

# The Mobile Internet Transformation

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# I. Introduction

In the past year, the mobile industry has witnessed a major market transition. For most of its history, the dominant applications have been voice and SMS. Now, we are seeing a rather dramatic acceleration in mobile data services, and in some geographies, we are seeing anywhere from a 400% to 800% year-over-year increase in traffic. This growth is being driven by 4 major trends:

1. There is rapid growth in **high speed mobile broadband services** based on HSPA, EV-DO, and WiMAX.
2. New devices have emerged to consume this bandwidth, including dongles on laptops and a **new generation of smartphones**—mobile computers, really—of which the iPhone is the first instantiation.
3. We are seeing a host of **new Web 2.0 applications**, many of which have made the transition from the wired world (e.g., Google Maps, YouTube).
4. We are seeing the positive market impact of operator **flat rate all-you-can-eat data plans**, usually with fair use restrictions. While this easily-understood billing model has accelerated consumption of and revenue for mobile data services, mobile operators are equally cognizant of the need to become more than bit pipe providers, and are actively sourcing solutions to help them deploy and monetize differentiated, premium services.

These 4 trends have created a “perfect storm” in the mobile world. Staying ahead of these trends will present major infrastructure and business challenges for today’s mobile operators.

This paper provides an overview of the mobile industry and the changes that occur as the industry starts to scale up their networks to address the coming wave of data traffic. Also discussed are the impact of new devices, new Web-based applications, and the move toward flat-rate billing plans. Lastly, the paper examines the major implications for service providers’ business, specifically capacity constraints, service control, and monetization of services.

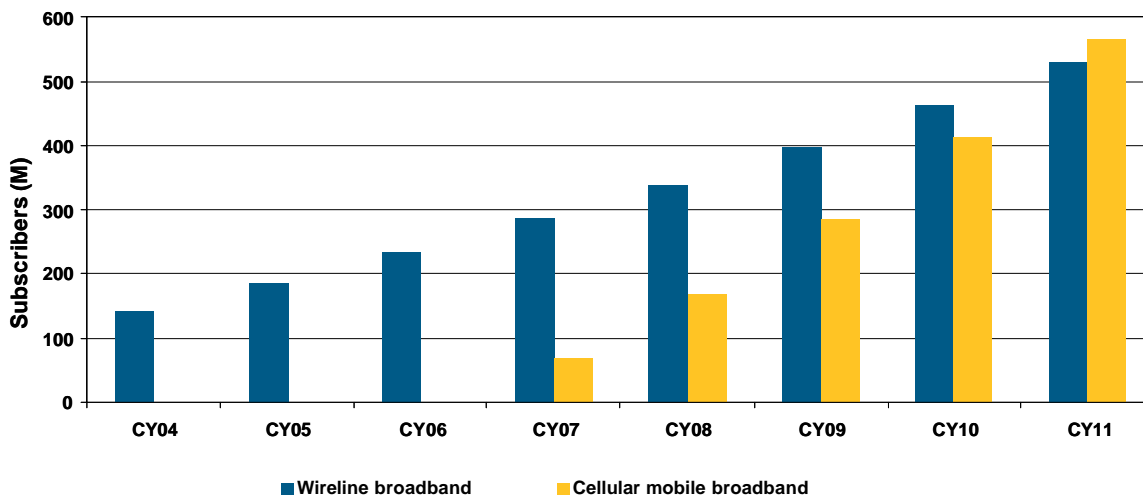
## II. How the Mobile Internet Is Changing the Industry

### A. Mobile Broadband Is Overtaking Wireline Broadband

According to Infonetics Research’s *Mobility: Broadband, Phones, Subscribers, and Services* biannual worldwide market share and forecasts report, released 9/19/08, worldwide wireline broadband subscribers reached 287 million in 2007, and cellular mobile broadband subscribers are just getting started with 67 million (not including WiMAX). However, through 2011, cellular mobile broadband subscribers will quickly catch up with and even overtake wireline broadband subscribers, with an expected total mobile subscriber base passing 5 billion by 2011. The trend is for mobile broadband subscribers to outnumber wireline broadband subscribers in the long term (e.g., 2015–2020). See Exhibit 1, below, for specific subscriber numbers and growth.

