



---

## **Disruptive Analysis**

---

*Don't Assume*

---

# **Adoption of HSPA and mobile broadband access in the enterprise market**

---

**October 2007**

## Contents

<b>1</b>	<b>Executive Summary and Introduction</b>	<b>3</b>
1.1	Background to HSPA	4
1.2	Current status of enterprise mobility	4
<b>2</b>	<b>An evolutionary path – HSUPA and HSPA Evolved</b>	<b>6</b>
2.1	Benefits of mobile broadband	6
<b>3</b>	<b>Usage cases for Enterprise HSPA</b>	<b>8</b>
<b>3.1</b>	<b>Key applications</b>	<b>9</b>
3.1.1	Internet and email	9
3.1.2	Intranet and VPN access	10
3.1.3	Line-of-business applications	10
3.1.4	Converged communications	10
<b>4</b>	<b>Enterprise HSPA devices</b>	<b>12</b>
<b>4.1</b>	<b>Device categories</b>	<b>12</b>
4.1.1	Laptops / notebooks	12
4.1.2	The role of connection manager software	13
4.1.3	Smartphones and other mobile devices	13
4.1.4	Fixed wireless HSPA applications	14
<b>4.2</b>	<b>HSPA Notebook Data Cards, Embedded 3G and USB Modems</b>	<b>14</b>
4.2.1	Introduction	14
4.2.2	Selling HSPA products vs. HSPA services	15
4.2.3	Testing and conformance	15
4.2.4	USB modems	16
4.2.5	Summary	17

<b>5</b>	<b>Selling HSPA to enterprise</b>	18
<b>5.1</b>	<b>Market segmentation considerations</b>	18
5.1.1	Organisation size band	18
5.1.2	User type / departmental and functional group	19
5.1.3	Industry vertical	20
<b>5.3</b>	<b>The HSPA value chain</b>	21
5.3.1	The value chain: role of System Intergrators and outsourcing companies	21
5.3.2	Remote access providers	21
5.3.3	The role of partners and the operator's own affiliates	22
5.3.4	The Smart Pipe model	22
5.3.5	The branding and differentiation paradox	23
<b>5.4</b>	<b>Addressing enterprise concerns</b>	23
5.4.1	Total cost of ownership	23
5.4.2	Pricing points	24
5.4.3	Support issues	25
5.4.4	Management and control	25
5.4.5	Security integration	26
5.4.6	Network coverage and capacity	26
5.4.7	Coexistence of HSPA with other networks	27
5.4.8	Application integration and support	27
<b>6</b>	<b>Conclusions and recommendations</b>	28

## 1. Executive Summary and Introduction

The rapid rollout of HSPA services around the world is enabling the provision of true mobile broadband for both consumer and business users. However, while consumer broadband is often a convenient and simple standalone proposition, the sale of HSPA services into the corporate market is much more complex. This paper has been written by Disruptive Analysis (and commissioned by the GSMA) as a means of discussing the benefits of HSPA Mobile Broadband to business users, and assisting mobile operators in selling into that audience. It covers:

- The key HSPA applications and usage cases, which are driving adoption of faster wireless access among company employees.
- Realistic ways that uptake can be accelerated by operators, positioning it within the most attractive target enterprise segments, in terms of industry, functional group and company size.
- Ways that operators can ensure that HSPA is 'packaged' to meet businesses' stringent IT purchase requirements.
- Why HSPA – and its later evolutions – represent a pivot point for wider adoption of corporate use of mobile data, extending beyond the few select mobile email users, to a much wider audience of PC-based professionals.
- Technical, marketing and distribution challenges that operators may face in offering HSPA, especially in selling and supporting 3G-embedded laptops
- The complex sales avenues for reaching corporate mobility purchasers, the evolving roles of mobile operators and systems integration houses
- Evolution from, and integration with, existing remote access technologies.

### It should be read by:

- Mobile operators wanting a clear and pragmatic insight into the realities of enterprise mobility deployment, and the applications and segments driving the next waves of HSPA adoption.
- Enterprise IT and network planners looking to understand how HSPA can assist their mobility and remote access strategies, as well as enhancing productivity and 'reachability' of their end users.
- Mobile device and software vendors wishing to understand better the dynamics and value chain of the mobile broadband market.
- Application developers, both inhouse and independent, looking to embrace the potential benefits of wide-area mobile connectivity within their solutions.
- Systems integrators and IT services firms looking to identify partnering, consulting and training opportunities related to mobile broadband.
- Regulators, investors and consultants tracking the evolution of cellular services and enterprise mobility.

### Among the paper's highlights are:

- Segmental analysis of enterprise HSPA markets, starting on Page 18
- Devices: embedded 3G laptops vs. USB modems vs. data cards, on Page 12
- Thoughts on the new, emergent mobile broadband value chain on Page 21

The report was written in mid-2007, on the basis of a range of specific interviews conducted with industry representatives, plus ongoing general mobile market coverage by Disruptive Analysis. The opinions and conclusions expressed are those of Disruptive Analysis Ltd. alone, and do not represent official GSMA viewpoints.

## 1.1 Background to HSPA

HSPA comprises HSDPA, HSUPA and HSPA Evolved (eHSPA, or sometimes HSPA+), defining the migration path of UMTS / WCDMA operators worldwide. HSDPA stands for High-Speed Downlink Packet Access. It is an enhanced version of 3GPP's initial 3G (third generation) mobile telephony communications standard WCDMA. Sometimes referred to as 3.5G, it allows cellular operators to offer much greater download speeds and also enhances the total capacity of the network. Peak theoretical bandwidths of 1.8, 3.6, 7.2 and 14.4Mbps are supported. HSUPA is the Uplink enhancement, offering increased peak uplink speeds from 384kbps now, and ultimately up to 5.7Mbps. These technologies have been adopted by operators worldwide, with over 74 having deployed HSDPA service at 1.8Mbit/s and over 47 now boasting 3.6Mbps. There are also a few which support 7.2Mbps and others that are 14.4Mbps-ready. HSUPA has already been launched in some markets and is expected to become much more prevalent during 2008.

In some ways, HSPA delivers on many of the original expectations of WCDMA, which had originally been hoped to offer speeds of up to 2Mbps (384kbps is more typical 'in the real world'). It also improves other characteristics of the earliest 3G variants, for example through a reduction of latency; important for real-time applications or even just greater responsiveness while web browsing.

Although it is given its full name in this document, most operators are expected to market the service to customers as 'Super 3G', 'Turbo 3G', 'Mobile Broadband' or similar terms.

## 1.2 Current status of enterprise mobility

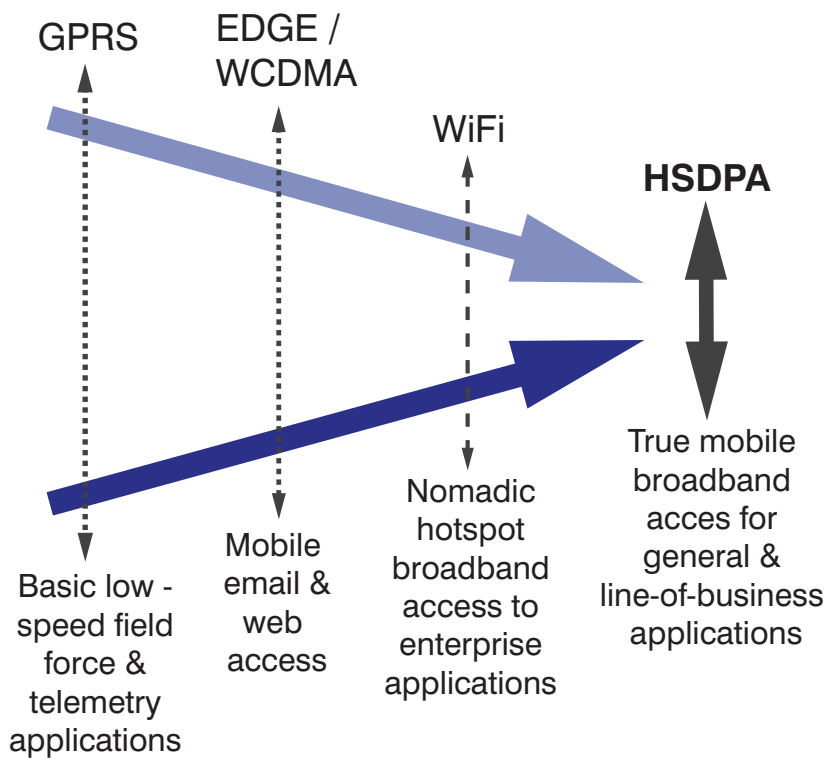
Until fairly recently, it was not possible for businesses to provide their employees with easy-to-use and cost-effective wide-area mobile broadband access. There have been limitations in terms of network speed and coverage, devices, and of course, cost. While GPRS is ubiquitous, it is really too slow for anything except specific applications designed for low data rates, such as email access, telemetry, or field employees' form-based uses. Its limitations in terms of cost, latency and bandwidth stopped it being a general-purpose connectivity medium for PC-based applications. Similarly, WiFi has constraints; while it is very good for 'nomadic' hotspot use, it falls down where the user needs full mobility. It has also frequently suffered from rampant overpricing by local monopoly providers at key locations, lack of joined-up partnering, and cumbersome log-in procedures. WiFi security has also been a key concern for enterprises.

But in recent years, wide area, high-speed mobile usage has become progressively more feasible, with the ongoing evolution of the 3G UMTS family of technologies, building on the foundations of GSM and GPRS. Starting in 2004, data cards using WCDMA started to become available. While these early variants of 3G were a distinct improvement on their 2G predecessors, they still had limitations in terms of outright performance, coverage and service costs, which tended to restrict them to a relative handful of users. Now that the next evolutionary step to HSDPA has occurred, the economics and performance are right for deployment to a much wider base of knowledge workers across the enterprise landscape.

