

AI and Autonomous Networks: Coordination across ETSI

Presented by:

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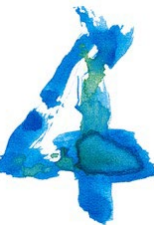
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Overview



- ETSI Operational Co-ordination Group on Artificial Intelligence (OCG AI) across ETSI
- OCG AI coordinating alignment with European Commission, CEN/CENELEC JTC21, etc.
- ETSI Operational Co-ordination Group on Autonomous Networks (OCG AN)
- Conclusions and next steps



ETSI Operational Co-ordination Group on Artificial Intelligence (OCG AI)

ETSI OCG AI is open to all ETSI members. Its tasks include

- To facilitate the exchange of views and information on AI activities in **Technical Bodies (TBs) and Industry Specification Groups (ISGs)** in order to identify synergies, best practices and common requirements and
- To **coordinate provision of information by the TBs and ISGs on AI matters** relevant to ETSI.

ETSI OCG AI is representing ETSI in regular EC / ESOs meetings where the European Commission, ETSI and CEN/CENELEC exchange information on the latest status of activities related to the European AI Act and AI in general.

**All ETSI members are invited to join OCG AI
which provides an holistic view on ETSI's activities in the field of AI!**



ETSI activities on Artificial Intelligence

The field of Artificial Intelligence (AI) and Machine Learning (ML) is broad and requires **diverse competences currently available within distinct Technical Committees and Industry Specification Groups**. Related activities are thus organized in the respective groups exploiting the available competences.

SAI

The aim of **Technical Committee Securing Artificial Intelligence (TC SAI)** is to develop technical specifications that mitigate against threats arising from the deployment of AI, and threats to AI systems, from both other AIs, and from conventional sources.

INT

ETSI TC INT (Core Network and Interoperability Testing) has defined the Generic Autonomic Network Architecture (GANA) as an architectural reference model for autonomic networking, cognitive networking and self-management.

MTS

ETSI TC MTS (Methods for Testing and Specification) provides technologies, tools, and guidelines on conformance and interoperability testing and certification of protocols and other systems, including AI and IoT systems.

ENI

ETSI ISG ENI (Experiential Networked Intelligence) introduces an experiential architecture, including an architecture that uses Artificial Intelligence (AI) and other mechanisms to improve its understanding of the environment, and hence the operator experience.



ETSI activities on Artificial Intelligence, Cont'd

CIM

ETSI ISG CIM (cross-cutting Context Information Management) defines a Context Information Management API (see ETSI GS CIM 009, V1.6.1 (2022-08) [10]) which allows users to provide, consume and subscribe to context information in multiple scenarios and involving multiple stakeholders.

eHealth

ETSI TC eHealth acknowledges a critical role for AI in the future provision of health services and is developing an ETSI Guide on “The role of AI in eHEALTH”.

ZSM

ETSI ISG ZSM (Zero-touch network and Service Management) defines the required end-to-end architecture and solutions for network automation, designed for closed-loop automation and optimized for data-driven machine learning and Artificial Intelligence algorithms.

PDL

ETSI ISG PDL (Permission Distributed Ledgers) covers the non-repudiation challenges in Permissioned Distributed Ledgers (PDLs), the non-repudiation strategies/technologies, and their viability in PDLs.

NEW

ETSI TC Data will be kicked-off in April'25 and will develop deliverables supporting Data related features related to Artificial Intelligence and beyond.





Approx. once per month, a **dialogue is organized between the European Commission and all ESOs (ETSI/CEN/CENELEC)** to provide a status update on AI related activities and the progress on deliverables in support of the EU AI Act. OCG AI represents ETSI in this dialogue and is reporting back to ETSI in the regular OCG AI meetings.

ETSI is collaborating with CEN/CENELEC in relation to the implementation of the EU AI Act (JTC21) through

- ETSI members being registered to contribute to relevant CEN/CLC JTC21 activities;
- ETSI providing information on available ETSI deliverables which are available for referencing by CEN/CLC JTC21 (see right hand side for an example).

