Enabling Seamless Videoconferencing

The PERIMETER Approach

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Seamless Videoconferencing?

→ Video communication increases in importance
  ↘ Less boring and more honest communication
    • ETSI EG 202 670 item 7.1.7: ”Sellers may tell the truth less with text communication, compared with video communication”
  ↘ Energy issues, CO₂ footprints and ash clouds
    • ETSI EG 202 670 item 7.3.1.25: ”High quality video communication is considered suitable if actual face-to-face communication is not possible”
  ↘ Key issue: be able to concentrate on the conference
→ Mobile terminals increase in importance
  ↘ Take-away conference (and connectivity)
Always Best Connected?

➔ Why care?
  ➔ Out of coverage  ➔ Network overload  ➔ Suboptimal network  ➔ Bad Quality of Experience (QoE)  ➔ increases churn risk

➔ Who is in charge?
  ➔ Operator? (Owns customers – does it really care?)
  ➔ Service provider? (Might try to react – cf. Skype)
  ➔ Typically the user itself
    ▪ IP ”Self-Service”
    ▪ Manual exchange of networks = dongles
    ▪ Break-before-make
Always Best Connected!

→ New paradigm of user centricity
  ¬ Switch networks on behalf of the user
  ¬ No loss of time and functionality
    ▪ Make-before-break
  ¬ No tedious configuration

→ User remains Always Best Connected
  ¬ Has the possibility to express what is best in form of preferences and opinions
  ¬ Privacy-preserved authentication, authorisation and accounting with reputation

→ New business opportunity: meta-operator
Provisioning-Delivery Hysteresis For Video


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Try to avoid problems, keep the delivery smooth

If possible

- Reduce resource consumption
- Control network conditions
- Switch seamlessly to a better-suited network
The PERIMETER Approach

Confirm & Express
Manage & Deliver
My Quality of Experience

Community Networks

Confirm & Express
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My Quality of Experience

Community Networks
Streaming With User Feedback
OS vs. PDV (Via 3.5G)

QoE

QoS

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QoE—QoS OS—PDV Relationships

3.5G

Power law, $R^2 = 0.76$

WLAN

Exp., $R^2 = 0.65$

Which one is better?
Best Network For Video?

<table>
<thead>
<tr>
<th></th>
<th>Avg. PDV</th>
<th>Avg. PLR</th>
<th>Avg. ZTT</th>
<th>MOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5G</td>
<td>42 ms</td>
<td>0.2 %</td>
<td>1.25 s</td>
<td>3.8</td>
</tr>
<tr>
<td>WLAN</td>
<td>20 ms</td>
<td>1.4 %</td>
<td>0.09 s</td>
<td>3.4</td>
</tr>
</tbody>
</table>

... under "normal" network conditions

PDV = Packet Delay Variation (jitter)
PLR = Packet Loss Ratio
ZTT = Zero Throughput Time
MOS = Mean Opinion Score

➡ Perception killers (seen from user rankings)

➡ 3G: outages (& jitter) ➔ affects QoDelivery
➡ WLAN: losses (& jitter) ➔ affects QoPresentation

▪ Increase with
  ▪ user population within cells
  ▪ radio channel issues
Network selection usually in automatic mode

- **Needs** objective and universal QoE-based criteria
  - So far, most seamless criteria are based on QoS
  - Not all QoS parameters correlate well with QoE

- **Generates** evidence for problems
  - Measurements
  - Switching actions
  - PERIMETER QoED(criptors)

Additional evidence from manual user intervention
Potential Standardisation Items (1)

→ QoE—QoS relationships
   - QoDelivery – temporal problems
   - QoPresentation – spatial problems
   - Identification of critical parameters
   - Identification of thresholds
   - Proposed classification of relationships

<table>
<thead>
<tr>
<th>Effect on QoE QoS change</th>
<th>Additive</th>
<th>Multiplicative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additive</td>
<td>Linear</td>
<td>Exponential</td>
</tr>
<tr>
<td>Multiplicative</td>
<td>Logarithmic</td>
<td>Power</td>
</tr>
</tbody>
</table>
Potential Standardisation Items (2)

→ Switching criteria; examples:
  - How many freezes should a user need to bear?
    - Cf. ETSI EG 202 534 4.6.1.x on failed attempts, uptimes and connection terminations
    - Strong correlation to bad user rankings – churn?
    - Overreaction may trigger oscillations
  - Impact of loss
    - ITU-T G.1010/ETSI EG 202 670 7.3.1.1 (video packet loss < 1 %) is basically confirmed – trends?
  - Different parameters for different networks

→ Reputation
  - Exploit the PERIMETER QoED
Conclusions

➔ Seamless videoconferencing – an opportunity
  ➔ Objective QoE parameters needed and generated
➔ Further work on criteria required
  ➔ Strong correlation QoE—QoDelivery—QoS a must
  ➔ Network-dependent set of parameters

➔ PERIMETER proposes a specific workshop in collaboration with ETSI HF
  ▪ PERIMETER Task 8.3
  ➔ Co-location with FIA in Ghent in December 2010?
  ➔ Second option: Stand-alone in Jan./Feb. 2011
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