demo showed in ENI#07 and ENI-AIAN workshop, GNTC conference.

Service & Network management work in ISG ZSM

ETSI ISG ZSM
Formed in December 2017; first meeting in January 2018

14 founding members

Key objective

Enable future operational processes and tasks to be executed automatically, end-to-end

Goal

Accelerate the definition of the end-to-end service management architecture, spanning both legacy and virtualized network infrastructures

Formed under the auspices of the ETSI ISG

Industry convergence

Facilitate collaboration with the relevant open-source projects, standardization bodies and fora

Interoperability

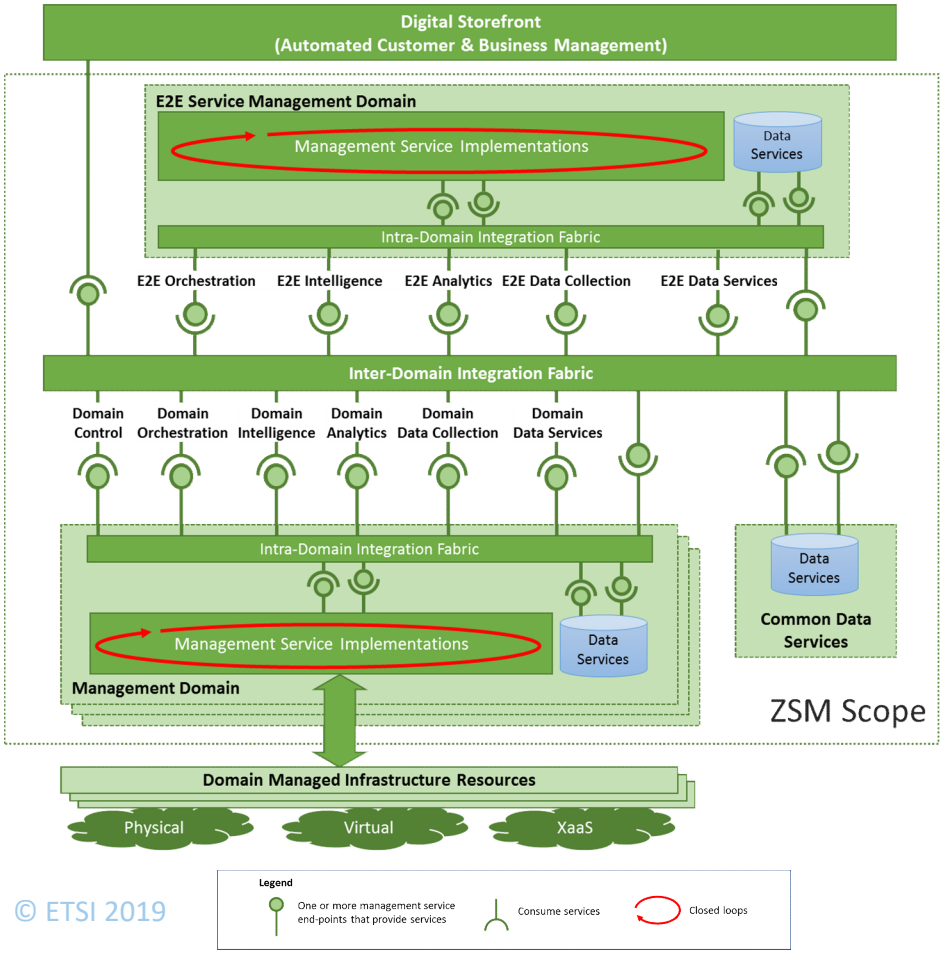
Provide a common foundation to enable a diverse ecosystem of open source groups to produce interoperable solutions

Work status

- The ISG ZSM work has started with the approval of the following seven new Work Items (WIs):
  - ZSM 001: Requirements based on documented scenarios (specification)
  - ZSM 002: Reference Architecture (specification)
  - ZSM 003: End to end management and orchestration of network slicing (specification)
  - ZSM 004: ZSM Landscape (report)
  - ZSM 005: Means for Automation (report)
  - ZSM 006: Proof of Concept Framework (specification) → PUBLISHED
  - ZSM 007: Terminology

Note: the ZSM DRAFT specifications are publicly available via the ZSM open area (Link).

ZSM architecture (ZSM 002*)



Architectural principles:

- Modular, flexible, scalable and extensible service-based architecture
- Separation of concerns: network domain management and end-to-end cross-domain service management; resources in multiple domains can be managed separately.
- Support of open interfaces
- Support of model-driven service and resource abstraction
- Support of intent-based interfaces
- Enablement of adaptive closed-loop management automation, where the automated decision-making mechanisms can be bounded by rules and policies
- Support of stateless functional components
- Design for failure

* Link to ZSM_RefArch DRAFT specification