NetWorld2020 SRIA webinar

Advanced wireless networks and systems for 5G and beyond

Edge computing and meta-data

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Outline

- Edge computing
  - Driving factors
- Development trends and challenges
- Conclusions
  - Selected research topics

Edge computing

Multiple factors driving edge computing

- Massive IoT
- Industry 4.0, private 5G networks
- Controlling public utilities
- V2X

Enabling technologies

- Edge AI
- Softwarization, virtualization

→ Need to reduce latency, increase reliability, minimize data flows

Development trends and challenges

- Platform development have been driven by cloud computing
  - Softwarization, virtualization, everything as a service
  - Microservices, service mesh
  - E.g., adaptation of SBA in 5G core
  - Evolutionary approach for edge computing

Development trends and challenges

- Are all these technologies suitable for Edge computing?
  - Mobility, optimal placement for services
  - Service life-time management
  - Limited resources (esp. far edge)
  - Security
  - Increased complexity vs. reliability / operability
- Need to identify the most relevant development goals

Conclusions
Research topics

- Computing platform technologies
  - Efficient and reliable virtualization
    - Containers and container orchestration
    - Alternatives, e.g., unikernels
  - Fast instantiations and mobility
    - Limited resources, energy-efficiency
    - Services should be started and tear down as needed
    - Service mobility, state replication

Conclusions
Research topics

- Edge AI solutions
  - Distributed edge AI, consensus convergence, federated learning
  - Resource limitations, localized data management
  - Model drift, continuous learning
  - HW acceleration
- Framework / Pipeline for AI/ML
  - Collecting & distributing data
  - Training models
  - Taking new models in to use

Conclusions
Research topics

- Distributed services for IoT
  - Open distributed edge computing architectures
  - Distributed IoT architectures for IT/OT integration
  - Managing heterogeneous communication and networking resources
  - Orchestration techniques for isolated networks

Conclusions
Research topics

- NFV/SDN orchestration
  - Orchestration architectures beyond virtualization
    - New types of programming abstractions (individual and aggregate resources)
  - Agile, automated composition and management of resources incl. cyber-physical systems and quantum information processing

Questions and comments?

Thank you for your attention!