MOBILE INTERNET ARCHITECTURE TRENDS: SMART PIPES AND CLOUD

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AGENDA

› Into & motivation

› Smart Pipe, solutions

› Clouds
THE NEW ICT INDUSTRY

MOBILITY + BROADBAND + CLOUD

DISRUPTIVE COMBINATION
Why do we need smarter pipes?
EXPLOSIVE OTT TRAFFIC BUT REVENUE BYPASS

Internet (OTT) Service Model

User

Carrier

Content Aggregator

Content Source

Basic “Good Enough” User Experience

No Differentiating Carrier Value

Revenue Limited to Flat Access Rates

Limited User Demographic

Limited Revenue Per User

Make profit from OTT by providing a smarter pipe.
MORE THAN FLAT RATE NETWORK DRIVEN

**FLAT RATE**
- Cost Based Pricing
- Operators Are Winners
- OTT Are Winners
- Lost Revenue Opportunity

**TIERED**
- Revenue Increase
- Operators Are Winners

**TIERED + VALUE ADDED SERVICES**
- Revenue & Profit Increase
- Operators & OTT Are Winners
+ VAS

THE E2E “SMART” IP NETWORK ENABLES NEW BUSINESS MODELS
“Here is a list of reasons that people say influence their choice of mobile phone service provider/operator. Imagine that you were to get a mobile phone subscription TODAY. How important is the following to you?”

<table>
<thead>
<tr>
<th>Reason</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good network capacity</td>
<td>3%</td>
<td>83%</td>
<td>86%</td>
</tr>
<tr>
<td>Geographic coverage</td>
<td>3%</td>
<td>80%</td>
<td>83%</td>
</tr>
<tr>
<td>Reliable services</td>
<td>3%</td>
<td>80%</td>
<td>83%</td>
</tr>
<tr>
<td>Services are easy to use</td>
<td>4%</td>
<td>76%</td>
<td>79%</td>
</tr>
<tr>
<td>Lowest price</td>
<td>7%</td>
<td>67%</td>
<td>74%</td>
</tr>
<tr>
<td>Customer service/customer care</td>
<td>9%</td>
<td>57%</td>
<td>66%</td>
</tr>
<tr>
<td>Convenience; easy to sign up with</td>
<td>11%</td>
<td>54%</td>
<td>64%</td>
</tr>
<tr>
<td>Innovative in offering new services</td>
<td>13%</td>
<td>46%</td>
<td>59%</td>
</tr>
<tr>
<td>The brand of network service provider</td>
<td>15%</td>
<td>43%</td>
<td>58%</td>
</tr>
<tr>
<td>A wide range of services</td>
<td>8%</td>
<td>38%</td>
<td>55%</td>
</tr>
<tr>
<td>The same range of services offered by operator/service provider</td>
<td>24%</td>
<td>26%</td>
<td>50%</td>
</tr>
<tr>
<td>The same network provider as my friends</td>
<td>23%</td>
<td>26%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Infocom China urban, Consumer Lab 2010

Network operator shall offer good capacity, reliable services and lowest price to keep customers satisfied.

Churn

Churn (Percent of Subscribers that leave within a year)

Customer Satisfaction

*Base Case C. S. =
SMART PIPE TO ADDRESS CARRIER CONCERNS ON TRAFFIC AND REVENUE

- Open APIs for unlimited value-add services via ecosystem partner’s integration
- Improved time to market
- IMS and Web2.0 Services integration
- Personalized services for improved user experience and customer stickiness

- Traffic offload and break-out functions
- Video caching to save network resources and improve user experience
- Common control and transport
- Platform and network convergence

- Fair use enforcement through deep packet inspection
- Higher availability through enhanced security
- Consistent QoE across multiple access networks
SMART PIPE: EXTRACTING THE VALUE OF THE NETWORK

Applications
- Navigation
- Browsing
- Mobile Video/TV
- Music
- Games
- Enterprise
- Family
- Entertainment

Devices
- Laptop
- Cell Phone
- PDA

Smart Pipe

CONTROL
- Security
- Policy Mgmt.
- Service Control
- Traffic Mgmt.
- Performance
- Rating/Billing

USER EXPERIENCE
- Personalization
- Location/Presence
- Context
- Creative Design
- Analytics
- Content
- Optimization

ENABLEMENT
- Business Models
- Mobile Advertising
- Open
- AppStores
- Developer
- Programs
- Devices

Extracting the value of the network for QoE
WHAT DOES SMART PIPE CONSTITUTE OF IN CARRIER NETWORKS?

A bit transportation facility…

**Tied to Identity**
- User / Device ID
- Assured Authentication
- Subscriber Awareness
- Location / Presence

**Intelligent Bit Transport**
- Appropriate quality of service
- Appropriate encryption
- Accounting / Billing
- Offload

**Mobility-aware**
- Device mobility
- Always Best Connected
- Simultaneous multi-access
- Automatic access selection
- Roaming

**High-touch Functions**
- Deep Packet Inspection
- Header Enrichment
- Video Transcoding
- Rich-Content/Media Control

...policy controlled in every aspect
COMBINING CONNECTIVITY WITH SERVICE LAYER TO ENABLE SMART PIPE

**SMART PIPE**

What are the research/technical opportunities to enable smart pipe?

