



HELSINKI UNIVERSITY OF TECHNOLOGY
Networking Laboratory

Technology competition: Mobile WiMAX vs. HSPA

Timo Smura

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Outline

- Technology competition
- Case: WiMAX vs. HSPA in Europe
- Future of WiMAX?



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Complementary or competitive?

Peaceful coexistence or technology battle?

WLAN vs. 3G

WiMAX vs. WLAN

WiMAX vs. 3G

WiMAX + WLAN vs. 3G

Technology-wise? For end-user? For vendors?

For operators? Regulation-wise?



Why Mobile WiMAX?

August 8th, 2006: “Sprint embraces WiMAX”

“Sprint today revealed it has selected Mobile WiMAX as the technology to power its next-generation “4G” mobile broadband networks, announcing both Motorola and Samsung as its major infrastructure vendors.

Sprint CEO Gary Forsee said it would invest between **\$2.5 billion and \$3 billion in 2007 and 2008** to building out a nationwide Mobile WiMAX network. The network will use both **Motorola** and **Samsung** network infrastructure, along with Motorola multi-mode handsets and access devices, and will be powered by technology partner **Intel**’s next-generation 802.16e Centrino chip. The network footprint will cover 100 million people in 2008, Forsee added.

The announcement puts to rest years of speculation over what Sprint would do with its accumulated **2.5 GHz spectrum**. Sprint settled on three candidates: **Qualcomm**’s Flarion-developed orthogonal frequency division multiplexing access (OFDMA) technology, **IPWireless**’s UMTS-based time division-CDMA technology, and **WiMAX**.

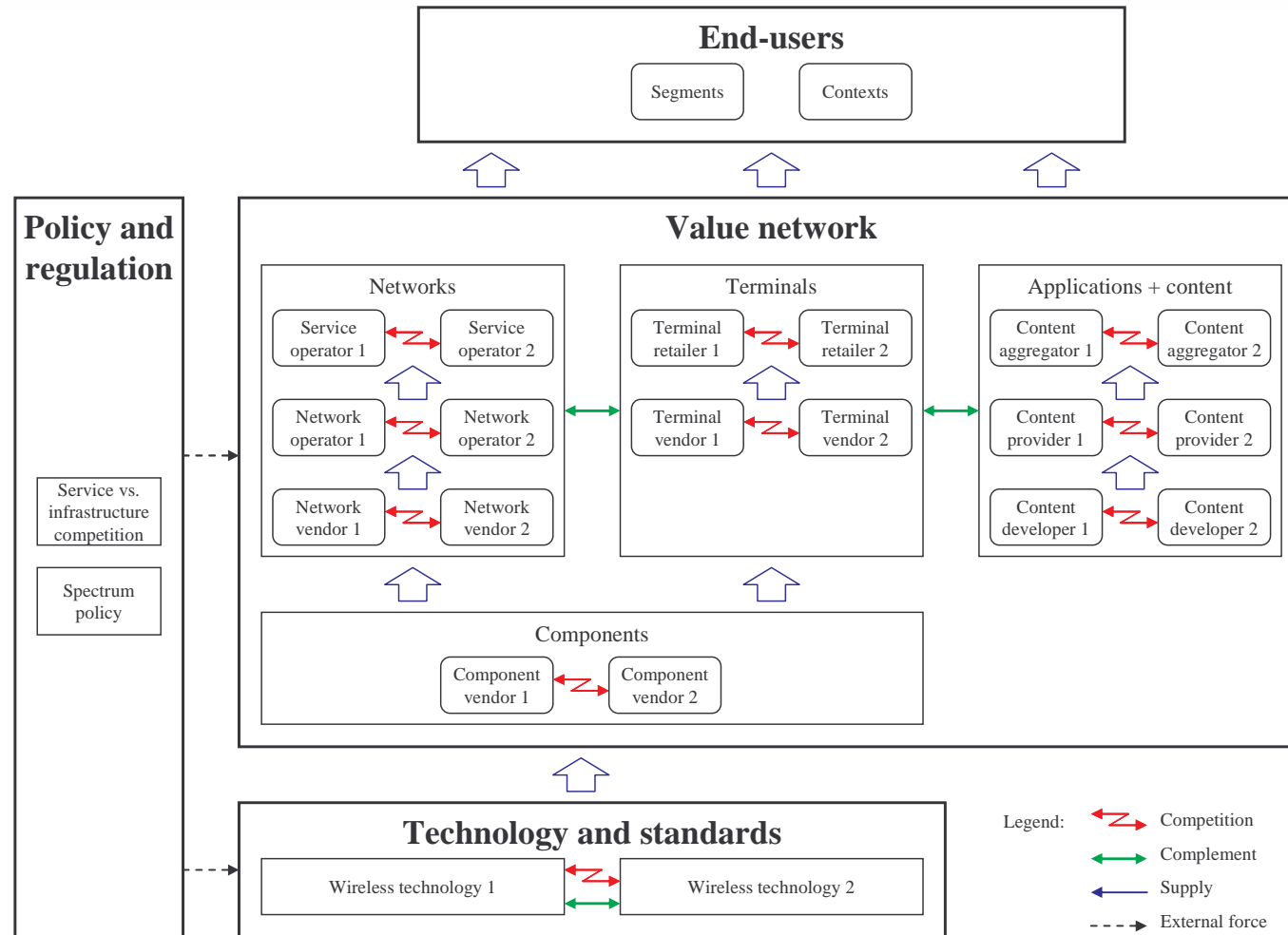
Sprint Chief Technology Officer and newly appointed president of 4G broadband Barry West said Sprint picked Mobile WiMAX because it meets all **four basic criteria: its major vendor ecosystem, its conformation to the characteristics of Sprint’s 2.5 GHz spectrum, its high coverage and performance, and most significantly its time to market.** “