2. Summary of ETSI ISG SAI work programme

The scope of ETSI's ISG SAI work programme is fairly extensive and has resulted in a number of important publications. Of particular note are the most recent publications of ETSI ISG SAI made in the first months of 2023:

ETSI GR SAI 007 V1.1.1 (2023-03): Securing Artificial Intelligence (SAI); Explicability and transparency of AI processing
The scope of GR SAI 007 identifies the content as identifying steps to be taken by designers and implementers of AI platforms that give assurance of the explicability and transparency of AI processing. AI processing includes AI decision making and AI data processing. The document identifies its target audience as designers and implementers who are making assurances to a lay person. In more detail the content addresses both static and dynamic forms in order to allow designers to be able to "show their working" (explicability) and to be "open to examination" (transparency)
ETSI GR SAI 009 V1.1.1 (2023-02): Securing Artificial Intelligence (SAI); Artificial Intelligence Computing Platform Security Framework
The scope of GR SAI 009 states that it describes a security framework of AI computing platform containing hardware and basic software to protect valuable assets like models and data deployed on AI computing platform when they are used in runtime or stored at rest. The security framework consists of security components in AI computing platform and security mechanisms executed by security components in the platform. By specifying the security framework, an AI computing platform can be consolidated against the relevant attack and can provide security capabilities to facilitate the stakeholders in AI systems to better protect the valuable assets (model/data) on an AI computing platform.
ETSI GR SAI 013 V1.1.1 (2023-03): Securing Artificial Intelligence (SAI); Proofs of Concepts Framework

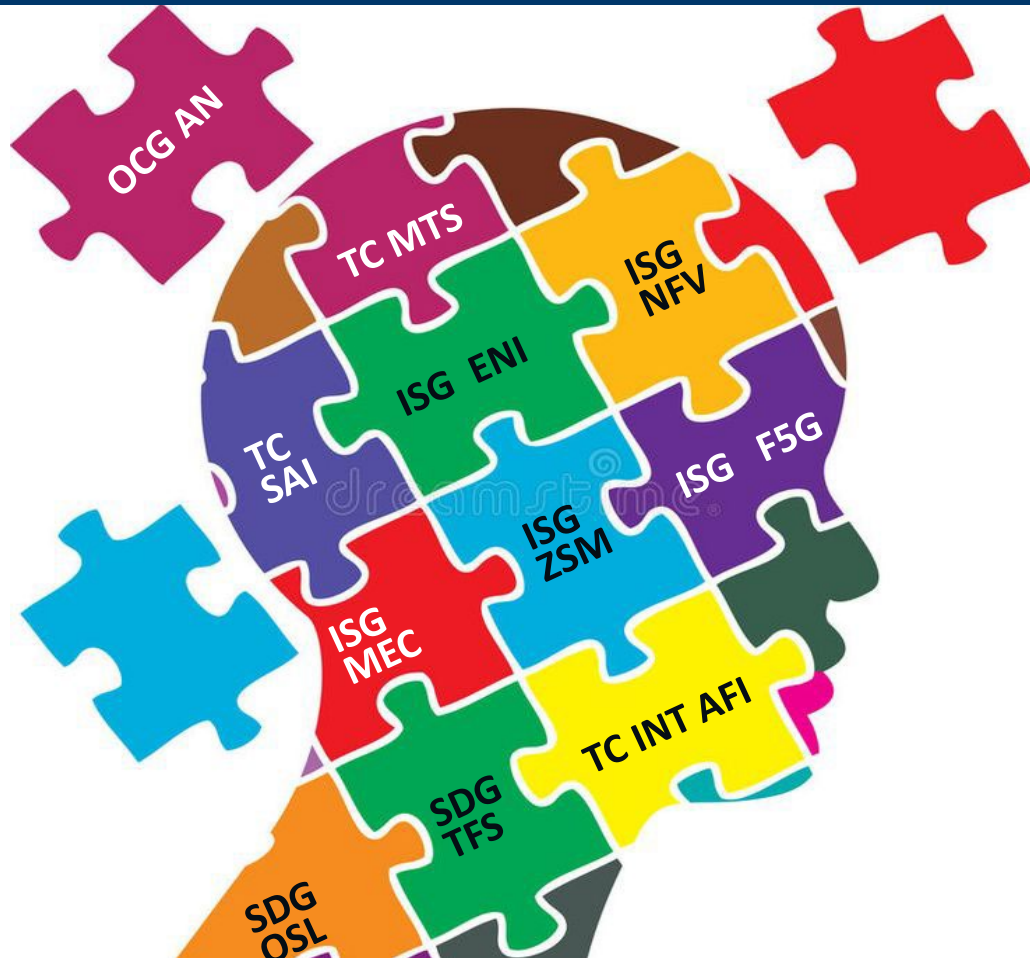
[https://docbox.etsi.org/OCG/OCG_AI/05-CONTRIBUTIONS/2023/OCGAI\(23\)032003_Liaison_Statement_from_ETSI_ISG_SAI_to_JTC21_on_recent_work_.pdf](https://docbox.etsi.org/OCG/OCG_AI/05-CONTRIBUTIONS/2023/OCGAI(23)032003_Liaison_Statement_from_ETSI_ISG_SAI_to_JTC21_on_recent_work_.pdf)

