Mobile Broadband for the Masses

The Case for Bundled Netbooks

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Pyramid Research
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Mobile Broadband for the Masses

The Case for Bundled Netbooks

Authors:

Svetlana Grant
Contributing Analyst

Cristiano Laux
Manager, Consulting

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Pyramid Research Locations worldwide www.pyramidresearch.com

World Headquarters
10 Canal Park
Cambridge, MA 02141
USA
Tel: +1 617 871 1900
Fax: +1 617 871 1933
Email: sales@pyr.com

Latin America
Waterford Business Park
5201 Blue Lagoon Drive
Suite 971 Miami, FL 33126
USA
Tel: +1 305 629 3615
Fax: +1 305 629 3100
Email: sales@pyr.com

Asia-Pacific
18/F — Caroline Center
Lee Gardens Two
28 Yun Ping Road
Causeway Bay, Hong Kong
Tel +852 2516 1329
Fax +852 2856 2907
Email: sales@pyr.com

Europe
UBM, Ludgate House
245 Blackfriars Road
London, SE1 9UY
UK
Tel: +44 20 7560 4471
Fax: +44 20 7560 4485
Email: sales@pyr.com
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América Móvil
Apple
ARM
Asustek Computer
AT&T
BenQ
Bharti Airtel
Bouygues
BSNL
Canonical
Cantv
China Mobile
China Telecom
China Unicom
Citrix Systems
Claro Brasil
Compal Electronics
Cosmote
Dell
DiGi
Docomo
ECS
Elektrobit
Elisa
Elitegroup Computer Systems (ECS)
Era PTC
Ericsson
Everex
Freescale Semiconductor
Fujitsu Siemens Computers
Fujitsu Technology Solutions
Gigabyte Technology
Google
HCL Infosystems
Hewlett-Packard (HP)
HTC Corp
Idea Cellular
Intel
Intelbras
Itautec
JP Sá Couto
KPN
Lenovo
LG Electronics
Maxis Communications
Medion
Microsoft
Micro-Star International (MSI)

Mobistar
Mobistar Belgium
MTNL
MSI Computer
Neuf Cegetel
Nokia
Nvidia
Orange France
Orange Slovakia
Phone House
Phones4U
Polkomtel
Portugal Telecom
Positivo
Qualcomm
Quanta Computer
Raon Digital
Reliance Communications
Samsung
SFR
SingTel
Sony
StarHub
Taiwan Mobile
Tata Indicom
Telefónica
Telefónica O2
Telefónica O2 Czech Republic
Telefónica Spain
TeliaSonera
Telmex
TIM
TIM Brazil
TMN
TMN
T-Mobile
T-Mobile Germany
T-Mobile UK
Toshiba
Verizon Wireless
Vivo
Vodafone
Vodafone Czech Republic
Vodafone Germany
Vodafone Netherlands
Vodafone Romania
Vodafone Spain
Vodafone UK
Yota
## Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G</td>
<td>third generation (of mobile networks)</td>
</tr>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
</tr>
<tr>
<td>aka</td>
<td>also known as</td>
</tr>
<tr>
<td>ARPS</td>
<td>average revenue per subscription</td>
</tr>
<tr>
<td>ARPU</td>
<td>average revenue per user</td>
</tr>
<tr>
<td>ASP</td>
<td>average selling price</td>
</tr>
<tr>
<td>BRIC</td>
<td>Brazil, Russia, India, China</td>
</tr>
<tr>
<td>CAGR</td>
<td>compound annual growth rate</td>
</tr>
<tr>
<td>CDMA</td>
<td>code division multiple access (a channel access method)</td>
</tr>
<tr>
<td>CEE</td>
<td>Central and Eastern Europe</td>
</tr>
<tr>
<td>CPU</td>
<td>central processing unit</td>
</tr>
<tr>
<td>EVDO</td>
<td>Evolution-Data Optimized (a wireless communications standard)</td>
</tr>
<tr>
<td>FTTH</td>
<td>fiber to the home</td>
</tr>
<tr>
<td>GB</td>
<td>gigabyte</td>
</tr>
<tr>
<td>IPTV</td>
<td>Internet protocol television</td>
</tr>
<tr>
<td>MBPC</td>
<td>mobile broadband PC (also a survey by Pyramid Research)</td>
</tr>
<tr>
<td>MID</td>
<td>mobile Internet device</td>
</tr>
<tr>
<td>MIDIA</td>
<td>Mobile Internet Device Innovation Alliance</td>
</tr>
<tr>
<td>MNO</td>
<td>mobile network operator</td>
</tr>
<tr>
<td>ODM</td>
<td>original design manufacturer</td>
</tr>
<tr>
<td>OEM</td>
<td>original equipment manufacturer</td>
</tr>
<tr>
<td>OS</td>
<td>operating system</td>
</tr>
<tr>
<td>PC</td>
<td>personal computer</td>
</tr>
<tr>
<td>PDA</td>
<td>personal digital assistant</td>
</tr>
<tr>
<td>PPP</td>
<td>purchasing-power parity</td>
</tr>
<tr>
<td>RAM</td>
<td>random access memory</td>
</tr>
<tr>
<td>SME</td>
<td>small and midsize enterprise</td>
</tr>
<tr>
<td>SOHO</td>
<td>small office, home office</td>
</tr>
<tr>
<td>TD-SCDMA</td>
<td>Time Division-Synchronous Code Division Multiple Access (a wireless communications standard)</td>
</tr>
<tr>
<td>U MPC</td>
<td>ultra-mobile PC</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>VAS</td>
<td>value-added service</td>
</tr>
<tr>
<td>VPN</td>
<td>virtual private network</td>
</tr>
<tr>
<td>WCDMA</td>
<td>Wideband Code Division Multiple Access (a transmission protocol)</td>
</tr>
</tbody>
</table>
Executive summary

These are times of big changes in the mobile computing industry. With 3G and soon 4G networks, mobile operators are challenging the dominant status of fixed operators in the broadband access market and becoming a new channel for sales of portable computers. At the same time, PC manufacturers are entering the mobile Internet device market, traditionally restricted to handset vendors.

The netbook is a key catalyst in this transformation. After sales of 13m units in 2008, this portable mini-PC is emerging as the mobile Internet device of choice for mass-market customers. Despite concerns about their small size and cramped keyboards, netbooks are perfectly capable of creating value, first and foremost for mobile broadband operators. The immediate outcome of their arrival in the market is to boost both PC and broadband penetration, especially in the mobile sector, thanks to the devices’ inherent mobility and affordability. Bundled with broadband plans, netbooks also allow mobile providers to curb churn and improve the utilization of their recently upgraded HSPA networks. Through netbooks, a host of new users, many of whom are currently attending school or university or working for small businesses in emerging markets, have gained access to mobile broadband networks.

At the same time, there are plenty of doubts about the future of these devices. While many operators are already clear about the business case for netbook bundles, OEMs are not happy about the downward pressure on laptop prices brought about by inexpensive netbooks. They also fear that netbooks will cannibalize the sales of high-end notebooks. For now, they have agreed to live with the threat, fearing that without netbooks the recession would hit computer sales even more than it has done already. When the economic gloom starts to lift, PC manufacturers will pick their sides. It is possible that they will decide to kill netbooks by ceasing to invest in better specifications and more attractive formats. We think this would be a mistake. We see a better opportunity for OEMs and broadband operators in supporting netbook sales to the young generation of mobile Internet users and preparing to up-sell higher-end, personalized devices to these buyers when the time comes to replace the first batch of netbooks in the next year or two.

Based on the analysis in this report, we believe that second option would be the wiser business decision. This view is supported by the main findings of this report:

- **Netbooks are a strategic tool for MNOs and OEMs alike, until the global economy recovers and users are ready — and able to afford — to migrate to more sophisticated devices.** In the context of the current economic situation, netbooks will play an important role by helping PC sales and spreading mobile broadband in emerging markets as well as among low-income and first-time Internet users in the developed markets. The Internet-centricity and inherent portability of netbooks also make them an attractive choice for 3G product managers, who live under pressure to show returns on 3G investments.

- **While in the developed world netbooks are considered inexpensive, the $500 retail price threshold is still prohibitively high for many potential buyers in emerging markets.** In the lower-income countries of Asia-Pacific, the Middle East, Africa, Eastern Europe and Latin America, most of the incremental impact from netbook sales will be seen only when the price of mobile PCs declines below $350. This is expected to happen in late 2009, with mass-market shipments picking up during 2010.

- **The netbook surge will provide a much-needed stimulus for mobile subscription computing, which in turn will address the shortcomings of the historical PC sales model.** Previously, high upfront costs prevented most low-income consumers, especially in emerging markets, from buying their first home PCs. This is clearly reflected in low PC penetration rates: Only 23% of the total population in Latin America had a PC at the end of 2008; even fewer people in North
Africa and the Middle East — 18% — had personal computers; and in Asia-Pacific the figure was a mere 15%. India and China will be the markets where sales growth will be most pronounced.

- **Netbooks will also help accelerate mobile broadband adoption among low-income customers.** We estimate that 20-30% of new mobile broadband subscribers will sign up thanks to the introduction of ultralow-price netbooks sold in bundles priced at $20 per month. Globally, Pyramid Research forecasts that 132.6m netbooks will be sold bundled with an Internet subscription in 2014, 37% more than the 96.7m in bundle sales that we had previously forecast for netbooks priced at about $500.

- **Service providers (fixed and mobile combined) are set to become the largest distribution channel for netbooks in the next five years.** We forecast that in 2014 more than half of all netbooks will be sold by fixed and mobile operators in bundles with broadband Internet service. Operators are already benefitting from more rapid growth in broadband subscription sales and from improving customer churn, and will continue to rally around netbooks in the future. After a slow start in 2008, we will see many more PC bundles launched in the second half of 2009 and 2010, especially in emerging markets.

- **It is, however, difficult to see how netbooks will make operators money beyond flat-rate mobile broadband subscription charges.** For most operators, an ideal scenario would be to migrate users to higher-end notebooks and higher-value broadband plans, both with greater potential to raise ARPS through value-added services.

- **Netbooks have well-publicized drawbacks:** Apart from their low processing power and small keyboards, they fail to deliver on other requirements of mass-market customers, such as storage and multimedia capabilities. Today these drawbacks are not much of a problem, since netbooks are the only devices that allow both mobility and the full Internet experience for mass-market users. However, we expect a new generation of buyers to look for higher-spec devices when they start “graduating” from their first netbooks in roughly two years’ time.

- **Future generations of notebooks will need to address specific wants and needs that are not currently met by netbooks.** A personalized approach and much more customer knowledge will be required to sell an advanced music notebook to a music lover and an advanced graphics notebook to an avid gamer. High-school teens are also likely to become a separate target group for more powerful notebooks that support their educational needs.

In conclusion, we believe that both broadband operators and PC industry players will benefit from adopting a supportive attitude toward netbooks. The future success of mobile computing will depend on close cooperation and long-term strategic commitment between OEMs and mobile and fixed broadband operators. Today, it is the service providers that own the customer relationship and have access to a wealth of subscriber data. PC manufacturers can therefore get help from providers with identifying customers who are ready to replace their PCs and with selling multiple mobile PCs to families and small businesses. In the end, this could be a win-win situation for all parties involved.

This report analyzes the business case behind bundling netbooks with broadband access for both operators and OEMs, discusses key performance indicators delivered by those operators that have embraced the use of netbooks, and assesses the value they have been able to extract from netbook sales. In Europe and the US, these operators include Orange, TMN, T-Mobile and Vodafone. We also look at the early examples of netbook bundles targeting students and examine the potential for netbook bundle sales in the markets of Brazil, Russia, India and China.
Introduction

After fixed and mobile broadband providers tentatively added netbooks to their device portfolios in 2008, bundles of these machines with Internet access are set to become a bread-and-butter offering for operators in developed and emerging markets alike, exceeding sales of notebook computers in the operator channel by 2010.