It is also important to recognise that in parallel with the network infrastructure development, it has been necessary for businesses themselves to evolve their internal perspective of the benefits of mobility. In particular, it has taken a long time to move beyond narrow deployments of email devices and simple field-force applications, to a situation where companies can build more generic mobility business cases, for a broad cross-section of employees. This, in turn, has been

assisted by the evolution of web-based and 'service-oriented' application architectures, which have reduced the need for mobile users to support multiple pieces of client software, many of which have not historically been optimised for remote usage. Brought together, the evolution of mobile networks to 3.5G and beyond, coupled with improvements on the IT side of enterprise mobility, should ensure mobile worker productivity is enabled much more broadly.

**Figure 1: Convergence of wireless technology & maturity of enterprise mobility usage**



Source: Disruptive Analysis

## 2. An evolutionary path – HSUPA and HSPA Evolved

For many operators, HSDPA is just another step on the ongoing evolutionary path of 3G UMTS, standardised by industry body 3GPP. In particular, the next version of the technology, HSUPA (High Speed Uplink Packet Access) is just starting to be rolled out with 6 operators already offering service and more to follow from late-2007 onwards. This offers a much higher upload speed for users, suitable for an additional range of usage cases, such as high-speed telemetry, uploading large files or images, and wide usage of real-time digital CCTV monitoring.

Beyond HSUPA, further developments are planned over the next 2-5 years, principally HSPA Evolved (sometimes called eHSPA or HSPA+) and then Long Term Evolution (LTE). At the same time that peak radio-access bandwidth is increasing, there are also parallel developments in the core of the network that will also impact performance, as well as lower the cost of service delivery.

### 2.1 Benefits of mobile broadband

The evolution of 3.5G technologies like HSPA is substantially changing the user experience for mobile workers. Although various forms of remote access have been available for many years, and WiFi has significantly improved the situation, full mobility (and guarantee of access) still remains a complex and hit-and-miss affair, which is often costly to support and administer. Most travelling business users will recognise the pain of battling with a recalcitrant WiFi connection manager, or network-access credit card payments that fail for some mysterious reason.

Deployment of HSPA should help to fix many of the frustrations with the current approaches to network access on-the-move:

- **Service ubiquity.** While WiFi hotspots or hotel ethernet connections are increasingly valued by business users, they are still far from uniform. Not all rooms in a venue may have coverage, and some sites suffer from downtime or limited customer support. WiFi roaming agreements are patchy. As HSPA networks roll out, users should find a considerably higher probability of service availability when and where they need it. It is also worth noting that international availability is much more widespread for HSPA than is the case for the competing CDMA EV-DO standard.
- **Full mobility.** Although much laptop use is 'nomadic', there are occasions when full mobility is needed. Checking a client's website in the back of a taxi, on the way to a sales meeting. Accessing corporate databases while on a train. While some public transport systems are adopting WiFi, it is often slow and unreliable and capacity is shared with many other users. Full cellular connectivity enables these types of usage scenario to be maintained while genuinely 'on the go'.
- **Cost.** While certain locations offer free or cheap WiFi, many do not. Some airports, conference centres and hotels charge exorbitant fees to their captive audiences – as much as \$40 a day is common in parts of Europe. Some of the new 'capped' or 'flat-rate' data plans for HSPA enable considerable savings to be made, especially for regular domestic-country travellers.
- **Convenience and user experience.** Mobile workers (and consumers) value convenience above almost all else. A single 'extra click' or 10 seconds setup time can reduce regular usage and satisfaction of a function. HSPA-enabled laptops and dedicated connection software can enable an easy and 'instant-on' mobile experience, especially compared to hunting for a suitable WiFi access point, then entering security keys or long complex passwords.
- **Easier onsite access at client sites.** While increasing numbers of companies offer wireless or ethernet 'guest access' to visitors, this typically requires login details to be obtained each time;

perhaps with limitations on which applications can be used. Technical support is often patchy. Access to wireless broadband via HSPA means that these problems can be avoided.

- **Security.** Although WiFi security is now considerably more reliable than in the past, especially on an enterprise's own premises, there remain concerns, for example with 'rogue' or fake access points. There may also be problems with using certain VPN software.
- **Control and reimbursement.** Many WiFi hotspots and fixed-ethernet connections still mandate local sign-up, via a combination of vouchers, credit-card payments, hotel room charges or other mechanisms. Collecting, managing and reimbursing a variety of individual electronic and paper-based receipts is time-consuming and cumbersome, and gives employers great difficulty in assessing their overall connectivity costs. Centralised purchasing of

mobile access improves oversight and accountability, and lowers administrative overhead for both the user and accounting teams.

- **Backward compatibility.** All 3G datacards and modems also support 2G GPRS/EDGE access. This provides an automatic 'fallback' (and session continuity) where the user is out of 3G coverage or roaming in another country. While WiFi is also obviously usable as a fallback, it will often require a new connection to be opened (and often paid for separately), resulting in the loss of any ongoing data session.

Taken together, mobile broadband and especially HSPA confers some compelling advantages for many use cases. This is not to say that it will replace WiFi, or that it is without its own challenges, as later sections discuss. It is, however, indisputably becoming part of the remote-access mobility mainstream.

## 3. Usage cases for Enterprise HSPA

For operators looking to market mobility solutions more effectively to enterprises, it is critical to understand the typical deployment scenarios in which mobile broadband may be used. The advantages described above are not universally applicable – within a given company, different sets of employees will have very different ‘profiles’ of mobility – where they go, how they work, what applications they use, and how much their time/productivity is worth.

Eventually, companies may decide to deploy wireless connectivity for true ‘general purpose’ use, in the same way they provide PCs or mobile phones to their employees, without having a specific single ‘purpose’ in mind. But most of the market for wide-area wireless data is not yet at that level of maturity; companies will typically have certain specific applications and usage cases, and will look specifically for solutions that fit with those initiatives. Mobile access to email by executives

has long been a classic example of this, as has the use of real-time fleet tracking or the capture of parcel delivery details.

More forward-thinking companies may be prepared to reassess certain core business processes around new capabilities like enhanced mobility. In these cases, operators can work to evangelise the possible benefits of HSPA-enabled laptops or other devices, although typically this will have to again be within the context of particular business improvements. While some of a company’s networking / IT staff involved in purchasing and business analysis may be appropriate to address with the specifics of HSPA technology, a more high-level pitch has to start with the generic benefits of mobile broadband rather than taking a stance on a particular technology.

Mobile Application	Typical Company type	Typical Employee type	Current solution	Future solution
Internet & email access	All	Senior executives, sales marketing & professional ‘knowledge worker’ staff	2G/3G cellular handheld device (eg BlackBerry) or laptop using WiFi and ethernet	1 or 2 devices equipped with HSPA mobile broadband plus maybe WiFi & other connections
Intranet & VPN	Finance, high-tech, professional services, FMCG government & public sector	Sales & marketing, onsite customer service, consulting & professional staff	Mostly notebooks WiFi and ethernet remote-access solutions for ‘nomadic’ usage	Always-on HSPA mobile broadband plus 2G & WiFi as fallback options
Line of Business Applications	Utilities, manufacturing, some finance, retail	Field worker, engineer, specialist sales & customer service	2G or offline devices with limited capability, eg PDA, EPOS terminal.	HSPA should enable richer applications & greater worker productivity
Telematics / in-vehicle systems	Retail & distribution, utilities, public safety, transport	Driver, field worker, public safety personnel	GPRS, TETRA or private radio systems	HSPA for high-speed innovative applications, plus GPRS, TETRA or GSM-R in other situations
Network backup for branch offices / disaster recovery	Finance, retail, public sector	IT / network administrator	ISDN, frame relay or leased-line fixed connections	HSPA enables safe & fast redundancy for occasional use
Converged Communications	High-tech, finance, media, self-employed, public sector	Frequent travellers, execs, collaborative teams, ‘techies’	Mix of WiFi, 2G, PC-based VoIP, some Internet-based (eg Skype), some corporate solutions (Cisco, Avaya etc)	eHSPA & LTE should enable VoIP & full unified comms over mobile broadband linked to corporate telecom systems plus inhouse WiFi

The 'vision' of fully-mobile corporate workforces, all with notebooks or smartphones using HSPA, may be unrealistic in the short term, since we are still in the relatively early stage of the technology adoption cycle. However, there are already examples of certain companies equipping their organisations with the technology. These include consulting firms which have outfitted their entire professional workforce with 3G connectivity for CRM, others launching FFM (field force management), and further firms employing primary and redundant wireless backup for mission-critical data applications.

For most companies, it is probably better to focus on extending the reach of mobile broadband within them, from the corporate VIPs, down to the next tier of management or other well-defined groups such as sales teams, service depts, customer care, etc. Then, over time, as productivity and other benefits become demonstrated, and prices of hardware and service provision fall, companies should look to gradually extend the penetration of HSPA (or its successors) through the organisation.

## 3.1 Key applications

### 3.1.1 Internet and email

Unsurprisingly, the lowest common denominator for corporate HSPA users – especially on notebooks – will be generic Internet access, for general web purposes and email. Delivery of large documents to travelling employees such as presentations, manuals or brochures via email is made easier (and sometimes cheaper) with mobile broadband. Most remote workers also need fast and reliable Web access for researching clients, booking or checking in for travel, or accessing corporate services like web-based mail.

In many instances, it is desirable to dip in and out of Internet access on an ad-hoc basis, in a variety of locations, rather than for an hour or a day in a fixed WiFi hotspot: it might pay off for a salesperson to do some last-minute browsing of a client's website in the taxi to the meeting; a

traveller stuck in traffic on the way to the airport may wish to stop at the roadside to reschedule his flight. Given the rapid pace of web evolution, the mere emergence of high-speed, ubiquitous mobile broadband access to the Internet is spawning a new array of innovative services and content. Although the focus of Web 2.0 applications has been for consumer usage, the business equivalent of social networks are becoming important, as are external web communications platforms like blogs.