ETSI Operational Co-ordination Group on Autonomous Networks (OCG AN)



ETSI OCG AN is open to all ETSI members experts in AN with the scope

- to facilitate the exchange of results and deliverables in TBs, ISGs and SDGs working on Autonomous Networks;
- to identify synergies, best practices and common requirements;
- to coordinate exchange of information on AN with other SDOs and Fora.

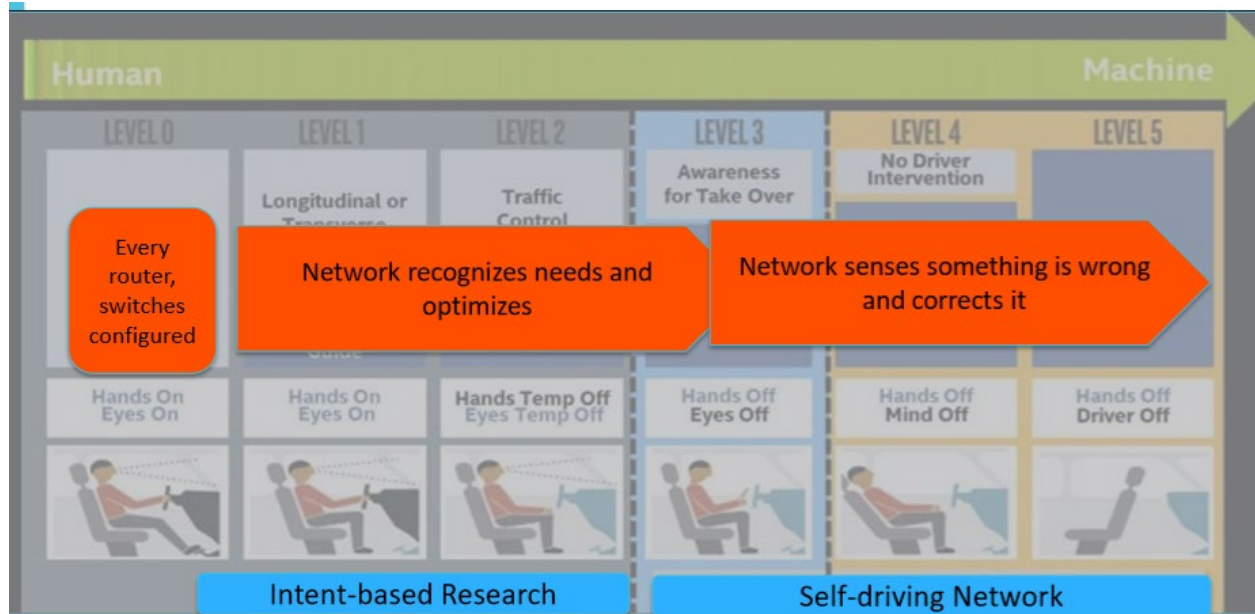


- **ISG ZSM:** zero-touch end-to-end network and service automation
- **ISG ENI:** experiential network intelligence enabled by AI and cognitive network management
- **ISG NFV:** NFV-management domain and virtualized infrastructure
- **ISG MEC:** multi access edge computing infrastructure
- **ISG F5G:** fifth generation fixed optical networks
- **TC SAI:** security for AI
- **TC INT AFI:** interoperability and generic autonomic networking architecture
- **TC MTS:** testing
- **SDG TFS - TeraFlow SDN:** open source cloud native SDN controller
- **SDG OSL - Open Slice:** OSS open source development (for Network as a Service).

Autonomous Networks

An **Autonomous Network** is a network that self operates according to the business goals with no human intervention beyond the initial supply of input (e.g., intent, goals, policies, certain configuration data) by human operator. It is capable of self-management operations (e.g., self-configuration, self-diagnosis, self-repair, self-healing, self-optimization, self-protection) of its resources, functions/applications and services.