The appeal netbooks hold for service providers is manyfold. First, there is the immense popularity of these mini-PCs among mass-market buyers, even during the economic downturn, when sales of other types of PCs are faltering. More than 13m netbooks were shipped in 2008, and total sales are expected to approach 30m in 2009. Due to the inherent mobility and Internet centricity of netbooks, they are perfectly suited for bundling with mobile broadband plans. Thanks to their low prices and thrifty power consumption, they are also attractive to students and first-time broadband users. Last, a boost in sales of mobile broadband services supported by netbooks will allow operators to more quickly recover their investments in 3G networks.

Yet in both developed and emerging markets there are still numerous questions surrounding the marketing and sale of netbook bundles.

Most operators believe that netbooks have strong potential to expand the broadband customer base, but as for the size of the incremental market and the impact netbooks will have on churn, ARPU and operators’ bottom lines, things are still unclear. Little analysis has been done comparing the contribution margins for bundled data plans of cheaper netbooks with those of higher-end notebooks, which have been offered by most major MNOs since 2007.

Operators need to understand if netbooks satisfy the needs of mobile and fixed broadband service buyers: Are Internet browsing and access to basic office applications enough to keep the level of netbook user satisfaction high?

Last but not least, most bundle buyers pay a flat monthly fee for broadband access, which leads mobile operators down the same commoditization path as fixed broadband providers. While fixed telcos are seeking to solve this challenge by including video and IPTV, these services have little adoption potential on netbooks considering their current specifications. Will netbooks be able to support the delivery of value-added services when they are needed in 3-5 years?

Equally important is the potential size of the operator channel, whether direct or via resellers, which could change the entire distribution chain for mobile PC manufacturers.

This report analyzes these challenges and answers the following questions related to netbooks:

- What role will netbook devices play in the adoption of mobile broadband?
- What will be the incremental level of new mobile broadband users, thanks to the availability of bundles with ultralow-cost portable computing devices?
- How will netbooks create value for service providers in the long term?
• Will netbooks make operators money beyond a flat-rate mobile broadband subscription?
• How different is a netbook subscription model from a laptop subscription model? How does it compare with stand-alone mobile data plans?
• Compared with total mobile broadband sales and total netbook sales, how big can the operator channel for netbooks get?

Our analysis is structured as follows:

• **Section 1** of the report assesses the key drivers of netbook sales, examines the models currently available in markets and discusses future developments in netbook hardware, software and prices.

• **Section 2** analyzes the impact of netbook bundles on operator subscriber bases, churn and ARPU, compares it with the impact of higher-end notebook bundles and discusses the potential for delivering value-added services on these small, low-spec devices. This section also provides case studies of bundles of netbooks and mobile broadband service in emerging and developed markets.

• **Section 3** of this report provides Pyramid Research’s view on netbook bundle adoption and a forecast of the incremental market opportunity that will result from the decline of netbook prices below US$350 in late 2009.
Section 1: The rise of netbooks

1.1 First things first: Defining the netbook

In the world of mobile computing, the big event of 2008 was the ascent of the netbook, with Intel as its chief architect. Together with Microsoft, Intel was the major force behind designing the ultra-mobile PC (UMPC) and mobile Internet device (MID) platforms and launching them in 2006. In 2008, its introduction of the Atom™ processor allowed original equipment manufacturers (OEMs) to create a universe of netbooks. More than a dozen major OEMs currently offer models with Intel Atom inside, and more than 30 models are on sale.

Before moving on, we need to define a netbook and differentiate between netbooks, notebooks, UMPCs, ultraportables and MIDs. Several criteria — from the size of the screen to the hardware and software feature set — determine in which category each device belongs.

A netbook, also called a mini-note or mini-PC, is a low-cost mobile personal computing device retailing at US$400-500, with a screen size of 7-11 inches. It is optimized for wireless Internet connectivity and often marketed as a low-cost alternative to notebooks. Intel expands this description, defining a netbook as “a device designed for consuming content, rather than creating new content.” The majority of today’s models use an Intel Atom processor and Microsoft XP Home. A number of netbook models also use the Ubuntu Linux operating system (OS), although its market share is currently less than 15%. Companies such as Qualcomm, ARM and Google have plans to launch netbook chipsets and operating systems.

By comparison, notebooks have a screen size of 12 inches or larger, use Intel Core or AMD processors and run a full Windows Vista or Linux OS (see Exhibit 1 for netbook/notebook comparison). Notebook prices start just above those of netbooks at US$500 and can go as high as $3,000, depending on the model, brand and technical specifications.

UMPCs have screen sizes smaller than eight inches and run Windows XP or Linux OS, while MIDs have screens of 4.8 inches and smaller.

The size of the screen is not the only distinctive feature of netbooks. Microsoft imposes additional restrictions on the memory and storage of a netbook device running its Windows operating system. These restrictions change, but the latest ones set the hard disk space at 160GB and RAM at 1GB.
Exhibit 1: Netbook vs. notebook attributes

<table>
<thead>
<tr>
<th></th>
<th>Netbook</th>
<th>Notebook</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main value proposition</strong></td>
<td>“Net-centric computing” A device designed for consuming content</td>
<td>“Productivity computing” A device designed for creating content</td>
</tr>
<tr>
<td><strong>Screen size</strong></td>
<td>7-inch to 11-inch</td>
<td>11-inch and larger</td>
</tr>
<tr>
<td><strong>Processors</strong></td>
<td>Intel Atom, Linux Ubuntu</td>
<td>Intel Core Duo, AMD</td>
</tr>
<tr>
<td><strong>Operating system</strong></td>
<td>Windows XP Home, Linux Low license fee (e.g., $25)</td>
<td>Windows XP, Vista, Linux</td>
</tr>
<tr>
<td><strong>Drives</strong></td>
<td>No removable media</td>
<td>CD and DVD drives</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>3-4 hours (three-cell) or 6-8 hours (six-cell) No room for cooling fan</td>
<td>2-4 hours Video/graphics require power, cooling fans</td>
</tr>
<tr>
<td><strong>Memory and storage</strong></td>
<td>From 4GB solid-state drives to 160GB hard drives RAM: Up to 1GB</td>
<td>Hard drives: 80-320GB and more RAM: 1GB or more</td>
</tr>
<tr>
<td><strong>Additional features</strong></td>
<td>Built-in speakers, 1.3 megapixel webcam, Wi-Fi and optional Bluetooth</td>
<td>Built-in speakers, 1.3 megapixel webcam, high-end graphics cards, Wi-Fi, embedded 3G modules</td>
</tr>
</tbody>
</table>

Source: Pyramid Research

1.2 Netbook drivers

Since Q4 2007 when the first netbooks went on sale, their growth has been stellar. In 2008, more than 13m netbooks were sold globally. A number of concurrent trends created the perfect conditions for this success, including the availability of an inexpensive processor, growing demand for mobile broadband and the ongoing need for mobile operators to recover investments in 3G. And this is all taking place in the context of an economic downturn that is amplifying price sensitivity, which drives substitution of high-end devices by low-cost functional devices.

Driver one: Light mobile processors and a market push by Asian PC OEMs

Taiwan-based Asustek Computer (Asus) pioneered cheap mini-notebooks with its Eee PC model in October 2007. The Eee PC was based on the Mobile Intel 915GM chipset, designed for handheld devices, powered by a 900MHz Intel Celeron processor, weighed only 920g and had a screen size of seven inches. Other Taiwanese manufacturers, such as Acer, Micro-Star International (MSI), Elitegroup Computer Systems (ECS) and Everex followed on Asus’ heels. History
was made: Netbooks, or mini-notes, kick-started the mobile Internet device revolution.

Behind the growth of netbooks is Intel: In April 2007, the chip giant in partnership with Asus, BenQ, Compal Electronics, HTC Corp, Quanta Computer and Elektrobit announced the Mobile Internet Device Innovation Alliance (MIDIA). This new organization focused on developing a $500 device capable of accessing the Internet from any location. The result was the launch of the first netbook models in 2008.

In March 2008, Intel released the Intel Atom processor (earlier codenamed Silverthorne) for use on MIDs, including netbooks. Based on a new micro-architecture, the Atom processor was designed for small devices with low power consumption, yet it maintained its compatibility with the instruction set of the Intel Core 2 Duo, which is deployed in notebooks. Acer, in its Aspire One 8.9” netbook model, was the first OEM to use the Intel Atom. Since then, almost all major OEMs have launched netbooks using the chip (see Exhibit 2).

Exhibit 2: Timeline for netbook model introductions by major PC OEMs

<table>
<thead>
<tr>
<th>Units sold</th>
<th>Early adopters</th>
<th>Mainstream ODM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Eee PC</td>
<td>Oct 2007: HP Mini</td>
</tr>
<tr>
<td></td>
<td>Aug 2008: Fujitsu-Siemens Amilo Mini</td>
<td>Q2 2009: Cloudbook MAX (WiMAX)</td>
</tr>
<tr>
<td></td>
<td>Oct 2007: Eee PC</td>
<td>June 2008: ECS G10IL (3G)</td>
</tr>
<tr>
<td></td>
<td>Nov 2008: Dell Inspiron Mini</td>
<td>Nov 2008: Dell Inspiron Mini</td>
</tr>
<tr>
<td></td>
<td>Summer 2008: Acer Aspire One</td>
<td>April 2008: HP Mini</td>
</tr>
<tr>
<td></td>
<td>April 2008: HP Mini</td>
<td>Oct 2008: Lenovo IdeaPad S10e</td>
</tr>
<tr>
<td></td>
<td>Aug 2008: Fujitsu-Siemens Amilo Mini</td>
<td>Q2 2009: Cloudbook MAX (WiMAX)</td>
</tr>
<tr>
<td></td>
<td>Oct 2007: Eee PC</td>
<td>June 2008: ECS G10IL (3G)</td>
</tr>
<tr>
<td></td>
<td>Nov 2008: Dell Inspiron Mini</td>
<td>Nov 2008: Dell Inspiron Mini</td>
</tr>
<tr>
<td></td>
<td>Summer 2008: Acer Aspire One</td>
<td>April 2008: HP Mini</td>
</tr>
<tr>
<td></td>
<td>April 2008: HP Mini</td>
<td>Oct 2008: Lenovo IdeaPad S10e</td>
</tr>
<tr>
<td></td>
<td>Aug 2008: Fujitsu-Siemens Amilo Mini</td>
<td>Q2 2009: Cloudbook MAX (WiMAX)</td>
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<td></td>
<td>Oct 2007: Eee PC</td>
<td>June 2008: ECS G10IL (3G)</td>
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</tbody>
</table>

Source: Pyramid Research

Until recently, Intel was the main chipset manufacturer behind the growth of netbooks. The strategy of its main competitor, Advanced Micro Devices (AMD), is focused on the more expensive “thin and light” notebook devices. AMD has made an occasional foray into the netbook space: Its Geode LX800 chipset was used for the One Laptop per Child Foundation’s XO low-cost mini-notebook...
model, and in August 2008 Raon Digital launched an Everun Note netbook using AMD's Turion 64 X2 processor running at 1.2GHz. AMD insists that its Yukon platform offers a full-PC experience at a low cost, but it is fair to say that AMD lost the initiative to Intel and has since adopted a wait-and-see approach to netbooks.

