Rethinking Wireless Broadband Platforms

William Lehr
wlehr@mit.edu

John Chapin
jchapin@mit.edu

Computer Science and Artificial Intelligence Laboratory
Research Laboratory of Electronics
Massachusetts Institute of Technology

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Rethinking Wireless Broadband Platforms

Focus: mass-market access networks

Wired networks are evolving to a broadband platform

Wireless networks will follow a different path

Story of wired network evolution

*From silos to platforms*

How wireless is different

*Silo architecture embedded*

Reasons & why this matters

How will wireless evolve?

*Hybrid wireless future*
Wired networks: silos to broadband platforms

**Single-purpose, separate networks** → **Multi-purpose, integrated network**
Wireless platform vision: same as wired

**Mobile Voice**
- Switched Voice
- GSM or equiv
- 2G Spectrum

**Mobile TV**
- 1way Broadcast
- MediaFLO or DVB
- Dedicated spectrum

**Mobile Data**
- IP
- HSPA or 1xEVDO
- 3G Spectrum

**Triple play bundle, separate networks → LTE or other 4G integrated network**

<table>
<thead>
<tr>
<th>Application</th>
<th>Voice</th>
<th>Internet Video</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3 Net</td>
<td>IP</td>
<td>LTE, WiMax, or equivalent</td>
<td>Operator’s licensed spectrum (across all bands)</td>
</tr>
<tr>
<td>L1/2 Link</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Media</td>
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4G will not evolve as envisioned

Essential differences between wired and wireless mean that wireless nets unlikely to become integrated platforms

<table>
<thead>
<tr>
<th></th>
<th>Wired</th>
<th>Wireless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Abundant</td>
<td>Scarce</td>
</tr>
<tr>
<td>Topology</td>
<td>Point-to-point</td>
<td>Broadcast</td>
</tr>
<tr>
<td>Reliability</td>
<td>Reliable</td>
<td>Unreliable</td>
</tr>
<tr>
<td>Mobility</td>
<td>Fixed</td>
<td>Mobile</td>
</tr>
<tr>
<td>Layering</td>
<td>Effective</td>
<td>Inefficient</td>
</tr>
</tbody>
</table>

Scarcity of RF spectrum is the key difference.
Future of wireless broadband: Hybrid Networks

Novel aspects of this model

Specialized air interfaces + dynamic reallocation of spectrum
- Software radio supports all air interfaces with one radio
- Overload on specialized net carried transparently by IP net

Operators exploit mix of dedicated and shared spectrum
End-user device plays active role in network selection
Market implications of the essential differences

**Wired Broadband**
- 1-2 (or a few) vertically-integrated similar platforms
- Network-centric, operator driven
- Over-the-top competition is key
  (open access to broadband Internet)

**Wireless Broadband**
- Many heterogeneous specialized platforms
- End users play larger role
- Low entry barriers are key
  (especially spectrum access)

Wired and wireless compete and complement
Multiple equilibria are possible
(1) Wireless bundle competition slows wired innovation
(2) Wireless/wired bundles emphasize differentiation
Regulatory implications of the essential differences

Interconnection & universal service
Separate regimes for wired and wireless

Technical & service neutrality across wired & wireless
Not realistic

Open Access
Wired: unbundle over-the-top
Wireless: spectrum

Spectrum Policy
Enable Dynamic Spectrum Access
Key takeaway points

Wired and wireless broadband are fundamentally different

Wireless will not evolve towards broadband platforms
   Future is a hybrid network with extensive spectrum sharing

Market structure will remain different
   Even though the two broadband services compete with each other

Appropriate regulatory treatment will remain different

Detailed analysis of the hybrid network model and its implications will appear in a companion paper

Thank you for your attention!

William Lehr  
wlehr@mit.edu

John Chapin  
jchapin@mit.edu
**Definition of “Broadband Platform”**

An integrated, high-capacity, general-purpose network

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<th>Video (TV)</th>
<th>Data</th>
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<tr>
<td>Media</td>
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<tr>
<td>Example wired platform</td>
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<td></td>
<td>IP</td>
<td>Switched ethernet</td>
<td>Fiber + short runs of other media</td>
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**Integrated**
services share common lower layer functionality & resources

**High-capacity**
capable of supporting triple play

**General-purpose**
multiple and extensible set of services (traffic types)

**Network**
access network including L1/2 (facilities based provider)