WBA Wi-Fi Industry Report: Global Trends in Public Wi-Fi
Next-Generation Hotspot: Moving from Standardization to Commercialization (November 2012)
About the Wireless Broadband Alliance

Founded in 2003, the aim of the Wireless Broadband Alliance (WBA) is to secure an outstanding user experience through the global deployment of next-generation Wi-Fi. The WBA and its industry-leading members are dedicated to delivering this quality experience through technology innovation, interoperability, and robust security.

Today, membership includes major fixed operators such as BT, Comcast and Time Warner Cable; seven of the top 10 mobile operator groups (by revenue) and leading technology companies such as Cisco, Google and Intel.

WBA member operators collectively serve more than 1 billion subscribers and operate more than 1 million Hotspots globally. They also work with international operators to drive innovation, deliver seamless connectivity and optimize network investments. The WBA Board includes AT&T, Boingo Wireless, BT, China Mobile, Cisco Systems, Intel Corporation, iPass, KT Corporation, NTT DOCOMO and Orange. www.wballiance.com

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Executive summary

1. The industry is moving toward new standards to make it easier to access Wi-Fi networks at home and abroad, paving the way for a new wave of increased Wi-Fi uptake and usage. Operators want to deploy Next-Generation Hotspot (NGH) technology to make it easier for end users to access Wi-Fi Hotspots and replicate the cellular mobile broadband experience in terms of ease of access and security. In our Industry Survey, of those respondents that plan to launch an NGH-compliant network, the majority (54%) plan to do so in 2013. The survey also found that the industry needs to show how operators can make a return on NGH-related investment to ensure the technology reaches its full potential.

2. This paper highlights the ongoing commitment operators are making to integrate Wi-Fi into their overall mobile broadband proposition in the context of the more bullish investment by the telecoms industry into public Wi-Fi over the last 12 months. An indication of the headroom Wi-Fi has to grow is that some operators are seeing as much as 75% of traffic in the home being carried over the Wi-Fi network compared with just 5% outdoors. As public Wi-Fi network sign-on becomes easier, the percentage of Wi-Fi-based Internet access outdoors can only be expected to grow.

3. This paper also highlights the challenges the industry needs to meet to realize the potential of Wi-Fi roaming, in particular around standards. Standards are essential to enable operators to realize the opportunity that Wi-Fi roaming presents. The industry must continue working closely together to ensure that common standards offer a seamless, cellular-like Wi-Fi experience to end users and also to lay a solid foundation on which operators can compete. The WBA is working to meet this challenge by defining Wi-Fi roaming interoperability standards. To improve the Wi-Fi roaming experience, operators need to increase the number of their Wi-Fi roaming agreements. They also need to consider whether to offer Wi-Fi roaming as part of their overall data roaming service package or try and generate incremental revenues from Wi-Fi roaming.
Q&A: An interview with JR Wilson, Chair, Wireless Broadband Alliance & Vice President of Partnerships & Alliances, AT&T Mobility

JR Wilson, Chair
Wireless Broadband Alliance

Q: What is your vision for the evolution of carrier Wi-Fi and what role will the WBA continue to play in this?

JR: As Chair of the WBA, my vision is to deliver an exceptional customer experience when it comes to Wi-Fi— one that is interoperable, seamless and secure. Wi-Fi will become a converged technology with the wireless network and customers will have the same experience agnostic of the network type.

Q: As the new Chair of the WBA, what are your top priorities for the Alliance?

JR: When it comes to interoperability, reducing friction is essential. Today, achieving Wi-Fi roaming agreements between carriers is not as simple as it should be, often due to lack of common specifications and a somewhat complex process to reach an agreement. The WBA can establish clear guidelines for operators, create a roadmap of the evolution of Hotspots, and develop a directory of various carriers’ Wi-Fi capabilities. Efforts such as these can improve the process for all members and speed the development of global Wi-Fi coverage.

