



Wireless Broadband Consumer Devices

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ABSTRACT

Embedded wireless broadband is a tremendous growth opportunity in the consumer electronics (CE) space such as laptops, netbooks, digital cameras, e-book readers, gaming, portable navigation, and other devices.

Embedded wireless provides network operators the opportunity of maximizing revenues and profits via the efficient use of network capacity and spectrum assets, and potential revenue sharing from applications & services. At the same time, device OEMs can innovate to open up vast possibilities in the consumer electronics space in ways never imagined before. Network operators now have an opportunity to leverage their core competencies and transform themselves from staid bandwidth providers to solutions/managed service providers who help companies leverage embedded wireless to foster innovation & differentiation in new markets, promote new business models, and enhance revenue opportunities for its clients.

What will it take to launch embedded mobile broadband in consumer electronic devices?



INTRODUCTION

The wireless revolution has had a tremendous impact on society and people worldwide. The technologies and networks that connect us to people, data, and devices wirelessly are rapidly transforming our everyday lifestyle and productivity.

Embedded wireless broadband is a tremendous growth opportunity in the consumer electronics (CE) space such as laptops, netbooks, digital cameras, e-book readers, gaming, and other devices. While 3G technologies now deliver downlink and uplink speeds of 10 Mbps and 5.8 Mbps respectively, new 4G broadband technologies such as WiMax and LTE promise even higher speeds of 100 (UL) and 50 (DL) Mbps, opening up vast possibilities in the consumer electronics space in ways never imagined before. Wireless operators, such as AT&T, Clearwire, and Verizon Wireless, are already moving toward 4G networks.

By 2014, market research firm [Strategy Analytics](#) predicts, there will be 100 million devices with 3G and 4G technology embedded in them. Initially, this market will be dominated by laptops and Netbook computers. Car makers in mature markets will focus on putting embedded wireless data connectivity into more than half of their "next-generation" cars by 2012, according to [research by Gartner](#). [AT&T](#) and [Sprint Nextel](#) have recently struck deals with Hertz and Ford Motor Co. respectively to put embedded wireless in vehicles that connect to their network to wirelessly manage and monitor their cars.

WHAT'S IN IT FOR OPERATORS?

Operator strategies have generally focused on maximizing revenue per delivered data bit. The real opportunity lies in maximizing the use of the abundant 3G network capacity and spectrum assets for generating revenues and profit. By appropriate bandwidth profiling, operators can prioritize allocation of capacity to high-revenue-per-megabyte services while simultaneously ensuring maximization of use of spare capacity in the network.

Aside from the network access revenue opportunity and potential revenue sharing from applications & services, consumer devices and other non-handset device prospects (M2M, wireless medical etc.) provide network operators a great opportunity to leverage their core competencies and transform themselves from staid bandwidth providers to solutions/managed service providers who help companies leverage embedded wireless to foster innovation and differentiation, and solve real industry problems, thereby enhancing revenue opportunities, cost savings, productivity, and competitiveness for its clients. This can be a significant revenue driver much like it has been for companies such as IBM and SAP who now derive a significant portion of their revenues from solutions and managed services as opposed to their initial core offerings of pure hardware and/or software.



But many hurdles have to be overcome before embedded wireless can be mainstream in consumer electronic devices. These challenges may be categorized into seven key areas.



Figure 1: Key challenges for embedded wireless consumer devices

CHALLENGES FOR WIRELESS CONSUMER DEVICE STRATEGY

1. LOWER ENTRY BARRIERS FOR OEMS

- *Easy wireless integration by OEM* with minimal BoM (bill-of-materials) impact
 - Use of pre-certified modules
- *Easy device provisionability* with minimal burden on OEM
 - Pre-provisioning and/or post-provisioning
- *Easy device upgradeability*
 - Device renewability
 - OTA upgradeability
 - Content portability
- *Easy integration into IT infrastructure* and back office systems of Application/Value-added Service provider



- *Expedient Testing & Certification*
 - Scalable testing & certification model is necessary to accommodate the plethora of consumer devices. Current arduous and long certification processes for cell phones are a significant hurdle to the penetration of wireless in consumer devices. Some operators such as Sprint, Verizon (Open Device Initiative), and AT&T have taken the lead in driving initiatives to accelerate testing and certification of embedded-wireless consumer devices.
 - Operator focus on certification (vs. testing) – Operators are normally used to testing cell phones on their own. No single operator will be able to test the hundreds of wireless-embedded consumer electronic devices on their own. Operators will have to off-load the testing burden and focus instead on choosing the devices that operate on their network. In the case of bundled/integrated pricing, OEMs may have to take ownership of network compatibility testing.
 - Central unified testing and certification agency formed from an alliance of operators could go a long way in eliminating fragmentation and duplication., and bring about efficiencies in testing and time-to-market

2. WIN-WIN BUSINESS MODEL BETWEEN OEMS AND OPERATORS

- *Clear OEM/Operator business strategy* built on
 - Core-competencies
 - Traditional CE device model where OEM owns customer on the device front
 - A symbiotic business model where OEMs and Operators are mutually incentivized throughout the life of the device/service
- *Clearly identified target market(s) and ROI*
- *Clearly understood impact on current business model* – Would it be disruptive to existing business models & processes?
- *Strategic competitive advantage to both OEMs and Operators*
 - New business models & revenue opportunities?
 - Differentiation – Product and/or business model?
 - Increase in consumer productivity/efficiency?
 - Enhanced customer loyalty?