An example is London-based HSBC, one of the world's largest banking and financial services organisations. HSBC's main objective was to enable its mobile sales force and other corporate users to connect to bank systems from anywhere. The company was looking to untether its mobile sales force, which either had to dial in from home or return to a bank branch to connect to the network. This travel time was eating into the time that could be spent servicing customers.

HSBC provided more than 4,000 users with mobile broadband service, utilising a variety of laptops with Option Wireless PC cards running on the Vodafone UMTS/HSDPA network. With real-time access to documents and sales tools, salespeople could close deals on location, rather than returning to the office to draw up agreements and potentially losing the sale. It is thought that having access to the technology also projected a favourable impression of HSBC as a company.

One additional benefit of the UMTS/HSDPA cards was to enable HSBC's IT team to update anti-virus signature files over the air, eliminating the need for sales people to visit an office to update their security.

## 3.1.2 Intranet and VPN access

Many larger companies now have extensive intranets; portals for their employees covering everything from expense claims, to HR procedures, to internal repositories of product information. A significant number also permit employees to use VPNs to 'tunnel' into corporate applications like email servers, sales or CRM databases, or their own desktop-accessible files and documents. By adding speed and reducing network latency, HSPA facilitates this type of access – especially for applications that are sensitive to 'roundtrip times' in sending data across a wireless network.

Taken together, email and Internet/intranet access account for the vast bulk of today's mobile workers' needs, especially those using laptops rather than more task-specific devices for field workers. In many ways, this reflects the fact that most traditional corporate applications like ERP (enterprise resource planning systems, such as SAP or Oracle) were not originally designed with mobility in mind. Over time, however, this is changing progressively, as developers factor-in remote workers explicitly to their programs.

## 3.1.3 Line-of-business applications

The previous section primarily considered 'out of office' access to applications that a user would normally have on his or her desktop PC. While there is huge scope for these to continue to evolve, there is also an entirely separate class of mobile-specific applications, or perhaps mobile-specific modules attached to existing solutions. Clearly, these will vary widely according to the individual's job function and the type of company. An insurance assessor will have very different software needs to an oil pipeline engineer, or a hedge-fund manager.

Tailored sales and marketing approaches will be needed to position HSPA for such different segments. It is probable that operators will need to engage with – or

partner – myriad different ISVs (independent software vendors) and VARs/system integrators, to extol the benefits of wireless working. In many cases it will be necessary to involve consulting professionals to help with business process redesign, or perhaps rework applications, to make them more 'wireless-friendly'.

An important trend in recent years has been a move to web services-based software architectures. For many corporate applications, it is now possible to connect via a browser and secure network connection, rather than relying upon a dedicated client on the user's PC. Having a 'web front end' simplifies many of the problems that have dogged remote-access mobile working in the past, especially as the additional middleware servers can make the applications more tolerant of disconnections or high latency than they are when run 'natively' on the end-user's PC. All of the major enterprise IT application-server providers have embraced this approach (IBM, Oracle, BEA, Microsoft and so on), and it is part of a wider trend in enterprise IT, as it moves towards 'services-oriented architectures' (SOA).

## 3.1.4 Converged communications

HSDPA and its evolution, HSUPA, also bring in the possibility of conducting high-quality, real-time session based communications and conversational services; especially involving voice or video. Some enterprises have already bought into the vision of "unified communications", tying together VoIP, messaging and multimedia conferencing. Some even going as far as high-definition telepresence. Others already use softphones on their laptops to connect over WiFi, enabling them to access the resources of their company's IP-PBX telephony system.

Although many operators still perceive VoIP as a threat, it could also represent a major opportunity in the corporate market. Carriers with solution sales and integration capability could take a broader, holistic view of enterprises' entire communications requirements

(which increasingly includes some form of VoIP), and look to gain an increased share of total spend, rather than focusing on narrower per-minute voice traffic metrics. It is notable that many fixed carriers such as BT have been quite successful with this type of IT/managed-service led strategy in the wireline domain, and it seems reasonable to extend the philosophy into mobile.

Some operators could therefore look to try and sell hosted or IP centrex-based VoIP-over-3G services, looking to substitute or complement PBXs. Others that have 'solutions' business units may find that they can make a better business case from assisting firms that want to control their own VoIP infrastructure: consulting, integration and ongoing operations management may offer greater profits than basic voice traffic. Others may see VoIP as an opportunity to upsell corporate users with higher-performance guarantees on their HSDPA / HSUPA connections. Still others may permit VoIP-over-3G with

the expectation of selling additional services enabled by 'capability exposure'; such as presence or location information, for example.

In any case, future versions of mobile broadband like LTE will be all-IP, so VoIP will become mandatory at that point anyway. Given that, it may well make sense for operators to explore the opportunity of adding value through IP now, creating "voice 2.0" services in the short term.

# 4. Enterprise HSPA devices

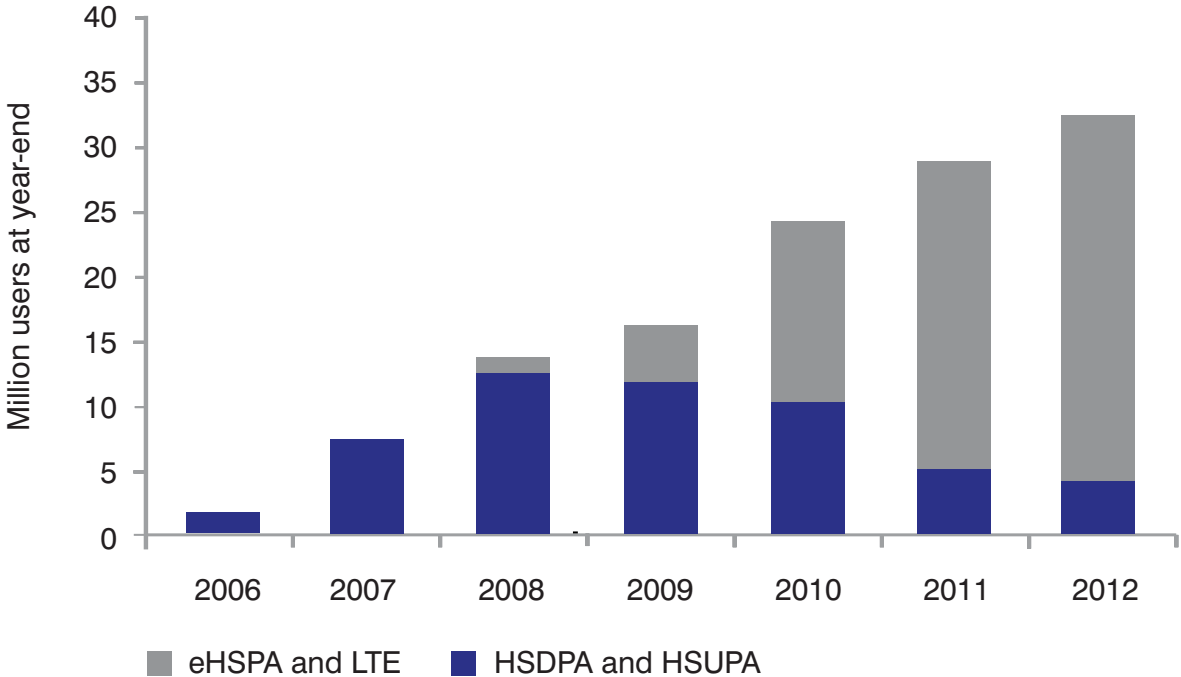
## 4.1 Device categories

### 4.1.1 Laptops / notebooks

Although an increasing number of users are adopting smartphones, handhelds or email devices, the key corporate mobile productivity tool relevant to HSPA remains the notebook PC. The majority of travelling 'information workers' still rely on a large screen and proper keyboard, along with typically a Windows operating system and standard corporate software applications. The addition of connectivity to the laptop is nothing new; 'remote access' dates back to the days of dial-up modems, while more recently WiFi has enabled hotspot and in-office wireless access. Increasingly, however, it is becoming desirable (and relatively inexpensive) to provide full wide-area wireless connectivity at speeds suitable for demanding applications. HSPA is one of the most prominent enablers of this type of mobile broadband on laptops, in different forms such as embedded, PC Card, ExpressCard or USB modem etc.

From an operator's point of view, looking to increase its sales of 3G data services to the corporate marketplace and drive traffic on its network, PCs represent the single most attractive target market. Of the total worldwide volumes of PC-based Internet broadband access traffic, around 98-99% transit a fixed line 'last mile'. Mobile broadband provision to notebooks potentially allows cellular operators to capture a greater share of the access business, in both traffic and revenue terms. On the other hand, it is important to realise that in this arena, many users' expectations will be driven by their prior experience of fixed broadband – especially in terms of expecting ever-higher speeds, free choice of applications and services.

Figure 2: Notebook users actively using HSPA & LTE mobile broadband



Source: Disruptive Analysis, October 2007

## 4.1.2 The role of connection manager software

An especially important element of HSPA use on notebooks is that of the "connection manager" (CM) software required. This combines the graphical interface for the user, with the 'plumbing' required for the computer to select networks, authenticate the user securely, manage any special requirements such as dealing with poor connections or data compression, and so forth. It also links into the underlying 'driver' software that controls the modem hardware. It represents a mechanism for the operator to exercise a level of visibility and control over the user's connectivity experience, although this needs to be undertaken carefully and not over-obtrusively.