Another key priority is to ensure compatibility across the Wi-Fi ecosystem whether it’s devices, networks, billing or settlement systems. The WBA will ultimately deliver a more secure and seamless experience to all end users by driving common specifications across this ecosystem. As Chair, I am committed to working closely with the equipment manufacturers and operators so that devices seamlessly interact with Wi-Fi networks. In addition to device compatibility, there is an opportunity to improve backend systems which cause excess friction in achieving interoperability in today’s environment. Therefore I will also make it a priority to drive uniform requirements across billing and settlement systems. The work that the WBA did last year in the NGH trials laid much of the ground work. I look forward to working with the WBA members and further build on this momentum and achieve compatibility across the ecosystem.

Q: The US has been at the forefront of the development of Wi-Fi. Do you believe other markets will follow the same path?

JR: Absolutely and we are already seeing rapid progress in Asia and Europe. For example, China Mobile is planning to deploy 2 million Hotspots nationally in the near future and BT built a massive Wi-Fi network to cover the high traffic Olympic Games in London. Licensed spectrum is a finite and expensive resource. Being able to leverage unlicensed spectrum is very advantageous, particularly when Wi-Fi is integrated with small cells. Around the world, operators are moving towards the ultimate goal of making Wi-Fi interoperable and seamless.

Q: AT&T really kick-started the second wave of Wi-Fi. How has the role of Wi-Fi evolved in AT&T’s corporate strategy?

JR: In terms of AT&T making Wi-Fi seamless for our customers, this was initially started as a hospitality business with organizations such as McDonalds, Starbucks, Fedex, Hilton, etc. Since then, it has evolved to incorporate major venues like stadiums and dense urban areas. For example, AT&T deployed Wi-Fi for the San Francisco Giants, and we built Wi-Fi zones providing blanket coverage in Times Square, Manhattan. AT&T’s strategy is to continue to integrate Wi-Fi more deeply into its macro network and, consistent with the WBA’s vision, to deliver a seamless, interoperable, and secure end-user experience across a variety of devices.

Q: What are the main changes you’re seeing in the Wi-Fi ecosystem that will impact how people will use the technology in the future?

JR: There is a perception by some in the industry that NGH networks
are taking a long time to come to fruition. This is partly due to there being some hesitation from operators to spend capital on purely enhancing domestic connectivity. It may require actions from large operators, to pave the way and create the impetus for NGH global expansion. In the past year alone, there has been a tremendous amount of progress. A large percentage of smartphones are now enabled for seamless authentication and the equipment now going in the ground supports many of the features that make up NGH today. Simply stated, NGH is coming. In the near future, end users will benefit from seamless access to Hotspots that in turn, provide an improved broadband experience.

Q: What do you think are the main hurdles the industry needs to overcome for Wi-Fi to realize its full potential?

JR: For Wi-Fi to realize its full potential, the industry needs a common set of agreements, standards, implementation practices and interoperability guidelines that outline how operators can easily connect with one another. One key priority is ensuring that device manufacturers are supportive and that the right technology is both in the network and on the devices to guarantee NGH compatibility. Adoption of these guidelines and standards by WBA members and across the Wi-Fi ecosystem are critical for Wi-Fi growth.

Q: Which emerging business models for Wi-Fi do you think hold the most potential?

JR: There are a variety of business models across the Wi-Fi ecosystem and different models will be viable for different players. Furthermore, the Wi-Fi ecosystem itself is in a nascent state. It’s essential that Wi-Fi becomes truly secure, seamless and interoperable so new business models and growth opportunities will build on this “next generation” Wi-Fi technology platform. On this platform, operators will be able to adopt an offload model to enhance the customer experience or build a roaming business, other players will grow new M2M businesses or create advertising revenues, still others may find new ways to monetize and elevate back end support systems like billing and settlement. Across the ecosystem, there will be a plethora of growth opportunities and business models, some of which have yet to be conceived.
Founded in 2003, the aim of the WBA is to secure an outstanding user experience through the global deployment of next-generation Wi-Fi, incorporating technology innovation, interoperability and robust security. In 2012, WBA launched the NGH Trial Phase 2 project and Interoperability Compliancy Program while continuing the momentum from the GSMA – WBA Joint Taskforce from 2011.

