5G Reimagined: New Business Models and Enhanced User Experiences

Panelists:
Brian Daly
Director, Core Network & Government/Regulatory Standards, AT&T
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Senior Consultant, Strategic Options Business Consulting

Moderator:
Jim McEachern
Senior Technology Consultant, ATIS
## ATIS 5G Initiative
### Use Case Focus

<table>
<thead>
<tr>
<th>Topic</th>
<th>ATIS Priority</th>
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</thead>
<tbody>
<tr>
<td>Use Cases Related to Optimized User Experiences on Smart Devices</td>
<td>High</td>
</tr>
<tr>
<td>New Business Models and Associated Use Cases</td>
<td>High</td>
</tr>
<tr>
<td>Evolution of 4G LTE to 5G</td>
<td>High</td>
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<tr>
<td>NA Regulatory Requirements</td>
<td>High</td>
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<tr>
<td>Spectrum Sharing and White Space Spectrum</td>
<td>High</td>
</tr>
<tr>
<td>Utilization of Unlicensed Spectrum and Dual Lic./Unlicensed Models</td>
<td>High</td>
</tr>
<tr>
<td>Virtualized Mobile Core with variable mobility and local offload</td>
<td>Medium</td>
</tr>
<tr>
<td>Millimeter Wave RAN Access</td>
<td>Medium</td>
</tr>
<tr>
<td>Expanded SON Use Cases to Address HetNets including 5G Small Cells,</td>
<td>Medium</td>
</tr>
<tr>
<td>Expanded use of Unlicensed Spectrum, etc.</td>
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</tr>
<tr>
<td>IoT Devices and Impacts</td>
<td>Medium</td>
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<tr>
<td>Fixed Wireless as a PSTN Replacement</td>
<td>Medium</td>
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</tbody>
</table>
5G Reimagined: What if…

5G: a different perspective

Carrier Network Provider

Content Providers

Application Providers

Users

Source: clipart.me, zonese7en.com, indiamart.com
5G Reimagined:
New Business Models and Enhanced User Experiences

Brian Daly
Director
Core Network & Government/Regulatory Standards
AT&T
## 5G Reimagined
### Optimized User Experience Use Cases

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Opportunity Addresses</th>
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</thead>
<tbody>
<tr>
<td>User QoE as a Marketing and Customer Care Tool</td>
<td>New approach to optimizing the end-user’s experience</td>
</tr>
<tr>
<td>Device Centric Approaches to QoE Use Cases</td>
<td></td>
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<tr>
<td>User QoE as a Network Infrastructure Management Tool</td>
<td>New approach to Network Management, Optimization and Engineering</td>
</tr>
<tr>
<td>User QoE Driven Dynamic Network Optimization</td>
<td></td>
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<tr>
<td>Analytics to Predict User QoE &amp; Required Network Enhancements</td>
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Quality of Experience

- QoE is the overall acceptability of an application or service, as perceived subjectively by the end-user
- 3GPP Evolved Packet Core (EPC) network controlled and class-based QoS
  - Based on the 3GPP policy and charging control (PCC) framework
- QoE research has shown complimenting QoS mechanisms with more user-centric approaches is needed to truly meet end-user requirements and expectations
QoE Ecosystem

Technology

Business

QoE can be viewed as attempting to cover the entire ecosystem
By managing user QoE networks can improve customer satisfaction, reduce user churn and improve their value to customers by tiering their services.

QoE measurements can also improve the customer service experience if customers contact the network operator to report problems by allowing the operator to quantifiably assess problems that the customer may be experiencing.

To fully leverage the value of QoE as a marketing and customer care tool, it needs to be integrated into the customer management systems.
Device-Centric Approaches to QoE

• If a user were to select a certain application, the network would be aware and may move the user to a more appropriate RF channel or cell.

• The device can display what the network is capable of handling.
  • For example ‘HDVideo-Streaming’ as an icon when there is unrestricted capacity available.
  • This would work in concert with network analytics.
QoE as a Network Management Tool

- QoE may be used to help answer “what changes need to be made to enhance your total experience?“
- As we move to 5G, network slicing and virtualization of the network, the network will be more and more context aware of the end user/device needs.
- Context awareness may also include QoE parameters associated with the device or service in order to provide an optimized experience to the end user.
  - Based on access location, time of day, or type of service/application.
Analytics to Predict QoE

- Network analytics used to reserve network attributes for the application or service that may be about to be run.