New competition to Intel is, however, emerging from the handset camp. ARM Cortex-based netbooks are about to arrive, and Qualcomm recently announced that it had partnered with several OEMs to introduce netbook devices based on its Snapdragon chipset. With AMD out of the immediate picture, Qualcomm and ARM are the largest chipset manufacturers that could put pressure on Intel in the future.

**Driver two: An ailing world economy, low PC penetration and shifting demand**

Deteriorating market conditions have contributed to the recent strong sales of netbooks. The price sensitivity of consumers and small and midsize enterprises, the largest group of buyers targeted by netbook manufacturers, increased during 2008 in direct correlation with growing economic uncertainty, declining living standards and looming job losses. It is not yet clear whether further economic problems will have a detrimental effect on the sales of netbooks in 2009, but these low-cost devices are better positioned than expensive notebooks to weather the decline in PC sales.

The price attraction of netbooks is significant: They currently retail at about 50% of average notebook prices. The 2008 revenue and shipment data reported by Asus suggests that the average selling price (ASP) of its netbooks stood at $308, compared with $640 for a notebook. Several factors contribute to the lower cost, from cheaper processors and a reduced number of components (e.g., no cooling systems, fans or CD/DVD drives) to lower license fees (e.g., Microsoft's XP Home edition is priced as low as $25 and Linux OS even lower at only $3, compared with the $70 price tag of Microsoft's Vista).

The pricing gap will widen with the new netbook models expected to come to market at the end of 2009, priced at $350 or less thanks both to economies of scale and to concerted efforts by the Linux and ARM camps to cut prices.

**Driver three: Selling to lower-income market segments and returns on 3G investments**

Exploding demand for mobile broadband Internet access and a push for 3G services by mobile operators became significant drivers of demand for netbooks. Between 2005 and 2008, mobile broadband prices declined by more than 50%, expanding the addressable market. Although businesses previously were the main buyers of mobile data cards and modems, in 2008 mass-market users came into the fold, bringing with them demand for more affordable portable computing devices.

At year-end 2008, there were just over 65m mobile broadband Internet subscriptions globally. This represented roughly 1% of the global population and 13% of total 3G subscriptions, despite the fact that globally more than 4bn customers have a mobile phone, compared with 1.2bn fixed lines in service.
Pyramid Research forecasts that in 2014, 3G and 4G subscriptions will account for nearly 50% of all broadband subscriber additions (see Exhibit 3). During the same period, the number of mobile broadband subscriptions will grow more than five times to 375m, generating $85.5bn in revenue for mobile service providers.

In such emerging markets as Africa and the Middle East — a region Pyramid Research defines as Africa, Iran, Turkey, the Persian Gulf and the Levant — mobile operators routinely offer mobile broadband as their first or even their only 3G service following their 3G network rollouts. We expect mobile broadband adoption in the region to grow faster than the global average over the next five years, with the subscriber total increasing at a compounded annual growth rate (CAGR) of 33% to reach 32.2m by 2014.

Exhibit 3: Broadband subscriptions globally by type, 2005-2014

<table>
<thead>
<tr>
<th>Type</th>
<th>CAGRs 2009-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIMAX</td>
<td>54%</td>
</tr>
<tr>
<td>FTTH</td>
<td>32%</td>
</tr>
<tr>
<td>xDSL</td>
<td>7%</td>
</tr>
<tr>
<td>3G/4G</td>
<td>30%</td>
</tr>
<tr>
<td>Cable modem</td>
<td>4%</td>
</tr>
</tbody>
</table>

Demand for netbooks has been boosted by the growing availability and popularity of 3G.

The mass-market potential of netbook devices becomes clearer when we compare the shipments of netbooks and iPhones, globally the most popular smartphone of 2008: In the last two quarters of 2008, netbooks outsold iPhones
globally with only a small fraction of the latter’s marketing and advertising cost (see Exhibit 4).

Exhibit 4: Netbook and iPhone sales globally, Q4 2007 to Q1 2009

In an attempt to boost the adoption of computing devices, mobile operators launched new business models based on subsidizing notebooks and bundling them with mobile broadband plans. TeliaSonera pioneered such bundles in mid-2007, and since then new bundle launches have been steadily trickling out across all regions.

However, even with subsidies, notebooks remain beyond the affordability threshold of an average mobile subscriber. Most initial subscription bundles were launched with high-end notebooks and PCs, with monthly payments as high as $68-70 per month, by such operators as Telefónica O2 in the Czech Republic and Cantv in Venezuela.

Compare this with the consumer pricing preferences communicated in the mobile broadband PC (MBPC) survey that Pyramid Research conducted in 2007-2008. Mass-market trial participants indicated that the optimal price for mobile broadband Internet access varied from $15 per month in emerging markets to $25 per month in developed markets (see Exhibit 5). The addition of a monthly fee for a subscription notebook PC would bring the optimal prices to $30 and
$50 per month respectively, which could be delivered only with a cheaper device.

Exhibit 5: Acceptable price range and optimal price of mobile broadband in select markets, 2007-2008

<table>
<thead>
<tr>
<th>Price (US$)</th>
<th>Asian markets (Malaysia, Philippines, Thailand)</th>
<th>African &amp; Middle Eastern markets (South Africa, Turkey)</th>
<th>European markets (Germany, Ireland, Romania)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td></td>
<td></td>
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<tr>
<td>$5</td>
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<td>$35</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$40</td>
<td></td>
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</tr>
</tbody>
</table>

Note: The point of marginal cheapness is where an equal number of respondents believe that the product is too cheap and a bargain — the low point of the acceptable price range. The point of marginal expensiveness is where an equal number of respondents believe that the product is expensive and too expensive — the upper point of the acceptable price range. The optimal price is where an equal number of respondents believe the product is too cheap and too expensive.

Source: Pyramid Research MBPC Survey 2007-2008

1.3 Netbooks today

Netbook sales and market shares

Asus, with its Eee PC, and Acer, with its Aspire One, proved that the early birds do indeed get the worm. Netbook sales represented 8% of total laptop shipments and 4% of total PC shipments in 2008, with more than 12m netbooks sold during the year. It was the Taiwanese manufacturers that captured the majority of these sales. Asus was the first on the market, bringing out its Eee PC in Q4 2007 and shipping 300,000 devices in the first several months — 4.9m in all of 2008.
Asus and Acer, which introduced its Aspire One model in mid-2008, shipped about 80% of total netbook devices in 2008 (see Exhibit 6).

Exhibit 6: Netbook shipments and ODM market shares

The largest notebook OEM, Hewlett-Packard (HP), introduced its own netbook model, HP Mini, shortly after Asus. Its chief competitor and the second largest notebook manufacturer, Dell, also brought out several netbook models. Both, however, continue to view netbooks as a niche product. Behind the weak commitment are both fear that sales of netbooks would cannibalize more expensive notebooks and uncertainty about future demand for the devices.

Most OEMs, such as Toshiba, Samsung and Fujitsu Technology Solutions (formerly Fujitsu Siemens Computers), launched netbook models in the second half of 2008, leaving Sony and Apple as the most conspicuous absentees from the market. Rumors about the introduction of netbook models from both companies are surfacing all the time, but for now the two are keen to support their positioning as high-end, expensive brands. Both already have small devices in their portfolios: Apple has been selling 13-inch MacBooks since late 2008, and Sony introduced a range of new P Series devices in January 2009. However, with price tags of $900, both might be more appropriately called subnotebooks rather than netbooks.

There is more competition to come. Netbooks are drawing in not only the traditional PC makers, but also manufacturers from the handset sector: Nokia and LG Electronics recently said they plan to introduce netbook models in 2009.
Netbook prices and form factors

Small is good, but bigger is better: Although netbook screen sizes span the range of 7 inches to 11 inches, and although Dell and Samsung have introduced 12-inch low-cost models, the largest number of models fall into the “sweet spot” of 8.9-inch and 10-inch screens. The seven-inch netbooks are simply too small for comfortable browsing of regular Internet pages, while 11- and 12-inch devices are coming too close to small but more powerful notebooks.

Exhibit 7: Form factors and embedded modems of netbooks

<table>
<thead>
<tr>
<th>OEM</th>
<th>Netbooks</th>
<th>Mobile broadband embedded models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asus (Taiwan)</td>
<td>7-inch: Eee PC 701</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.9-inch: Eee PC 900, Eee PC 131</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-inch (2008): Eee PC1000, 1000H</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-inch (2009): Eee PC 131</td>
<td></td>
</tr>
<tr>
<td>Acer (Taiwan)</td>
<td>8.9-inch: Aspire One A150X-3G</td>
<td>3G module available in A150X-3G model</td>
</tr>
<tr>
<td></td>
<td>10-inch: Aspire One D250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-inch: Aspire One D150</td>
<td></td>
</tr>
<tr>
<td>Dell (US)</td>
<td>8.9-inch: Inspiron Mini 9</td>
<td>Embedded 3G models shipped for partner MNOs</td>
</tr>
<tr>
<td></td>
<td>10-inch: Inspiron Mini 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12-inch: Inspiron Mini 12</td>
<td></td>
</tr>
<tr>
<td>Elitegroup Computer Systems (ECS) (Taiwan)</td>
<td>8.9-inch: G10IL (8.2-inch)</td>
<td>G10IL was one of the first embedded models on the market</td>
</tr>
<tr>
<td></td>
<td>10-inch: G10IL</td>
<td></td>
</tr>
<tr>
<td>Everex (Taiwan, US)</td>
<td>7-inch: CloudBook</td>
<td>MAX model is to be released in Q2 2009 with embedded WiMAX</td>
</tr>
<tr>
<td></td>
<td>8.9-inch: CloudBook MAX (WiMAX)</td>
<td></td>
</tr>
<tr>
<td>Fujitsu Technology Solutions (Japan)</td>
<td>8.9-inch: Amilo Mini</td>
<td></td>
</tr>
<tr>
<td>Gigabyte Technology (Taiwan)</td>
<td>8.9-inch: M912</td>
<td>T1028 will be shipped with 3.5G module embedded</td>
</tr>
<tr>
<td></td>
<td>10-inch: S1022, S1024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-inch (coming soon): T1028</td>
<td></td>
</tr>
<tr>
<td>Hewlett-Packard (US)</td>
<td>8.9-inch: HP Mini 1000</td>
<td>All shipped to partner MNOs with 3G embedded</td>
</tr>
<tr>
<td></td>
<td>10-inch: HP Mini 1000</td>
<td></td>
</tr>
<tr>
<td>Lenovo (China)</td>
<td>10-inch: IdeaPad S10e</td>
<td></td>
</tr>
<tr>
<td>MSI Computer (Taiwan)</td>
<td>8.9-inch: Wind U90</td>
<td></td>
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<tr>
<td></td>
<td>10-inch: U110 ECO, U123T, U100, U115, U120</td>
<td></td>
</tr>
<tr>
<td>Samsung (South Korea)</td>
<td>10-inch: NC10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12-inch: NC20</td>
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</tr>
</tbody>
</table>

Source: Pyramid Research, OEMs

Despite the obvious attraction of netbooks for mobile broadband connectivity, only a handful of models have shipped with built-in 3G modems so far. All
netbook models boast 802.11b, g or n connectivity, and most have optional Bluetooth and Ethernet. Yet for most of 2008, only HP, Dell, ECS and Gigabyte Technology were selling notebooks with built-in mobile broadband modems. Everex recently launched a WiMAX-embedded netbook, the CloudBook Max, while Samsung started selling modified a NC10 netbook with WiMAX in Russia.

Price has been an important reason why 3G modules are so rare. At HP, for example, the Mobile Broadband netbook series sells at a premium of $120 compared with its Mini 1000 XP Edition series, and at $170 more than the Mi series, which runs on Linux, with all other specifications (memory, processor and hard drive) exactly the same.