Autonomous Levels



Self-X Capabilities

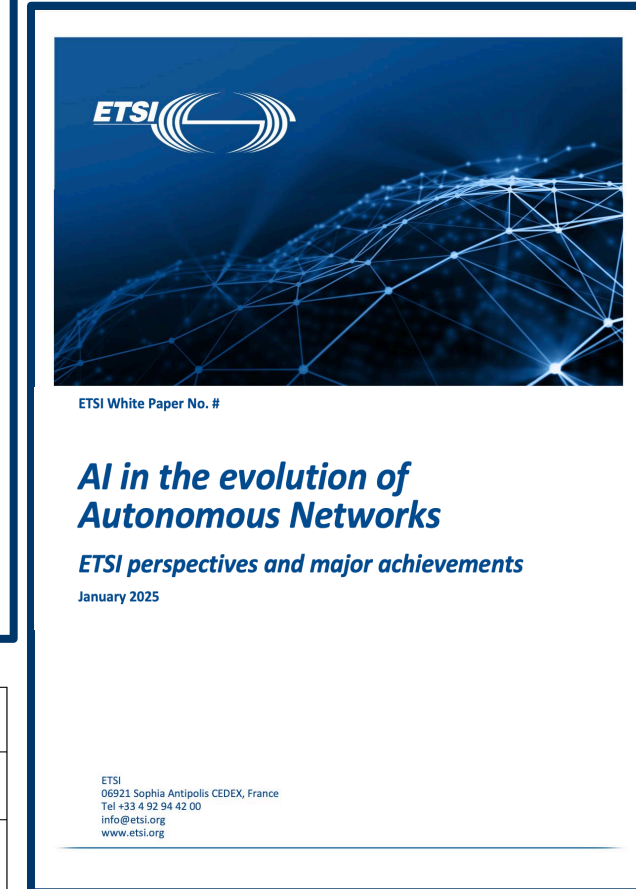
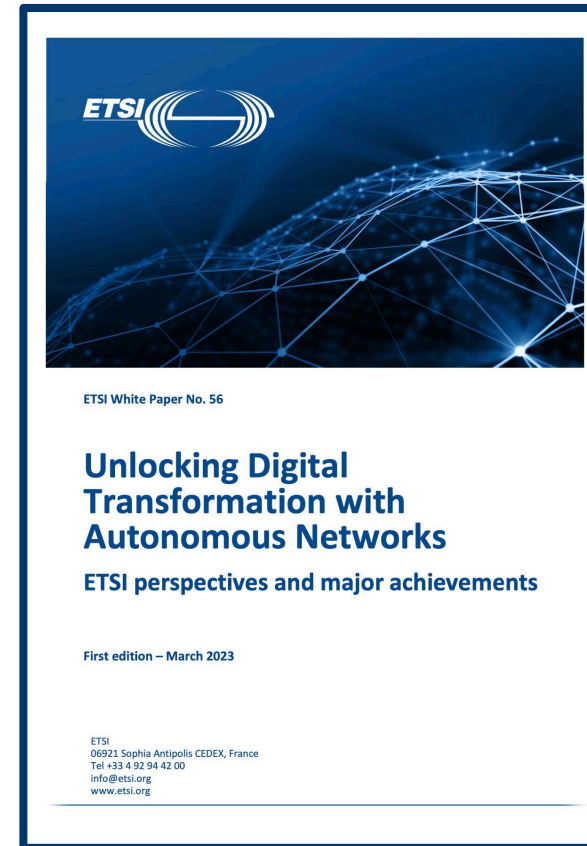
Level Definition	L0: Manual Operation & Maintenance	L1: Assisted Operation & Maintenance	L2: Partially Autonomous Network	L3: Conditionally Autonomous Network	L4: Highly Autonomous Network	L5: Fully Autonomous Network
Execution (Hands)	Human icon	Human and robot icons	Robot icon	Robot icon	Robot icon	Robot icon
Awareness (Eyes)	Human icon	Human icon	Human and robot icons	Robot icon	Robot icon	Robot icon
Decision (Minds)	Human icon	Human icon	Human icon	Human and robot icons	Human and robot icons	Robot icon
Service Experience	Human icon	Human icon	Human icon	Human icon	Human and robot icons	Robot icon
System Complexity	Not applicable	Sub-task Mode-specific	Unit level Mode-specific	Domain level Mode-specific	Service level Mode-specific	All modes

Telco Operators expressed the importance of achieving the highest Level of Autonomy as fast as possible. This means evaluate the actual level of autonomy, identify a road-map to move forward to AN L4 and provide the technologies to progress Network autonomy.