The CM has various other capabilities, and its importance is likely to increase significantly in coming years. As PCs become multi-access capable, the CM is likely to act as a 'broker', determining which network is best for a given application at a point in time. It may also enforce various 'policies' on behalf of the operator or the IT department of the company; perhaps downloading anti-virus updates before connection is allowed, or checking that the employee is allowed access to mobile data while roaming. It can also act as a reporting tool, enabling managers to check utilisation rates of mobile devices and services, and plan for upgrades or even employee training as required.

In general, each operator has its own CM, typically customised from a number of third-party software companies' proprietary base versions. Vendors include companies like Diginext and Smith Micro. This customisation permits a tailored user experience, and typically includes branding, network selection, localisation and so forth. Some HSPA operators also have WiFi hotspot networks or partners, or fixed broadband services, and often the control of these is blended in a single 'remote access' application for the end user. This may be either done in-house (eg Telefonica or T-Mobile), or in conjunction with a 3rd-party aggregator that works in a partnership, wholesale or MVNO model, perhaps

with its own connection client (eg BT or iPass). So for example, Orange Business Services has partnered with iPass for its multinational clients, using iPass' CM to facilitate multi-access capabilities, whilst continuing to use its own inhouse solution for smaller customers.

In some instances, larger enterprises may have their own preferred connectivity software, perhaps optimised for their specific applications or security mechanisms, and with their own internal branding designed around their employees' needs. Some of the more flexible mobile operators are able to work to accommodate their customers' software preferences, although this may require them to have specialised consulting/integration teams to assist. This process also involves the PC vendor, which must configure the software and hardware appropriately for build-to-order delivery to the customer.

There is also some work ongoing to standardise elements of connection managers, perhaps even putting some aspects into the operating system in future.

## 4.1.3 Smartphones and other mobile devices

While the bulk of this paper focuses on the data applications of HSPA in enterprises, as applied to 'computing-type' devices, it should also be considered that the normal handset form factor may have relevance too. HSPA phones are starting to enter the mainstream corporate marketplace, typically in the guise of high-end smartphones and wireless PDAs. Numerous vendors such as Nokia, Samsung, and HTC have already been targeting this space, and by 2008 there will be a broad range of options suitable for businesses.

Some of the handset-based HSPA usage models and applications are identical to those applicable to laptops; fast web browsing, and corporate intranet access. It may also be the case that some uses are even better-suited, especially those that can integrate with the handset's other functions such as the phonebook, camera, and increasingly GPS capabilities. However, it should also be

noted that some corporate data applications – notably push email without attachments – benefit little from HSPA's extra speed on smartphones.

In addition, there is also a benefit to educating consumer-facing enterprises on the enhanced capabilities of their customers' phones. Various companies could participate actively in B2C mobile content, commerce or communications with a diverse set of applications; downloads or streamed content most obviously, but also interactive customer care or sales.

## 4.1.4 Fixed wireless HSPA applications

Although the majority of focus concerning HSPA is around the notebook market, there is also a growing range of use cases for wireless broadband for fixed connectivity in enterprises:

- CCTV cameras (fixed or in vehicles)
- Wireless routers for temporary sites (or as backup for permanent routers providing better performance at lower costs than ISDN)
- Telemetry applications
- Wireless delivery of advertising content (eg to electronic billboards)
- Backup for fixed corporate data connections

Although some of these applications are ideal for HSPA (such as advertising downloads, or in-vehicle hotspots), others such as telemetry applications or M2M have historically used slower-speed GPRS. Potentially, these can be upgraded to newer technologies like HSPA; for example, vending machines could display advertising.

However, it is essential for operators to ensure good 3G coverage in the relevant locations (often indoors), and consider appropriate wholesale data pricing models, where such services are delivered through 3rd-party specialist providers. Some applications such as CCTV

may be more suited to HSUPA services which provide high-bandwidth upload capability.

## 4.2 HSPA Notebook Data Cards, Embedded 3G and USB Modems

The previous section highlighted corporate use of mobile broadband-connected notebooks as the primary driver for operators looking to sell HSPA. In particular, many observers believe that the integration of HSPA into "off the shelf" laptops should drive much more rapid uptake of services and subscriptions. This section examines the various mechanisms for connecting notebooks to HSPA networks, and the implicit business model and usage-case choices that arise from this.

### 4.2.1 Introduction

Historically, cellular data services for notebook PCs have been delivered by the use of external cards, typically plugged into vacant PCMCIA slots on the side of the computers. Although this approach has worked well, it adds the risks of modem breakage or loss, plus sub-optimal radio performance, as well as occupying a card slot that may be desired for other purposes. Having a separate component for connectivity also increases the likelihood of extra support calls, compared with an integrated 'out of the box' solution. While enterprises can cope with extra support calls via their internal helpdesk, this adds to the total cost of ownership of the overall solution.

In recent years there has also been some market fragmentation for external cards; some laptops are no longer sold with full-sized PCMCIA slots, instead relying on the smaller ExpressCard or USB interfaces for external peripherals. Some of the Apple and Sony Vaio range fit in to this category. However, some of the new ExpressCard products ship with an adaptor to fit into older PCMCIA Type II slots to help alleviate this issue.

So while the data card approach is continuing to evolve

as services move towards HSPA, alternative approaches are emerging that may be even more enterprise-friendly:

- Integration of the 3G/HSPA modem and antenna into the body of the notebook itself (Embedded 3G).
- Use of external modems connecting via USB ports (USB modems).
- Portable 3G routers which connect multiple notebooks locally via WiFi, before linking the whole group into the cellular network via a single 3G/HSPA connection.

The embedded approach should ultimately afford significant advantages for end-users and operators. Many laptop designs already have an integrated antenna which has been specifically designed/optimised for mobile broadband, as well as an internal slot for a modem (typically in a PCI Express Mini Card form). Various commentators have forecast rapid uptake of this connectivity option. Alongside the embedded approach, USB modems have proven more attractive to customers than initially expected, with volume shipments ramping up swiftly. The 3G router approach is suitable for certain niche use cases, such as temporary project teams and business continuity assurance / fixed-line backup.

The following sections further describe the issues related to selling, supporting and integrating the various options to corporate users.

## 4.2.2 Selling HSPA products vs. HSPA services

One of the potential upsides of embedded HSPA in laptops is that of a single point of contact for all the elements of mobile broadband for a corporate buyer – the device and the service.

But this can bring in problems as well. Often, an IT hardware vendor (OEM) may have an account team for an enterprise that sells a variety of products – notebooks, desktop PCs, servers and possibly services such as

integration or maintenance as well. Such sales and marketing teams can lack training or motivation to sell operators' HSPA services and activations. They may be unsuited to helping a purchaser select between carriers or tariffs. In many cases, there may be a separate buying point and decision chain for hardware and network services within the client organisation. In some instances, this complexity risks slowing down the process of signing a deal for sale of the hardware, and thus may get limited support from the OEM's sales teams. Operators need to understand the internal processes of their partners in this regard, and provide training, marketing support or incentivisation where required.

The alternative option is that the operator leads the mobile broadband sale. This leads to a converse problem: few operators have deep skills in selling laptops to corporate customers. In the majority of cases, HSPA capabilities will only rank as a secondary or tertiary criterion in notebook selection – most IT hardware purchase decisions will be based on the cost, performance and durability of the computing elements, rather than the connectivity. It is unlikely that the operator will be able to devote as much time and effort to explaining different OEMs' laptop options as they can to their own connectivity offerings. They may also encounter similar issues to those described above – buying points may be different, there may be incumbent major-account links with alternative PC vendors and so forth.

Consequently the marketing and sale of embedded-3G laptops needs to be highly collaborative, with good teamwork between PC supplier, operator and quite possibly an application provider or system integrator.

## 4.2.3 Testing and conformance

It is common practise in the mobile industry for operators (and their suppliers) to stringently test all products. A wide variety of testing types occurs for handsets – radio frequency tests, network protocol tests, interoperability with other devices and network infrastructure, usability tests, conformance against the operators' branding

and operational rules – the list is extensive. Even after extensive trials during development, and certification by independent laboratories, it is not uncommon for mobile devices to undergo a further three months or more of acceptance testing by operators before finally going on sale. Each operator's processes differ, especially as each often requires a different variant of the software drivers and firmware for the modem.

This places a considerable burden on PC manufacturers developing embedded notebooks, as many of these processes were originally intended for mobile phones – which usually ship in volumes of millions, or tens of millions, rather than the hundred thousand more typical in the laptop industry. The work required reduces the likelihood of any specific product being offered to a wide variety of operators. In an ideal world, most operators would support most brands of 3G-embedded laptops, so that they can supply to customers who have a definitive IT hardware brand preference. This however requires operators to certify – or permit self-certification – by this wide range of suppliers.

A move towards common, and less onerous, testing practices for 3G notebooks will lead to a greater range of devices becoming available, through a wider range of service providers, and would thus help stimulate the demand for mobile broadband connectivity in the enterprise market and beyond. Otherwise, the inability for companies to match together their desired combination of operator+notebook brand indirectly shifts demand to USB or card-type modems.

## 4.2.4 USB modems

A major market shift in 3G notebook connectivity during 2006 and 2007 has been the rapid growth in sales of USB modems. This form factor has combined ease-of-use with competitive pricing, largely driven in its initial stages by the efforts of equipment vendor Huawei, with other suppliers following hard on its heels. It has several advantages:

- Only the modem needs testing & certification by the operator, not the entire PC to which it is attached.

- Familiarity of users with USB accessories means that it is 'non threatening' as a piece of technology.
- Ability to transfer modems between users, for example with companies employing occasional travellers.
- Greater ease to upgrade to newer versions of HSPA technology – although laptops are typically specified with 'future-proofed' state-of-the-art HSPA modules, it may be that some may still need upgrading during their working lives. While new modules can be installed in such cases, this typically involves swap-outs conducted with a screwdriver rather than just 'plug and play'.
- Possibility of removing 3G functionality from users whose roles change, who are issued with alternative devices, or who are found to generate excessively high charges.

