Openness in the Mobile Broadband Ecosystem

Mobile Broadband Working Group
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# Broadening Our Scope

<table>
<thead>
<tr>
<th></th>
<th>AT&amp;T/FaceTime Case Study</th>
<th>Ongoing Work</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who</strong></td>
<td>Mobile network operators (carriers)</td>
<td>Mobile broadband ecosystem</td>
</tr>
<tr>
<td><strong>Openness</strong></td>
<td>Transparency, blocking, traffic discrimination</td>
<td>Incentivizing investment in mobile broadband</td>
</tr>
<tr>
<td><strong>Time frame</strong></td>
<td>Short term, single timely event</td>
<td>Long-term trends and principles</td>
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Virtuous Cycle

Networks

Mobile devices

Applications

Users
Complex Inter-relationships

- Apps
- OS
- Device

Mobile carriers

Network equipment vendors
## Small Number of Players in U.S.

<table>
<thead>
<tr>
<th>Category</th>
<th>Dominant Players</th>
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<tbody>
<tr>
<td>Device manufacturers</td>
<td>Apple (34.5%), Samsung (28.5%), and many smaller players (&lt; 8% each)</td>
</tr>
<tr>
<td>Operating system developers</td>
<td>Google Android (60.5%), Apple iOS (34.5%)</td>
</tr>
<tr>
<td>Mobile carriers</td>
<td>Verizon (34%), AT&amp;T (32%), Sprint (17%), T-Mobile (10%)</td>
</tr>
<tr>
<td>Network equipment vendors</td>
<td>Ericsson (34%), Huawei (22%), Nokia-Siemens (20%), Alcatel-Lucent (14%)</td>
</tr>
<tr>
<td>Application developers</td>
<td>Many, diverse, most make &lt; $500/month</td>
</tr>
</tbody>
</table>
Users

OS Developers
- User experience
- Learning curve
- Brand loyalty

App Developers
- Perceived value
- Network and battery usage
- Limited data portability

Users

Device Manufacturers
- Battery, form factor
- Learning curve
- Brand loyalty

Mobile Carriers
- Product definition
- Contract terms
- Pricing plan
Application Developers

OS Developers
- App stores
- API exposure

Users
- Customers
- Significant choice
- Promotion
- Network effect

App Developers

Device Manufacturers
- Customer base
- API to hardware

Mobile Carriers
- Coverage
- Performance
- App restrictions
Device Manufacturers

OS Developers
- Bundled with device (iPhone iOS)
- Licensing agreements (Android)

Users
- Customer
- Identify with the device

Device Manufacturers

App Developers
- Perceived value
- User base
- Distribution of handsets
- Device locking restrictions

Mobile Carriers
Mobile Carriers

OS Developers
- Control over user experience
- Gating access to users
- Resource allocation policies

Mobile Carriers

App Developers
- Perceived value
- Customer spend
- Bandwidth use, signaling load

Users
- Customer
- Changing providers
- Cord cutting

Equipment Vendors
- Equipment costs
- Available features
- Management complexity

Device Manufacturers
- Device subsidies
- Retail sales
- Testing and technical support
Network Equipment Vendors

Users, App Developers, OS Developers
- Creating demand
- Limited interaction

Device Manufacturers
- Standards, interoperability
- Compete for carrier spend

Network Equipment Vendors
- Customer
- Incumbency
- Feature requirements

Mobile Carriers
Case Studies

- App stores
- SDK and handset agreements
- Carrier service agreements
- Network-unfriendly applications
- WiFi offloading
Apps & OS: App Stores

• Mobile app distribution
  – Balancing trust, functionality, convenience
  – App review by platform provider
  – Semi-sandboxed execution environment

• Policies affecting openness
  – Installation mechanisms (app store required)
  – Screening policies (performance, security, …)
  – Revenue-sharing agreements (e.g., 20-30%)
  – App store navigation (promotion, categories)

• Longer term: HTML5 and WebRTC
OS & Device: SDK/Handset Agreements

• Android
  – OS is free and open (unlike Apple iOS)
  – But the OS isn’t the whole story
• Agreements with handset manufacturers
  – Early access to new versions of Android
  – Engineering and technical support
  – Access to Google Play (app store and search)
• Anti-fragmentation policy
  – Reduces app portability problems
  – Limits OS experimentation (e.g., search, navigation)
User & Carrier: Service Agreements

• Service agreements and pricing plans
  – Customers: clarity and flexibility
  – Carriers: recoup costs and limit risk
  – Unlimited, usage cap, usage-based pricing

• Policies affecting openness
  – Device locking (and device subsidies)
  – Restrictions on tethering (and unlimited plans)
  – Application restrictions (e.g., FaceTime)
  – Zero-rating (“toll free”) trend outside U.S.
App & Carrier: Net-Unfriendly Apps

• Misbehaving apps overload the network
  – Chatty: wasting signaling resources
  – Unfair: consuming excessive bandwidth
  – Inefficient: poor caching wastes bandwidth

• Challenging to address
  – Large number of developers
  – Naiveté about app impact on the network

• Aligned incentives
  – Educate developers (e.g., AT&T ARO tool)
  – Benefit users (e.g., less bandwidth and battery)
Long-Term Trend: WiFi Offloading

• WiFi offloading
  – Unlicensed spectrum
  – Low-cost (free or cheap to users)
  – Carries 30-70% of mobile data traffic

• Multiple flavors
  – Home or office, offered by a business (e.g., Starbucks), commercial service (e.g., Boingo)

• Influencing the market structure
  – More options for consumers
  – Cellular for coverage, and WiFi for capacity
  – Seamless authentication and mobility support
Conclusions

• Complex ecosystem
  – Beyond consumers and carriers
  – Apps, OS, device, equipment vendors
  – Multiple parties affecting incentives to invest and innovate in mobile broadband

• Next steps
  – Complete the case studies
  – Identify principles (transparency, net-friendliness)
  – Identify possible areas to monitor further
Backup Slide: Market Share Data