

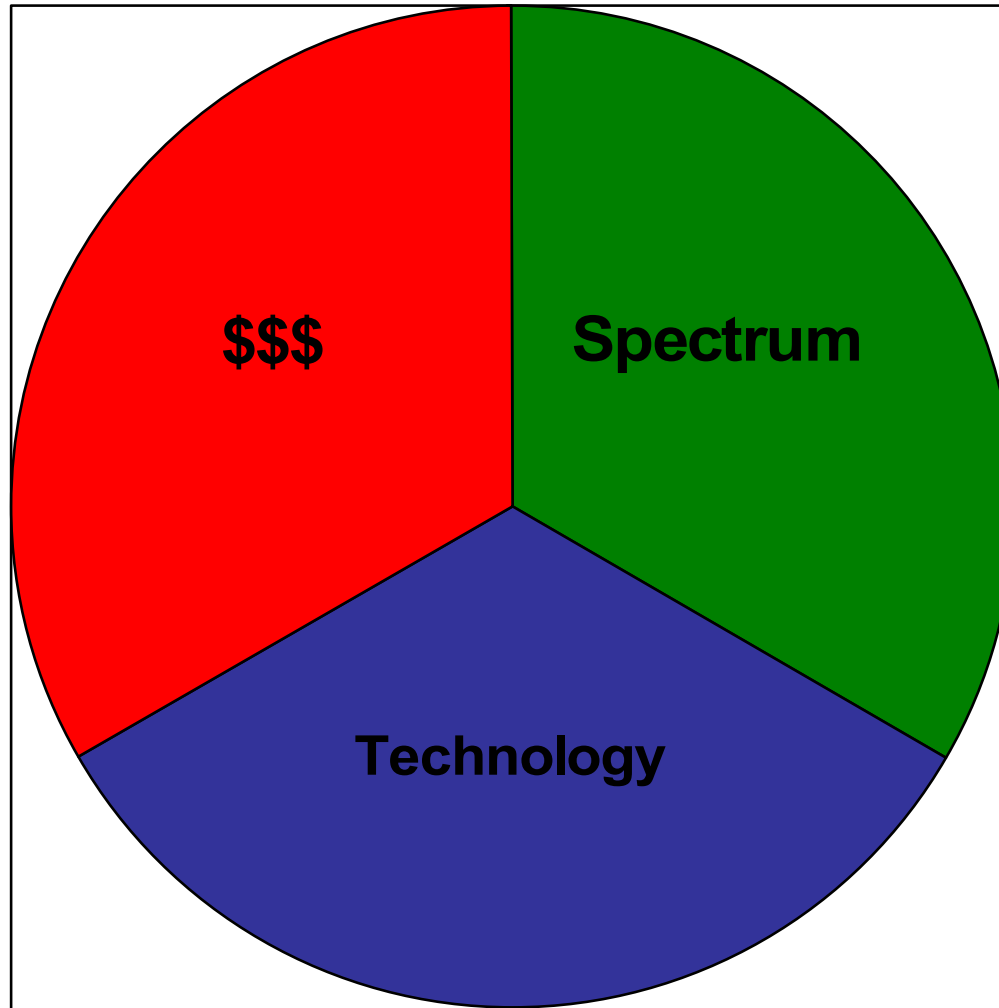
WiMAX: Utilities' Wireless Broadband Solution?