Mobile broadband is driven by the rapid rollout of HSPA (high speed packet access) networks, and their ability to support spectral efficiencies of 1bit/s/Hz or greater has given the world a radio access network suitable for high speed data. At last count, there were over 200 HSPA networks worldwide, and that number keeps growing. The trend will accelerate even faster when OFDMA-based technologies such as WiMAX and LTE reach significant penetration rates.

**Exhibit 1** **Subscribers:**  
**Worldwide Wireline Broadband vs Cellular Mobile Broadband**

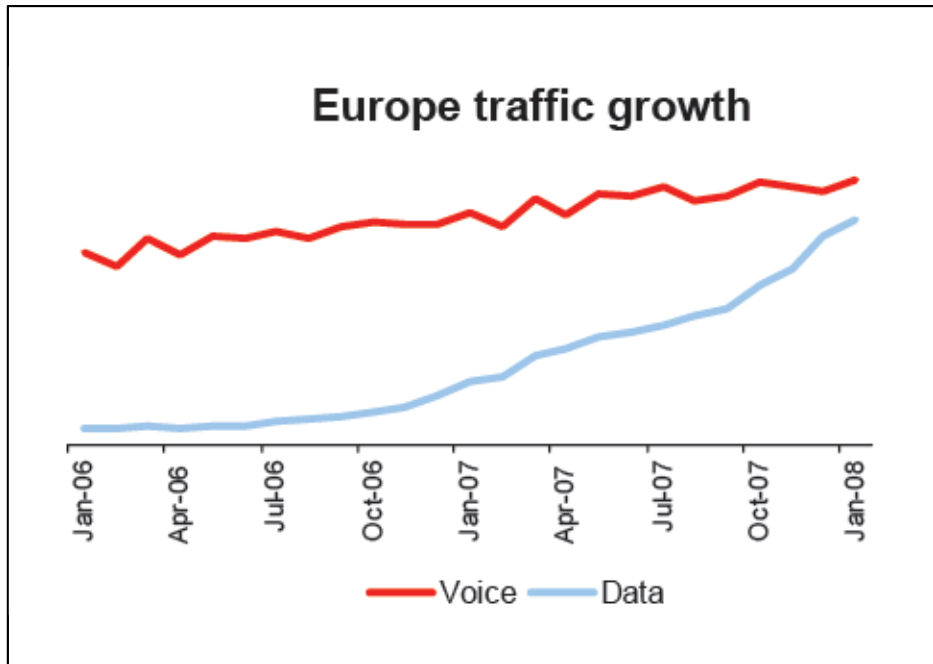


Source: Infonetics Research, Inc., Fixed and Mobile Subscribers annual worldwide market forecasts October 29, 2008

Mobile operators around the globe have been reporting a tremendous acceleration in data traffic. The mobile data traffic growth of Vodafone Europe shown in Exhibit 2 illustrates this trend. Much of this growth has been driven by traditional Internet applications like e-mail, video, MP3 download, Web browsing, presence, gaming, instant messaging, and social networking.