Jump-starting Wireless Broadband Consumer Devices

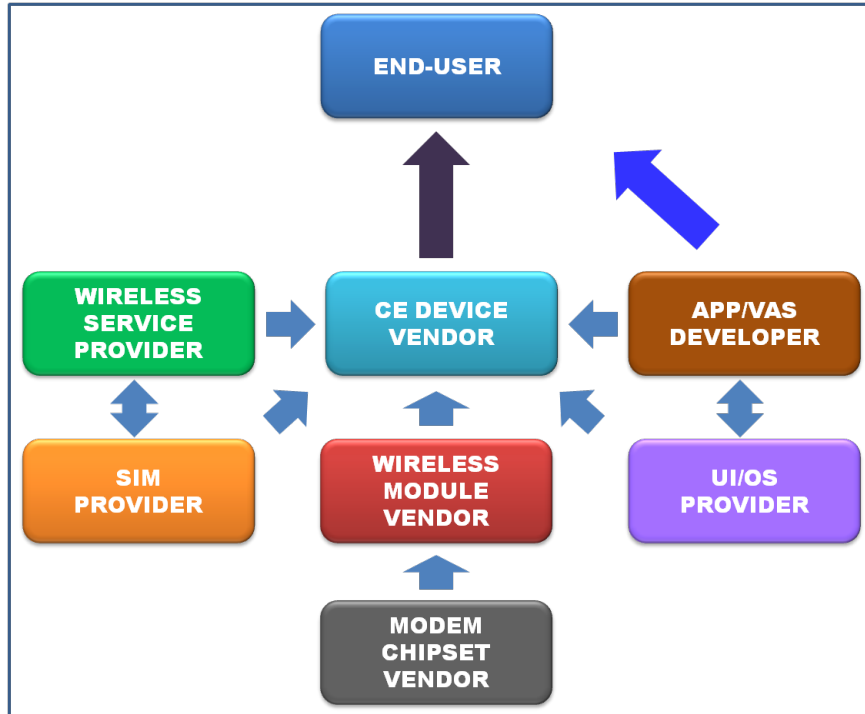


Figure 2: Business model where consumer purchases device and network access via an integrated bundled pricing from the device OEM (Amazon Kindle model)

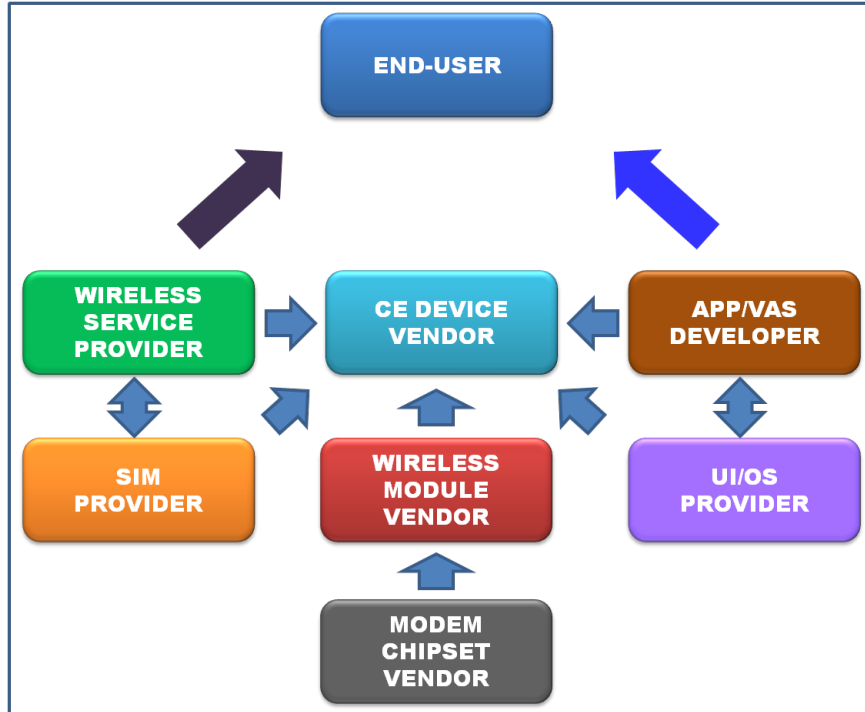


Figure 3: Business model where consumer purchases device and network access via from the Operator (traditional cell phone service model)