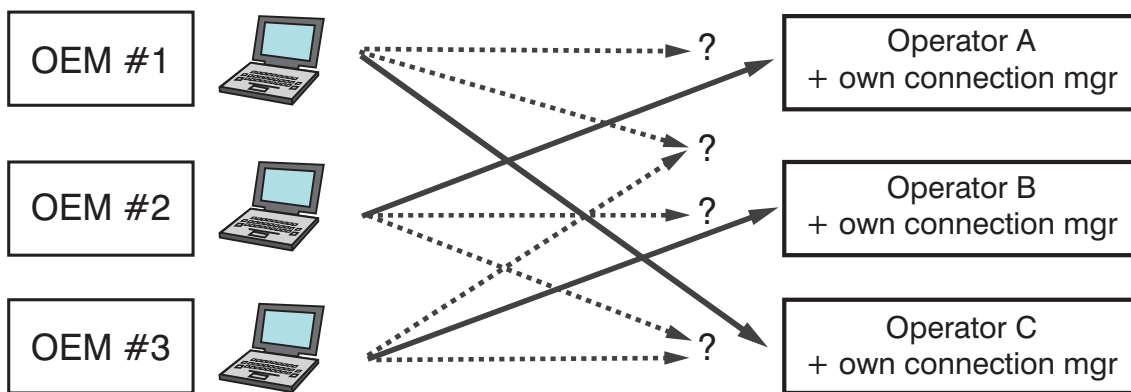
However, the USB solution has its limitations; USB implementations are not always optimised in terms of speed and control, and in some cases there are questions over the level of power supplied through the USB port. The fact that it appears to the operating system as 'just another USB accessory' can sometimes also reduce the flexibility of the connection manager in selecting different access technologies – an important consideration where application developers are concerned. A particular issue is that an enterprise's IT department may have less visibility over when a USB modem is connected to a PC, and thus less control from a network management point of view.

Nevertheless, it is very apparent that 3G USB modems have been very much a success story during 2007, with the signs very positive for continued growth in 2008 and beyond.

Figure 3: The notebook manufacturer/operator paradox

Notebook OEMs want many distribution channels for standardised products with OEMs low time-to-market barriers

Operators want to support a small number of optimised, differentiated devices which have been rigorously tested



...and enterprises want full choice of both PC OEM and operator

Source: Disruptive Analysis

Further discussion is outside the scope of this document, but it should be noted that the USB form-factor is also suited to use of wireless connectivity by consumers, and can even be used in conjunction with desktop PCs as a form of fixed broadband access modem. This is helping to further drive scale and experience curves within operators.

## 4.2.5 Summary

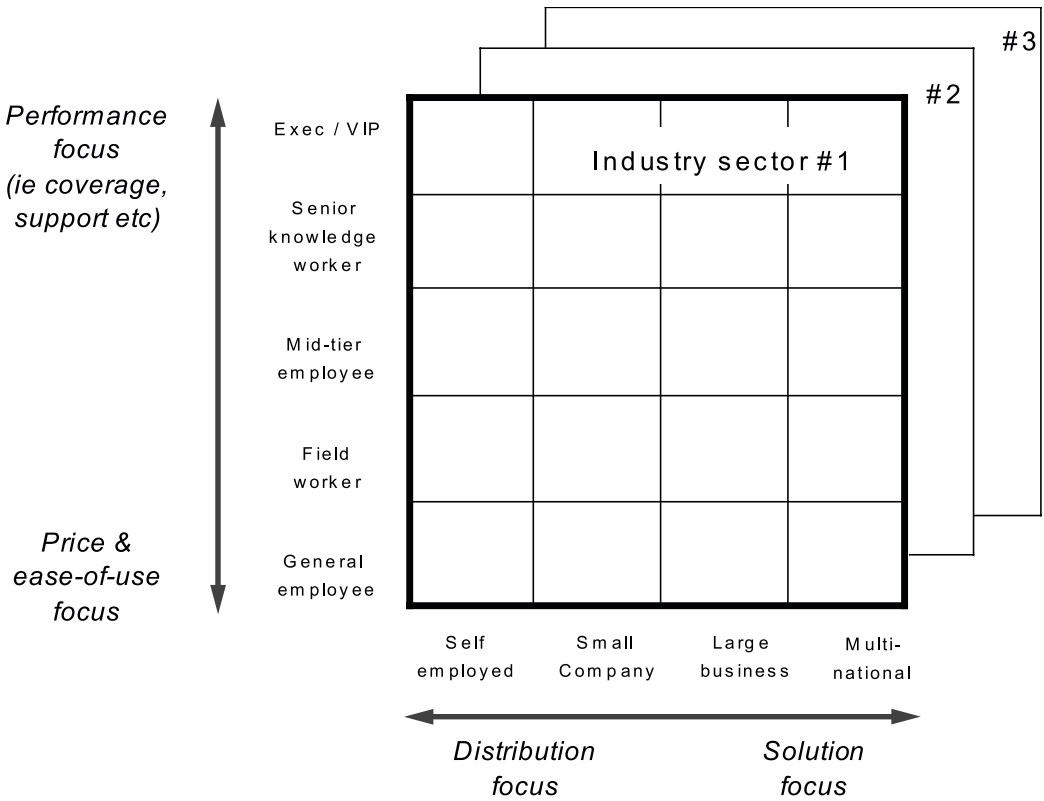
Embedded 3G notebooks can create benefits to operators looking to sell HSPA services to the enterprise market. They enable more 'strategic' sales and are optimised for users who already understand the costs and usage cases for 3G/HSPA, and want the most elegant solution. However, the complexities involved in bundling IT hardware and mobile subscriptions should not be underestimated. Close collaboration between PC suppliers and operators in sales and marketing is essential. In the short term, USB-based HSPA may be a simpler sale.

# 5. Selling HSPA to enterprise

This section of the paper considers the main considerations, potential approaches and key challenges involved in marketing and selling HSPA services to business users.

## 5.1 Market segmentation considerations

Figure 4: Operators must carefully segment HSPA marketing strategies to target audiences, with reference to their inhouse skillsets and capabilities



### 5.1.1 Organisation size band

Potential purchasers of mobile broadband vary considerably by company size, from self-employed individuals up to the largest multinational corporations. Mobile operators should ensure that their sales and marketing operations pursue an appropriate approach to segmentation, which may require a different approach to that of their traditional voice-centric strategies.

Because of the involvement of notebook PCs and the relevance of security and connectivity software, most

HSPA deployments will often fall to IT purchasers, rather than the more traditional mobile voice-oriented buying points. It is also important to factor in other issues:

- Large enterprises are typically looking to increase staff productivity and increase remote/flexible working. Marketing approaches should fit into a wider picture which includes home-working as well as more typical 'road warrior' usage cases.
- It is important to distinguish between national and international corporations in positioning mobile

broadband options. In particular, it may be the case that decisions on central purchasing of IT (eg laptops) take place in a different location to that for mobile services. There is also likely to be a greater emphasis on overseas roaming issues for pan-national organisations.

- The largest organisations will often have their own large campus sites in out-of-town locations, rather than using offices in shared-tenancy buildings in urban centres. This may introduce specific coverage and capacity issues, especially if employees start using HSPA-enabled laptops in large numbers or concentrations at a particular location (eg in a corporate conference room). In such circumstances, it will be essential to involve network engineering considerations in the sale and support process.
- In theory, small businesses ought to be easier to sell to, as they are less likely to have a central IT function or as-strict security policies. But they often incur high costs of sale as they are 'hard to reach' via traditional sales channels, especially as they may only have a small number of potential HSPA users each.
- Many small businesses fulfil their IT needs (for example buying PCs) through local VARs or resellers. The very smallest will often have 'an IT guy' external to the firm, who provides ad-hoc expertise, and may also buy hardware or services on their behalf. Accessing these influencers and suppliers can be extremely challenging; there may be thousands of them, even in relatively small markets.
- Operators should not treat all small businesses as a homogenous group. Sub-segmentation is needed to maximise marketing efficiency. There are huge differences in usage case, route-to-market and ROI considerations. For example, consider the differing communications requirements of a small manufacturer, a growing software company and a venture capital firm. Generally the 'sweet spot' among SMEs will be those that are the most 'information-

intensive'; existing use and penetration of PCs, Internet and mobile phones is a good guide. Among the most attractive groups are professional services firms like lawyers and accountants.

## 5.1.2 User type / departmental and functional group

In the longer term it is hoped that the benefits of mobile broadband and HSPA may be applicable as a 'default' for all information users within a company. However, this is not the case yet for most corporations. Typically only a relatively small proportion of employees merit mobile data devices and service plans. While operators should definitely evangelise the general benefits of rolling out wireless connectivity to a wider audience, they should also be prepared to focus on the most HSPA-appropriate functional groups and departments in the shorter term.

Much has been written about the ultra-mobile 'road warrior' groups within enterprises; typically those in marketing and product management roles, whose working lives include frequent international travel, constant meetings with clients and suppliers, attending conferences and trade shows and so forth. Certainly, this group has a significant requirement for access to email, the Web and VPNs, although as a horizontal group there are relatively few specialist applications.

Possibly the next most important target group at present within large companies is that of "VIPs" - essentially senior executives or other management staff - who are valued enough to mandate always-on connectivity. There is also often a solid HR reason for keeping them happy by giving them 'toys'; trendy laptops with global roaming capability, cool phones like Apple's iPhone and so forth. Although small in number, these users are obviously critical to support well - they may be influential enough to impact overall IT/telecom supplier decisions, and they are typically non-technical.

