Forwarding on Gates
–
Separating Forwarding and Routing

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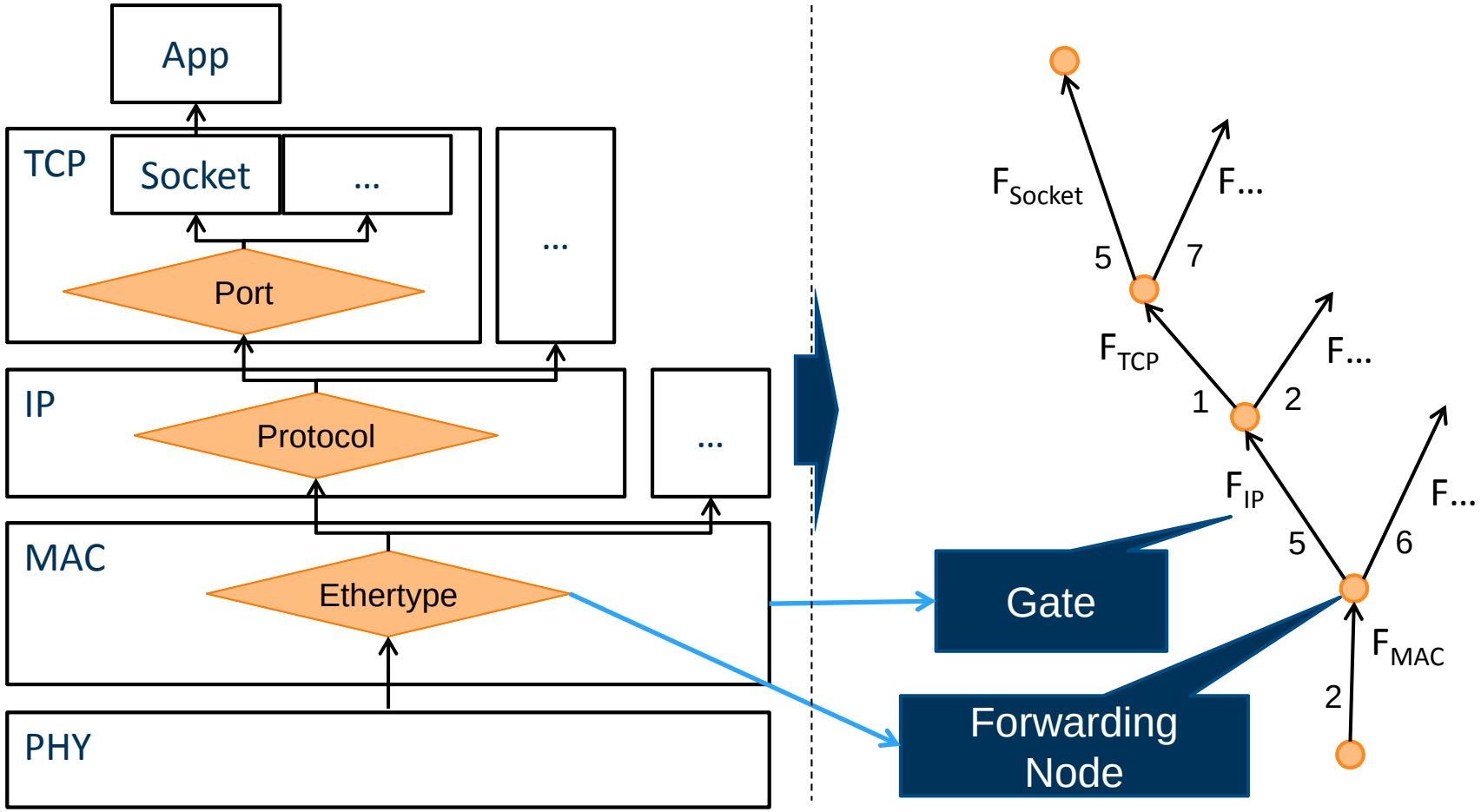
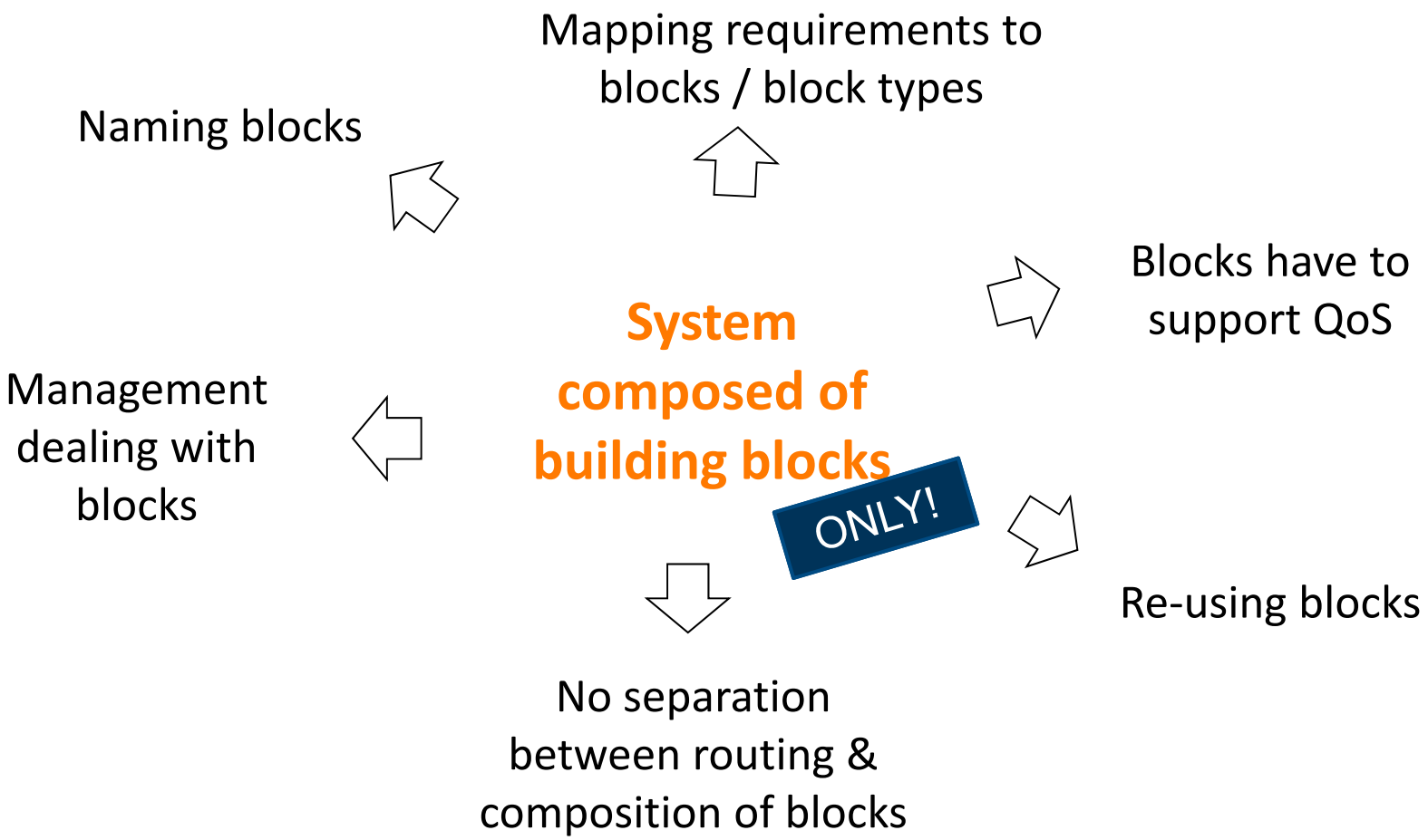
Ilmenau University of Technology

