ACROSS project - Introduction

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Overview

- **Project Name:** ACROSS - Automated zero-touch cross-layer provisioning framework for 5G and beyond vertical services

- **Project website:** across-he.eu.

- **Stream:** A-01-07

- **Members:**
  - NOVA
  - Telefónica
  - NOKIA
  - ERICSSON
  - NEC
  - TTC
  - UNIVERSIDAD DE PATRAS
  - POLITÉCNICA
  - UBITECH
  - WINGS
  - K3Y
  - Inieem Commercial Pathways

- **Key objective:** ACROSS develops a secure E2E network and service management platform that employs vertical and horizontal zero-touch mechanisms, enabling multi-objective service management optimizations in the presence of trade-offs between performance, energy consumption, and cost.
Motivation

Edge to core continuum
Cloud-native services
CPU+GPU processing

# of events ++
# of devices ++
Data volume ++
In-network proc. (FPGAs)
AI breakthrough
Cross-layer automation

5G
Today

6G
Tomorrow
**Concept**

**ACROSS #1**
Scalable end-to-end service orchestration platform and control

**ACROSS #2**
Standardised communication interfaces

**ACROSS #3**
Deep end-to-end telemetry

**ACROSS #4**
Intelligence

**ACROSS #5**
Full-stack automation

**ACROSS #6**
Secure & trusted orchestration

**ACROSS #7**
Test case-driven methodology

**ACROSS #8**
Drive standards & catalyze innovation

**ACROSS Stakeholders**

- SDOs
- Operators
- 3rd parties
- Open source
- Service Providers
- Data Scientists

**UI & NBIs**

**Multi-domain E2E Orchestrator**

- Integration Fabric

**Domain Orchestrator #1**

**Domain Orchestrator #N**

**SBIs**

**Infrastructure**
Key development objective

• ACROSS project’s developments...
  • ... provide an ultra-scalable service orchestration stratum, built as an ensemble of
    • a highly-distributed grid of domain orchestration instances
    • managed by a multi-domain cloud-native service orchestrator, able to ...
  • ... manage multi-X {domain, technology, vendor, tenant} infrastructures spanning across geo-distributed edge-to-core deployments, with...
  • ... increased security and trust over the underlying set of devices and ad-hoc data sources, while
  • ... jointly exploiting the data plane programmability, and the exciting momentum of AI to greatly outperform and outsmart existing service orchestration loops.
Key technologies investigated

• Ultra-scalable cross-domain service deployment and orchestration through standardised and vendor-agnostic cross-domain integration fabric
• Deep end-to-end telemetry on open programmable infrastructures, from both RAN-to-Core infrastructure and the service layer
• Real-time analytics and AI for next-generation end-to-end orchestration, exploiting complex graph relationships and AI for TE principles
• Full-Stack cross-domain zero-touch provisioning (ZTP), enabling both Vertical (App-to-Hardware) and Horizontal (RAN-to-Core) automation
• Secure & trusted orchestration mechanisms in fields of TEE, efficient and secure enclave management, improved sec-VNF placement
# Planned standardization activities

**Alliance with standards and tangible beyond state-of-the-art contributions**

## Per-module innovation plan

<table>
<thead>
<tr>
<th>Aligns with</th>
<th>Contributes to</th>
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<tbody>
<tr>
<td>ETSI ZSM, ETSI TFS, P4.org, IETF OAM</td>
<td>ETSI OSM, ETSI TFS, P4.org/Stratum, OpenSlice</td>
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<tr>
<td>ETSI ZSM</td>
<td>ETSI OSM or third-party platforms</td>
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<tr>
<td>ETSI ZSM, ETSI ENI, ETSI SAI</td>
<td>ETSI TFS, OpenSlice, open AI platforms</td>
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<tr>
<td>ETSI ZSM, ETSI NFV, TMF, 5GPPP</td>
<td>OpenSlice/ETSI OSM, commercial orchestrators</td>
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<td>ETSI SAI, SNS Security WG</td>
<td>Open security and trust platforms</td>
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Experimentation facilities

ACROSS Core Domain
CTTC Barcelona, Spain

ACROSS Edge Domains
UBITECH Athens, Greece
CTTC Patra, Greece

ACROSS Data Generation Lab
TID Madrid, Spain

Example Use Cases
Energy
Education
Transportation
Industry
Entertainment

Domain Orchestrator

Domain

Dynamic Data Generation Environment

Secure Data Sharing

Internet

Control Plane

Data Plane

ACROSS Central Platform

Multi-Domain E2E Orchestrator

Integration Fabric

UI & NBIs

Domain 1
Instance 1

Domain 2
Instance 2

Domain 3
Instance 3

Secure Data Augmentation

Internet

UI & NBIs
Test cases overview

TC1 | Stakeholder-driven (NBI) zero-touch orchestration
TC2 | Device-driven (SBI) zero-touch orchestration
TC3 | Intelligence-driven (AI) zero-touch orchestration
TC4 | Stakeholder events and policies

- Policy-driven zero-touch secure device onboarding
- Policy-driven zero-touch telemetry
- Policy-driven zero-touch service management
- Policy-driven zero-touch security

- Context-aware UPF provisioning/decommissioning
- Load-aware and secure zero-touch UPF migration
- Energy-aware zero-touch slice adaptation

- Anticipatory detection, analysis, and prevention of congestion problems
- Smart energy-aware zero-touch TE
- Smart QoS-aware zero-touch TE
- Intelligent zero-touch SLA preservation
- Heavy-hitter prediction for zero-touch DDoS prevention

- east-west expansion of the ACROSS multi-domain e2e orchestration layer
- east-west expansion of the ACROSS domain orchestration layer
- east-west expansion of the NFV orchestrator
- east-west expansion of SDN controller instances

- zero-touch device discovery and onboarding
- zero-touch telemetry
- zero-touch service onboarding
- zero-touch UPF provisioning
- intelligent zero-touch SLA preservation
Thank you!

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