Equally important is the demand for embedded netbooks from mobile operators. Today, operators are still a relatively small PC distribution channel: They accounted for only about 2% of all netbooks and notebooks sold in 2008. With the arrival of more MNOs on the scene, the operator channel is set to grow, along with demand for embedded devices. Exhibit 8 shows major partnerships between OEMs and mobile operators to sell netbooks.

The embedded mobile broadband ecosystem is now gaining momentum, which means larger volumes and more affordable prices. Ericsson, for example, recently announced a new 3G module, signing up LG Electronics, Dell, Lenovo and Toshiba as customers. The module, available in the second half of 2009, will support the Windows 7 operating system and deliver further energy savings and longer battery life — the bane of 3G devices so far.

### Exhibit 8: Major netbook OEM partnerships with MNOs

<table>
<thead>
<tr>
<th>OEMs</th>
<th>Service provider partnerships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asus (Taiwan)</td>
<td>SFR (France), TIM (Italy), Docomo (Japan), SingTel (Singapore), Telefónica Spain, China Mobile</td>
</tr>
<tr>
<td>Acer (Taiwan)</td>
<td>Phone House, TMN, TIM, T-Mobile, Orange Slovakia, China Mobile</td>
</tr>
<tr>
<td>Dell (US)</td>
<td>EMEA-wide partnership with Vodafone StarHub (Singapore), China Mobile</td>
</tr>
<tr>
<td>HP (US)</td>
<td>Bouygues (France), Cosmote (Greece), Elisa (Finland), Mobistar (Belgium), StarHub (Singapore), China Mobile</td>
</tr>
<tr>
<td>Samsung (South Korea)</td>
<td>Phones4U (UK), T-Mobile, Vodafone</td>
</tr>
</tbody>
</table>

Source: Pyramid Research
1.4 Netbooks tomorrow

We expect to see a more diverse range of netbooks over the next 2-3 years. The roadmaps and prototypes recently showcased by OEMs indicate that new netbook models will have larger screens and better performance. At the same time, the netbook universe will soon contain models as inexpensive as $200-300. Below is an overview of the trends and developments in netbook feature sets.

Hardware and software

Following Moore’s Law, netbooks will become faster, consume less power and have longer battery life.

- **Processors:** Intel’s mobile roadmap includes an upgrade to its existing Atom chipset from a single core to dual cores. However, it is unclear if a dual-core processor of Intel’s current or next generation will run on netbooks anytime soon. For example, Microsoft is still restricting the use of its XP OS to single-core processors. At the same time, plans to launch dual-core processors have been announced by ARM and Qualcomm, which have turned to the Linux OS for these models.

- **Memory:** Several upcoming netbook models (such as the Dell Inspiron Mini 10) will be shipped with 1GB of RAM, expandable to 2GB.

- **Batteries:** The six-cell battery is expected to become the norm for netbooks, providing 4-6 hours of battery time.

- **Hard drives:** From 160GB of storage space, netbooks are moving toward 250GB and in the future will feature solid-state drives with more capacity. Asus, for example, has demonstrated the new Eee PC131 model with 512GB of disk space, although the price for the device is likely to be well above the $500 threshold.

- **Form factor:** The emphasis is shifting from 7-inch screens to the sweet spot of 8.9- and 10-inch screens. A high-definition display is also becoming a standard feature.

- **Bells and whistles:** New features are scheduled to arrive on future netbook models, among them a TV tuner and Nvidia’s Ion 9400M, which will deliver improved performance and enable gaming.

Today’s functionality will soon be delivered at an even lower price level. Competition in netbook processors is emerging from the ARM and Qualcomm camps. ARM, the manufacturer of mobile phone circuitry, including processors in the iPhone, has recently shown interest in the netbook and MID space; it has partnered with Canonical, which develops the Ubuntu distribution of Linux, to bring to market new high-performing devices with improved video functionality. Freescale Semiconductor has just announced that it will be launching new silicon for netbooks, which will be based on an ARM architecture and support low-power 1GHz performance at prices below $200.

As with mobile phones, personalization will be growing in popularity among mass-market netbook buyers. While business-oriented notebooks can be in any
color as long as it is gray or black, netbooks are closer to mobile phones in catering to younger buyers. Most OEMs are now shipping models in multiple colors and with designer covers.

Dedicated operating systems are emerging for netbooks. Windows XP is the main OS for the current family of netbooks, with Linux Ubuntu Netbook Remix a distant second-place competitor. However, several new OSs are about to be brought to market:

- **Windows 7**: In October 2008, Microsoft announced its Windows 7 platform. The new OS will have a smaller footprint, faster boot-up and shut-down times and improved power management for enhanced battery life. All Windows 7 editions will run on netbooks.

- **Linux**: The open source OS will continue to be supported by the Moblin project, although more needs to be done to improve the popularity of Linux among mass-market buyers. Developers are eyeing Linux and ARM in their search for a cheaper platform for netbooks, and several OEMs, including Asus, HP and Dell, are already shipping netbooks running the Moblin OS. Moblin 2.0 is at the alpha stage today, getting improved performance and a number of additional applications, which are already running on Linux.

- **Google Android**: Having launched its open-source, Linux-based operating system for mobile smartphones, Google is now interested in the netbook space. A release of a netbook/notebook OS is widely expected, although no confirmation has been provided by Google itself. In the meantime, HP has started evaluating Android in some of its netbooks and smartphones, and Asus announced plans to use it in its netbook range.
Section 2: Creating value with netbooks

Mobile Internet connectivity is a key part of the netbook value proposition, making this low-cost mini-PC a perfect fit for mobile operators that strive to expand their portfolios of mobile Internet devices.

In 2008, 95% of netbooks were distributed through traditional PC retailer channels. However, their growing popularity caught the eye of MNOs that had just started offering subscription bundles with higher-end notebook models. Netbook bundles first went on sale in Europe in early 2008 and are now on offer from most major MNOs. In fact, netbooks are becoming the mobile Internet device of choice for 3G product managers, helping them boost returns on 3G investments. Some operators, such as TMN (the mobile subsidiary of Portugal Telecom), have almost completely replaced notebooks with netbooks in their portfolios of mobile broadband devices for mass-market consumers.

In this section, we analyze the financial and operating impact of adding netbooks to a service provider’s portfolio of mobile broadband devices, and their potential to create future value for broadband providers. Just as the low cost of a netbook minimizes the subsidy required of a service provider, it also helps to deliver healthy margins on mobile broadband subscriptions and promises to reduce churn. But the main attraction of netbooks lies in expanding the number of subscribers to broadband services.

There is more to netbooks than a sound financial case. These mini-PCs could become a strategic tool for MNOs and OEMs, helping them attract new customers, who would potentially migrate to more sophisticated devices when the global economy recovers. In the context of the current economic situation, it is netbooks that can spread mobile broadband in emerging markets as well as among low-income and first-time Internet users in the developed economies.

At the same time, operators need to ask themselves what will happen when the initial 2- or 3-year contracts with subscription bundle buyers come to an end in 2010–2011. Purchased on the strength of their low prices, netbooks do have a number of drawbacks, from limited computing capacity to small screens, keyboards and generally a lack of embedded 3G modems. All these will come to light at the time of the replacement of a device and require a clever renewal strategy and an in-depth knowledge of the customers by service providers and OEMs alike.

2.1 The three Ps of the netbook value proposition: Price, portability and low power

Netbook target segments

The first low-cost netbook devices were developed under the auspices of the $100 Laptop project set up by Nicholas Negroponte and the One Laptop per Child non-profit organization (http://laptop.org). Intel entered the market in 2006 with its own low-cost reference design, called Classmate PC; such OEMs as Asus followed Intel in targeting the education sector. In Russia, for example, Intel and Asus committed to shipping 200,000 Eee PCs and Classmate PCs to
schools during 2008 along with about 8,000 traditional notebooks for teachers. In Brazil, the Ministry of Education launched a tender for 150,000 netbooks.

Since the first netbook models went for sale, however, the initial target market has expanded. Today, the main buyer segments are low- to mid-income families, students and first-time users of the Internet.

During the global survey conducted by Pyramid Research in 2007-2008 with 18,000 users, we discovered that more than 60% of the demand projected for low-cost mobile broadband notebooks came from the middle and bottom of the income pyramid (see Exhibit 9). The survey results were confirmed in the marketplace: The initial launches of PC subscriptions in markets in Latin America (such as Mexico and Venezuela), CEE (such as Romania) and Asia-Pacific (such as China) showed that 80-90% of all new subscribers came from socioeconomic segments C, D and E (see Exhibit 9).

Several new netbook buyer market segments also emerged during 2008:

- In developed markets, these include high-income buyers of second computers for mobile use outside the home and office. Low weight and portability are important to netbooks’ appeal.
• In emerging markets, netbooks have become attractive for SMEs and enterprise customers, which were also identified as potential customers in our MBPC survey (see Exhibit 10). This segment is currently small: fewer than 10% of all netbooks have been sold to business customers to date, and we expect that their use in the corporate sector will remain niche for the foreseeable future.

Exhibit 10: Mobile broadband PC buyers by occupation

Source: Pyramid Research, MBPC Survey 2007-2008

Netbook value proposition for consumers: Affordable, portable, mobile

The netbook’s value proposition for consumers is simple: Anytime mobile Internet access at an affordable price. Long battery life, combined with basic office functionality, delivers additional value for students and teens. See the case study below for details of netbook bundle offers targeting students in Portugal and France.

The proliferation of affordable USB drives and external hard drives make up for the absence of CD/DVD drives. Moreover, in September 2008, Asus announced an offer of 20GB of free online storage space to buyers of its Eee PCs.
CASE STUDY: Netbook bundles for students and schools in Portugal and France

In Portugal and France, governments are an important driving force behind the offers of PCs to students and schools. In Portugal, the government allows MNOs to pay lower 3G spectrum license fees in return for supporting the government initiative to promote affordable mobility computing to students. In France, the government provides student buyers a 50% tax refund on the cost of PC.

In 2006-2008, Portugal’s and France’s largest mobile operators, TMN and Orange, launched several broadband-PC subscription bundles with low-priced notebook and desktop devices aimed at students. Netbooks are now taking over as the preferred entry-level device for these bundles.

For both operators, the main objective was to create targeted offers for students and schools, segment the market and provide lower-priced broadband tariff plans without cannibalizing higher-end mobile broadband subscriptions. Student mobile broadband bundles are offered at a discount, and a limited number of low-cost devices have been chosen to improve the affordability of the bundles and match the low revenue stream from this user segment (see Exhibit 11 for details of these offers).
Exhibit 11: Student PC bundles by TMN in Portugal and Orange in France

<table>
<thead>
<tr>
<th></th>
<th>TMN (Portugal)</th>
<th>Orange (France)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student broadband subscription plans</td>
<td>TMN offers a €5 (US$6.80) discount off standard broadband plans for students signing up for 24-month contracts. It also offers two subscription PC plans, both requiring an upfront €150 payment for a PC and a subsequent payment of €17.50 or €24.50 per month for standard and premium broadband plans.</td>
<td>Orange charges €40 ($55) per month for a bundle of unlimited broadband 3G access and a Medion Akoya netbook with a USB modem over a term of 24 months; it offers a €200 discount for an upfront purchase of any PC. An additional 10% discount is offered to subscribers who are less than 26 years old.</td>
</tr>
<tr>
<td></td>
<td>Medion Akoya E1210 netbooks with 80GB of disk space and XP Home edition.</td>
<td>Medion Akoya E1210 netbooks with 80GB of disk space and XP Home edition.</td>
</tr>
<tr>
<td>Student PC bundle devices</td>
<td>It offers an 8.9-inch Magalhães netbook (based on the Classmate PC design and built by JP Sá Couto) with 1GB of RAM and 30GB of disk space for buyers of the e.escolinha subscription plans. For e.escola students, it offered six notebook models earlier in 2009, but has cut the choice to three models with 14-15-inch screens. At the same time, TMN launched three additional netbooks — Asus Eee PC, Acer Aspire One and Toshiba NB1000 — as part of its bundles targeting the mass market.</td>
<td>Orange has also just launched two netbook models — the Asus Eee PC 1000H Go and the Samsung NC10 — as part of its bundles targeting the mass market.</td>
</tr>
</tbody>
</table>

Source: Pyramid Research

In both markets, the impact on broadband adoption has been significant, even though bundles are not the only driver of broadband uptake — other factors, such as the lower prices and more targeted approach of the bundles, have contributed, too:

- In Portugal, as many as 50% of all e.escola subscribers are new users of broadband. The share of contract customers increased and overall data usage on TMN’s networks grew by 400%.