- Main fields
  - Electrical engineering
  - Mechanical engineering
  - Computer science
  - Economics
  - Media
- Statistics
  - Professors: ~100
  - Students: ~6500
- Research Cluster on Mobile Communications

From a Stack to Forwarding on Gates (FoG)

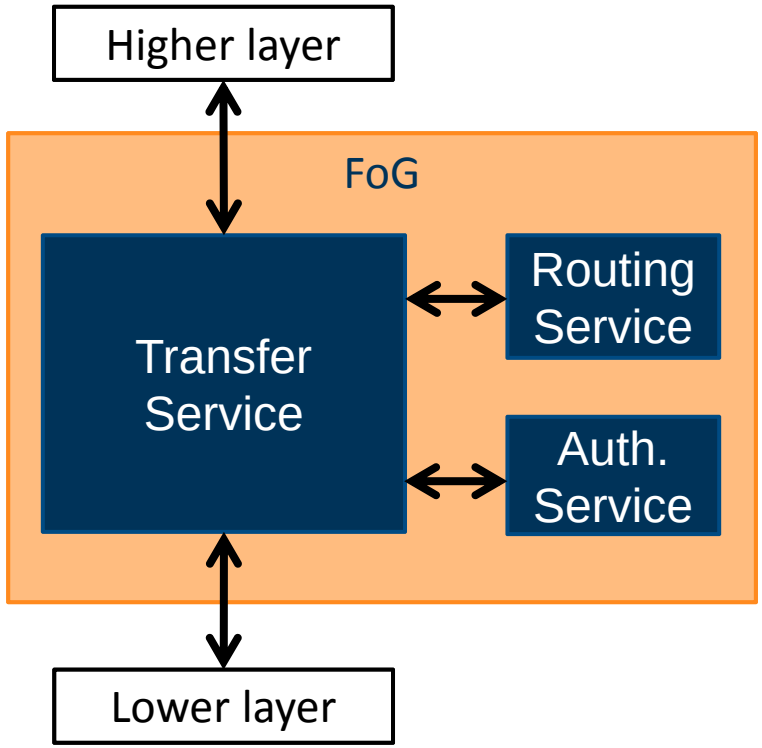


Key Ideas


Mapping requirements to blocks / block types
Naming blocks
Blocks have to support QoS
System composed of building blocks
ONLY!
Management dealing with blocks
Re-using blocks
No separation between routing & composition of blocks

FoG Architecture

- Transfer service
  - Packet forwarding
  - Consists of and manages
    - Gates
    - Forwarding nodes
  - Manipulates packets
- Routing service
  - Path calculation
  - Supports partial routing
- Authentication service
  - AAA support



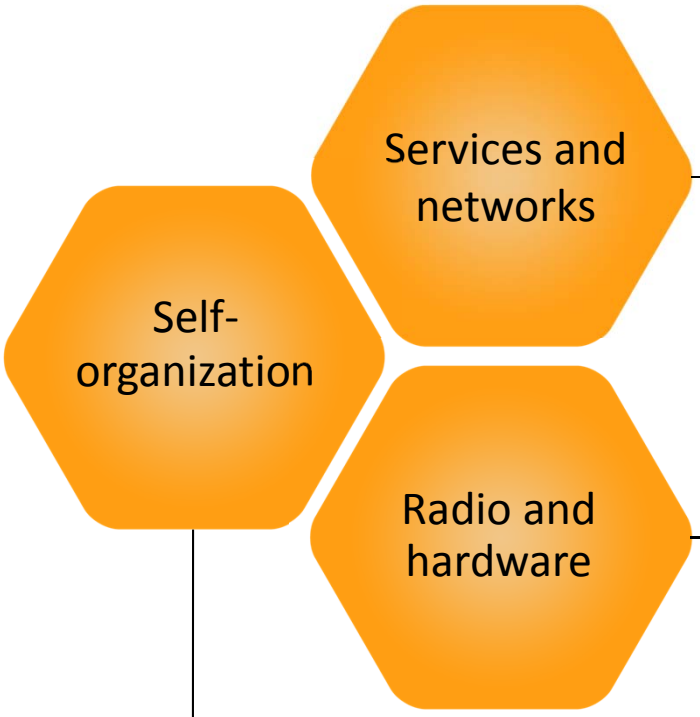
FoG Features

- Combines building block creation and classical routing
- Enables native QoS and dynamic stack creation
- Frees routing from forwarding
  - Addressing internal to routing
  - Multiple routing services
- Scalable routing
  - Incremental route calculation
  - Respects network operator policies (routing/security)
- Intrinsic authentication
- Flexible integration of innovations into the network

