CYBERSECURITY IN THE CONNECTED AND AUTOMATED MOBILITY WORLD

Rossen Naydenov
Officer in Network and Information Security, ENISA

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EVERYTHING IS CONNECTED

Automated mobility is IoT for mobility

- Wide ecosystem
  - OEMs
  - Intelligent transport systems
  - Suppliers
  - Third party services, e.g. ride share, different modes of transport (scooter, bike, bus)
- Advanced connectivity
- Adaptive behavior
- Artificial Intelligence
- Numerous sensors and actuators
- Real-time analytics
ENISA ACTIVITIES ON MOBILITY

• Support the implementation of the NISD in the Road Transport sector

• Recommendations for CAM
  • Builds on the good practices for smart cars from 2019

• Collaboration with DG MOVE, RTD, GROW & CONNECT via CCAM Platform

• Engagement with industrial stakeholders, e.g. OEMs, Tier 1 and Tier 2 suppliers, wider ecosystem stakeholders

https://www.enisa.europa.eu/road
HARMONIZATION EFFORTS IN AUTOMOTIVE TRANSPORT

- **Mapping to existing automotive cybersecurity initiatives**
  - UNECE, ISO, SAE, ETSI, …
- **Engaging and validating findings with the community**
  - Manufacturers
  - Tier 1, Tier 2 suppliers
  - Relevant EC DGs and MS cybersecurity agencies
- **Threat model of ENISA 2016 was used for UNECE threat model**
- **2019 study maps to UNECE regulation**
  - Extra security measures for semi-autonomous and autonomous vehicles
  - Wider view of automotive ecosystem
CONNECTED AND AUTOMATED MOBILITY ECOSYSTEM

• **Stakeholders**
  - Connected vehicles,
  - Connected infrastructure (e.g. traffic management, etc.)
  - Suppliers – both to the vehicles and the infrastructure
  - Third party services (e.g. intelligent transport, bikes, scooters, parkings, etc.)

• **Critical services**
  - Connected to the user
  - Between stakeholders in the ecosystem

• **Critical information infrastructure**
  - Vehicle systems
  - Systems with direct or no direct vehicle interaction
CAM SERVICES (PREVIEW)

User services

Driving Enhancement
- Driving optimization
- Autonomous driving
- Navigation
- EV services
- Parking & Toll services

Infotainment
- Music / Audio
- In vehicle Payment
- Information apps
- Games

Safety Management
- ADAS (Emergency functions, collision protection, hazard warnings, etc.)
- Roadside assistance
- Environmental protection

MaaS
- Car sharing
- Car rental
- Co-riding
- Public / shared transport
- Bike sharing services
- Free floating services
- Soft mobility navigation and optimization
- Multimodality optimization

Home Management
- Appliances management
- Automated features when approaching home

Remote services
- Vehicle data collection (performance, use, etc.)
- Remote control

Insurance Management
- Pay as you drive/use
- Incident investigation

Security systems
- Video protection
- Anti-theft
- Tracking

Vehicle interaction (V2X)
- C-ITS services
- C-CAM services
- C2C services

Advertising
- In-vehicle advertising
- Promotional offer
- Suggestion

B2B Services (OEM, suppliers, operators, tiers)

Fleet Management
- Localization
- Data collection
- Fleet optimization
- Rental Management

Maintenance
- Diagnosis & prognosis
- Over The Air update & repair
- Data collection

Road Infrastructures Management
- Route and priority optimization
- Traffic signal management
- Road analysis and management
- Road infrastructures analysis and management
- Traffic analysis and management
- Data braking
SYSTEMS AND INFRASTRUCTURES

Conception and Development
- Design and Development of CAM systems (CAO, Coding, etc.)
- Configuration management systems
- Supplier management systems

Vehicle, components and systems Manufacturing
- Onboard electronic initialization systems
- Asset inventory & procurement systems
- Industrial control systems

Cybersecurity tools and back-ends
- Detection and reaction systems (VSOC)
- Vulnerability Management systems
- Risk Management systems
- Infrastructure protection systems (IPS, etc.)
- Administration systems
- Secured archiving systems
- Back-ends

Manufacturer, Suppliers and Service providers Operations
- Connected Services Management & Upgrades
  - Connected Vehicles Platforms
  - Customers applications
  - Connected services
  - Over the Air Systems

Dealer Network – Sales, Distribution and Customer relations
- Marketing systems
- Sales and After-sales systems

Maintenance
- Asset inventory & procurement systems
- Diagnostic systems

Road Vehicles & Micro mobility
- Onboard cybersecurity systems
- Onboard E/E systems & (ECUs, sensors, etc.)
- Onboard Infotainment systems and services
- Telematic systems
- Short range communication network
- Long range communication network

User devices
- Smartphone and other portable devices
- Smart Home building integration

Interactions, interoperability and 3rd Parties
- V2X communication systems (C-ITS, C2C, etc.)
- 3rd Parties systems and platforms
- Data exchange and collaboration systems and platforms
- MaaS systems and platforms

Tiers and Road Infrastructures
- Communication systems for ecosystems (police, rescue, etc.)
- Traffic management & signaling systems
- Road Infrastructures Systems (highway toll, parking meter, etc.)
- Monitoring & Surveillance systems (CCTV, etc.)
- Intelligent Transport systems (intelligent warehouses, parking lots, etc.)
- EV charging infrastructures
- Micro mobility systems (bikes, e-scooters, stations, etc.)
CHALLENGES AND RECOMMENDATIONS FOR CYBERSECURITY OF CAM

• **Objective**
  - Identify which are the challenges the stakeholders have in implementing cybersecurity in the CAM ecosystem
  - Propose recommendations to overcome the challenges

• **Target audience**
  - Policy makers - European Commission, National Authorities
  - OEMs
  - Suppliers
  - Third Party Service providers
  - Road Equipment Manufacturers
CHALLENGES IN CAM (TOP 3)

- **Governance**
  - integration of cybersecurity in the corporate activities

- **Top Management support**
  - Cybersecurity not a priority

- **Technical Complexity**
  - Multiple stakeholders with different or even no security requirements

Challenges:
- Governance and cybersecurity integration into corporate activities - 27%
- Lack of top management support and cybersecurity prioritization - 24%
- Technical complexity in the CAM ecosystem - 16%
- Technical constraints for implementation of security into CAM - 14%
- Lack of expertise and skilled resources for CAM cybersecurity - 9%
- Fragmented regulatory environment - 10%
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PREVIEW OF RECOMMENDATIONS FOR CYBERSECURITY OF CAM

• Establish administrative structures for top-level management to discuss and exchange views with cybersecurity experts and CISOs.

• Incentivize innovation and R&D activities for securing IT and CAM environments, components, systems and services.

• Promote the use of standardized components to homogenize the systems in order to simplify, and make possible the understanding of the ecosystem interaction.
CONCLUSIONS

• Mobility industry is having similar cybersecurity issues as many other industries, e.g. Rail, Energy

• Encourage cross-functional security and safety knowledge exchange between IT and mobility experts respectively

• Raise awareness to the board level of the organization about the impact of cybersecurity and technology on the CAM ecosystem lifecycle
THANK YOU FOR YOUR ATTENTION

European Union Agency for Cybersecurity
Vasilissis Sofias Str 1, Maroussi 151 24
Attiki, Greece

Tel: +30 28 14 40 9711
Email: info@enisa.europa.eu
Website: www.enisa.europa.eu