**Exhibit 2**

**Vodafone's Traffic Growth in Europe**

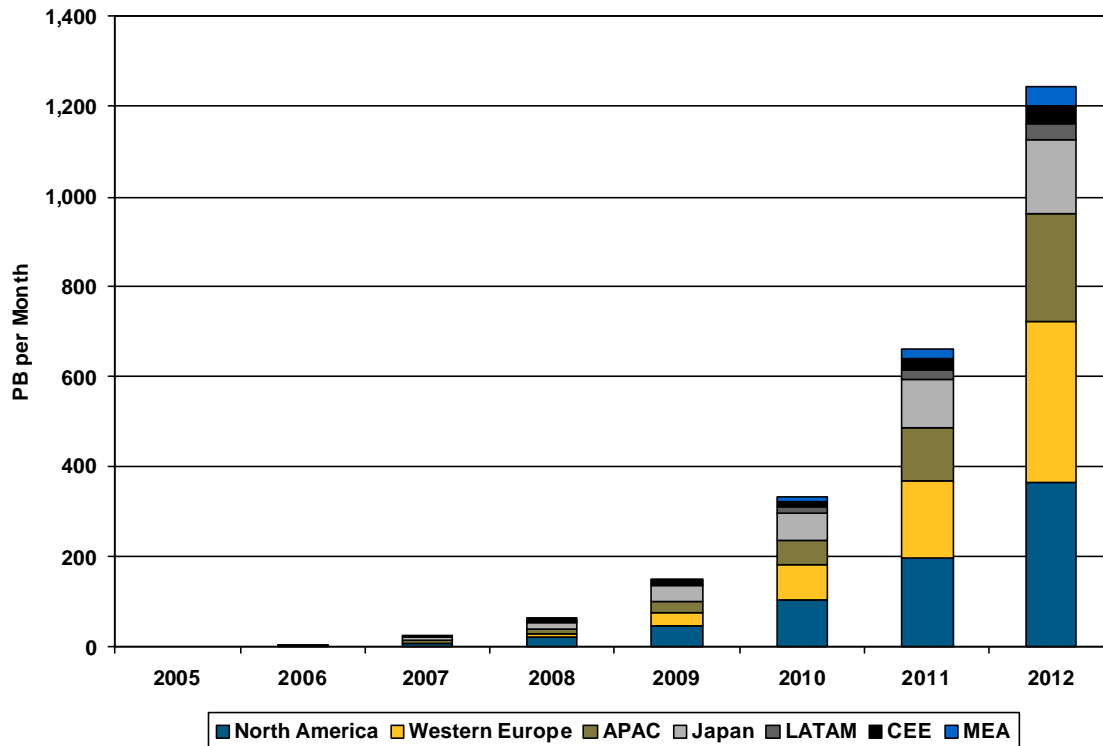


Source: Vodafone

A new era of innovative Web-based applications will continue to feed this “perfect storm,” and put additional pressure on existing network architectures.

Forecasting the future is always a bit challenging, but Cisco's Visual Networking Index (Exhibit 3), based on a mix of Cisco's own research (data collected directly from major service provider networks) and independent analyst forecasts, predicts that mobile data traffic will grow at a 120% average year-over-year rate over the next 4 years. Other forecasts are predicting even higher growth rates.

