Topics for theses (Bachelor, Master, also projects)

General information

Important, please note the following conditions if planning to work on one of the projects or theses:

– For the documentation, the Word template can be found at Template engl. or Template ger. which must be used. The template contains all the necessary information for formatting the document.
– The processing takes place in the laboratory for telecommunication networks.

Various Topics

Create LCX containers with different services for reuse in CORE networks
(Project**)**

– Create LCX Containers with different network services, like DNS, DHCP, HTTP, FTP, SIP, etc.
– The containers should be usable in the CORE network emulator to deploy the corresponding services flexibly
– It should be possible to reuse these containers in different emulated core networks
– CORE: https://github.com/coreemu/core
– **Contact**: Alexander Seng - seng@e-technik.org

Analysis of the Implementation of an eSIM-Solution for 5G Campus Networks (Project/Thesis**)**

– Development of a concept eSIM solution for 5G campus network
– Analysis of existing provisioning/deployment options
– Test implementation of an eSIM solution
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Analysis and Implementation of the Flexible RAN Intelligent Controller (FlexRIC)
(Project/Thesis**)**

– Analyzation of FlexRIC functionalities
– Implement a simulation and emulation environment for testing
– Test with SDR cards
– Test O-RAN Alliance compliant E2 node Agent emulator
– Openairinterface MOSAIC5G Project
– GitLab: https://gitlab.eurecom.fr/mosaic5g/flexric
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Implementation of 5G Core Network using Openairinterface Network Exposure Function (NEF) and Network Data Analytics Function (NWDAF) (Project/Thesis**)**

– Implementation of Openairinterface 5G Core Network (CN), including NEF and NWDAF
– Implementation of extended NEF/NWDAF functionalities/capabilities regarding 3GPP Releases
– Testing of implemented NEF/NWDAF functionalities/capabilities (northbound and southbound interfaces)
– Openairinterface OAI 5G CN
– GitLab: https://gitlab.eurecom.fr/oai/cn5g
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Implementation and Integration of Network Data Analytics Function (NWDAF) (Project/Thesis**)**

– Implementation of NWDAF, possibly of existing Open Source solution
– Integration into an Open Source 5G Core Network, e.g. Open5GS or Openairinterface
– Testing of NWDAF functionalities
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Analysis of Development and Provisioning of 5G Digital Twins (Project/Thesis**)**
– Analyzation of possible 5G Digital Twin solutions
– Analyzation of development and provisioning concepts for 5G Digital Twin solution
– A prototype implementation of a 5G Digital Twin solution
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Simulation and Analysis of a Body Area Network based on NS-3 network simulator (Project/Thesis**)**

– Get Familiar with NS-3
– Understand Body Area Networks
– Explore Available Sensors and Models
– Integration of (new) Sensors
– Sensor Data Generation and Collection to build AI/ML models
– Contact: Rami Khaldi – khaldi@e-technik.org

Concept and Prototype Realization for Intra-Network Slicing in Special Purpose Networks (SPNs) based on WLAN and Bluetooth Subnets (Project/Thesis**)**

– Analysis of the possibilities for realizing network slicing on the basis of WLAN
– Analysis of the possibilities for realizing network slicing on the basis of Bluetooth
– Development of a concept
– **Contact**: Alexander Seng - seng@e-technik.org

Implementation of 5G Sidelink Communication (Project/Thesis**)**

– Analyse 5G sidelink
– Implementation based on different end devices, e.g. RaspberryPi, 5G USB Dongle, etc.
– Testing and evaluation
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Implementation of 5G Multi-Core System based on Open5gs (Project/Thesis**)**
– Planning of a 5G Multi-Core System
– Implementation of a private 5G Multi-Core based on Open Source
– Testing and evaluation, e.g. Roaming
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Performance and Functionality Analysis of different 5G UPFs (User Plane Function) (Project/Thesis**)**
– Implementation of different Open/Closed Source UPFs, e.g., Amarisoft, Open5gs, eUPF, UPF (TUN/TAP)
– Analyse supported functionalities and services of different UPFs
– Performance measurements of different UPFs
– **Contact**: Prof. A. Lehmann – lehmann@e-technik.org

Further Topics on 5G/6G, WMN and DTN

Integration of a Special Purpose Network (SPN) in the Amarisoft 5G System
(Project/Thesis**) Contact**: Alexander Seng - seng@e-technik.org

Connecting a Special Purpose Network (SPN) to a 5G System using UERANSIM and Open5GS
(Project/Thesis**) Contact**: Alexander Seng - seng@e-technik.org

Connecting a Special Purpose Network (SPN) to a 5G System with UERANSIM and Open Air Interface System
(Project/Thesis**) Contact**: Alexander Seng - seng@e-technik.org

Development of a highly available 5G/6G SPN Gateway (mesh connection to the inside and outside)
(Project/Thesis**) Contact**: Prof. Dr. U. Trick – trick@e-technik.org

Concepts for Communication in Special Purpose Networks (SPNs) with special regard to Bit Rates and Availability
(Project/Thesis**) Contact**: Prof. Dr. U. Trick – trick@e-technik.org

Development of a Special Purpose Network (SPN) for the Realization of high availability based on IEEE 802.11/MESH/Bluetooth
(with Bluetooth-based smart sensor networks and mesh WLAN networks; among others with Raspberry Pi**)**
(Project/Thesis**) Contact**: Prof. Dr. U. Trick – trick@e-technik.org

Concept and Prototypical Realization for Distributed Computing in Special Purpose Networks (SPNs) considering Extreme Edge Computing (also considering edge, fog and cloud computing**)**
(Project/Thesis**) Contact**: Prof. Dr. U. Trick – trick@e-technik.org

Concept for Orchestration in SPNs connected via 5G/6G Networks (including consideration of APIs, security, blockchain**)**
(Project/Thesis**) Contact**: Prof. Dr. U. Trick – trick@e-technik.org