WBA NGH Trial Phase 2 Project is an advanced trial of Next-Generation Hotspot (NGH) which will give users easier access to a far greater number of public Wi-Fi access points around the world. The trials will take place in 4Q12 and employ the first generation of Wi-Fi CERTIFIED Passpoint equipment which the Wi-Fi Alliance announced it will start approving. The WBA expects the larger-scale commercial NGH deployments start by 1H13. More than 50 companies are involved in this initiative.

Next-Generation Hotspots will use Wi-Fi CERTIFIED Passpoint equipment, thereby allowing users gain access without the need for usernames and passwords, while also allowing operators to establish relationships with each other so their users can access a wide variety of Hotspots in their own country and around the world. The advanced trials will build on the first phase of tests conducted earlier this year that used prototype equipment from a wide variety of different vendors to test automatic Hotspot discovery and authentication across many different operators’ networks.

Phase 2 trials will repeat the basic Phase 1 tests using newly-certified Wi-Fi equipment as well as verify more advanced operator-billing and connectivity policies in addition to extensive authentication methods.

The trials will vet operator-connectivity policies for automatically choosing a Hotspot when many are available. In order to ensure as many people as possible can access Hotspots without entering usernames and passwords, the trials will test a variety of authentication methods, including SIM-based for the growing number of smartphones, as well as non-SIM based for tablets, laptops and legacy phones which cannot support SIM authentication. The methods to be tested are EAP-TLS, EAP-TTLS, EAP-SIM and EAP-AKA.

The WBA Interoperability Compliancy Program is focused on Tiers of Compliancy for a minimum set of requirements to manage a Wi-Fi roaming business as well as being deeply integrated with NGH. More than 50 companies are involved in this initiative. WBA targets to launch the program to facilitate operator interoperability and optimize the technical interconnection between operators for Wi-Fi roaming. This program aims to promote the best Wi-Fi network practices and network quality of the WBA Members, facilitating the integration of roaming agreements among
operators, with the guarantee that operators correctly follow the WRIX specifications and roaming guidelines as well as optimizing the efforts for roaming implementations, by knowing what to expect from the partner.

**GSMA-WBA Joint Taskforce** is a joint GSMA-WBA taskforce to promote Wi-Fi offload and roaming. The GSMA and the Wireless Broadband Alliance (WBA) announced in March 2012 they are working together to simplify connectivity to Wi-Fi Hotspots from mobile devices such as smartphones and tablets. The joint initiative is developing technical and commercial frameworks for Wi-Fi roaming, which will bring together the benefits of mobile technology and Wi-Fi networks for the first time, creating a far simpler consumer experience. Wi-Fi is increasingly emerging as a feature on smartphones and tablets, but today there is no consistency in the way these devices attach to Wi-Fi networks. This process includes device configuration, the use of access keys and the various mechanisms for acquiring and paying for connectivity. Wi-Fi roaming will allow mobile devices to seamlessly connect to a Wi-Fi Hotspot using the SIM card for authentication, as well as enable mobile operators to uniquely and securely identify users whether they are on a mobile or Wi-Fi network.

Wi-Fi roaming will be based on the WBA’s “Next-Generation Hotspot (NGH)” program and the Wi-Fi Alliance’s “Passpoint certification” technology. It will also build on the GSMA’s successful roaming principles that have propelled the mobile industry to more than six billion mobile connections worldwide, a number that is expected to more than double within the next 10 years.
Wi-Fi has undertaken a remarkable journey in the space of just a few short years. It is a journey that has been defined by a global spread of investment by network operators, the integration of Wi-Fi as a key component of a heterogeneous network strategy, the emergence of new and innovative business models and, perhaps most importantly, by a strengthening of user dependence on Wi-Fi. It is now widely accepted that operators wishing to provide a complete set of broadband-based services to their customers will need to do so by using a converged pool of both licensed and unlicensed spectrum.

The ever-growing importance of Wi-Fi is demonstrated by the continued expansion of the membership of the Wireless Broadband Alliance. Since the publication of the first report in October 2011, a further 19 companies have joined, taking the total number of member companies to 95 by October 2012, representing a near-doubling of the membership in less than 24 months.

