Between Shared Data Plans and Sponsored Content: Towards a Comprehensive Research Agenda for Smart Data Pricing

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Moderator: Peter Reichl
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Panel Participants

- **Maurizio Naldi**
  University of Rome „Tor Vergata", Italy

- **Ludovic Noirie**
  Alcatel-Lucent Bell Labs, France

- **Claude de Jacquelot**
  Political Advisor, France

- **Tuan Trinh Anh**
  Budapest University of Technology and Economics, Hungary

- and of course: **YOU, THE AUDIENCE** !!

Starting Point

- Sen et al.: *Smart Data Pricing (SDP): Economic Solutions to Network Congestion.*

   In: Haddadi and Bonaventure (eds.): *Recent Advances in Networking.*

   SIGCOMM Open Access:

   http://www.sigcomm.org/content/ebook

- Smart Data Pricing: „broad set of ideas and principles that goes beyond the traditional flat-rate or byte-counting models and instead considers pricing as a network management solution"

Starting Point (cont'd)

- **Shifts in the principles of network management**
  - Pricing for end-user Quality of Experience and not just byte-counting
  - Application layer control to impact physical layer resource management
  - Incorporating edge devices as a part of network management system

- **Several key questions**
  - Why do we need SDP?
  - Haven't user fields already used pricing innovations?
  - Isn't SDP to complex to be implemented?
  - What are the open problems in enabling SDP?

Moreover…

- **Network congestion is growing**
  - Cloud services and M2M applications
  - Mobile video
  - Capacity-hungry applications
  - Bandwidth-hungry devices

- **Impact on Network Ecosystem**
  - Traffic growth
  - Increase of consumer's cost (e.g. by penalty schemes)
  - Creation of open APIs between devices and billing systems
  - SW/HW limitations
  - Content delivery issues and regulatory concerns

Main Ideas

- Usage-based pricing/metering/throttling/capping

- Time-/location-/congestion-dependent pricing

- App based pricing/sponsored content

- Paris Metro Pricing

- Reverse billing/sponsored content

- Innovative congestion management

- Note: multidisciplinary approach (economics, systems engineering, HCI)

Further Input

- Other markets: electricity/transportation
  - Real-time communication
  - Elasticity of demand
  - Long-term volatility

- Psychological aspects
  - Adoptability by end users (client-side interfaces)
  - HCI aspects of time-dependent pricing
  - Usage visualization
  - Manual usage control
  - Degree of price certainty
  - User field studies

Towards New Pricing Plans

- Static / Dynamic Pricing

- Shared Data Plans
  - → several devices share common data cap

- Fair Throtteling
  - → ISPs forcibly limit usage to limited bandwidth

- Heterogeneous Networks
  - → mobile traffic offload to Femto / WiFi

- Sponsored Content
  - → sharing price for connectivity between user and content provider

20 Open Topics: Static Pricing

1. Efficient usage and monitoring of (monthly) quota by the user?

2. Choice (user) / provisioning (operator) of appropriate QoS levels or times for receiving better QoS?

3. Contract negotiation w/o deep technical know-how?

4. Monitoring of usage per application for personalized pricing (+ privacy / net neutrality concerns)?

5. Sharing of data quota imposed by shared data plans among different devices?

20 Open Topics: Dynamic Pricing

6. Frequency and periodicity of price changes?

7. Price announcement in advance?

8. Appropriate information of users about changing prices (interface / mechanisms) + their response?

9. Price variation also by location?

10. Efficient price computation (incl. requirements)?

11. Anticipation of user reaction in order to set „optimal" prices?

12. Coupling between dynamic pricing and QoS?

20 Open Topics: Sponsored Content

13. Preferred mode of sponsoring?

14. Sponsored content per transaction?

15. Measurement and tracking of transaction cost (accounting system)?

16. Violation of network neutrality?

20 Open Topics: Fair Throtteling & Offload

17. Criteria for fair throtteling? Network neutrality issues (e.g. throtteling per application)?

18. User involvement in traffic prioritization?

19. Amount of offload traffic and cost efficiency?

20. Pricing plans for bundled access to supplementary networks (+ user adoption / network congestion)?

And now...

- Do we agree??

- Open discussion

- Summary of main conclusions on following slides

Conclusions

- **Several things are already commercial reality**
  - User tracking
  - Shared data metering

- **Simplicity (vs accuracy) for the end user**
  - charging for user experience? strong HCI issues
  - usability and acceptance are key
  - recently: maximum QoS pricing plans in AT. Example from IT
  - what about business users?

- **Dynamic pricing: keep it simple**
  - in general: not too dynamic
  - rather: trend to personalized offers - but: privacy (!!???)
  - will telco users accept personalized/location-based pricing?

Conclusions

- **Sponsored content: keep it simple**
  - data vs content: pricing is about valuation of information
  - network neutrality: up to the user (who is able to choose)
  - charging rules are changing (receiver pay)

- **Fair throtteling**
  - customer will always blame operator for lack of quality
  - data caps/monetary discounts more relevant than speed
  - is access really congested? tariffs don't show that
  - What is fair? How to implement fairness?

Conclusions

- **Further open issues**
  - Bundled pricing plans rather than dynamic pricing
  - Commoditizing network services (we know more and more about customer → data mining!!)
  - Who should be subject to SDP?
  - What about advertising? Smart pricing of personal data?
  - Which options to offer the user (+ influence of choice itself)? On which time-scales?
  - What is quality? Best effort vs better than BE? QoS vs QoE?
  - Evolution of value chains (including federations/alliances of economic actors)
  - Privacy valuations: WTA vs WTP. How to charge for it?
  - Even more challenging: pricing private information in clouds