**Exhibit 3 Mobile Data and Internet Traffic Forecast, 2006–2012**

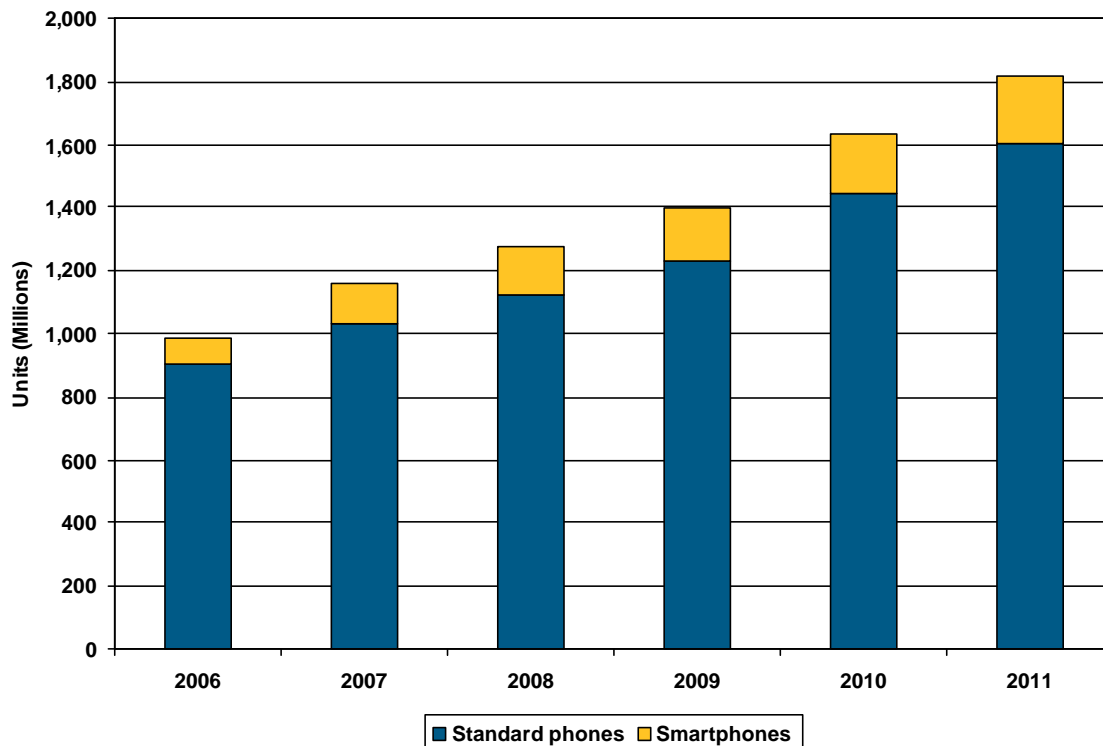


Source: Cisco

## B. New Mobile Devices Are Changing the Game

The introduction of commercial HSPA-based services and the initial traffic surge has largely been fueled by dongles on laptops, but the real surge in mobile data traffic will come when all the new data-friendly devices hit the market. These devices, which can be considered mobile computers, have the capability to consume enormous amounts of bandwidth. The Apple iPhone showed the world what could be done with a small battery-powered device and an elegant, user-friendly interface—even on a 2G network. Now platforms from Microsoft, RIM, Symbian, and Google are already being rolled out to challenge its position. Exhibit 4 illustrates how smartphones are cutting into the mobile phone market. The smartphone market is forecast to top 150 million units in 2008, and reach 5-year total of over 800 million units between 2007 and 2011. Favored brands such as RIM's BlackBerry and Apple's iPhone are outperforming the market overall.

**Exhibit 4** **Worldwide Mobile Phone Unit Shipments**



Source: Infonetics Research, Inc., *Mobility: Broadband, Phones, Subscribers, and Services* biannual worldwide market share and forecasts, released 9/19/08

Early indications are that favorable billing plans, strong user interfaces, innovative application ecosystems, and a compelling Web browser result in these devices putting almost as big a load on the network as laptops.

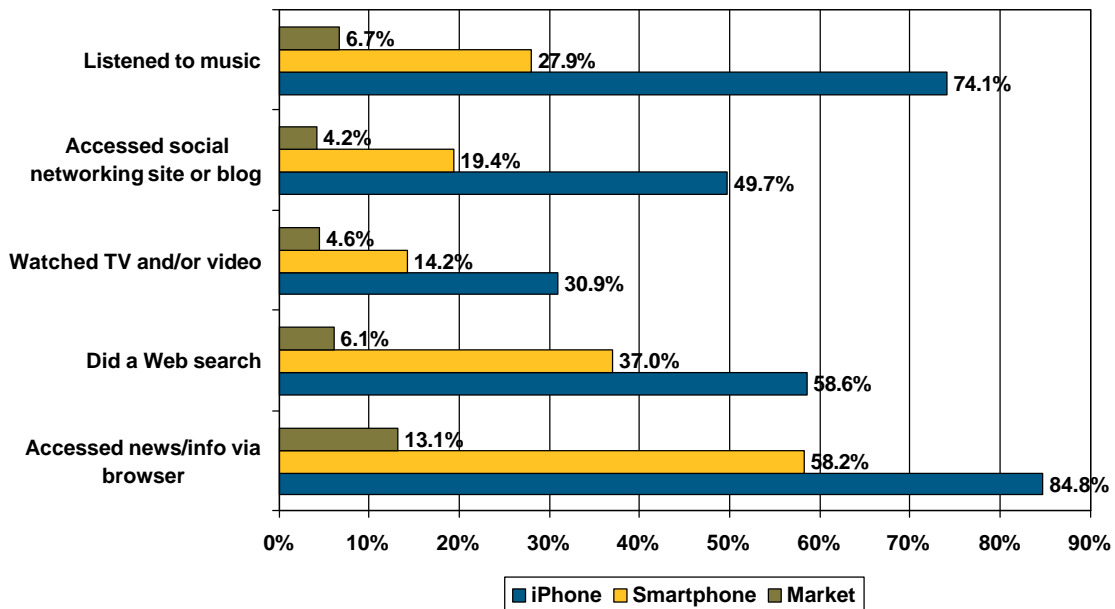
The Apple iPhone is the world's first smartphone that functions as a true mobile computer with a full Web browser and compelling user interface, and was the clear catalyst for a revolution in the device space. The success of Apple's iPhone has spawned a huge wave of innovative touch-screen mobile devices from manufacturers around the world over the past year, providing consumers with a multitude of options such as Samsung Electronics' Instinct, LG Electronics' Dare, and the HTC G1 running Google's Android software. RIM is a very strong player here as well, and has a wave of new high-end devices hitting the market.

