Mobile Broadband Growth, Spectrum Scarcity, and Sustainable Competition

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Key Points

Spectrum scarcity threatens competition in mobile broadband

Shared small cell infrastructure can preserve competition
  Synergistic with increased spectrum sharing

One way to get there
  Offload providers that sell network component access to mobile broadband providers

The role for policy
  Prevent cartelization
  Leverage public assets
  Preserve openness to technology innovation and new entrants
Spectrum scarcity threatens competition

Outcome
2 high-grade mobile broadband providers in major markets
1 or 0 in smaller markets, including suburban areas
An alternative broadband future

Infrastructure sharing

Controls cost/km² per provider

Shared dense cell infrastructure

Increased total broadband capacity

Ability to exploit shared spectrum

4G data rates in more locations

Linchpin is to amortize dense cell costs across multiple providers

Key questions:

How to get infrastructure sharing?

How to prevent cartelization?
Types of infrastructure sharing – both desirable

**Network Sharing**
Shared subsystem is a full network
Provider leases capacity
  (megabits/sec over the air)
Today: roaming

**Desirable type: offloading**
Mobile remains registered on home network
Only some traffic offloaded to shared network

**Component Sharing**
Shared subsystem < a network
Provider uses shared components in its network
Today: shared towers

**Desirable type: antenna sharing**
Avoid competition problems due to siting restrictions
Reduce social costs
For smallest cell sizes: distributed antenna system
Small cells enable spectrum sharing

**Spectrum sharing is essential under congestion**
- Sharing between mobile broadband providers
- Sharing with other services

“Hotzones” approach – separate infrastructure – is too costly

**Small cells are a key enabler**
- Low power \(\Rightarrow\) Tunable RF components available
- Low power \(\Rightarrow\) Access to more spectrum
- Small diameter \(\Rightarrow\) More users within range of shared spectrum

The denser the cells, the more spectrum sharing is possible.
Structure for sharing infrastructure and spectrum

One attractive structure:
An offload provider (offload = only handles some types of traffic) operating largely in shared spectrum who leases infrastructure components to mobile broadband providers who use those components to support networks in licensed spectrum with the offload service and licensed broadband services sharing a distributed antenna system in the densest areas.

Paths to get there:
Partnership of tower company and local wireline service provider Evolution from local government public safety or last-mile network
Role for policy

The policy challenge
- Shared infrastructure/spectrum => bottleneck => open access
- Lower small cell infrastructure costs
- Lower spectrum access costs
- Promote competition => lower entry barriers, more innovation, choice
- Minimize regulatory distortions => as light-handed reg as possible

Future will be heterogeneous, change incremental
- Continued use of dedicated infrastructure/spectrum, but also shared
- As much facilities-based competition as feasible

Promote sharing and investment in
- Dense neighborhood fiber for backhaul
- Spectrum sharing (technology, business models, ....)
- Small cell infrastructure
National and Local Policies

**National**

Spectrum reform: expand spectrum access opportunities
- including for shared access spectrum (dedicated and secondary)

Promote commercialization of innovative radio technology
- testbeds, operational experiments, R&D funding

Harmonize/rationalize rules for deploying local infrastructure
- access to conduit, rights of way, pole attachment, etc.

**Local**

Finance fiber/dense-cell infrastructure (community bonds)

Leverage public assets (schools, govt buildings)

Anchor tenant (public safety)

Municipal utility (where it works)

Public/private partnerships
Summary

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Thanks for your attention!

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Traffic splitting and spectrum sharing

**Delay-intolerant**
- Voice
- Gaming
- Video-conferencing

**Delay-sensitive**
- Text messages
- Operations when user is waiting
- Streaming video

**Delay-tolerant**
- Unattended file transfer
- Telemetry

**Shared but dedicated to broadband**
- Reallocation must be rapid to decorrelate demand peaks
- Cellular standards (e.g. LTE) don’t work, WiFi is suboptimal

**Other licensed spectrum**
- Access guarantees on a case-by-case basis (if cooperative)

**Fully unlicensed spectrum**
- Unpredictable access