This momentum is underlined by the strong commitment of leading telcos globally: 18 of the world’s top 20 largest telcos by revenue have now publicly committed to investing in deploying their own Wi-Fi Hotspot networks.

According to the industry survey conducted by the Wireless Broadband Alliance and Informa Telecoms & Media, 78% of telcos believe that Wi-Fi is either important or very important to their overall strategy.

An interesting insight from survey was that 43% of operators are now more bullish about investments into public Wi-Fi, while around one-third of operators indicated a cautious attitude (see fig.). However, even those operators that have not committed to deploying their own public Wi-Fi networks will still need to develop a clear strategy for Wi-Fi since they face the reality that their customers will only continue to become more reliant on Wi-Fi given the widespread deployment of Hotspots that is taking place around them.

### Wi-Fi: A global trend that goes well beyond headline-making

The many proof points that have validated the renaissance of Wi-Fi are now well understood, with the media covering the latest headline developments on a daily basis. But it is the events that go relatively unnoticed that hold greater relevance to the future role that Wi-Fi will play.

At the very high end of the smartphone market, whether it is the Apple iPhone, Samsung Galaxy or the Nokia Lumia, Wi-Fi has been a default feature for several years. Indeed, such is the importance of Wi-Fi to the overall experience of a smartphone that there is now strong evidence that handset manufacturers are seeking to differentiate through the Wi-Fi capabilities of their devices. Features such as dual-band 802.11n support, Wi-Fi Direct and, in the future, Passpoint certification hold the promise of driving incremental value to customers by enabling an enhanced user experience.

Importantly, however, the speed of Wi-Fi innovation is replicated at the low end of the market. Wi-Fi has become an integral feature of low-cost devices sold in huge volume in emerging markets. Price-sensitive consumers in markets such as China and India can purchase locally-manufactured devices with Wi-Fi support for less than US$50. But branded devices are also reaching the market at lower and lower price points with Nokia’s Asha series of 2G and Wi-Fi-capable devices a key but by no means isolated example.

Wi-Fi also continues to drive a significant level of M&A activity across each stage of the Wi-Fi value chain. Perhaps the most significant and most high-profile acquisition was Ericsson’s purchase of BelAir Networks. This was a landmark moment since it signaled the wholehearted entrance of the world’s largest mobile infrastructure company into the Wi-Fi ecosystem.
Again, it is by looking beneath the surface, and in this case at smaller, less-publicized acquisitions, that the signs of change can be found. It is arguably these transactions that are interesting since they herald the emergence of innovative and transformative business models. Arqiva acquired Spectrum Interactive, a small UK-based Wi-Fi operator, in a move that will position Arqiva as a strong player in the wholesale-only, neutral host market in the UK, thereby seeking to replicate the strategy of US-based Towerstream.

US Wi-Fi provider Boingo, meanwhile, acquired the small California-based start-up Cloud Nine in August 2012 with little fanfare in a move that is designed to position Boingo as a driving force in the development of ad-sponsored free Wi-Fi.

**Accelerated momentum**

Clearly, the momentum behind Wi-Fi gathered pace during 2012 and the outlook for the coming 12 months is equally positive for the Wi-Fi ecosystem. There are three key factors that will add further fuel to the fire.

1. **Expansion of Wi-Fi into new venues**

In the world’s most connected cities, locations such as London, New York, Moscow, Seoul or Tokyo, local smartphone users can enjoy access to Wi-Fi at every point of their day-to-day life. The expansion of Wi-Fi into more and more venue types means that connectivity is available in their homes, in their offices and in virtually every type of leisure venue.

These users are coming to expect that their in-home or in-office Wi-Fi experience will be replicated wherever they go and at every point of their day; the journey to work on public transport; at their favorite lunch or coffee spot; and in bars, restaurants; as well as in sports stadia and any other leisure venues. Where fixed or cellular connections were once the main or only connectivity option, Wi-Fi now increasingly is the principal form of connectivity.

In the future, it is entirely reasonable to assume that wherever there is high-speed broadband connectivity and it is a venue where people gather, even if only for a short space of time, this place will be a natural location for a Hotspot. There is a consensus emerging that every customer-facing business will be required to provide Wi-Fi to their customers in the long term.