State of FoG

- FoG specification
- Distributed emulator
  - Overlay over IP
  - Java/JINI based
- Linux implementation
  - Directly over layer 2
  - Custom boot image for G-Lab
- Use cases
  - Live video streaming (SIP)
  - Interoperability with IP

Mobile Communications Research Cluster



- Security — Prof. Schäfer
- Services — Prof. Seitz
- Protocols and networks — Prof. Mitschele-Thiel
- SatCom and data casting — Prof. Heuberger
- MIMO technology — Prof. Haardt
- Radio and localization — Prof. Thomä
- Reconfiguring RF systems — Prof. Hein
- Self-org. inform. managem., P2P — Prof. Sattler
- Cognitive systems, cogn. robotics — Prof. Groß

Mobile Communications Research Infrastructure

Intl. Projects and Networks

- EurAAP
- WWRF
- COST 2100
- COST IC902
- EuRaMIG
- EUWB
- NEWCOM
- OMEGA
- PULSERS
- RadioTect
- SAPHYRE
- WINNER

National Programs and Networks

- EASY-A
- EASY-C
- G-Lab
- KERAMIS
- mobileGaN
- MoSaKa
- TakeOFDM
- UKoLoS
- UMIC

Cooperations with Industry

Alcatel-Lucent, Nokia Siemens Networks, Nortel, Fujitsu, Toshiba, Elektrobit, Thales, EADS, DTAG, T-Mobile, Vodafone

Funkwerk Kölleda, IMST, Desotron, Falcon, IDEO, Cuculus, MEDAV, Falcom, MEODAT, Xfab, IHP

Study Programs

- Electrical Engineering and Information Technology
- Computer Engineering
- Computer Science
- Media Technology
- Intl. M.Sc. Comm. and Signal Processing
- Intl. M.Sc. Computer and Systems Engineering

Mobile Communications Research Cluster

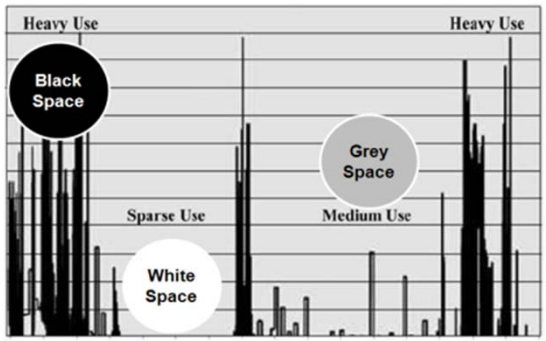
University Profile

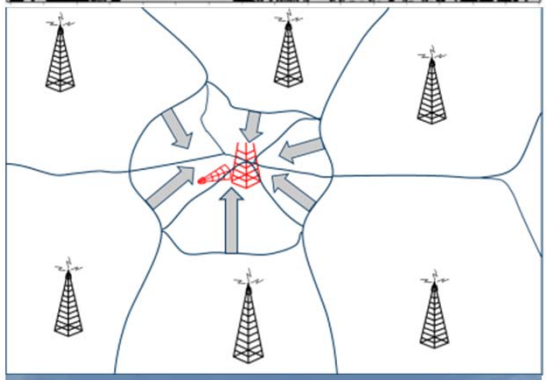
- Communication and Media
- Intelligent Mobile and Stationary Systems
- Micro and Nano Systems

Infrastructure

- Antenna Lab
- Mobile Comm. Lab
- m3 Lab
- Wireless Internet Lab
- DRIN Experimental Net.
- PlanetLab
- SatCom Lab
- Quadrocopter Lab
- ZMN/IMN

Self-organization in Networks





Cognitive radio networks

- spectrum sensing
- spectrum management
- radio resource map
- over-the-air test environment

Self-organized radio systems

- repair of failed base station
- dynamic load balancing between stations
- Interaction of self-organized algorithms

Communicating Unmanned Aerial Vehicles (UAVs)

- autonomous flight control
- self-organized reconnaissance
- self-organized placement of UAVs
- data ferrying (SMS, voice message)

Contact

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