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Cryptography and Information Security for Open Networks

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KISON Research Group

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1.1 Universitat Oberta de Catalunya

- Universitat Oberta de Catalunya (UOC) is a **leading university of quality online education** that is rooted in Catalonia and open to the world.
- It offers people **lifelong learning** to help them and society advance, while carrying out **research** into the knowledge society.
- It is the 2nd Spanish-speaking online educational institution in the world with more than **90.000 students** in the academic year 2025/2026.



1.2 KISON

- KISON is a research group started in 2001 focused on **new solutions for the conciliation of network security with users' privacy** in order to accomplish with the demands of the network society.
- The KISON group research lines focus on the compatibility of the **security of decentralized networks** (e.g. ad-hoc, P2P or IoT networks) and the **protection of information in the Internet** (especially multimedia contents) with users' rights to privacy.
- The group has 22 members, 9 of them professors.



2.1 Research line in 6G

Deployment a 5G testbed (e2e)

- Generation of 5G datasets (multiple slices, cybersecurity attacks, in particular GTP)
- Implementation of intrusion detection using federated learning
- Analysis of privacy and security attacks on the federated learning system

Robust adaptive IA models

- Transfer learning
- Optimal hyperparametrization
- Neuro-symbolic graph neural networks

Development of a trust model

- Trust model based on blockchain and smart contracts





2.2 Future research lines in 6G

Moving towards AI-driven cybersecurity with a focus on AI-targeting attacks and adaptive solutions.

- Proactive reinforcement learning for defense
- Adaptive Byzantine-robust aggregation in FL
- Self-healing capacities
- Cross-Layer adversarial attack analysis
- Introduction of zero-trust by design



3.1 Funding

• Competitive projects:

- **International Chair ARTEMISA** in Cybersecurity. Chair INCIBE UPF-UOC – Recovery, Transformation and Resilience Plan. (2023-2026)
- **Strategic project DANGER** of Cybersecurity. Project INCIBE UAB-UOC - Recovery, Transformation and Resilience Plan. (2023-2026)
- PID2021-125962OB-C31 Bringing Sustainable Cybersecurity to the Internet of Things (**SECURING**), Proyectos de Generación de Conocimiento (2022-2026)
- Secure and private adaptive response for a sustainable digital ecosystem (**SAFE**), Proyectos de Generación de Conocimiento (2025-2028)

• Tenders in the topic:

- I2CAT. Lot 5 Exp. 2023040500. **Trust and privacy framework for adaptation in advances 5G or 6G networks**, in 6GENABLERS Project - Reliability, Privacy, and Security in 6G (TSI-063000-2021-13). (2023-2024)
- I2CAT. Lot 7 Exp. 2023040500. **Applied Research and Development Services focused on the study of cyberattacks in advanced 5G or 6G networks**, in 6GENABLERS Project - Reliability, Privacy, and Security in 6G (TSI-063000-2021-13). (2023-2024)
- Centre Tecnològic de Telecomunicacions de Catalunya (CTTC) Exp. CTTC-2022-20037. **Blockchain security in the service “FREE 6G: Redes cell-free basadas en aprendizaje automático (ML)”**. (2023-2024)

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