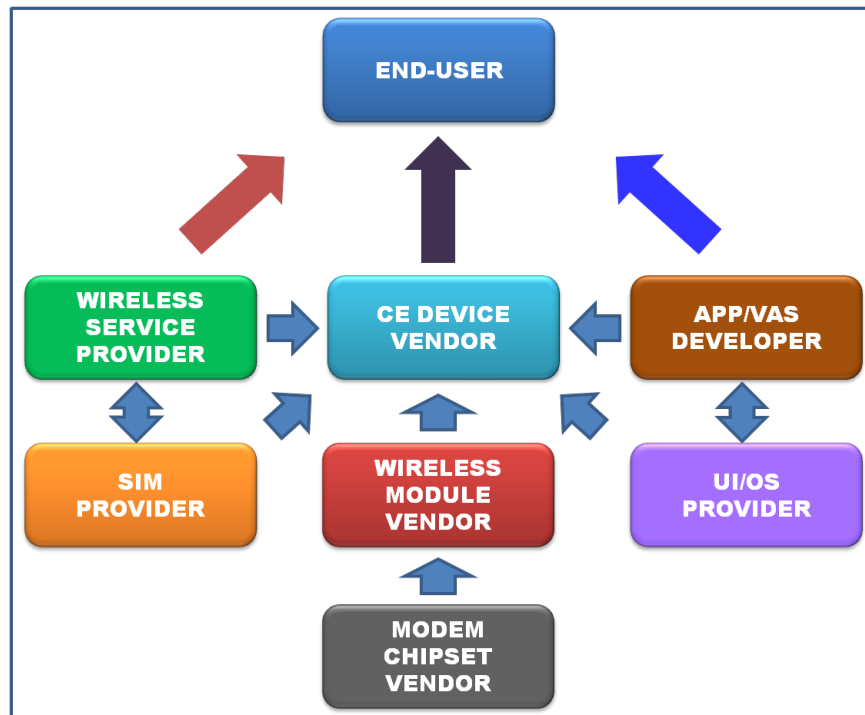


Figure 4: Business model where consumer purchases device, network access, and application/VAS separately

3. DEVICE DESIGN – TARGETED FOR WELL-DEFINED USER EXPERIENCE

- *Well defined application/user experience at optimal cost* – A one-size fits all approach can dilute the user experience and consumer appeal of the device.
- *Device type* – Data-only versus Voice+Data?
- *Ergonomic accessibility features* – User inputs (multi-touch display, keyboard, trackball, scroll-wheel, etc.), size and form-factor, high-resolution display, universal I/O ports, etc.
- *Features for enhanced user experience* – Intuitive UI, Performance (multimedia & graphics), Extended battery life, Reliability (environmental), Peripheral connectivity to other devices and storage media with universal I/O ports
- *Content, multimedia & graphics, page length, and download times* optimized for specific device and user experience
- *Upgradeability* – Device renewability, OTA upgradeability, Content portability
- *Integrated Security* -- Restrict network service to the specific CE device only, Content security



4. APPLICATION, CONTENT, AND VAS DEVELOPER ECOSYSTEM

- Win-Win business model between Application/VAS providers and OEMs
- Developer-friendly environment
 - Open Application Development environment – Closed (e.g. iPhone) or open source (e.g. Linux) OS platform but with an ‘open’ ecosystem (viable 3rd party developer network)
 - Standardized Application Development Platform and easy availability
 - Easy access to SDKs and Toolkits
 - Access to all APIs on the device, including OpenGL, multi-touch, embedded modules such as Bluetooth, GPS, Wi-Fi, accelerometers etc.
 - A full device simulator to help with debugging
 - Performance analysis tools to make apps run fast on the device
 - An OEM-hosted Developer Forum(s) to registered developers to promote discussions of technical aspects of developing software and evaluating beta-SDKs for the device
- A centralized App store (either through OEM or through the Operator) to distribute the applications
- Expedient Application Testing & Certification

5. EFFICIENT DEVICE DEPLOYMENT

- *Out-of-the-box flexible provisionability*
 - Pre-provisioned, or
 - Simple 1-step on-line post-provisioning

Jasper Wireless has developed, for instance, an [automated provisioning system](#) to support connected devices and applications automatically as soon as the first data transmission is sent by the device at the customer’s location.