- In France, Orange’s take rate on the bundles has also been above 50%, despite only one netbook model on offer and a relatively high monthly payment for a bundle.
Price is by far the main attraction for all groups of netbook buyers. With prices as low as $500, the purchase of a netbook is easy to justify even in an economic downturn. As with TV sets, second and third home PCs are becoming a widespread phenomenon in developed markets and in the high-income segments of emerging economies. In the mobile broadband PC (MBPC) survey conducted by Pyramid Research in 2007 and 2008, as many as 42% of all prospective buyers were planning to purchase a second PC for their home, compared with the one-third who were first-time PC buyers.

At the same time, netbooks are becoming a primary PC for buyers in emerging markets, used for computing and communications. Whereas in the developed world netbooks are considered cheap, the $500 price tag is still too high for buyers in emerging markets. In Southeast Asia, Africa, Eastern Europe and Latin America, where PC literacy is low and user penetration rates are below 25%, netbooks are still perceived as high-end devices. In these markets, most of the impact from the sales of netbooks will be seen only when the price declines below $350. This is expected to happen in late 2009, with mass-market shipments picking up during 2010. Customers who could not previously afford a PC will now have a device that can be carried anywhere, can be used to access the Internet and supports basic office applications.

Similarly, netbooks will become a primary PC in rural areas. Today notebooks are sold largely in urban centers, where there is broadband network coverage and incomes are higher. As 3G networks are deployed outside cities, low-cost mobile broadband netbooks will become an attractive primary PC device for rural customers in emerging and developed markets alike.

The growth potential of rural markets is significant. In India, for example, more than 73m rural customers were served by GSM operators in November 2008, according to Idea Cellular. The number increased at a rate of 4m customers every month — nearly 50% of all GSM additions. In Malaysia, mobile networks cover more than 20m people, while broadband networks pass 3.5m homes, and only 2.5m of these can be served economically (see Exhibit 12).
Netbook value proposition for businesses: Inexpensive and functional hardware to improve productivity

There are several barriers to extensive use of netbooks by business customers, including their slow processors, small screens and keyboards. The installation of any enterprise security or VPN software — a must if a business device is carried out of the office loaded with commercially sensitive information — leads to a significant decline in a netbook’s performance.

Despite these drawbacks, their low power consumption and long battery life make netbooks perfect for several business niches:

- Field workers, sales people visiting points of sale and entry-level management look for more than access to email and vertical applications in a rugged portable device.
- Netbooks’ ability to let the user simultaneously browse the Web and edit simple Office documents satisfies the requirements of many small-business PC users. Anecdotal evidence from our discussions with providers in Europe and North America suggests that netbooks are starting to be used as primary PCs by a growing number of mom-and-pop shops and SOHOs. For these customers, even netbooks with the smallest screen size of 7 inches are better for reading Web pages and writing email than smartphones such as the BlackBerry.
Finally, the emerging trends of cloud computing, managed and hosted services, and subscription computing will facilitate the use of netbooks in enterprises. Web- and Citrix-based applications are prime candidates for enterprise use on the go.

2.2 Netbook Internet bundles: Selling 3G in an economic downturn

With voice revenue stalling and prices for mobile Internet access on the decline, MNOs have entered the stage of building a mass market for mobile broadband services and more aggressively attempting to expand their market shares. The economic decline and a slowdown in consumer spending have forced them to look for new ways of lowering barriers to buying mobile PCs and to signing up for mobile broadband.

The introduction of notebook bundles has been the first step in lowering the barriers against PC purchases and expanding the mobile broadband opportunity. Most providers, however, are not ready to disburse large lump sums to purchase and resell notebook devices costing $1,000. Mobile data plans sold with handheld devices also remain far from successful, with the exception of the iPhone. Thus, the decision to add netbooks to operator device portfolios has been easy for 3G product managers, who have been under pressure to deliver returns on 3G investments.

The first netbook models arrived in the market at a time when broadband providers had just started selling subscription bundles with higher-end notebook models. But by early 2009, netbook bundles had become a global phenomenon. In Western Europe, the first netbook bundles were introduced in mid-2008 as an entry-level device to complement high-end and midrange notebooks retailing at $500-1,000. In the US, AT&T launched bundles in April 2009 and is about to be followed by Verizon Wireless. Several players, including América Móvil and Telefónica, have started introducing netbooks in Latin America (see Exhibit 13).
Emerging-market netbook sales will gain momentum in 2009, bringing mobile broadband to the mass market.

Exhibit 13: Regional launch timeline of mobile broadband bundles

<table>
<thead>
<tr>
<th>Notebooks</th>
<th>Netbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006: Telmex, TMN, Orange France</td>
<td>Early 2008: T-Mobile Europe, Vodafone in CEE</td>
</tr>
<tr>
<td>H2 2007: TeliaSonera, DiGi</td>
<td>Mid-2008: Western European operators, Vodafone in CEE</td>
</tr>
<tr>
<td>Early 2008: Operators in Central &amp; Eastern Europe, Western Europe and Asia-Pacific</td>
<td>H2 2008: CEE and Asia-Pacific operators</td>
</tr>
<tr>
<td>H2 2008: Some Middle Eastern operators</td>
<td>Q1 2009: AT&amp;T, Latin American operators</td>
</tr>
<tr>
<td>H2 2008: Some Middle Eastern operators</td>
<td>H1 2009: Verizon Wireless, operators in CEE, Western Europe and Asia-Pacific</td>
</tr>
</tbody>
</table>

Source: Pyramid Research

In some regions, most notably Africa, India, China, Eastern Europe and Latin America, it is the netbook that can make mobile broadband bundling a mass-market phenomenon. During 2008, demand for netbooks in developed economies caused a shortage of Intel Atom processors and became one of the reasons for the late arrival of netbooks in emerging market. Although such operators as Vodafone Romania started selling notebook bundles in early 2008, meaningful uptake in emerging markets is starting only in 2009, when less expensive netbook models have arrived in sufficient quantities.

Netbook broadband bundles: The value of combining product and service

MNOs are the main providers of netbook bundles today, but other companies planning to offer netbook subscription PC packages include fixed-line providers, mobile virtual network operators and retail chains (such as Phone House/Carphone Warehouse and Phones4U) as well as OEMs (for instance HP, which is an MVNO in Japan).

The attraction of PC bundles for all of them is the ongoing customer relationship and the recurring revenue stream. For service providers, this means re-signing a customer to a new contract when the old one expires; for OEMs, replacing a netbook with a new model in 2-3 years’ time.

The potential entry of OEMs into the services space suggests that longer device replacement cycles, currently exacerbated by difficult economic conditions, are pressuring them to find new business models to sell PCs and other devices. For example, Apple has successfully been selling cheap iTunes tracks to support the
sales of millions of iPods. Similarly, OEMs could forego making high margins on
the broadband subscriptions but sell more netbook devices.

However, selling an attractive device in a bundle is not enough if its price is
above the affordability level. In emerging markets especially, cheaper devices
hold the most value to the subscribers. In India, for example, subscription PC
bundles have been available from all major broadband providers since 2007. The
high upfront prices charged on PCs, however, mean the bundles fail to generate
significant adoption, despite six months of free broadband access thrown into
the deal. Even the existing models of netbooks, sold at $450-500, are considered
prohibitively expensive.

The quality of the device matters, too. Several Indian operators started to offer
subscription computing with thin-client PCs in 2008. No upfront cost was
charged, and tariffs were set at $30 per month, enabling middle-income
subscribers to pay off the thin client in installments. Yet this subscription
computing offering failed to generate broad interest, this time because of
hardware limitations and poor customer experience. Operators believe that
when prices for current netbook models decline to the $200-250 level, they will
finally see a real change in the market.

Netbook and notebook bundles: Financial and operating impact

To assess the impact of launching a netbook bundle on a broadband provider’s
operating and financial performance, we modeled a scenario for a broadband
operator that sells broadband services and PCs directly. This scenario compares
the performance of netbook and notebook bundles with standard mobile
broadband subscriptions sold without a PC.

For this scenario, we used Pyramid Research’s subscription computing model to
analyze the following key performance indicators:

- The size of the incremental subscriber market for netbook bundles.
- The impact of netbook sales on the adoption of mobile broadband.
- The impact of netbook bundles on average revenue per subscriber
  (ARPS), total broadband revenue and operating margins.

The main assumptions used for the model are presented in Exhibit 14. Exhibits
15, 18 and 19 refer to the analysis of the above scenario. The assumptions are
based on the interviews and case studies of broadband providers conducted by
Pyramid Research during the past 18 months. It should be noted that most
operators offer netbooks as entry-level devices complementing high-end and
midrange notebooks. In this analysis, we focus on MNOs, but the conclusions also
hold for other providers.
### Exhibit 14: Key model assumptions for netbook and notebook bundles

<table>
<thead>
<tr>
<th></th>
<th>Standard broadband offering</th>
<th>Netbook bundles</th>
<th>Notebook bundles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device price</strong></td>
<td></td>
<td>$0</td>
<td>$480</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$800 for midrange (60% of all subs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$1,200 for high-end (40% of all subs)</td>
</tr>
<tr>
<td><strong>Broadband ARPS</strong></td>
<td>$30</td>
<td>$20</td>
<td>$30</td>
</tr>
<tr>
<td><strong>Monthly device charges</strong></td>
<td>$0</td>
<td>$15-20</td>
<td>$30-50</td>
</tr>
<tr>
<td><strong>Total subscriber spending</strong></td>
<td>$30 per month</td>
<td>$35-40 per month</td>
<td>$60-80 per month</td>
</tr>
<tr>
<td><strong>Take rate</strong></td>
<td>Assume 10% of the addressable market</td>
<td>Assume 10% of all new broadband subscribers choose a notebook PC bundle and 30% of all new broadband subscribers choose a netbook bundle</td>
<td></td>
</tr>
<tr>
<td><strong>Churn</strong></td>
<td>~2-3% per month</td>
<td>~1% per month</td>
<td></td>
</tr>
<tr>
<td><strong>Acquisition cost (subsidy only)</strong></td>
<td>$0</td>
<td>$0-100</td>
<td>$300-450</td>
</tr>
<tr>
<td><strong>Retention costs</strong></td>
<td>Assume the same:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Although bundle customers are likely to require higher level of support, most customer care calls are routed directly to the OEM’s call centers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additional cost</strong></td>
<td>Assume the same USB modem, marketing, activation and installation cost, although bundle buyers are likely to incur higher selling cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Pyramid Research*

### Adoption

At the current nascent stage of 3G market development, the main outcome of introducing netbook bundles is a significant boost to the adoption of mobile broadband subscriptions:

- The key benefits of a netbook bundle are that the mobile broadband subscriber base will grow more rapidly and that it will attract customers that an operator would not otherwise connect. Based on the results of the initial launches, we estimate that as many as 50% of new broadband customers choose netbook bundles; this ratio is even higher if the offering is the first in the market.
The take rate can be twice as high for netbooks as it is for notebooks. Factoring this into our model, by year five a broadband provider in the netbook bundle scenario would be able to connect 50% more customers than if no such offer were available, and 15% more customers than with two notebook bundles alone (see Exhibit 15).