Sales teams have a slightly different set of requirements. As well as email and Internet access, the ability to hook

into CRM applications and sometimes supply-chain management is more important, enabling the entry of sales, checking inventory levels and so forth. Many will look to work from home to fulfil their administrative tasks, perhaps only coming into the central office once a week or less. From an HSPA perspective it is also important to recognise that many salespeople will be national rather than international travellers – this makes roaming less important - but nationwide domestic network coverage much more so. While executives and marketing staff typically stick to major cities and industrial zones, account personnel may visit their clients across a much broader territory.

Field service groups are different again, often these are task-based personnel based in vehicles, using specific applications like scheduling and route-planning, or perhaps calling up site plans or logging deliveries. This will partly affect the types of devices used; perhaps ruggedised or specialised terminals. Like salespeople, there will be a greater emphasis on coverage area, perhaps even to the deepest rural districts for people working in utility or natural resources sectors.

Lastly, it is probable that a certain proportion of internal IT and networking staff will themselves require mobile broadband coverage, especially for remote management tasks as well as connectivity for email. Needless to say, these employees are likely to be highly influential in suggesting more widespread rollouts.

## 5.1.3 Industry vertical

The potential for use of HSPA varies very widely by industry sector. When developing marketing and sales approaches, operators will need to be aware of the significant variations in applications, budgets, purchasing structure and supporting IT requirements. In many instances, they will already have industry-specific vertical market knowledge as applied to their target customer segments. It will be necessary to map HSPA onto the more general issues considered by customer-facing staff.

It is outside the scope of this document to detail the possible HSPA use cases of every industry, as these will often vary not just by sector, but even by finely-grained sub-sector. However, it is useful to consider some examples as a starting-point for this type of analysis.

- **Finance and banking** – typically investment banks, insurance firms and similar institutions are less cost-sensitive than other sectors. Many have high-salary employees who expect to be equipped with the best solutions available. However, they are also typically very strict about issues like security, and thus the ability to accommodate their choice of firewall and VPN client is essential.
- **Professional services** – firms in the legal, accounting, consulting and advertising industries often have a high proportion of ‘information intensive’ users, often working on clients’ sites. As it is often difficult for these employees to get temporary ‘guest access’ to the LAN at these locations, HSPA offers a real solution for accessing corporate resources. High daily charge-out rates also make even small productivity increases from mobility quite easy to justify economically.
- **IT and telecoms industry** – the telecoms and computing industry is itself a major user of its own technology. It too has many information-intensive travellers, with high use of Web and email, and relatively few legacy applications.
- **Government, public safety and defence** – public-sector use of mobility technology is important but fragmented, encompassing everything from senior officials travelling internationally, to notebook PCs fixed into ambulances and police cars. Key issues include stringent security concerns, the frequent role of major systems integration partners, and the importance of specific procurement paths and tendering processes. Roaming is often less of an issue.
- **Media industry** – the arrival of HSDPA (and HSUPA in the near future) should enable the media industry

to benefit significantly from mobile data. High quality image and video content is very demanding on bandwidth. The sector includes journalists requiring connectivity at maximum speed and with maximum ubiquity. The most high-profile media firms will be fairly price-insensitive for their key staff, supplying them not just with HSPA and WiFi, but probably satellite connectivity too. The sector also includes advertising and creative workers, who may have specific requirements such as support of Apple notebooks.

- **Healthcare** – Although the structure of the healthcare sector varies from country to country, it still has some common factors. International roaming tariffs tend to be less of concern than in other sectors, as staff do not tend to be “road warriors”. Conversely, cellular communications may be unsuitable in hospitals, so an HSPA/WiFi mix may be more appropriate. Budget issues and infrequent travel by some staff may also drive use of ‘shared’ solutions like USB modems rather than embedded laptops.
- **Utilities, resources and construction** – there is increasing use of mobile data in those industries that operate “outdoors” and away from carpeted office environments. Electricity field workers, oil exploration engineers, architects and many others have requirements for broadband-connected laptops or other devices, used in areas well away from WiFi hotspots. In some cases, however, coverage requirements may be beyond even some operators’ 3G networks, necessitating fall-back to GPRS. There are also specific needs for this group, such as mountings for notebooks in vehicles, and ruggedisation, as well as the need to support some fairly specific (ie non-Internet) applications. Specialist partners may be appropriate to solve these problems.

## 5.2 The HSPA value chain

### 5.2.1 The value chain: role of System Integrators and outsourcing companies

It is important for operators to recognise that there may well be third parties intermediating between themselves and enterprise customers in the sale of HSPA services. Many businesses employ a variety of IT service companies to perform a wide range of operational and planning roles, such as:

- Outsourced procurement for IT hardware
- Systems integration related to major mobility projects
- Desktop outsourcing – for example, running IT helpdesks
- Full-scale business process outsourcing

In these instances, it may well be that the potential organisation that is the theoretical end-customer for the operator’s HSPA services (or partners’ resold notebooks) may not be the actual buying organisation. Instead, firms such as IBM, Accenture, HP or Computer Sciences may be ‘in the middle’; sometimes via an office in another geography.

### 5.2.2 Remote access providers

While some smaller firms may represent ‘greenfield sites’ for mobility, many larger companies have used “remote access” for mobile workers for many years – initially with dial-up modems - and more recently with WiFi and secure connection via home broadband. Thus in many instances, HSPA will be added to an existing remote access strategy.

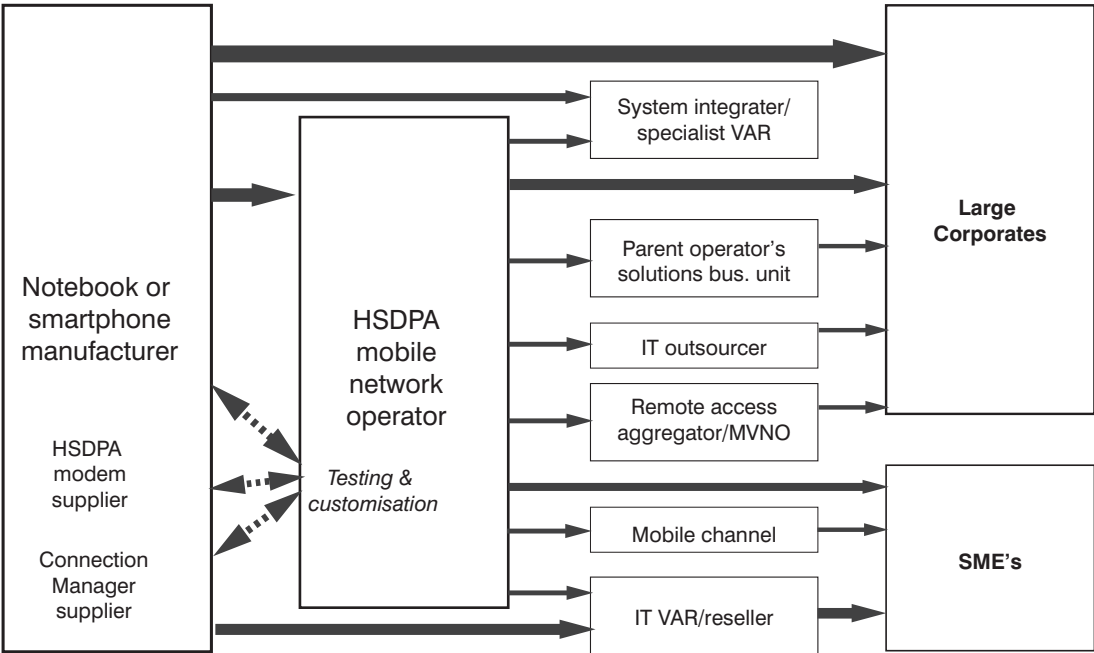
As such, it will need to coexist in terms of software and any infrastructure (eg VPNs and authentication platforms) already used by the enterprise. It may also mean that the operator needs to work with the incumbent supplier of remote access services, perhaps on a wholesale basis.

Alternatively, it is likely to mean that any truly competitive solution will need to be multi-access capable, rather than cellular-only.

### 5.2.3 The role of partners and the operator's own affiliates

Linking into the theme of systems integrators and outsourcing/consulting IT services firms discussed above, it is worth noting that many operators now have such organisations within their own corporate group. However, there may sometimes be a fair amount of 'organisational distance' between the two arms, plus possibly different geographic focus or financial goals. Nevertheless, it is critical that an operator's management sees beyond the simple number of "data plans sold" or "HSPA traffic on the network", as from a corporation-wide stance it may be that a large-scale managed or outsourced mobility IT project is more valuable. This may even mean making some hard decisions about balancing notional mobile ARPU vs. consulting revenues.

Figure 5: The value chain for HSPA products & services



Source: Disruptive Analysis

### 5.2.4 The Smart Pipe model

For many operators, the idea of being seen as purely a "mobile ISP" is uncomfortable. Yet in many cases, this is exactly what the enterprise wants from its remote access providers, irrespective of the bearer technology employed: HSPA, WiFi, CDMA/EVDO, WiMAX, ethernet or dial-up. A combination of Internet access and VPN connectivity to corporate servers accounts for 99% of requirements. A small number of applications may be hosted elsewhere, but they will typically be supplied by a specialist IT managed services provider.

Despite this, there are options for carriers to add value beyond the infamous 'dumb pipe' model. Among these are:

- Multi-access (HSPA + WiFi + home broadband, for example)
- Managed roaming
- Web Services / SOA 'capability exposure' to third-party application and services providers

- Elements of security (eg mobile content filtering, anti-spam or anti-virus)
- Integration of SMS/MMS with corporate systems
- Provision of location information to enterprise applications (eg for tracking, or scheduling). 3G data cards and laptops will be soon be available with GPS built-in
- Management of voicemail or unified communications
- Data compression or acceleration
- Reporting or administrative tools for IT staff controlling their employees' use
- Remote disablement / deletion of lost or stolen PCs

For many operators, it will not be possible to offer all these from existing in-house resources. Partnerships will be essential and it is important to recognise that sometimes the operator will need to be the wholesaler of bandwidth, not the 'retailer' of these functions.