- Ideally, an *Open network access model* will be desirable where any device can operate on any network. This can catalyze the proliferation of embedded-wireless consumer devices. This could be a possibility as GSM and CDMA networks converge towards LTE. The benefits are numerous:
 - No in-store activation required
 - Device OEMs own the customer
 - Device OEMs can differentiate and take ownership on device innovation (including aftermarket services and content, such as App stores) based on their market view (and not tied to Operator requirements)
- *Traditional distribution channels* must be empowered to distribute easily



- *Branding* – Carrier versus OEM/ODM, depending on business model

6. SIMPLIFIED BUSINESS MODEL FOR CONSUMERS

- *Straightforward, simple, and compelling value proposition* – centered on enhanced user experience and customer ownership
- *Customized business model* (versus one-size fits all)
 - ‘Bundled’ integrated pricing for device and pre-provisioned network access for casual/occasional network access offered either by the OEM (Figure 1, Amazon Kindle model) or by the Operator (as in Figure 2)
 - 1-step online activation for network access with separate network access fee for frequent/always-on network access (Figure 3) as in mobile computing

Many business models are thus possible, some of which are illustrated below

- *Targeted at lower total COO* – A lower total COO (device + service) is essential to winning the confidence of the purchaser. The service cost is especially a factor in CE devices previously not associated with a value-added service. An example is a digital camera augmented with embedded wireless broadband connectivity that enables instant upload of images to a network storage site. Device subsidies can lower entry barriers but may not always be necessary. They make sense when
 - Customer is willing to pay a separate subscription fee for the VAS
 - The service revenues over the life of the subscription offset the subsidies
 - Entity providing subsidy is incentivized from other ‘hooks’ to gain revenues from subscriber (e.g. content) on the device

7. COMPELLING END-USER EXPERIENCE

- *Enhanced convenience, mobility, productivity, and user experience.*
- *Built on familiar usage patterns*
- *Easy out-of-box experience*
 - Learn
 - Pre-loaded content
 - Easy device provisioning/activation – Pre-provisioned, or 1-step online activation with device-unique ID – on ANY preferred carrier
- *Enhanced operational (normal) usability experience*
 - Overall ease of Operation
 - Simple and Intuitive UI
 - Web-browsing experience



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- High-resolution display and size
 - Features
 - Performance & interactive responsiveness – Audio/Visual quality (multimedia & graphics), application, connectivity, and communication/network
 - Accessibility (display, keyboard, multi-touch, etc.)
 - Battery life
 - Cool factor incl. aesthetics, form factor and weight
 - Reliability (environmental)
 - Peripheral connectivity to other devices and storage media with universal I/O ports
- *Superior aftermarket service* – Customer service, Accessories
 - *Availability of content*, where applicable

SUMMARY

Embedded broadband wireless is poised to be the biggest growth opportunity for the wireless industry in the coming years. The new embedded wireless device world will provide opportunities for all players in the mobile ecosystem. The Amazon Kindle has been a great model of success for embedded wireless in consumer devices.

The opportunity is here.

This is a new frontier and it calls for new ideas and fresh perspectives. Many Operators, OEMs, and consumer electronics companies have created separate divisions, un-shackled from their old ways of doing business, to address this emerging segment. The possibilities are vast for embedded wireless, and it heralds a paradigm shift and a new revolution in consumer electronics.

ABOUT THE AUTHOR

Sunil Hattangady is the President of Emblaze Consulting LLC, a company dedicated to helping technology businesses define and implement strategies for business competitiveness, new market penetration & customer acquisition, product innovation, creative marketing & communications, and strategic alliances & acquisitions.

Sunil is a marketing and business leader with multi-disciplinary achievements, international experience, and a track record in achieving revenue generation via market analysis and competitive product positioning, driving new product & business initiatives, building business-enhancing eco-systems, and managing effective & persuasive communications.



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In his 14 years at Texas Instruments, Sunil has had a track record of innovation and product delivery in diverse roles such as Strategic Marketing Manager for TI's 2.5G/3G/4G Wireless Products, OMAP Software Product Line Manager, OMAP Wireless Security Program Manager, and Technology Development Leader.

His major accomplishments include driving product management and competitive strategy for TI's 2.5G/3G/4G smartphone, featurephone, and MID (Mobile Internet Device) products; managing TI's OMAP Wireless Security Applications program from concept to first implementation; driving strategic alliances with smartphone OS partners that led to revenue-generating joint products; leading a miniaturization initiative that culminated in the smallest 'phone-in-a-chip' GSM module; and pioneering an advanced semiconductor technology now an industry standard and adopted worldwide.

Sunil is currently working on strategic opportunities and business development for growing companies with a focus on next-generation communication technologies (4G), smartphone development including applications & services, consumer devices (e.g. e-book readers), wireless M2M (machine-to-machine) communication devices and systems, energy conservation (smart-metering), and medical devices.

Sunil has an MBA from University of Texas at Austin, and a Ph.D. in Engineering from North Carolina State University, and holds over 20 US patents.

For more insight on how you can penetrate the embedded wireless market, please contact:

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