- Regardless of the type of mobile PC offered in a bundle, in developed markets that have several subscription PC players only 5-10% of mobile broadband customers are completely new to a mobile operator’s network. Most bundle buyers are already using mobile voice and messaging services, so for operators, bundling is an opportunity to up-sell the mobile broadband plan.

- Equally important is the potential to steal these contract subscribers from competitors, especially if they do not offer such bundles.

We believe that netbooks combined with standardized mobile broadband offerings provide operators with an ideal tool in markets where fixed-line broadband still has only a marginal presence and where PC penetration remains low. The jury is still out, however, on the ability of netbook-broadband bundles to deliver an ongoing relationship with the customer.

**Exhibit 15: The impact of selling bundles on the broadband subscriber base**

![Graph showing broadband subscribers over years](chart)

Note: standard mobile broadband subscriptions sold without a PC

*Source: Pyramid Research*
Impact on churn

Like notebooks, netbook bundles are sold on contract terms of 12-36 month. Since the first bundles were launched as recently as 2008 and most subscribers are still tied into their contracts, voluntary churn cannot be measured yet, and most broadband operators are not yet able to assess the difference between netbook and notebook churn.

Generally, we expect buyers of netbook bundles to have higher levels of churn: Netbooks are more likely to be sold on prepaid mobile data plans, with USB dongles rather than embedded 3G modules, and often on shorter contract terms. All of this makes it easier to switch to a new service plan. At the same time, service providers are planning to use a subscription model similar to that of mobile phones, whereby a netbook will be replaced at the end of the contract term with a new — potentially more expensive — device and a new bundle subscription.

Selling netbooks with embedded 3G modules will help to address potentially higher churn levels.

While 3G USB dongles have been very successful in the market so far, they do not stop mobile broadband subscribers from leaving the mobile network and connecting the mobile PC to a fixed broadband service as their second home device. The sales of PCs with embedded 3G modems will curb some of this churn by making it more difficult to move to a new provider at the end of the contract term. The latter is the main reason behind the growing number of partnerships between OEMs and operators aimed at selling netbooks with mobile broadband embedded (see Exhibit 16 for examples of netbook models offered by MNOs in select markets).
## Exhibit 16: Netbook models on offer from MNOs in major markets

<table>
<thead>
<tr>
<th>Market</th>
<th>Operators</th>
<th>Netbook models on offer</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>AT&amp;T</td>
<td>Four models (Acer Aspire, Dell Mini 9, LG Xenia, HP Mini 1000)</td>
</tr>
<tr>
<td>Germany</td>
<td>T-Mobile</td>
<td>Seven models</td>
</tr>
<tr>
<td>Germany</td>
<td>Vodafone</td>
<td>Two models: LG X110, Samsung NC10</td>
</tr>
<tr>
<td>UK</td>
<td>T-Mobile UK</td>
<td>Two models</td>
</tr>
<tr>
<td>UK</td>
<td>Vodafone UK</td>
<td>One model: Dell Inspiron Mini 9</td>
</tr>
<tr>
<td>France</td>
<td>Orange</td>
<td>One model: Medion Akoya E1210</td>
</tr>
<tr>
<td>Spain</td>
<td>Telefónica</td>
<td>Two models: Eee PC 900, Eee PC 701, Compaq Mini 705</td>
</tr>
<tr>
<td>Spain</td>
<td>Vodafone</td>
<td>One model</td>
</tr>
<tr>
<td>Portugal</td>
<td>TMN</td>
<td>Four models: Eee PC, Acer Aspire One, Magalhães, Toshiba NB100-130</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Vodafone NL</td>
<td>One model</td>
</tr>
<tr>
<td>Poland</td>
<td>Polkomtel</td>
<td>One model (Samsung NC10)</td>
</tr>
<tr>
<td>Poland</td>
<td>Era PTC (T-Mobile)</td>
<td>One model: HP Mini Note 2133</td>
</tr>
<tr>
<td>Romania</td>
<td>Vodafone</td>
<td>Three models: Eee PC and Eee PC 904HD, Log’n’go Vodafone</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Vodafone CR</td>
<td>One model: HP Mini 2140</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Orange</td>
<td>One model: Asus Eee PC</td>
</tr>
<tr>
<td>Brazil</td>
<td>TIM</td>
<td>Asus Eee PC models</td>
</tr>
<tr>
<td>Singapore</td>
<td>SingTel</td>
<td>One model: Asus Eee PC</td>
</tr>
<tr>
<td>Singapore</td>
<td>StarHub</td>
<td>Two models: HP Mini, Dell Inspiron Mini 9</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Taiwan Mobile</td>
<td>W101 (own model)</td>
</tr>
<tr>
<td>China</td>
<td>China Mobile</td>
<td>Plans to offer as many as 20 models from all major netbook OEMs</td>
</tr>
<tr>
<td>India</td>
<td>Reliance Communications</td>
<td>Six models: Asus Eee PC 9” and 10”, Lenovo S9/S10 LeapPads, Acer Aspire One 9”, HCL Infosystems MiLeap MH04 10”</td>
</tr>
<tr>
<td>India</td>
<td>BSNL</td>
<td>Four models from HCL, Acer and Sai InfoSystems</td>
</tr>
</tbody>
</table>

*Source: Pyramid Research, operators*
ARPS: Lower for netbook bundles

A majority of operators offer the same tariff plans to broadband customers with or without a PC bundle and make no difference between notebooks and netbooks. As expected, however, a netbook buyer will typically choose a lower-priced plan and pay less on a monthly basis. In such CEE markets as Romania, for example, the mobile broadband monthly ARPU of a subscription PC customer for a bundle with a reasonably capped volume of data is as low as €10; in Western Europe, it stands at about €25.

Payment for PC devices in installments adds an additional component to the monthly bundle charge, which increases the total spending of netbook and notebook subscription PC subscribers to $30-60 per month. A netbook bundle subscriber will be paying on average 30-40% less than a notebook subscriber, making netbook bundles a more affordable and attractive proposition. See Exhibit 17 for a comparison of total monthly expenditures on different types of bundles, based on the assumption that financing is offered at an annual interest rate of 10% for a period of 24 months. In this scenario we assumed an average notebook price of $680 and average netbook prices of $200 and $400.

Exhibit 17: The impact of netbook and notebook bundles on subscribers’ total monthly expenditure

Note: This is based on the assumption that financing is offered at an annual interest rate of 10% for a period of 24 months.
Source: Pyramid Research

Because of their lower ARPS and despite their higher adoption levels, netbook subscription bundles will likely produce less revenue than notebook bundles (see
Exhibit 18). Note that in this example notebook and netbook revenue includes the monthly PC installments. Also, with notebook subscribers, especially business customers, the potential to generate additional revenue from value-added services such as hosting and managed services is greater. Revenue from value-added services is not, however, included in this analysis and could lead to even higher revenue for the notebook bundle scenario.

Exhibit 18: Total broadband revenue in three broadband service scenarios: netbook bundle, notebook bundle and stand-alone broadband

From a broadband provider’s perspective, however, the main advantage of selling netbooks is that unlike notebooks these low-cost devices require no subsidy. In Western Europe, netbooks are sold without any upfront payment, and their cost is amortized through higher monthly charges. T-Mobile UK, for example, charges £30 ($45) for netbook bundles, compared with £15 for a standard mobile broadband subscription. In some cases, service providers subsidize the interest rates of the financing. Eliminating the upfront fee gets rid of the largest barrier to the PC purchase and can even create an illusion of buying a “free PC,” which serves as a powerful marketing tool.

Generally, we find that operators have no margins on PC sales and outsource their support entirely to OEMs. Since netbooks require no subsidy, they will generally deliver higher operating margins than notebooks (see Exhibit 19). In our scenario analysis, over a five-year period, operators connect a larger number of netbook bundle customers with slightly higher operating margins than notebook bundle customers, leading to a significant difference in operating margins.
By and large, operators prefer to sell netbooks directly to customers, avoiding an additional payment to resellers.

An additional potential advantage of selling netbooks comes from the direct-sales model. With rare exceptions, such as T-Mobile in Europe and mobile operators in the UK, which sell netbooks extensively through distributors, most MNOs sell netbooks directly from their own shops or online, partially because the small size of netbooks allows inventories to be kept in the stores. This saves the operators commission fees, lowering the cost of subscriber acquisition. Selling netbooks through their own stores also gives operators the opportunity to charge an installation fee for connecting the device to the network.

In conclusion, netbooks are the most attractive device for mobile broadband providers at the current stage of the game, which is about aggressively expanding the market and grabbing market share. Growth in mobile Internet subscriptions — boosted by bundling — has been strong, and the market is still far from mature. In emerging markets, the number of mobile subscribers using data other than messaging is still only 10-15% (see the case study on emerging markets below).

Rapid growth in mobile broadband services will also give operators an opportunity to expand and market notebooks through distributors and value-added resellers. A number of other opportunities for delivering pure mobile broadband connectivity are also being considered, including the following:
• Resale of mobile data services through third-party providers, including OEMs, that already take care of all post-sales customer care. In March 2009, the Japanese arm of Dell launched an MVNO in Japan. Its initial plans involve selling embedded-HSPA notebooks at prices starting at $500, but netbooks might be included in its device portfolio at a later date.

• Sponsored access, similar to existing Wi-Fi hotspots.
CASE STUDY: Low-cost netbooks in emerging markets

Netbooks have had only a small impact in emerging markets to date. While a $500 price tag might look cheap for consumers in wealthier economies, it remains too expensive in markets like India, where the average annual PPP-adjusted income is as low as $2,920. The arrival of $200 netbook models is awaited eagerly, and it is these devices that are expected to make a proper dent in the PC and broadband penetration rate in the next five years.

Due to significant gaps in incomes between the top and bottom income quintiles in emerging markets, vendors will be able to sell inexpensive netbooks as low-end devices to socioeconomic segments A, B and C (high-end and middle-class buyers), and as high-end devices to the D and E segments (bottom of the income pyramid).

<table>
<thead>
<tr>
<th>GDP per capita (US$ at PPP)</th>
<th>Brazil</th>
<th>Russia</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC penetration</td>
<td>26.1%</td>
<td>26.3%</td>
<td>3.7%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Broadband penetration</td>
<td>6%</td>
<td>4.4%</td>
<td>0.5%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Internet user penetration</td>
<td>36.9%</td>
<td>32%</td>
<td>5.3%</td>
<td>16.1%</td>
</tr>
<tr>
<td>Mobile broadband penetration</td>
<td>0.6%</td>
<td>0.8%</td>
<td>0.16%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note: All penetration ratios are percentages of the total population.
Source: EIU, Pyramid Research

The arrival of $200 netbook models is awaited eagerly, and it is these devices that are expected to make a proper dent in the PC and broadband penetration rates in the next five years. BSNL in India, for example, already offers a desktop PC with an LCD monitor for $280, discounted by 7-12% on average, and even this price is still perceived as high. There is a general consensus that bundle prices must be reduced to $20-25 per month for demand to pick up. For rural areas, the inflection point is nearly 50% lower, at $10-15 per month.