It is a similar path we see in Autonomous Driving Car where assisted driving capabilities were applied as first.

Highlights by OCG AN

- **“ETSI Internal Coordination Paper on Autonomous Networks “**
- **TB/ ISG Activity Tables on AN progress (regularly updated)**
- **TB/ISG Deliverables Table on AN (regularly updated)**
- **ETSI WP No.56: “Unlocking Digital Transformation with Autonomous Networks” (March 2023)**
- **Dedicated Session at Network-X 2023 on AN**
- **Presentations at AN MSDO Table**
- **Proposal of ETSI presentations for 2025 at AN MSDO**
- **A new 2025 White Paper is on going: “AI in the evolution of Autonomous Networks” focusing on:**
 - AI technology enablers
 - Business value and requirements for AN L4
 - AN API and Data Models
 - AN ecosystem
 - AN for sustainability



	AN topics / ETSI Groups	TC INT ARI WG	ISG ENI	ISG ZSM	ISG FSG	ISG MEC	ISG NFV	TC SAI	TC MTS	SDG TFS
1	Terms & definitions	●	●	●			●	●		
2	Use cases & requirements	●	●	●	◐	○	●			
3	Architecture / framework	●	●	●	◐	◐	◐	◐	◐	◐



AI in Autonomous Networks

- **Machine Learning for Network Management** to continuously monitor the networks, analysing data in real-time allowing the network management systems to identify patterns that reveal anomalies, enabling proactive problem-solving and self-healing mechanisms.
- **Deep Reinforcement Learning** for Resource Allocations to optimize spectrum and maximize network performance and user quality experience;
- **Generative AI** to autonomously detect and resolve network issues, optimizing performance, enhance network security by identifying and mitigating threats in real-time reducing human error and ensuring consistent policies across the network.
- **Network Digital Twin** enhances AN operations by providing a virtual replica of a communications network, enabling advanced modelling, including dynamic behaviour, simulation and decision-making:
 - Generate datasets for training AI/ML algorithms;
 - Perform prediction and prevention;
 - Analyse new scenarios and management strategies without requiring direct actions on the physical network.
- **AI Agents**, acting as autonomous decision-making entities, analyse data, plan tasks, take actions, adapt and optimize processes continuously in real time to deploy, configure and monitor the Network.



AN Multi-SDO Table

Autonomous Networks is achieving huge interest in the ICT ecosystem and the main important SDO, Fora and Alliances are working on this topic.

A coordination/ exchange of information was considered crucial

AN Multi-SDO Table was created to:

- Promote a better understanding of shared challenges and requirements for Autonomous Networks
- Encourage collaboration among SDOs to align on priorities and progress.
- Facilitate regular engagement and information exchange to drive industry-wide alignment.

Multi-SDO AN Participants:

3GPP, BBF, CCSA, ETSI, GSMA, IEEE, IETF, ITU-T, NGNM, ONAP, TM Forum (acting as meeting convener)

The activity consists mainly in workshops (organized regularly) on key topics (eg. share the latest developments in AN, provide updates on CSP AN journey progress, explore topics of mutual interest: high-value scenarios, AN PoCs, intent-driven processes, AI/GenAI role in AN)

ETSI is a leading player in the Multi-SDO community thanks to the excellent results achieved in AN supported by the wish to share information and to open collaboration opportunities



Conclusions



- ETSI has strong work program related to AI/ML and a strong community contributing;
- Dialogue with EC and CEN/CLC JTC21 is active and ongoing, but impact on contribution to EU AI Act still needs to be improved;
- ETSI reached a leading role on Autonomous Networks; a high-profile community of experts from service providers, operators, vendors, technology providers and universities deliver high value results covering a large number of business use cases and scenarios.
- AI is a key enabling technology to move forward in the evolution of intelligent Autonomous Networks, accelerating the path to AN L4 and L5 with significant advantages for all the community in terms of cost reduction, sustainability, Networks reliability, new business opportunities and best in class services to customers.