4G Demystified: The Plain Truth About LTE and WiMAX

Business Planning Considerations

Randall Schwartz
Principal Consultant

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Consulting group focused on the emerging broadband wireless market – 3G, LTE, Wi-Fi, WiMAX™

Expertise in *Broadband* technology, market and modeling

Provide support to the “Broadband Wireless Ecosystem”
- Component Vendors, Equipment Vendors, Service Providers, Regulators

Developed over 40 Wireless Business Cases and network deployment plans around the world
- North America, South America, China, Europe, Africa, Middle East

Developed comprehensive tools to model broadband wireless networks
- What is the impact on ROI?
Challenges Facing BWA Operators

1. Bankable Business Case – Most BWA operators are challenged to raise capital; equity, debt & vendor financing
2. OpEx/CapEx Management – investments in high-capacity scalable packet microwave can save significantly on leased line backhaul costs to handle broadband traffic growth
3. Technology/Product Roadmap – rapid deployment of best available WiMAX/LTE technology and roadmap for 4G evolution
4. Vendor Selection – leverage competition among equipment vendors for best technology, support, and financing terms
5. Market/Competitive Strategy – initial focus on business broadband market requiring high speed, QoS, and value-added services
6. Revenue Growth – offer MVNO and resale options to 2G and 3G operators to bundle broadband with mobile service

Leverage BWA Spectrum for Broadband Networks
Understanding the Market

- What is the potential for 4G services?
- Who are potential customers?
- Can the market support a pricing structure to make the business case work?
- How does CPE strategy affect my network and services strategy?
Fitting into the Competitive Landscape

- What services are offered today in the market? 3G? 4G?
- Who are likely competitors who will/can offer 4G services in the future? When will service begin?
- Where is/where will like competitive coverage be?
- What market segments are best to target?
- What are the critical success factors that give you the best chances for success in your market?

*These are the same for WiMAX or LTE*
Mobile Internet business cases are currently based on simple ARPU models of mobile broadband subscriptions and usage as rapid mobile data traffic growth is widening the gap between network investment and mobile broadband revenues.

3G+ and BWA operators must analyze and visualize impact of mobile broadband subscriber demand, adoption, traffic growth, and new service revenues on the mobile Internet business case.
Road to 4G – Personal Broadband Mobile Internet Revolution

- Fiber
- Cable
- WiFi
- DSL

Fixed

Wireless

Mobile

- 2G GPRS, 1xRTT
- 3G UMTS-HSPA EV-DO Rev. A/B
- 3G+ HSPA+
- LTE
- Mobile WiMAX 802.16e

- 802.16m
- Mobile Internet

Broadband

Mbit/s Speed
## Technical Comparison Between LTE vs WiMAX vs HSPA+

<table>
<thead>
<tr>
<th></th>
<th>.16e</th>
<th>.16m</th>
<th>HSPA+ (R8)</th>
<th>LTE (R10) FDD</th>
<th>LTE (R10) TDD</th>
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<tbody>
<tr>
<td>Availability</td>
<td>NOW</td>
<td>2012</td>
<td>2010</td>
<td>2012</td>
<td>2012</td>
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<tr>
<td>Spectral Efficiency*</td>
<td>5 bps/Hz</td>
<td>15 bps/Hz</td>
<td>5.5 bps/Hz</td>
<td>15 bps/Hz</td>
<td>15 bps/Hz</td>
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<tr>
<td>Modulate and Code Rate</td>
<td>64 QAM-5/6</td>
<td>64 QAM-5/6</td>
<td>64 QAM-3/4</td>
<td>64 QAM-5/6</td>
<td>64 QAM-3/4</td>
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<tr>
<td>MIMO (BS Antenna)</td>
<td>2x2</td>
<td>4x4</td>
<td>2x2</td>
<td>4x4</td>
<td>4x4</td>
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<td></td>
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<tr>
<td>MAX Sector Rate</td>
<td>39 Mbps</td>
<td>(300 Mbps @20MHz)</td>
<td>326Mbps</td>
<td>300 Mbps</td>
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<tr>
<td>MAX MS DL lab Rate @10MHz</td>
<td>35Mbps</td>
<td>100Mbps</td>
<td>42Mbps</td>
<td>100Mbps</td>
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<tr>
<td>MAX MS DL lab Rate @20MHz</td>
<td>140Mbps</td>
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<td>140Mbps</td>
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<tr>
<td>MAX channel bw</td>
<td>10MHz</td>
<td>20MHz</td>
<td>5MHz UL</td>
<td>20MHz UL</td>
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</tbody>
</table>

**Sources**
- WiMAX Information from WiMAX Forum and WiMAX Vendors
- HSPA+ and LTE information from 3GPP and LTE Vendors such as Qualcomm
So If There Is Little Difference…

…how do you choose?

