Future Radio Access Networks Empowering Mobile Cloud Computing

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Outline

- Mobile cloud computing
- Mobile network evolution
- Their relationship

Background and motivation

- Work with telco cloud
- Closer look into the technologies used in the field

Related work

- Articles on different aspects of both subjects
- Fernando et al. Mobile cloud computing: A survey
- Chatzimilioudis et al. Crowdsourcing with Smartphones
- Gohil et al. 5G Technology of Mobile Communication: A Survey
- Rappaport et al. Millimeter Wave Mobile Communications for 5G Cellular: It Will Work!

Mobile computing challenges

- Mobile devices design focused on size, weight, battery life over computational capacity
- Connectivity issues (connection availability, data rates, latency)
- There are problems that can't be solved in this environment (image processing, natural language processing)

Mobile cloud computing

- Remote clouds: traditional cloud computing, offloading to huge datacenters
- Cloudlets: offloading to laptops or desktop computers in close proximity
- Clouds of mobile devices: offloading to other mobile devices

Cloudlet / mobile cloud advantages

- Faster connections
- Cheaper
- Less battery drain
- Availablility
- Lesser congestion to core network

Cloudlet / mobile cloud challenges

- Architectural changes
  - Existing applications need to be modified
  - New architectures must be developed
- Deciding when is it beneficial to offload
- Deciding where is it most beneficial to offload
- Deciding how to offload
- Security
- Mobility

Cellular networks

- Radio access network
- Mobile core
- Internet

Future requirements

- Supporting numerous low rate connections along higher rate connections
- Increased data rates
- Lower latency
- Energy and cost efficiency

How to achieve them

- Turn base stations on/off based on usage
- Renewable energy
- New business models
- Ultra-densification
- MmWave
- Masissive MIMO
- Virtualization
- Improving existing features (small cell caching)

Relationship

- Similar goals
- Same problems to be solved
- Mainly benefits remote cloud connections

Conclusions

- Mobile cloud computing approaches' value should be investigated closely
- Try to find out what are their advantages after mobile network evolution
- Remote cloud in advantage?
- Densely deployed Internet of Things favors close range connections?
- Requires architectural changes and new infrastructure