

Security in 5G networks

Unit 1. Introduction to security

- Motivation and classical cryptography
- Symmetric cryptosystems
- Public key cryptosystems
- Network security

Unit 2: Cellular networks security

- Cellular networks security history... from voice to data. 2G & GPRS
- Today security in 3G and 4G. Standards and implementation
- Secure networks architecture in a Telco. 5G as an evolution from 4G. Standards and security architecture for 5G
- Evolution of Cellular cryptographic algorithms
- Specific security protocol. Common protocols: SS7, RADIUS, DIAMETER, GBA, IPsec, IMSI, GTP, etc., and their security
- Legal impact (legal interception, data retention). Practical vision. Tools, attacks and solutions. Examples and attacks description in mobile networks. Tools and security related software

Unit 3: Operating systems security

- Review of OS fundamentals. Security goals. Trust and threat models. Authorization. Access control fundamentals (access matrix, capabilities)
- Vulnerabilities. Security in Windows and UNIX systems (protection system, authorization, security analysis, vulnerabilities)
- Building a secure Linux system: the case of SELinux. Security in virtualization: basic concepts (architectures, types of hypervisors)
- Separation kernels, Top risks in virtualization, issues with file sharing and network storage. Hypervisor security issues
- Common attacks: DoS, VM jumping, host traffic interception. Recommendations and best practices: separation of duties, network and storage security, auditing and logging, virtual machine security

Unit 4: Security in SDN

- Protecting the SDN
- Security in SDN: Protection with SDN

Unit 5: NFV security

- The NFV security challenge: how NFV introduces new threat surfaces and threat remediation mechanisms. Additional security considerations in an NFV environment
- Virtualization issues. Dealing with security properties and regulation in a virtualized environment: trust and keys, attestation, identity, legal interception

Unit 6: Lab session

- Operating systems and virtualization
- NFV security