*The real selection factors*

- When do you need to deploy?
- What spectrum do you have? How much spectrum?
- What kind of system are you deploying? Is it a closed system or open system?
- Is compatibility with competitive or roaming systems important?
- What is your exit strategy?
4G Business Planning with WiROI™ Tool

- **Wireless 20/20** focused on the wireless and mobile broadband markets worldwide since 2006
- **WiROI™** Comprehensive Wireless Business and ROI Planning Tool to demystify network deployment and technology evolution for WiMAX™, LTE and 3G HSPA in multiple frequency bands
- Model, analyze and visualize impact of new technology assumptions, demand and adoption rates for new services plans on business case
- Easy to use Dashboard GUI for Sensitivity Analysis and “What If” Scenarios for Wireless Industry ROI – WiROI
- Over 50 Business Cases for 4G networks developed using WiROI:
  - Middle East/East/Africa: Saudi Arabia, Iraq, Ghana, Zambia, Ivory Coast, Uganda
  - CIS/Eastern Europe: Bulgaria, Greece, Ukraine, Georgia and Armenia
  - Americas: US, Canada, Mexico, Brazil, Chile, Costa Rica, Jamaica, Barbados
  - Asia/Pacific: Indonesia, China, Taiwan
3G+ data traffic could go on exploding to meet user demand, but operators cannot afford to expand capacity endlessly.

Current investments in backhaul address the symptoms as operators develop a solution for scaling mobile broadband.

Move to 4G will supercharge mobile broadband laptop cards and create another refresh cycle for smartphones:
- WiROI shows how use of caching/DPI and local video hosting to drive down cost of international Internet connections can have a significant impact on opex to ensure optimum ROI.
- Difficult to derive a sufficient return on new network infrastructure investments based on fat-pipe business model.

Operators need a new transaction-based business model to fully monetize mobile Internet services, hosted content, and applications.
WiROI Business Case Supports 4G Technology Roadmap

- WiROI business case demonstrates that WiMAX networks deployed for BWA operators to capture market share now.
- Evolution to TD-LTE in 2-3 years without significant cost or service disruption.
- Scenarios for transition to LTE network:
  - Overlay network
  - Cut over strategies
- Scenarios for the cost of stranded CPE investment.
- Requirements to transition core to EPC.
- Value of spectrum licenses as TD-LTE in long term.
- Vendors must have a successful track record of delivering “LTE Ready” HSPA+ and mobile WiMAX networks and transforming a trial into a fully operational 4G network including RAN, backhaul and packet core with appropriate service platforms.
WiROI™ “TD-LTE Ready”
WiMAX Business Case

4G Business Case Tool to help plan “TD-LTE Ready” Mobile WiMAX networks using Broadband Wireless Access (BWA) spectrum, with a market and technology roadmap to migrate to TD-LTE when the technology matures in 2011 or 2012
Conclusions

- Each BWA business case is unique and different
- Before building a 4G network, build a simulation model and test it
- There are over 300 input parameters affecting a business case
- A disciplined business case development is a must for 4G operators
- Building a simulation model and testing the assumptions provide clarity and visibility
- Sensitivity analysis allows optimization of the business case.

“A Comprehensive WiROI™ Operator Business Case Process” white paper provides a step by step guide
The WiROI™ Tool demo is available free at: [www.wireless2020.com](http://www.wireless2020.com)
Contact Info:

www.wireless2020.com

Meet us at 4G World in Chicago

Randall Schwartz  
+1 650 490-3090  
randall@wireless2020.com

Haig Sarkissian  
+1 408 884-1561  
haig@wireless2020.com

Dave Sumi  
+1 408 835-8746  
dave@wireless2020.com