QoS Optimisation over WiFi via Timing – an SDN approach

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Background

- Internet growth driven by 3rd wave
  - M2M, Internet of Things (IoT), CPS
- QoS of RTC traffic must be protected
- SDN can play a key role
- Time awareness can also play important role
  - Time Aware Applications, Computer and Communications Systems (TAACCS)
- WiFi local access
  - Presents severe RTC latency issues
Background – 802.11e

- IEEE 802.11e traffic (ACs)
  - MAC layer enhancement
  - 802.11aa
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- Intra-Voice AC Prioritization

- Downlink
  - AP bottleneck remains
iAP Concept – Delay Optimisation

(A) Before Equalization

(B) After Equalization

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...applied to ITU-T E-Model

(A) Before Equalization

(B) After Equalization

E-Model “Good QoS” Threshold

R-value
Experimental test-bed

Synch Time for delay measurement over standard WiFi – patent filed
Experimental test-bed
iAP Mechanism

1. Identify individual VoIP sessions
2. Calculate one-way (and intra-one-way) delay for each session
3. Calculate each way QoS R-factors for each session
4. Run prioritization algorithm for VoIP sessions
5. Implement session prioritization on AP downlink
6. Remote management - SDN
iAP Architecture - Simulation
iAP Architecture – Delay calculation
iAP Architecture
NS-3 vs Experimental Test-bed

A QoS Enabled WiFi AP, IEEE NOMS, Krakow 2014

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NS-3 vs Experimental Test-bed (R-factor)

![Graph showing R-value vs Downlink Wired Network Delay for S1 (ms)]

Session #
- S1 Downlink Testbed
- S1 Downlink NS-3

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Moving towards SDN

Application Layer

Business Applications

Business Applications

Business Applications

API

API

API

Control Layer

SDN Control Software

Network Services

Network Services

Network Services

Control Data Plane interface (OpenFlow)

Infrastructure Layer

Network Device

Network Device

Network Device

Network Device

Network Device

Network Device
Moving towards SDN

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Moving towards SDN
Conclusions

- QoS for RTC will remain challenging
- WiFi is especially challenging
- SDN offers solutions
- Time Awareness can further assist
- Time-Awareness with SDN approach
- See www.taaccs.org
- See www.cpspwg.org