Managing Quality of Experience Across Future Networks

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Outline

• The end of profit and strategies for the future
• Customer Experience Management: value added and differentiation
• User-Centric Customer Service Assurance
• Impact on Standardization bodies
• Huawei’s efforts
Trends in the Telecom Market

- Service revenue growth globally decreases as services commoditize
  - Increased Smartphone adoption
  - Flatrate business models
- Value shifts from operator’s managed services to content and terminals with Smartphone OS ecosystems
- End of Profit is near with current models (Tellabs Study 2011)

**Total Telecom & Mobile Service Revenue Growth**

Source: TMF – Exploiting Analytics
From end-of-profit to new profit strategies

- LTE adoption
  - Increase bandwidth
  - Reduce cost
  - Improve user experience
- Customer Experience Management
  - Increase service adoption
  - Reduce churn
  - Increase content availability
- Network Centered Ecosystem
  - Increase customer retention

End of Profit

Profit
Customer is ready to $ for quality

Most of the customers would like to see adapted plans: pay for quality

QoE is a key driver for changing SP

Source: Vanson Bourne/Comptel, 2011
The Future Network Ecosystem

- Offers mutualised platform (storage, distribution, billing, marketing, customer care, troubleshooting...)
- Offers mutualised mediation and composition tools with QoE/SLA composition capabilities
- Recovers customer ownership

Application/Content Providers
- Benefit from marketplace to reduce costs in publishing the app or content
- Benefit from CEM functions with marginal cost
- Benefit from QoE and SLA composition tools

Cloud & SaaS

Mediation & Composition Tools

Network Operators

Service & Content Enablers
- Helps network operator through bundling and content management
- Benefits from improved customer knowledge
- Often enablers are internal to operators but third-party integration is a tendency

Virtual / CSP / Lifestyle Providers
- Benefits from marketplace: improved segmentation from larger number of customer and variety of interest
- Benefits from QoE marketplace capabilities with marginal cost
- Benefits from larger availability of content and applications

Customers

Marketplace

- Benefit from marketplace to reduce costs in publishing the app or content
- Benefit from CEM functions with marginal cost
- Benefit from QoE and SLA composition tools

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Customer Experience Management
The four pillars of Customer Experience Management

Customer Service Assurance deals with the service-related management of the customer experience.

Source TM Forum
The user perspective needs to be end-to-end

Business Opportunities

Operations Efficiency

User Perspective

Network Perspective
How to assess user’s perception?

- Subjective evaluation
  - Estimated QoE
    - Validation
    - Estimated QoE
- Correlations
  - Data collection (KPIs)
- Service Modeling
  - Data collection (KPIs)

- Narrow scope of application and validity: expensive and hardly reusable
- Wider scope of application and high reusability
  - Enough room for customization
User-Centric Service Modelling

Open questions:

- How does accessibility, retainability and integrity impact user experience?
- What is the interdependency of the three KQIs on user impact?
- Which KQI should be improved if the user is not satisfied?
  - Why the user is not satisfied if all the three KQIs are OK?
- How to evaluate the QoE(t) within a session?
- How to evaluate the QoE from session to session?
- How to evaluate the QoE from sessions of different services?
The User-Centric service model
Sessions and Segment views

Segment Visualization Screen

Query Parameters:
- Period Type: Time Period
  - 2011-08-01 00:00
  - 2011-09-20 23:59
- Location:
- User ID:
- Service Type: CS Voice Service

<table>
<thead>
<tr>
<th>Segment Level KQIs</th>
<th>Index</th>
<th>KQI Name</th>
<th>KQI Name</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>KQI 11</td>
<td>Accessibility</td>
<td>E2E Setup Ratio</td>
<td>%</td>
<td>86.4</td>
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<td>KQI 12</td>
<td>Accessibility</td>
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<td>Accessibility</td>
<td>Call Abortion 2</td>
<td>%</td>
<td>2.4</td>
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<td>Accessibility</td>
<td>Call Abortion 5</td>
<td>%</td>
<td>14.7</td>
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<td>KQI 18</td>
<td>Accessibility</td>
<td>Call Success Rate</td>
<td>%</td>
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<td>KQI 19</td>
<td>Integrity</td>
<td>Average Call Quality</td>
<td>Mkt E3.40</td>
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<tr>
<td>KQI 20</td>
<td>Integrity</td>
<td>Average Call duration</td>
<td>s</td>
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<td>KQI 21</td>
<td>Delay</td>
<td>Average waiting time before 1st ring</td>
<td>s</td>
<td>3.54</td>
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<td>Delay</td>
<td>Average waiting time before user drop 1</td>
<td>s</td>
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<td>KQI 23</td>
<td>Delay</td>
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<td>s</td>
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<td>Average waiting time before network abort 1</td>
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<td>Delay</td>
<td>Average waiting time before network abort 2</td>
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<td>Average waiting time before 1st ring (link in calls from Scenario 4)</td>
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Segment QoE = 3.16
User perspective requires end-to-end observation

Considerations

• The probe must capture e2e traffic between the UE and the SP
  • it can be placed on any interface on the user plane path
  • DPI on the user plane data is enough to monitor video QoE
• For troubleshooting, the probe must be correlated with lower level probes
  • Network KPIs must be collected/aggregated and correlated in the final architecture
• For segmentation/analysis the probe must be correlated with other information
  • for user segmentation, needs correlation with HSS records
  • for device segmentation, needs correlation with device capability information (MME records)
Network + User perception enables troubleshooting and optimization

KQIs to KPIs mapping

Statistical measurement of QoE per segment of users
uCSA: USM value added to CSA

KPI_1, KPI_2, KPI_3, KPI_n
Service Model

KQI_accessibility, KQI_retainability, KQI_integrity

HUAWEI User-Centric Service Modeling

Acceptability: satisfied?

Service

User

Value Added

Usage Analysis & Forecasting
QoE Assessment
QoE Monitoring & Assurance
Business Intelligence
Intelligent Troubleshooting
QoE Intelligence
End user view is network and technology agnostic
Impact on Standardization

**User View**
- Common KQIs across platforms
- Session data record formats
- Service modeling framework
- Context definition framework
- Validation methodologies
- Human Factors

**Network View**
- Common KPIs across platforms
- Transactional data record formats
- Service to network mapping models

**Data Collection**
- Open interfaces
- Data formats and protocols
- Common measurable parameters across platforms

**Standardization Opportunities**
- QoE estimation calculations
- Technology-agnostic service models
- Context instances and recommended parameters
- Value-added data mining applications

**Know How/Differentiation for actors**
- KQI to KPI mappings
- Problem detection methods
- Technology-aware service models
- Optimization methods
- Storage and retrieval strategies

- Storage and retrieval strategies
- Performance requirements
- Embedded vs. external probing
- Probing placement strategies

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Huawei supporting activities

- **Standardization is key to attain economies of scale**
- **Huawei is actively working on the Customer Experience Management domain**
  - User-Centric Customer Service Assurance Platform
    - Capture the subjective experience
    - Enable troubleshooting
    - Enable network resources optimization
    - Enable service adaptation in alignment with operator marketing portfolio
- **Huawei supports standardization around Customer Experience through**
  - Partnering with service providers around innovation projects to proof and validate USM and UCSA concepts
  - Participating in standardization bodies interest groups
    - Standardizing data model and data records (TDR and SDRs) through product lines
Thank you

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