This year (2009) will be the first when netbooks will lead to higher growth in broadband subscriptions. In all, a little more than 1.1m netbooks were shipped to these four markets in 2008 — about 8% of the global netbook total. In 2009, Pyramid Research estimates that this total will rise to 4.2m, nearly a quarter of all shipments of mobile PCs in these four countries and 18% of forecast netbook sales globally (see Exhibit 21).
Within the next year, MNOs will become the largest netbook distribution channel.

Only in the second half of 2008 did BRIC market telecom providers start offering netbook bundles, but we expect MNOs to become the largest netbook distribution channel by 2010.

- In Russia, netbook bundles are now provided by the largest mobile provider MTS, while a WiMAX challenger, Yota, has just introduced Samsung’s NC10 WiMAX netbook. The machine will, however, retail for almost $600. Even without operator sales, netbooks as a share of total mobile PC sales shot to about 19% in Q4 2008, a number we forecast will grow to 30% in 2009.

- In China, netbooks have so far been sold primarily through retailers or OEMs. However, mobile operators are about to make an entrance. The largest mobile service provider, China Mobile, is preparing to introduce as many as 20 models of TD-SCDMA netbooks from all major OEMs, priced at $300-600. Similarly, China Telecom and China Unicom are planning to bring in netbooks to sell with their WCDMA and CDMA-EVDO broadband service plans.
MOBILE BROADBAND FOR THE MASSES: THE CASE FOR BUNDLED NETBOOKS

While every effort has been taken to verify the accuracy of this information, Pyramid Research cannot accept any responsibility or liability for reliance by any person on this information.

In India, netbooks were launched in October and November 2008 and are sold by several large service providers. A dozen models from Asus, Acer, HCL Infosystems and Lenovo are currently available. Demand for broadband is on the rise, manifested in the recent upswing in sales of data cards, and the government is preparing to award 3G licenses this year. Most operators agree that if affordable netbooks are made available, they can now generate more interest in bundles than a year ago. We believe that starting in 2011 India will join China in leading the adoption of mobile subscription computing, with BSNL, MTNL, Reliance Communications, Bharti Airtel and Tata Indicom competing with bundled offerings.

In Brazil, TIM became the first operator to offer netbooks by partnering with Asus to offer a bundle with an unlimited broadband plan. Asus recently announced that it will produce its Eee PC models locally to benefit from the government’s local manufacturing fiscal incentives and avoid high duties on imported electronic components. Local OEM Intelbras is partnering with Intel to make its own netbook model, and other local leading vendors such as Itautec and Positivo are expected to announce netbook releases in 2009. We expect that bundling of netbooks and mobile broadband will gain momentum in Brazil toward the end of 2009 and early 2010 when MNOs Vivo and Claro enter the market for mobile subscription computing with competitive offerings.

Netbooks sales are not without problems. In such markets as Russia and India, the growth of the mobile channel will be slowed by delays in 3G network deployments. Indian authorities have not yet issued 3G licenses, and the spectrum is still not available in the Russian capital, Moscow, where most of the country’s large businesses and wealthy consumers are based.

Whereas in developed markets netbooks are purchased as a second home PC, in the BRIC markets they are becoming popular among small-business users. Pyramid Research expects that the introduction of $300 netbooks in such markets as India will lead to 20% growth in PC sales.

In the business-as-usual scenario, Pyramid Research forecasts that mobile broadband penetration will increase four-fold over the next five years in all four BRIC markets. We expect three-quarters of all netbooks to be sold through operators.

2.3 Netbook Internet bundles: Long-term value and VAS

Creating value with netbooks: What comes next?

While the netbook is an attractive device in this period of market expansion, operators need to ask themselves what will happen when the initial 2- and 3-year contracts with subscription bundle buyers expire in 2010 and 2011.

Purchased thanks to their low prices, netbooks do have a number of drawbacks, from limited computing capacity to small screens and keyboards as well as a lack of embedded 3G modules. All these shortcomings will come to light at the time the device needs to be replaced, and many OEMs are already aware of the potential problems. Asus, for example, benefitted greatly from the launch of...
the very first 7-inch Eee PC model, yet recently it admitted that the smallest form factor does not sell well and decided to focus on selling 8.9- and 10-inch netbooks.

Returning to the results of the mobile broadband PC survey Pyramid Research conducted in late 2007, we find that end-user responses indicated that PC hardware needed to support entertainment usage scenarios (see Exhibit 22). Such support is limited on netbooks.

**Exhibit 22: PC hardware features that notebook buyers intend to use often**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Respondents intending to use feature often</th>
</tr>
</thead>
<tbody>
<tr>
<td>External microphone</td>
<td></td>
</tr>
<tr>
<td>Mobile broadband</td>
<td></td>
</tr>
<tr>
<td>Built-in microphone</td>
<td></td>
</tr>
<tr>
<td>Video camera</td>
<td></td>
</tr>
<tr>
<td>Bluetooth</td>
<td></td>
</tr>
<tr>
<td>Wi-Fi</td>
<td></td>
</tr>
<tr>
<td>Headphones</td>
<td></td>
</tr>
<tr>
<td>Watch high-quality video</td>
<td></td>
</tr>
<tr>
<td>Burn DVDs</td>
<td></td>
</tr>
<tr>
<td>Burn CDs</td>
<td></td>
</tr>
<tr>
<td>Built-in speakers</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Pyramid Research MBPC survey, 2007*

This means that operators will need to be very aware of potential problems at the time of renewal and be prepared to address them. As the initial contracts expire, service providers will be able to choose from several approaches to renew the subscriptions.

The first step for operators will be to conduct a thorough business review and get to know their customers in order to pick the appropriate course of action. The optimal strategy will depend on the composition of the subscription PC subscriber base. Options include the following:
• Competing on price and selling the next bundle at a lower price. With this strategy, operators should be prepared to lose those customers for whom the quality of the device is more important than the cost. This approach is likely to work for connecting new first-time users and the most cost-sensitive customers.

• Using a PC subscription model in which a netbook is replaced with a new one when the contract expires. This sales model has been used by Neuf Cegetel to sell Easy Gate PCs to students in France and by Telefónica O2 to sell its “Computer Solutions” bundles to business customers in the Czech Republic. However, this sales model is not very familiar to customers and requires a new approach from the sales force — as well as customer education, which will translate into additional marketing and customer acquisition costs.

• Upgrading to a higher-cost notebook model. A future notebook will need to address a specific personal need that is not currently captured by netbooks, and thus connect with a user. An example would be an advanced music notebook for a music lover. This means that OEMs will be under more pressure to produce higher-standard — but not necessarily much higher-priced — next-generation notebooks.

• Differentiating through value-added services and up-selling broadband subscriptions. We will consider this option in more detail.

Netbooks and VAS potential

Despite much talk about the need to pick a route different from that of fixed-line Internet service providers, which face plummeting prices for broadband connectivity in commoditized markets, there is no sign that mobile operators have managed to find a different business model.

Connectivity remains the main source of growth in the mobile broadband business, and just as with fixed-line broadband, unlimited (or practically unlimited) Internet browsing at a flat monthly rate is the main mobile pricing model offered today. Prepaid daily and monthly access pricing plans are also gaining popularity; T-Mobile UK recently stated that it sees prepaid as the leading model for mobile broadband connectivity.

It might take a couple of years before the need to focus on value-added services (VAS) emerges, but it should set MNOs on a path of searching for ways to make money from such services on mobile PCs. Will netbooks allow operators to make money beyond the flat fee? Consider the existing content categories and their suitability for a netbook:

• Sales of music and video content: Mobile operators have had limited success selling multimedia content, and netbooks, with their limited disk space, won’t change that.
• **Hosted content:** Every cloud has its silver lining. Without much storage, netbooks provide a new opportunity in the hosted applications space. This means hosting the content as well — photos, films, music and other multimedia. More significantly, it includes an opportunity to provide hosted applications for business customers, especially SMEs. In the scenario described on page 33, an increase in netbook ARPS across the entire subscriber base of a mere $1 will result in a 1.5% improvement in the operating margin.

• **Mobile gaming:** Mobile gaming is an insignificant revenue stream in the case of mobile broadband notebook users, and on today’s netbooks it is virtually non-existent. However, in future, with the introduction of models with high-definition screens and graphics processors such as Nvidia’s ION, gaming might become a feasible application among typical netbook users — teens, tweens and students.

A netbook for every family: Implications for mobile network traffic

The impact of large-volume sales of netbook bundles on traffic is another important question asked by operators. While revenue from VAS is not guaranteed, operators might see extra costs result from an explosion in traffic caused by the delivery of mobile broadband services:

• In our interviews, Western European operators noted that while the potential for data usage on a netbook is much greater than on a smartphone, there was no difference in mobile data usage between netbooks and notebooks. Thus, the main impact will come from the growing number of netbooks in use.

• With the netbook being an Internet-centric device, mobile operators are facing a potential traffic explosion similar to that on the fixed-line Internet. The combination of iPhones, USB dongles and mobile videos are already driving traffic growth on top-tier mobile networks in mature markets at rates of 10-15% per month.

Amid this threat, there are also positives to the sale of netbooks instead of notebooks:

• Due to the restricted disk space, a netbook user is less likely to engage in the most disruptive type of downloading, such as BitTorrent.

• For rural customers, the netbook could be the primary PC. It will be used primarily at home, but not exclusively so (see Exhibit 23).
Most netbooks will be used during evenings and weekends, helping operators manage network traffic loads.

Exhibit 23: Intended usage locations of mobile broadband PCs

- Last but not least, a majority of netbook users today are consumers, which means the traffic load on mobile networks will be heavier during evenings and weekends. This is good news for mobile operators, which want to avoid congestion or service quality issues affecting its business customers during the day.
Section 3: The netbook opportunity

3.1 The global size of the netbook opportunity

As our analysis in Section 2 indicates, faster and wider adoption of broadband services is the foremost advantage of netbook bundles. In this section, we assess the size of the overall broadband opportunity in terms of netbook sales on a global and regional level, as well as the potential for netbook sales through fixed and mobile operator sales channel.

Pyramid Research’s proprietary subscription computing forecasts estimate the global opportunity for sales of portable PC devices at prices starting at $450-500. We have expanded these forecasts to provide a breakdown of notebook and netbook unit sales at the country level and evaluate the potential growth of broadband services that will result from the introduction of sub-$350 netbooks (which we call “ultralow-cost netbooks” in the analysis below).

Netbooks and adoption of broadband

Most importantly, ultralow-cost netbooks improve the affordability of PC bundles by reducing the upfront payment for a PC, in some cases to zero, and bringing down monthly fees for bundled services to $20-25 per month. We expect that this lower price threshold will attract a new set of customers and expand the addressable market, particularly in emerging markets. In Central and Eastern Europe, for example, during the mobile broadband PC trials conducted by Pyramid Research, Microsoft and the GSM Association in 2007, we established that nearly 40% of all respondents — each representing a single household — considered monthly broadband prices above €25 (~$36) too expensive.

The main assumptions behind our forecast of netbook bundle adoption are as follows:

- We expect incremental adoption of netbook-broadband bundles based on gross broadband subscriber additions in 2009-2014. In addition to first-time broadband subscribers, who represent the largest target market for PC bundles, we expect that existing broadband customers will also be attracted by bundle deals.