## 5.2.5 The branding and differentiation paradox

The majority of mobile operators' customers and revenues are derived from the consumer marketplace; mass market phones, voice and SMS services, and increasingly the hope for higher ARPU from new multimedia and content services. Marketing to consumers involves huge advertising budgets, clever techniques to stand out at the point-of-sale, and often investment in physical bricks-and-mortar retail outlets. Unsurprisingly, a large amount of effort is expended on branding, which extends from the general corporate image down to the menus and 'look and feel' of the handset software.

Unfortunately, this does not always play as well in the corporate space, especially as mobility intersects with the IT domain with mobile broadband and HSPA-equipped notebook PCs. There is a real paradox here; operators

usually want to position themselves as an ongoing part of the user's mobility 'experience', often using bright colours and flashy user interfaces. Conversely, most IT users (and especially IT administrators) tend to prefer to standardise on simpler environments such as the normal Windows desktop and menu designs, keeping unnecessary branding out of the way. Some corporations also have their own in-house branding or design which they want to use in front of employees.

## 5.3 Addressing enterprise concerns

While there are clear benefits in many business information workers using mobile broadband, it is important that operators are also realistic about understanding the challenges of broadening adoption. There remain significant challenges to fostering the wider use of HSPA in enterprises; at this point it is likely too optimistic to assume that penetration will naturally grow to the same level as voice and mobile phone usage.

**This section details the most critical issues, especially:**

- Ensuring the 'total cost of ownership' of mobile broadband makes return-on-investment decisions look attractive
- Provision of effective customer support mechanisms
- Higher upfront purchase price of embedded laptops
- Control and management of HSPA-enabled users by IT administrators
- Customisation and integration with enterprise IT and networking domains

### 5.3.1 Total cost of ownership

Enterprise IT purchases are driven by a myriad of concerns, but often paramount are the concepts of "return on investment (ROI)" and "total cost of ownership (TCO)". While ROI is quite well-understood throughout all areas of economics, TCO is much more specific to

technology deployments. It includes all cost elements associated with providing a particular product or service such as HSPA to an employee; not just the capex cost of the device, or notional monthly opex of a service subscription, but also the 'hidden' costs of training, support, maintenance, upgrades, roaming charges and so on. For complex solutions, these elements can far outweigh the upfront purchase cost. Often, businesses will not commit to a full roll-out until after the TCO has been established through comprehensive trials and pilots.

The flipside of the cost is of course the return. This includes 'hard' savings such as eliminating or reducing ad-hoc WiFi or ethernet broadband access fees – often \$15-20 per day or more – especially in Europe. There are also 'soft' financial benefits from productivity gains, lower administrative expenses and better 'reachability' of employees. While the latter group of positives can be difficult to estimate quantitatively, they can have a major bearing on investment decisions for the more visionary purchasers. Lastly, there are the really intangible factors such as improved convenience and ease-of-use for employees. Five minutes of extra productivity is good... but five minutes of productivity in place of five minutes of loyalty-sapping frustration is even better.

In the short term, many organisations are still unaware of the potential costs and benefits of mobile broadband and HSPA, or the probable usage patterns of users. Some will likely need to conduct trials or pilots before they become willing to commit to long-term, large-scale rollouts for a significant proportion of their employees. It is in operators' interests to facilitate these pilot studies, as well as developing 'reference sites' and case studies that might help the internal IT buyer build a business case. It will also involve the provision of detailed reports, or even tools enabling the IT administrators to conduct their own measurement and control of their employees' HSPA usage. It should also be noted that pilot studies are also relevant for operators in predicting traffic loads and ensuring adequate network planning, especially on-campus at a customer's HQ site.

## 5.3.2 Pricing points

The range of current HSPA plans spans a broad range of price points, and it is apparent that mobile broadband costs are becoming cheaper at an accelerating pace. Many operators have been working to create tariffs that appeal to small businesses and even consumers; in many cases moving towards flatrate or even pay-per-use structures. However, notebooks with built-in HSPA still command a significant premium over add-on cards.

Nevertheless, various interviewees and other observers still believe that current HSPA subscription price points are still too high for enterprises to consider making broadband a 'default' option for the majority of their mobile workers. The exact location of the 'tipping point' for mass corporate rollout is hard to judge, and will probably vary by country, but is probably in the range of \$20-30 per month for a reasonable data allocation.

A related concern is that of international data roaming charges, which are often perceived as prohibitively high. Although these too have been falling in the past 12-18 months, there needs to be a broader and more concerted effort among operators to ensure suitability for different user groups.

One way to help enterprises manage the costs of HSPA is to offer intelligent roaming solutions, such as software and control mechanisms for the enterprise IT administrators. Ideally, there should be tools that enable network managers to provision HSPA or roaming for specific employees on a selective basis; perhaps with a given bandwidth cap, or for a specific trip, or permitting only certain applications. While some of this can be done in the operator's network, it also may involve smarter connection managers on the PCs themselves, plus policy/reporting tools accessible by IT personnel.

## 5.3.3 Support issues

Another critical concern for enterprise IT purchasers is that of customer support. There needs to be robust, easily-accessible helpdesk processes, with call centres staffed by knowledgeable people. If a company's CEO is having connectivity problems while waiting for a flight in a foreign airport in a different time zone, there has to be a bulletproof way to provide assistance. This is also important in defining user behaviour; after one bad experience, many people will look for alternatives in future. Indeed, there is some momentum in adopting HSPA for that exact reasoning after bad experiences with WiFi. The reverse should not be allowed to happen i.e. users' experience of HSPA needs to be easy and reliable.

To achieve acceptable support performance, mobile broadband operators need to learn lessons from more general ISP and IT outsourcing providers. Large resources need to be dedicated to helpdesks, with staff appropriately trained and with access to diagnostic tools and FAQ databases. In some cases, it may be the enterprise's own IT support team that is on the frontline – and they will need to have visibility of any problems on the operator's network side. There is possibly a role for 3rd-party support providers, such as WDS Global, or partnering with established remote access management specialists like iPass or IBM.

There is also an economic implication here for operators – they need to work extremely hard at creating as good a user experience as possible, with minimal need for users to ever get involved in configuration-setting or troubleshooting or requests for support. Connection, email, browsing, security, VPNs and billing all need to 'just work', otherwise the costs to the operator of providing adequate support will spiral out of control. This means extensive testing of the typical software environment, substantial work on interface design and usability, awareness of all the major laptop models and security software, monitoring of network quality and service assurance, and efficient capture of all queries and solutions for future reference.

## 5.3.4 Management and control

Many larger enterprises have high expectations in terms of managing and controlling their users' technology platforms. This in part stems from optimisation of investments, but also relates to minimising TCO through reducing the variabilities that can lead to problems. In some companies there may also be corporate-wide policies relating to compliance or risk-management, such as Sarbanes-Oxley or various financial services regulations, which mandate accountability over the use of IT systems.

**This has a number of implications for mobile broadband use, including:**

- **Provisioning** – IT administrators should be able to determine which employees can use HSPA, and easily turn the capability on or off. They will also want to use standardised software that can be pre-loaded into PCs in bulk.
- **Monitoring and Reporting** – it is important for network managers to track usage and traffic, in order to plan rollouts and upgrades, and also control costs in areas such as roaming.
- **Policy** – in the context of mobile broadband and HSPA there are various layers of rules that may be applied in enterprises. Who can use the service, for which applications, in what locations, and with what security measures enforced?
- **Integration with other management tools** – one of the challenges for enterprise IT administrators is that different systems often come with their own management platform. Ideally, it is possible to link them together under an "umbrella" system of tools and process, such as IBM Tivoli or HP OpenView.

An example of the challenges that operators face is ensuring that their evolving range of HSPA connectivity devices (data cards, USB modems etc) does not mean a parallel fast cycling of their driver and CM software. Large enterprises will typically work with a standardised

software 'image' that gets pre-loaded onto all their new PCs and laptops. The image is designed so as to minimise support and training costs, thereby improving the TCO of the PC investment. Usually, the image is only updated every 6 months or so, and thus there is an expectation that it will work with any peripherals that the PC may be supplied with.

## 5.3.5 Security integration

Mobility solutions already pose large security headaches for enterprises – theft of laptops, risk of virus infection or hacking exploits from insecure connections, plus satisfying the increasing demands of compliance legislation. The largest companies will have dedicated teams of security professionals, and their own preferences in terms of software and procedures. Operators looking to provide corporate-grade mobile broadband will need to work around these constraints, and with these groups of people. There needs to be proven interoperability with a range of VPN and anti-virus clients and other tools and a recognition that the IT administrators will want the same software to work across HSPA, WiFi and fixed connections.

There are also opportunities here for operators to differentiate their services. They could offer remote disabling of devices, or even deletion of sensitive content. They could partner with security firms to enable free downloads of anti-virus or firewall updates. They may facilitate advanced authentication or encryption techniques. Overall, mobile broadband operators need to stay abreast of developments in enterprise security, and have sufficient resources and expertise to provide adequate support, customisation and innovation.

## 5.3.6 Network coverage and capacity

A potential concern for enterprises looking to adopt HSPA is that of the ubiquity, scalability and reliability of the underlying network. Although many operators are rolling out HSPA rapidly, quite often the capability is

quite 'thin and narrow' – sometimes only available in major urban centres, and with limited capacity initially. Spectrum constraints, the 'breathing' nature of 3G cells' technology and limitations on cell-site backhaul connections mean that planning is critical. A worst-case scenario – and one that already happens in the WiFi world – is for 100 users in a basement conference room to attempt to connect simultaneously to a single base station.