Source: Telephony Online



Viewpoints to technology competition

End-user, technology, value network, regulation





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HSPA and Mobile WiMAX will be substitutes

- End-user point-of-view:
 - Same applications in same contexts
 - Broadband internet access to laptops and handsets
 - Both initially aimed to business users
 - Both technologies complementary to Ethernet, WCDMA and WLANs
- Technical point-of-view:
 - Technical differences not significant
 - Network architecture, data rates, QoS similar
 - Some uncertainty about the real performance exists



HSPA value network is stronger

HSPA is also first to market

	HSPA	Mobile WiMAX
Networks		
Market status	HSDPA networks launched in late 2005, available in 25 EU countries. HSUPA networks in 2007	No commercial network equipment available.
Leading vendors	Ericsson, Nokia-Siemens Alcatel-Lucent	Motorola, Samsung, Alvarion (fixed WiMAX 802.16d)
Network/service operators	Incumbent operators with 3G licenses	3.5 GHz licensees with various backgrounds. No major deployment plans announced.
Terminals		
Market status	HSDPA data cards, laptops and handsets available, > 100 HSDPA terminals launched. HSUPA in 2007.	No terminals available.
Leading vendors	Samsung, Motorola, HTC, LG, Nokia	Intel-based laptop vendors. Samsung, Motorola, Nokia?
Terminal providers	Mostly incumbent operators bundling the terminals with data service subscriptions	Laptop retailers WiMAX operators
Applications and content		
Market status	Basic broadband internet access services available	Basic broadband internet access services to appear first
Content providers / aggregators	Access to both operator's own services as well as open access to Internet	Mainly open access to Internet



Will regulator pick the winner?

- In Europe, spectrum allocations favor HSPA
 - 2 GHz vs. 3.5 GHz
 - 3.5 GHz regulation differs between countries, originally reserved for fixed wireless access. Licenses often fragmented to small regions.
 - The future of IMT-2000 extension band (2.5 GHz) important for WiMAX: Technology neutrality? WiMAX to become an IMT-2000 technology?
- Service or infrastructure-based competition?
 - In general, new entrants have three options:
 - 1) build their own WiMAX network
 - 2) build their own HSPA network
 - 3) lease capacity from the existing HSPA network operators and become virtual operators
 - Regulator can affect this make-or-buy decision
- National / Continental strategies and goals
 - HSPA vs. WiMAX ~ Telecom vs. Internet ~ Europe vs. U.S.?



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From fixed to mobile broadband?

WiMAX in Finland and in Europe

	Fixed broadband	Mobile broadband
Urban	<p>xDSL / Cable in dominating positions Regulator pushing service competition WiMAX cannot compete against 10-20 Mbps per user alternatives</p>	<p>WiMAX and 3G offer similar performance 3G / HSPA in strong positions</p> <ul style="list-style-type: none">• Industry support, time-to-market <p>Regulator in an important role</p> <ul style="list-style-type: none">• Spectrum policy, open access
Rural	<p>Techno-economic performance often better than competitors' Latent demand in underserved areas Suits basic needs, but how about high throughput services? (IPTV, P2P, VoD)</p>	<p>Currently available spectrum not sufficient Competing solutions on good positions</p> <ul style="list-style-type: none">• Flash-OFDM, CDMA @ 450 MHz• UMTS/HSPA @ 900 MHz?• Vs. WiMAX @ 3500 MHz



References

- **T. Smura, Competitive potential of WiMAX in the broadband access market: a techno-economic analysis, in 16th European Regional ITS Conference, September 4-6, 2005 in Porto, Portugal.**
- **T. Smura, Competition between Emerging Wireless Network Technologies: Case HSPA vs. WiMAX in Europe, in 17th European Regional ITS Conference, August 22-24, 2006, Amsterdam, Netherlands, 2006.**