Courses in English
Course Description

Department 07 Computer Science and Mathematics
Course title Secure Network Management
Hours per week (SWS) 4
Number of ECTS credits 5
Course objective
The course focuses on practically oriented concepts related to secure network management and computer networks. It includes topics related to configuring, monitoring and controlling network components such as switches, routers, servers, as well as the secure local and remote management of network components. The core topics include secure network management protocols for querying, installing, manipulating and deleting the configuration of network devices (SNMPv3, NetFlow, NetCONF, OpenFlow), type of attacks on network components, methods and tools for simulating attacks on network management components, as well as concepts and tools (commercial and open source) for network and network management protection (Firewalls, IPS-Snort, VPN, OpenNMS). Case studies by industry partners.

After completing this course students will be able to:
* Understand the role and the objectives of network management (NM) for an organization
* Learn how to investigate various standard/private Management Information Bases (MIB) and Remote MIBs
* Analyze various types of network management protocols: SNMPv2/v3, NetFlow, OpenFlow
* Diagnose security problems and use diagnostic/auditing tools
* Investigate attacks on network components and on network management tools
* Use tools and techniques for protecting the network components: FW, IPS, VPN, TSL
* Plan and implement secure management concepts, e.g. migration to secure SNMPv3
* Be aware of the security assurance requirements of the organizations for network protection.

Prerequisites
Computer Networks, OS-Linux, Virtualization, Java/Python Programming.

Recommended reading

Teaching methods
lecture (2 SWS) + exercises (2 SWS)
Online support (Moodle), Powerpoint slides/animations
Exercises: combination of theoretical questions and programming assignments

Assessment methods
Lab performance = 30% of the final grade.
Project performance = 20% of the final grade.
Discussions performance = 10% of the final grade.
Written presence exam (60 min.) = 40% of the final grade.

Language of instruction
English

Name of lecturer
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Course content
Chap. 1. Surveys of Fundamentals on Computer Networks: Medium Access Control, TCP/IP Protocol Stack, Spanning Tree Protocol, Virtual LANs, Addressing/Subnetting within the TCP/IP Networks, Routing Algorithms and -Protocols as well as -Tables, Quality of Service (QoS), Class of Service (CoS), Standard 802.1q, Policy-based QoS, DiffServ/ IntServ QoS.
Chap. 3. Management Information Bases (MIBs): Standard and Private MIBs structure, MIB II, ASN.1 formal Language, Structure of Management Information (SMI) using ASN.1, Basic Encoding Rules (BER), Remote Network Monitoring MIBs (RMON), RMON1&2, Configuring a Network Management Systems (NMS) using OpenNMS.

Remarks