- In order to estimate the number of new broadband subscribers, we use the take-up rates provided by service providers that have already launched notebook and netbook bundles in their respective markets. These take rates will vary by technology, reaching as high as 20-23% for mobile broadband (3G and WiMAX) in 2013-2014, and hovering lower, at 10-20%, for wireline technologies such as DSL and FTTH. We have seen very few PC bundle offers from cable providers and expect that uptake among them will remain lower than for ADSL- and fiber-based providers.
We assume that there will be some cannibalization of netbook and desktop subscription bundles by netbooks. The main reason behind this assumption is that netbooks have already started to replace both types of PCs in operators’ portfolios. Desktops will continue being part of subscription PC bundles, thanks to their full suite of features and affordable prices; however, netbooks bundled with ADSL, fixed WiMAX, cable modems and FTTH will be replacing some entry-level desktop models. In the US, AT&T, for example, currently offers netbooks discounted by as much as $400 to subscribers of a combination DSL-wireless service plan priced at $70 per month.

Generally, we find that the economic downturn makes it difficult to gauge the impact of netbooks on high-end notebook and desktop sales. Dell and HP, the two largest OEMs, claim they see no cannibalization of notebooks by their netbook models. Both posted poor results in the fourth quarter of 2008, with declining unit sales and revenues from portable PCs; yet, both insisted that a general market downturn is the main reason behind the results.

The performance of Intel in Q1 2009 seems to confirm this view: The chip maker reported that its revenue from Intel Atom microprocessors and chipsets was down 27% on Q4 2008. Even accounting for seasonality, this was a striking difference from the previous four quarters of strong growth, suggesting that notebooks and netbooks have been equally affected by the downturn.

The main conclusions of our forecast are as follows:

- Total sales of netbook bundles will reach 132.6m in 2014, growing at a compound annual growth rate (CAGR) of 88% over the next five years (see Exhibit 24). This compares with a forecast of a 24% CAGR for notebook bundles and a 19% CAGR for desktop bundles. Altogether, 155m bundles will be sold by operators in 2014, up from about 4.5m sold in 2008.

- Netbooks already outsell notebooks for those operators that offer bundles. We expect that many will be offering only netbooks to their mass-market customers, limiting the sales of notebooks to businesses and high-end subscribers. Thus, we forecast that sales of netbook bundles will surpass notebook bundles by early 2010 and account for 87% of all bundle sales in 2014 (see Exhibit 25).
By 2014, emerging market operators will sell 58% of all netbooks.

Source: Pyramid Research

Exhibit 24: Netbook, notebook and desktop bundled sales totals, 2008-2014

Source: Pyramid Research

Exhibit 25: Bundle sales breakdown by type of PC, 2008-2014

Source: Pyramid Research
• During the forecast period, operators in emerging markets will become an increasingly important channel for netbook sales, accounting for 58% of the total in 2014, up from 12% in 2008. This is largely due to operators in India and China, which are expected to sell more than 40m netbook bundles in 2014.

Exhibit 26: Netbook bundle sales in emerging and developed markets, 2008 and 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Developed Markets</th>
<th>Emerging Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>2014</td>
<td>42%</td>
<td>58%</td>
</tr>
</tbody>
</table>

Note: In Asia, China and India are counted as emerging markets, while the rest of Asia-Pacific countries are included among the developed markets.

Source: Pyramid Research

• We expect that new sales of broadband subscription bundles resulting from launching sub-$350 netbooks will reach 35.9m in 2014, just over 5% of the global fixed and mobile broadband net additions in the same year (see Exhibit 27). These ultra-low cost devices will account for 30% of total bundles sold in 2014, from about 9% expected for the full year 2009.
Exhibit 27: New sales of netbook bundles as a percentage of total broadband net additions

By 2014, more than half of all netbooks will be sold through operators.

Source: Pyramid Research

3.2 Sales of netbooks through the operator channel

Mobile network operators have long waited for a functional and affordable portable PC model that would unleash mass-market demand for 3G mobile Internet access. Although today MNOs represent a completely new channel for the sales of mass-market mobile PCs, OEMs are increasingly relying on them to raise the level of PC penetration, especially among lower-income consumers who see the value in spreading the acquisition cost of a PC to 24 or 36 months.

Globally in 2008, operators sold only 2% of all PCs in bundles. As operators' openness to and interest in bundles grows, so will the size of the channel. We forecast that by 2014, 54% of all netbooks will be sold through operators, compared with about 13% of notebooks.

Exhibit 28 shows our forecast for sales of netbook and notebook bundles. The majority of these sales will be made by operators themselves, as most currently prefer to sell directly through their own stores, online shops and call centers. However, there are some exceptions, notably the UK, where retailers account for more than 80% of total portable PC sales today. Not all notebooks and netbooks sold by UK retailers are in fact sold as part of bundles: Many customers buy a device and a subscription from separate retailers.

Sales of netbooks through the MNO channel will depend heavily on the availability of models with embedded broadband modules. Many sub-$350 netbooks will continue to be sold through retail channels without embedded 3G to keep down the cost. We expect that most sub-$350 netbooks will be sold
without embedded mobile broadband in the short to medium term, which means that mobile operators will continue selling them with USB modems.

Mobile operators will not be alone in benefitting from this opportunity. In 2009, fixed operators, led by such players as Telmex, will sell one-third of all PC bundles, but by 2014 their share will have declined to 17%.

3.3 The future of netbooks

We conclude that the single most valuable proposition of netbooks lies in expanding the addressable market and the number of users of broadband Internet service in general and mobile broadband in particular. In order to achieve the success that we believe netbooks are capable of, however, they will require support from the major PC and mobile broadband industry players. While it comes in abundance from some quarters — namely from manufacturers in Asia and from service providers globally — the support among the largest OEMs is still half-hearted.

Our view on the market potential of netbook bundles and the size of the operator channel is optimistic. In addition to the positive impact on affordability discussed above, additional considerations speak in favor of netbooks:
- **Sales volume potential**: A netbook is a more personal device compared with a notebook or a desktop: One netbook can be purchased for each person in a household, as opposed to one desktop per home. This brings the potential for netbook sales closer to the volume of mobile handsets, of which 1.2bn units were sold in 2008, than to the volume of notebooks and desktop PCs, which combined sold about 290m units the same year.

- **Demand for netbooks in certain consumer segments is strong**. Simply put, no other device currently caters to the need for a cheap, portable and Internet-enabled PC among children, students and first-time Internet users. Smartphones and high-end notebooks are simply not the right device for this group of buyers. Equally, we do not expect to see large-volume mass-market sales of thin and slim notebooks in emerging markets due to their higher cost.

We do not see much potential in netbooks as a platform for value-added services. We expect that plain vanilla browsing of the Internet and basic office applications will remain the main applications deployed on these devices. But this is by no means an impenetrable barrier to the growth of netbook adoption. For sure, with their small screens and keyboards, netbooks are not the right device to support the nine hours of daily browsing to which many users in developed market have grown accustomed. However, a couple of hours of Internet access is much more than many potential netbook buyers in emerging markets currently get and will be of significant value to them.

Instead, netbooks are a great entry-level mobile PC platform and can become a stepping-stone to the purchase of a more powerful notebook at the replacement stage in 2-3 years time. For this, operators will need to maintain good knowledge of their customers to facilitate the migration of first-time users to higher-value plans.

Multicolor personalized netbooks are also changing the attitude of mass-market customers toward mobile computing devices. Dull, gray and expensive laptops will no longer work for the average consumer, and OEMs should be aware of this when the time comes to up-sell to current netbook users.

In conclusion, we believe that netbooks merit more attention from OEMs and mobile operators alike. Many other questions deserve additional examination, including the impact of netbook sales on notebooks, desktops and smartphones; the affordability of netbook bundles in specific countries; and the market potential of delivering managed services and cloud computing to small businesses. Clear understanding of changes in the mobile Internet value chain and the mobile computing ecosystem is a prerequisite for success in the world of mobile broadband service.
Related resources

Recent reports and other products from Pyramid Research

Europe to See Huge Growth in Mobile Broadband Services despite Recession
Telecom Insider published May 2009
More than 10.7m new mobile broadband connections were added in Europe in 2008, compared with 6.5m in 2007. We believe that in spite of the economic slowdown, mobile broadband adoption will continue to grow relentlessly across This Telecom Insider analyzes the growth potential of mobile broadband computing in Europe, focusing on the three main factors affecting adoption: Networks, user devices and pricing. It looks in detail at the four markets that best represent the different regions of Europe: Poland, Russia, Spain and the UK.

Mobile Broadband Computing Services: Complement or Substitute for Fixed Broadband?
Research Report published March 2009
This report examines mobile broadband services enabled by 3G and WiMAX networks on a global, regional and market-by-market basis, focusing on service plans offered for computing devices (mainly netbooks, laptops and MIDs). It assesses the positioning of mobile broadband relative to fixed alternatives, helping to identify the best strategies for both developed and emerging markets. Built on extensive case studies, the report provides a five-year outlook on mobile broadband computing trends, including subscriber numbers, penetration levels and revenue expectations.

Emerging Opportunity: Boom Times Ahead for Mobile Broadband in Africa & Middle East
Telecom Insider published April 2009
The launch of 3G services in much of Africa and the Middle East means that its Internet market is now on the brink of a similar makeover. We expect the subscriber total to increase at a CAGR of 33% to reach 32.2m by 2014, but mobile broadband will generate only a modest 5% of total mobile revenue regionally by 2014. This report looks at the use of mobile broadband as an Internet access technology for PCs, identifying the factors that affect adoption in markets across the region. It focuses on three key markets: South Africa, Morocco and Saudi Arabia.

Mobile Data Forecasts, Q1 2009
Forecasts published March 2009
Updated on a quarterly basis, our Mobile Data Forecast products provide complete pictures of demand trends for 81 geographical markets worldwide. The Excel output includes five years of historical data and five years of market projections for metrics such as penetration, mobile subscriptions (by type of package, by operator or MVNO and by network technology), users of specific data services (SMS, music, etc.), MOU, ARPS (by operator, by subscription type, by service, by application) and revenue (by messaging and non-messaging applications). The Forecasts are based on extensive field research and use a consistent methodology, aiming to capture the total spending on mobile data services in each market.

Mobile Advertising in Emerging Markets: Market Trends and Strategies for the Third Screen
Research Report published February 2009
Leading operators are pushing a variety of advertising methods, from sponsored messaging and alert services to more sophisticated content over mobile portals, and mobile advertising will markedly boost mobile data service revenue. This report looks at mobile advertising initiatives and the revenue potential in emerging markets, with a particular emphasis on Brazil, China, India, Indonesia, Mexico, Romania, Russia, South Africa and Turkey. We also put our findings in context by making comparisons with global trends and developed markets, such as the US and UK.

Mobile Financial Services in Africa: The Business Case for Operators and Banks
Research Report published January 2009
The use of mobile devices to pay for goods and services has been held back in most markets, but mobile payments are having a more penetrating impact in poorer economies than in mature ones, with market dynamics that are starkly different, especially in Africa. In this context, new business models have emerged that are transforming the financial landscape in developing countries. This report reviews and analyzes mobile financial services offerings in African markets, looks at drivers and obstacles to mobile financial services, breaks down business models to assess their true bottom-line impact, and provides market projections based on intrinsic market dynamics.

Capex in Asia-Pacific: Driven by 3G in China, Spending to Rise Despite Global Downturn
Telecom Insider published February 2009
This report analyzes the drivers that make investing in infrastructure imperative for operators in Asia-Pacific, economic downturn or not. It puts the revenue generated in Asia into a global context and looks at the plans for future Capex in both developed and emerging markets in the region. The report also discusses vendors and which ones will gain market share during these trying times. Three case studies, on NTT Docomo, China Mobile and Bharti Airtel, focus on the Capex plans of the main players in Japan, China and India, providing metrics such as Capex as a percentage of service revenue.
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