

UNIVERSITÄT
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ESSEN

Open-Minded

Context Factors in QoE Management

Example Use Cases and Open Research Topics

Florian Metzger ■ 17. April 2015

Modeling of Adaptive Systems

<https://www.mas.wiwi.uni-due.de/en/>

- Topic in TF2 and TF8
 - Modeling in TF8, Management in TF2
- Monitor context instead of directly monitoring QoS/QoE
 - Advantages/Disadvantages?
 - Fields of application and viable scenarios?
 - General influence of context on QoE
 - Specific definition of context information and how to monitor it
- We are interested in your research interests, ideas, and cooperations!
 - Initial research proposals, previous and current work, and scenarios worth investigating
 - Also WIP TF2 context monitoring white paper

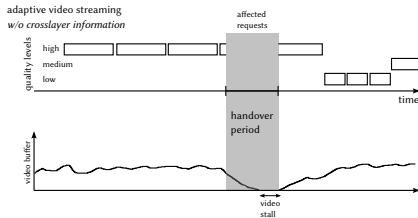
- Importance of location as well as trajectory
 - Current as well as future location/trajectory
 - Requires good predictors or deriving information from past patterns
- Pre-caching of content based on current location
 - Caching at a local router or directly at the device
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- Mobility context from network perspective
 - Predict flash crowds through network-wide mobility and provide additional resources accordingly

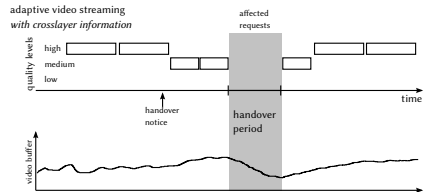
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- Tunnel Scenario
 - Mobile phone predicts upcoming service outage (e.g. driving into a tunnel)
 - Applications can take action to ensure appropriate QoE during the outage or at least notify the user ("Your call will be interrupted while passing through this tunnel. Connection will be restored momentarily.")

- Use context and context predictors in adaptive streaming strategies
- Predict bandwidth and buffer state based on location, connectivity state (3G, WiFi, upcoming vertical/horizontal handovers), social (e.g. flash crowds), movement (tunnel), time schedule (going to work)
- Compute optimal context-based buffering and quality level selection strategy to ensure best QoE

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Stalling occurs without handover hinting



Prevent stalling by proactively filling the buffer

- Provide an interface with every available context information to applications so that they can conduct appropriate QoE optimizations themselves
- Baseband (PHY and link) knows considerably more on current connectivity state than apps
 - E.g., current cell and neighboring cells, signal strength, radio resource block allocation, modem state, occurring handovers
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- Mobile phones have quite a lot of additional context information available through other “sensors”
 - GPS, WiFi coverage, recently/often visited locations, user/social habits and schedule, temperature, atmospheric pressure, orientation, brightness, ...
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- Allow user decisions using context
 - E.g.: “Don’t handover to eduroam while I’m in the tram and moving faster than 30 km h^{-1} ”

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 - Use context of character location to enhance lag compensation?
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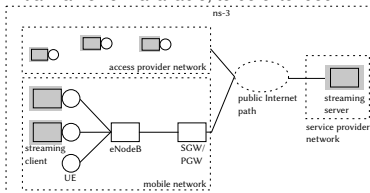
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- Other research interests
 - Cloud/online gaming security; optimal local game streaming; measuring full end-to-end gaming lag

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- Simulation: Adaptive TCP Streaming in LTE/EPC Mobile Networks

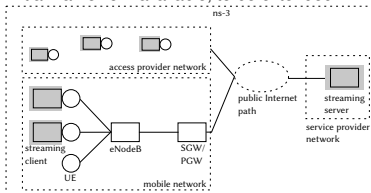
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- Implement context-sensitive streaming strategies, e.g., the tunnel scenario
- Crowdsensing
 - Collect and combine sensor data points of several mobile phones to larger perspective
 - Voluntary participants, requires tackling privacy issues, e.g. through giving control of data precision to participants
 - Android demo app available (Sensorium), can be extended



Participate!

Tell us what you are interested in