### C. Web-Based Applications Are Being Used by These New Devices

Six months after the iPhone's US launch, the device had already changed the mobile landscape. According to M:Metrics, by January 2008, the iPhone was already the most popular device for accessing news and information on the mobile Web, and 85% of iPhone users used it to access news and information.

As illustrated in Exhibit 5, M:Metrics found that a staggering 30.9% of iPhone users used the device to watch mobile TV or video; this is almost double to rate for all smartphone users, and the market average is just 4.6%. Social networking is also popular among iPhone users: 49.7% accessed such a site in January 2008. Twenty percent of iPhone users accessed Facebook, one of the very first social networking sites to customize its content for the iPhone.

**Exhibit 5** **Mobile Device Usage**



Source: M:Metrics

As of October 2008, Nielsen estimates that there are 3.6 million mobile subscribers ages 13 and over actively using the Apple iPhone. The expansion of the iPhone universe is set to continue. As of Q3 2008, one in five subscribers (21%) who intend to upgrade their device in the next 12 months say they'll consider purchasing an iPhone next, which is up from just 15% a year prior.

This data represents a major change for an industry that has been dominated for many years by voice and SMS. iPhone applications and widgets are driving mobile content consumption; for example, M:Metrics reported that iPhone widgets for Google Maps and YouTube are extremely popular. And there is no lack of new applications popping up from the Web 2.0 community; the Software Development Kit issued by Apple was downloaded more than 100,000 times in 4 days, suggesting that many more applications will appear soon.

#### **D. Unlimited Mobile Data Plans Driving Mobile Broadband Services**

To stimulate user adoption, early mobile data plans have been of the all-you-can-eat variety, often with generous fair usage quota limits. These easy-to-understand billing plans have encouraged users to access their favored applications via mobile devices without fear of billing surprises, and thus have contributed greatly to the accelerated growth in mobile data usage. This pricing trend continues, although operators are beginning to look for ways to deploy intelligent network capabilities such as flexible policy management and charging, deep packet inspection, and subscriber and application awareness solutions that enable them to offer value-added, differentiated services over and above existing core mobile data services.

### **III. Implications for Service Providers' Business**

#### **A. The Mobile Internet Forces Business Transformations**

The iPhone, G1, and the new wave of mobile devices are proving that mobile users are willing to pay more for a compelling experience. However, today's mobile Internet is a closed, non-interoperable, tightly-controlled environment unlike the open, interoperable, innovative Internet, with its huge vendor community and creative business models.

With the growth of the mobile Internet, users expect an "Internet everywhere" experience, whether using their laptops, handsets, or other mobile devices. This has challenged mobile operators with moving orders of magnitude more traffic for an order of magnitude lower cost per bit. This represents many business model challenges for operators, including how to cost-effectively scale their networks while increasing their capital and operational costs while at the same time maintaining attractive profits.

Opportunities for mobile operators will include enhancing the user experience based on providing quality of service (QoS), location-based services (LBS), contextual information, access to billing records, and other features such as search and social networking. In the near future, widgets and

mash-ups will be added. For users accessing enterprise applications, mobile operators will be tapped to provide mobile VPN services, unified communications, Web conferencing and collaboration, and other applications requiring stringent security.

## B. The Mobile Internet Drives Infrastructure Upgrades

To cope with this traffic surge, mobile operators will have to:

- **Monitor asset utilization:** despite the boost provided by HSPA, mobile network utilization stands at around 20% on average in Europe, reaching 50%–60% in the busy major cities (e.g., Bonn, London, Paris), and even higher rates in Scandinavian capitals. As data traffic continues to accelerate, these networks will soon be overwhelmed.
- **Increase RAN capacity:** most of the early HSPA adopters have upgraded to 7.2M, and are currently moving forward with 14.4M upgrades to be completed by the end of 2008 (e.g., Vodafone); 28.8M commercial trials are already on the agenda for 1H09.
- **Leverage both licensed and unlicensed spectrum:** the mobile Internet will need a lot more airlink capacity, and technologies such as WiFi and femtocells (small cellular base stations that reach indoor users more cost effectively) are expected to play a major role. With more than 70% of mobile users accessing services indoors, these technologies are expected to be very popular.
- **Upgrade the backhaul:** data-driven increases in traffic are prompting mobile operators to move toward fiber-based backhaul in major metro areas, and microwave backhaul in less densely populated areas. Ethernet is seen as the preferred link layer technology regardless of the physical layer. Legacy technologies can be supported over carrier Ethernet using pseudowire technology.
- **Deploy more powerful gateways:** the growth in data traffic means that mobile gateways need to move onto high-end edge routers. Forward-looking operators are already dimensioning their network for 30K per provisioned user. This number will certainly go up as new radio technologies emerge. When you multiply these numbers by the number of provisioned users on a gateway, the number easily reaches into several tens of gigabits.
- **Optimize routing of data traffic that reduces latency and lowers cost:** legacy equipment such as Radio Network Controllers (RNCs) and Serving GPRS Support Nodes (SGSNs) that are not responsible for the processing of packets should not be in the path of data traffic. The goal is to route data on a single tunnel from the base station directly to the mobile gateway.

- **Deploy intelligent service enablement and control:** with the acceleration of mobile broadband, operators can avoid becoming bit pipe providers by deploying intelligent networking solutions that enable service control, subscriber and application awareness, content classification, flexible billing, content filtering, fair use quota enforcement, policy-based control and enforcement—and thus be able to deploy and monetize premium and personalized services. Additionally, such intelligent networking investments will allow operators to develop business relationships with over-the-top (OTT) and other third-party application developers and thus have a positive impact on operator revenues. These partnerships will enable operators to provide a wider range of services to customers and to reduce the cost of creating and launching services.

In addition to helping mobile operators face the rising tide of mobile data usage, these infrastructure investments are also essential in advance of the evolution to all-IP architectures such as LTE (as specified by 3GPP).

## IV. Conclusions

The mobile industry has witnessed a major market transition that is shaping up as a perfect storm, transforming mobile operator networks into a mobile Internet and causing significant changes in traditional mobile business and technical metrics. The tremendous acceleration of data traffic is putting a great strain on mobile networks. This acceleration is being driven by fast networks, powerful new devices, compelling applications, and an initial billing model based on flat-rate billing. Operators have significant challenges ahead in cost effectively scaling up to meet this challenge. The question that arises is: are service providers prepared to translate this into an opportunity, or will they be swept away by the storm?

The good news is that help is on the way. For example, powerful new mobile packet gateways that can scale up into the tens of gigabits in performance are now available and can deliver performance even while providing additional features such as content inspection and policy enforcement. Carrier Ethernet is the perfect solution for backhauling data traffic from base stations. Some RAN vendors are talking about the need to backhaul 200M–300M in LTE deployments in the not-too-distant future.

The radio domain is probably the toughest area to scale cost effectively. The answer here for operators may well be to additionally leverage other technologies like femtocells, which offer terrific spectral reuse, and WiFi, which is inexpensive, widely deployed, and has lots of (unlicensed) spectrum.

Building the mobile Internet will require a very different approach to building networks. It will require that RAN vendors work closely with IP vendors to deliver the necessary technology. Despite the growing demands on the network infrastructure, the mobile Internet offers operators new ways to monetize their mobile networks to translate the investment into revenue.

In addition to requiring solutions that can scale to meet ever-increasing traffic volumes and bandwidth, operators must enhance the user experience, and provide intelligent value-added IP services and features. These services include QoS, anti-virus, parental controls, security, tiered service bundles, flexible billing, targeted advertising, personalization, and many other competitive features. As the Internet goes increasingly mobile, operators must transition to flat-IP, “decentralized” architectures and intelligent networking solutions in order to enter this new world of rich services.

## About Infonetics Research

Infonetics Research ([www.infonetics.com](http://www.infonetics.com)) is an international market research and consulting firm serving the communications industry since 1990. A leader in defining and tracking emerging and established technologies in all world regions, Infonetics helps clients plan, strategize, and compete more effectively.

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