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Essential Elements for Wireless Technology Rollouts



Essential Elements for Wireless Technology Rollouts

- Technology
 - Operationally stable, cost-effective deployment strategy for infrastructure and subscriber units.
 - Equipment/software chipmaker support
- Spectrum
 - Sufficient quantity, favorable propagation characteristics, global/regional allocation
- \$\$\$
 - Sufficient resources to deploy, support, and market the service

Essential Elements for Wireless Technology Rollouts

Technology (cont'd)

- Not mired in patent/IP disputes

- IP licensing costs are moderate

- Open v. proprietary standards

- CPE: Open access or compatible devices controlled or defined by services provider

 - Ex.: EV-DO cards of Verizon and Sprint

Spectrum: Winners or Losers

Winners

- Broadband PCS
- 900 MHz MAS
- AWS
- 11 GHz Fixed
- WiFi at 2.4 GHz and 5.8 GHz
- 800 MHz and 900 MHz land mobile

Losers

- Narrowband PCS
- WCS 2.3 – 2.4 GHz
- LMDS
- 38 GHz Fixed

Jury's Still Out

- BRS—2.5 GHz WiMAX
- 3.65 GHz
- 220 MHz
- 700 MHz

Utilities' Wireless Broadband Challenge: No Private Allocation

- Growing wireless broadband appls
- Potential wireless broadband spectrum
 - Licensed spectrum held by auction winners, commercial providers, educational institutions or combinations thereof
 - Secondary markets have not yet developed
 - Unlicensed spectrum is unlicensed
- Potential hybrid at 700 MHz

Utilities' Wireless Broadband Challenge: The Private Mindset

- No private broadband allocation = No wireless broadband = No progress
- Need to distinguish
 - Essential appls
 - Grid management and control
 - Emergency response
- From potential applications and redundancy benefits

Wireless Broadband Technologies—IEEE Standards

- Personal Area Networks (“PAN”)
 - IEEE Standard 802.15
 - Bluetooth
 - Up to 10’
- WiFi (“Wireless Fidelity”) (“LAN”)
 - IEEE Standard 802.11
- WiMax (“Worldwide Interoperability for Microwave Access”) (“MAN”)
 - IEEE Standard 802.16

WiFi and WiMAX at a Glance

- WiFi
 - IEEE Standard 802.11
 - Multiple versions
 - Broadband “Hotspots”
 - Limited range (<300’)
 - Unlicensed spectrum
- WiMAX
 - IEEE Standard 802.16_
 - Substitute for DS-1
 - 5 km - 30 km
 - Broadband “Hot Zones”
 - Several kilometers
 - Licensed and unlicensed spectrum

WiMAX Frequency Bands

- 2.5 GHz (licensed spectrum in USA)
 - Assigned or auctioned in USA
 - Broadband Radio Service
 - Primary Licensees: Sprint & Clearwire
 - Education Broadband Service (Formerly ITFS)
- 3.5 GHz
 - 3.65 GHz is “closest” US allocation
 - Hybrid licensing scheme implemented by FCC
- 5.8 GHz (Unlicensed spectrum in USA)
- Other Potential Bands
 - 4.9 GHz
 - 700 MHz

WiMAX v. Other Wireless Broadband Technologies

- WiMax Benefits
 - Open standard
 - Multimedia QoS, not only contention-based
 - Many more users
 - Substantially higher data rates
 - Greater coverage areas
 - More capacity v. existing BWA systems
 - Ex. Verizon Wireless' and Sprint's EV-D0
 - 256 kbps to 700 kbps
 - Derived from cellular and PCS bands
 - Bandwidth constrained

WiMAX Challenges

- Sprint-Clearwire
 - Largest owners of 2.5 GHz spectrum
 - Just beginning to roll out service
 - Finances are challenged
 - 3rd party investments from cable and Intel?
- Will WiMAX emerge at 700 MHz?
- Emerging Wireless Broadband Technology
 - LTE
 - Endorsed by Ericsson, AT&T Wireless and Verizon Wireless

WiMAX and Utilities

- Will WiMAX thrive?
 - Will the ecosystem be built?
 - Will WiMAX overcome or co-exist w/ dominant carriers' commitment to proprietary networks?
- Will QOS and form of priority access evolve to allow utilities to deploy¹⁴ WiMAX beyond basic business apps and redundancy needs?
- Will secondary markets for 2.5 GHz spectrum develop? Will it matter?

Thank You!