- **End user**
  - Enhanced quality of experience to premium users, based on QoS
  - Control in the network and advance functionality for content adaptation and transformation

- **MVNOs and Roaming Operators**
  - Exposure and monetization of smartpipe API’s to OTT players
  - Cooperation and complement of content delivery providers

- **Network Operators**
  - Identity federation
  - User profile exposure towards OTT service providers

- **Content/Service Providers**
  - Google, Facebook, BBC, ...

- **Advertisement Industry**
  - OTT Service providers ...

- **Content Deliver Providers**
  - Akamai, ...

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Smart Traffic Management in LTE/EPC
2G/3G/LTE/WLAN Convergence

› WLAN is connected to GGSN/P-GW, ensure universal service experience and service continuity

› PCRF can install the policies based on the access type, define traffic offload policy and instruct BRAS offload local traffic

› ANDSF suggest access selection strategy for user according to user report and network load status

› Combine charging package and policy control
What about Over-The-Top services?
MOBILE CLOUD ACCELERATOR SERVICE
ERICSSON-AKAMAI ALLIANCE

Today

Accelerate Mobile Content
Providing End-to-End Quality of Experience

With MCA
MCA ENABLE OPERATOR NEW BUSINESS MODEL

Upstream Enterprises, Content Provider
- Media
- Education
- Retail
- Financial Services
- Government
- Healthcare
- Utilities
- Comms

Broker/Operator

Downstream user business

Network Provider

Network Provider

Broker Network

Yahoo!

Google

YouTube
SUMMARY: SMART PIPE FUNCTIONALITIES IN THE NETWORK

MCA: Mobile Cloud Acceleration
CDN: Content Delivery Network
TIC: Transparent Internet Cache

Converged Policy Control provide consisted QoE, differentiated charging and policy in converged network

TIC/CDN functionality in operator’s network can improve user experience, reduce peering traffic, and provide new business opportunity

Converged Policy Control and TIC/CDN together optimize e2e QoE of mobile services

MCA converges 3GPP PCC and CDN solution, provide e2e QoS to OTT services, and is the foundation of the bilateral business model
CLOUDS
CLOUD...

...is happening

• Operators
• Telco Vendors
• IT Vendors

...is disruptive

• Business Models
• Technology
• Competition

...opportunities

...threats

• QoE
• Network capacity

Telco cloud window of opportunity
BUILDING CLOUDS

BUILDING & CONSOLIDATING OPERATOR CLOUDS

› Building clouds – building public and private cloud solutions for operators, including security & cloud management

› Cloud management solutions – build a cloud management layer and integrate into service provider existing OSS/BSS

› Consolidating datacenters, platforms & application migration – reducing operational cost in the operators private cloud environment

› Aggregation of cloud services

The keys to success:
• Development of a complex and powerful automated management system (OSS, mediation, provisioning, & reporting

• Integration with external OpCos OSS and BSS

“Operator Cloud”
CLOUD COMPONENTS IN THE CLOUD ARCHITECTURE

Cloud Service layer
- SaaS
- PaaS
- IaaS

Resource abstraction and control layer
- Virtualization
- Compute
- Network
- Storage
- Facilities (Site)

Cloud Components in the Cloud architecture

Cloud RM
Cloud OSS
Cloud BSS

Cloud Consumer
Cloud Provider
Cloud Service Creator
Cloud Broker
PROTOTYPING OF CLOUD MANAGEMENT COMPONENTS

Cloud Service layer

- SaaS
- PaaS
- IaaS

Resource abstraction and control layer

- Virtualization
- Compute
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- Storage
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Cloud Orchestration

- VPC mng
- Elastic NW

Cloud Service layer

- SLA Manager
- Appl. Provisioning

Cloud Orchestration

- Auth.

Cloud Provider

Cloud Service Creator

Cloud Broker

Cloud Consumer

Services

- OSSIM
- NAGIOS
- OTRS
- GIT
- Elastic NW
- VPC mng
- Cloud Orchestration
- Appl. Provisioning
- SLA Manager
- Auth.

Components

- KVM
- Xen
- nicira
- openstack
THE CLOUD EVOLUTION

CLOUD 1.0
- Virtualization of machines
- Pay as you scale model
- Application/Innovation explosion
- New business opportunities for enterprise users & cloud providers
- Data center focus

CLOUD 2.0
- Cloud federation
- Cloud Resource virtualization
- User experience & concerns addressed (Performance, QoS, security)
- Cloud service growth
- Cloud for consumers
- Data center rationalization
- Network resource management

CLOUD 3.0
- Distributed Cloud
- Network & Cloud managed as one entity
- A surge of new services – towards networked everything & everywhere
- New business models
- User needs & experience focus

Distributed Cloud
- Network & Cloud managed as one entity
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SUMMARY

› Mobility + Broadband + Cloud → disruptive combination
  – Business Model, Technology & Competition

› Smart pipe puts values on the bits in operator network
  – creates new business model and opportunities

› Telco Cloud offer new opportunities for mobile operators

› Cloud 3.0: the Integrated Cloud
  – is personalized; local services & interaction with persons and things;
    is anytime, anything and anywhere