- Being able to properly assess applications performance when throughput, latency, coverage or other network performance measures are operating at different levels.

- Look at network performance on an end-to-end basis including elements such as:
  - Backbone connection performance.
  - Edge and core cache effectiveness.
  - Performance of backhaul and other connectivity elements.

- Measurements to trend changes in user’s QoE based upon:
  - Likely growth in overall network load over time.
  - Location from which the network is accessed.
  - Changes in traffic pattern of important applications based upon application upgrades, etc.
5G Reimagined: New Business Models and Enhanced User Experiences

Fred Kemmerer
Senior Consultant
Strategic Options Business Consulting
## 5G Reimagined

### New Business Model Use Cases

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Opportunity Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible MVNO and Carrier Partnering Models</td>
<td>Models for more effective collaboration among Over The Top Content Providers (OTTs), 3rd Party Providers and Carriers</td>
</tr>
<tr>
<td>“All You Can Eat” Content Services (Subscription Based)</td>
<td></td>
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<tr>
<td>Models Trading Access to User Information for Value</td>
<td>Enables a broader range of indirect business models while protecting privacy</td>
</tr>
<tr>
<td>Local Offloaded Broadband</td>
<td>Creates a wider range of service options and outlines a new enabling network architecture</td>
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<tr>
<td>Low/No Mobility Services</td>
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<tr>
<td>Network Resource Sharing</td>
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<tr>
<td>IoT Device Focused Services</td>
<td>Outlines infrastructure enhancements to broaden the opportunity for IoT and M2M applications</td>
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</table>
Wireless Service Provider of the Future?
Collaborative Delivery of Personalized Content and Services

OTT Content/Service Provider

Enterprise Network Provider

Cloud Centric Network Sharing Platform

Carrier Network Provider

Public Wireless Provider

Sources: IST Services, Canfone and Vivaldi Partners Group Websites

5G Reimagined Webinar
December 2, 2015
Service Business Model of the Future?
User Selected Range of Information Sharing Models

Anchor in Carrier Video Offers

Integrate OTT Video Providers

End-User Device Opt-In Platform

Potential Location/Other Info. Sharing

Broad-based Value Creation

Sources: Placed.com, Facebook, directv.com, hulu.com, twekyourbiz.com
5G Reimagined
Flexible Network Architecture

Sources: 5G Mobile Research Lab, Digital Service Cloud

- Seamless Integration of Shared Elements
- Dynamic Low- and No-mobility options
- Core-less and P2P Service Delivery Options
- “Light-weight” Subscriber Access and Service Management
# 5G Reimagined Key Technology Elements

Common Elements From Use Cases

<table>
<thead>
<tr>
<th>Supporting Element</th>
<th>Local BB Offload</th>
<th>Low / No Mobility</th>
<th>Network Sharing</th>
<th>Flexible Partnering</th>
<th>IoT Services</th>
<th>All You Can Eat BB</th>
<th>User Info Trading</th>
<th>QoE Mkt/Cust.</th>
<th>QoE Net Mgmt.</th>
<th>QoE Nwk. Optimization</th>
<th>Device Centric QoE</th>
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<tbody>
<tr>
<td>Dynamic Local Broadband Offload Independent of Mobile Core</td>
<td>X</td>
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<td>Lightweight Billing &amp; Customer Care</td>
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<td>Enhanced Dynamic Allocation of Network Resources</td>
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<td>QoE Measurement</td>
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<td>Device Presence (User Info. Ecosystem and Opt-in Interface)</td>
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<td>QoE Analytics and Machine Learning</td>
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<tr>
<td>Simplified Access &amp; Auth., Efficient P2P, IoT Spectrum</td>
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<tr>
<td>Information Centric Networking</td>
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Thank you for attending ATIS’ 5G Reimagined: *New Business Models and Enhanced User Experiences* Webinar

All registered attendees will receive a follow up email containing links to a recording and the slides from this presentation.

Access the ATIS 5G Reimagined: *A North American Perspective* white paper at [www.atis.org/newsroom/whitepapers.asp](http://www.atis.org/newsroom/whitepapers.asp)