Most operators' CFOs are understandably reluctant to build out too far in advance of demand. However, while this makes sense for certain user groups – consumers and high-end corporate VIPs tend to congregate in fairly confined regions – it is more problematic for HSPA usage in some corporate scenarios, such as wide-roving sales forces or field service engineers.

Another inter-related problem also rears its head here. In many parts of Europe and Asia, HSPA is currently used on the main 3G frequency of 2100MHz. This suffers from considerably worse indoor penetration (and range) than lower-frequency networks. In-building coverage can be poor in many large corporate sites, which often have metal and concrete construction, metallised reflective windows, and radio-absorbing internal partitions and furniture. Given current regulatory trends, it is likely that some operators may start to 'refarm' their older 900MHz GSM spectrum for use with 3G over the next few years, which could help fix this problem. But in the interim period, it may be necessary for a corporation and its operator partner to collaborate on RF planning and perhaps installation of a dedicated in-building coverage system. Various coverage enhancement solutions exist, including distributed antennas and picocells.

Clearly, these issues will vary according to operator and country and depend on the availability of particular spectrum, targeted sectors within the business marketplace, and even the type of construction practices prevalent in the region. Nevertheless, it is critical that operator sales and consulting teams consider the limitations of the radio network – especially

if there could be scenarios where traffic grows suddenly in a given cell, as radio engineers may not be able to increase capacity overnight.

## 5.3.7 Coexistence of HSPA with other networks

For some mobile workers, HSPA could be the only connection needed. However, such customers will be the exception rather than the rule; operators need to plan for graceful coexistence of mobile data with other connectivity mechanisms. Generally, HSPA will be part of an ongoing evolution of corporate 'remote access' spanning many years, and everything from dial-up modems through to WiFi, home DSL and a fixed ethernet cable in the office. While some of these networks may be under the operator's control (or controlled via a partner), others will be 'private', such as the corporate WLAN in a company's main offices. There may even be a need for coexistence with CDMA/EV-DO or WiMAX technologies in the same device in future.

The connection manager and other software needs to reflect these realities, and will ideally support different profiles; preferring an operator connection while 'Out', the corporate LAN while 'In', and maybe the user's own broadband when at 'Home'. All of this must be achieved through a simple user interface and some measure of intelligence about making decisions. Preferences will vary, in some cases enterprises may wish users to connect via HSPA rather than possibly-insecure home broadband and WiFi, for example.

Generally, enterprise purchasers will be unwilling to accept anything that forces traffic through a particular network, when a better/cheaper/faster/more-secure alternative is available; especially if it's their own in-house LAN or WLAN. There is also a significant risk of software conflicts where enterprises have to support multiple connection managers on the same PC to link into all the different remote access channels required. Operators will need to temper their natural desire to maximise traffic 'on net' and the importance of their own service, with

the more pragmatic concerns of the corporate user; especially where their customers have their own 'on net' prerogatives.

## 5.3.8 Application integration and support

One of the limiting factors for HSPA (and other wireless access mechanisms) is that many applications lack explicit developer optimisation for "sometimes connected", slower or more expensive access technologies. Many examples of enterprise software "assume" a connection to a server across a very high-speed (up to 1 gigabit per second) office LAN, which has minimal latency, and which is not subject to per-volume charges. These applications often do not translate well to use on laptops, where network coverage is variable, latency times much higher, and where (for example in roaming scenarios) there is a significant incremental cost in being bandwidth-hungry. Latency is also a major concern; if an application involves a lengthy 'hand-shaking' procedure between PC and server, then the cumulative effect of several network round-trips can seem to the user that it has 'hung'. In some cases it may also exceed the application's 'time out', causing it to fail outright.

Over time, software platforms like Microsoft Windows and Symbian OS are building in more 'hooks' so that developers can design applications that behave better over all types of mobile / wireless connections. As these become 'bearer aware', then it should be easier for operators to guarantee their customers' software will function as expected.

In the meantime however, service providers need to ensure adequate testing with their customers' chosen applications over HSPA – some may need modifications, or in some cases may need another layer of mobile middleware to shield them from the vagaries of the network. The suppliers of connection manager software will be among the first to benefit from any new OS capabilities, and operators should ensure that they track evolution in this space carefully.

## 6. Conclusions and recommendations

This report has provided an overview of the opportunities and issues inherent in supplying HSPA mobile broadband services and products into the business marketplace.

Overall, Disruptive Analysis believes that HSDPA (and its successor HSUPA) have great potential to enable a large number of business users to experience the benefits of mobile broadband today. Tens of millions of corporate workers are becoming fully-fledged mobile employees, equipped with notebooks and other devices. In theory, all can benefit from improved wide-area connectivity. However, it is important that mobile operators give careful thought to the design, pricing and positioning of their services, and especially to the ways these fit with enterprises' preferred mechanisms for selecting, deploying and managing their IT infrastructure.

There are particular challenges with selling into the largest multinational organisations, which often have stringent requirements on hardware procurement, software configuration and control, with which their telecom suppliers need to work. The early signs for HSPA are very positive, especially for high-end users

like corporate executives and top sales/marketing representatives. But the calculations involved in assessing return-on-investment will be done using conservative assumptions, with a need for clear and sustainable proof points.

Various actions by mobile operators can accelerate awareness and uptake of HSPA among business users. Ensuring support of a broad selection of integrated PCs and external 3G modems is important, as is facilitating trials and pilots. The complexities of system integration, distribution and technical support will often require a range of effective partnerships to be built. Operators need to be pragmatic about the coexistence of HSPA with other remote-access technologies; especially where their customers have already made substantial investments. Lastly, enterprises will adopt HSPA more quickly if given adequate tools to provision, manage and monitor their employees' use of mobile broadband.

It will take considerable thought and effort for mobile broadband to spread throughout the wider corporate marketplace, but the future potential is huge.

Benefits for Operators	Benefits for Enterprises
Additional revenue stream and share of businesses' overall comms spend	Enabling a more flexible, productive and responsive workforce
Deeper and more strategic customer relationships	Potential cost and administrative savings versus purchase of ad-hoc WiFi hotspot and fixed broadband connections
Higher levels of 3G network utilisation	Greater levels of ubiquity and mobility in wireless connectivity
Increasing proportion of data ARPU	Improvements in ease-of-use compared with frustration of complex ad-hoc payment, password and login procedures
Integrated solution opportunities with sister companies and partners	Ability to access network resources from client sites with minimal fuss
Gaining a role at the table in discussions on future mobility strategy & applications	Proven reliability and roadmap to future higher-performance networks

# HSPA in Enterprise

Considerations for Operators	Considerations for Enterprises
Pursue fine-grained market segmentation for enterprise HSPA	Pilot HSPA cards / embedded PCs for selected groups of users
Look to adopt multiple sales / support channels, both direct and with partners	Test performance of preferred applications and security software
Target propositions to vertical markets	Identify probable use cases and traffic volumes and productivity gains
Ensure adequate network coverage and capacity and backhaul dimensioning	Consider ease of provisioning / control of HSPA PCs and modems
Ensure testing regime enables a wide range of supported HSPA laptops	Segment mobile users between international and domestic travellers and by job functions
Examine issues with security software and policy integration of PCs	Assess impact of blending HSPA into existing remote access platform
Factor in enterprise IP procurement preferences eg PC brand and channel	Consider future mobile use cases during the software development / integration process
Adopt consultative sales model for mobile broadband in large corporates	Develop policies on applications and roaming for mobile broadband
Support a mix of datacards, USB modems and 3G-embedded notebooks	Evaluate options for connection manager eg operator vs 3rd party

## Background to this study

This study is an independent research paper based entirely on the research and opinions of Disruptive Analysis Ltd. It is intended as a balanced analysis of both the opportunities and challenges faced by mobile operators in providing HSPA services to enterprise customers. Although it has been commissioned by the GSMA, it does not represent the official views of that organisation.

## About Disruptive Analysis

Disruptive Analysis is a technology-focused advisory firm focused on the mobile and wireless industry. Founded by experienced analyst Dean Buble, it provides critical commentary and consulting support to telecoms/IT vendors, operators, regulators, users, investors and intermediaries. Disruptive Analysis focuses on communications and information technology industry trends, particularly in areas with complex value chains, rapid technical/market evolution, or labyrinthine business relationships. Currently, the company is focusing on fixed-mobile convergence, IMS, SIP, mobile handsets and wireless broadband technologies.

Disruptive Analysis attempts to predict - and validate - the future direction and profit potential of technology markets - based on consideration of many more "angles" than is typical among industry analysts. It takes into account new products and technologies, changing distribution channels, customer trends, investor sentiment and macroeconomic status. Where appropriate, it takes a contrarian stance rather than supporting consensus or industry momentum.

***Disruptive Analysis' motto is "Don't Assume".***

***Website: [www.disruptive-analysis.com](http://www.disruptive-analysis.com)***

***Blog: [disruptivewireless.blogspot.com](http://disruptivewireless.blogspot.com)***

## Intellectual Property Rights / Disclaimer

### ***All Rights Reserved.***

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publisher, Disruptive Analysis Ltd and the GSMA.

Every reasonable effort has been made to verify research undertaken during the work on this document. Findings, conclusions and recommendations are based on information gathered in good faith from both primary and secondary sources, whose accuracy it is not always possible to guarantee. Disruptive Analysis Ltd. disclaims all warranties as to the accuracy, completeness or adequacy of such information. As such no liability whatever can be accepted for actions taken based on any information that may subsequently prove to be incorrect. The opinions expressed here are subject to change without notice.



---

## **Disruptive Analysis**

---

*Don't Assume*

*Website: [www.disruptive-analysis.com](http://www.disruptive-analysis.com)*

*Blog: [disruptivewireless.blogspot.com](http://disruptivewireless.blogspot.com)*