A land-grab is underway to establish a presence in the prime Hotspot locations in markets globally. With competition for these premium locations increasing, the price of acquiring the rights to them is increasing in parallel.

In markets where Wi-Fi is still establishing itself – which are typically focused on the first-phase locations, such as airports, hotels, transport hubs – the Hotspot build-out phase is expanding quickly into new locations, such as retail and outdoor hotzones.

Even in markets where there is already a dense deployment of public Hotspots, there are still many greenfield opportunities in those retail locations, stadia and large private enterprises that are still not connected to their true Wi-Fi potential.

The Super Bowl sporting event held in Indianapolis in January 2012 provided a clear example of the need for in-stadium Wi-Fi. During the match, 19% of the total audience of nearly 70,000 used one of the 604 access points installed inside the stadium; a total of 370GB of data was used with each user averaging around 30MB of data during the game. Wi-Fi traffic analysis carried-out by by Cisco also revealed the importance of uploading; almost 40% of the total traffic consumed was through uploading – sharing of pictures/video/status.

It is clear that venue locations are not only becoming more varied, but are also growing in scale and complexity. The Olympic Games held in London during the summer of 2012 was provided with the highest-density Wi-Fi network ever built; it covered nine Olympic venues over an area of more than 250 hectares. Despite the undoubted challenge of providing service to tens of thousands of users in such a high-density traffic environment, BT, the official supplier to the Olympics, was able to achieve 100% availability.

2. **A world of Wi-Fi-enabled devices**

The Wi-Fi device ecosystem is not just a story of smartphones, tablets or even feature phones, but is also about a vast addressable market of other connected devices – from e-readers to games consoles, from...
smart TVs to smart refrigerators and from connected cameras to connected weighing scales. The Wi-Fi Alliance continues to show impressive momentum in certifying new Wi-Fi devices. In total, the WFA has certified over 15,000 devices, with 2012 again proving a record year with more than 2,400 device certifications by October.

If a product or service can be made more valuable or useful to end users by being connected, then this will eventually take place. In many cases, manufacturers will turn to Wi-Fi over cellular technologies due to the lower cost and complexity involved in integrating Wi-Fi-based connectivity. Importantly, the addition of connectivity allows manufacturers to create new monetization opportunities for themselves and other members of the value chain by the possibility of building services on top of their core products.

3. An enhanced Wi-Fi user experience

The performance and experience of Wi-Fi is also set to evolve. The development of NGH and deployment of Passpoint-certified network equipment and devices, the growing availability of 802.11n (and the promise of 802.11ac) and 802.11u will enrich the user experience and enable new types of service opportunities and end-user propositions, propelling Wi-Fi further into consumers’ expectations and lives.

The momentum behind the move towards NGH has been considerable. The Wireless Broadband Alliance successfully completed a series of basic trials during the first quarter of 2012 and has now moved forward with more advanced tests taking place in the final quarter of 2012 involving a broad range of members from across the entire Wi-Fi value chain.

These final trials before commercial deployment will:
- Test newly-certified Wi-Fi equipment
- Verify advanced operator billing procedures
- Test connectivity policies
- Assess extensive authentication methods, including SIM and non-SIM-based authentication.

The successful completion of trials looks set to prepare the ecosystem for the first commercial deployments of NGH in the first half of 2013. The impact of the migration to NGH-compliant networks will be felt in multiple ways. The speed and simplicity of the connection and a vastly-improved user experience generally is expected to drive increased usage of Wi-Fi networks, in terms of both the frequency of sessions and the average traffic consumption per session. The customer experience will be further enhanced by the transition to NGH, which will lead to a faster deployment of 1x, 11u and EAP methods – the primary focus for enabling seamless, secure and cellular-like user experience, and an acceleration of dual-band 2.4GHz and 5GHz deployments. The ability to use their billing and policy platforms should also open the door to new monetization opportunities for operators, especially if they experiment with new pricing models.

A clear focus for the industry for 2013 will be to drive a strong commitment from Wi-Fi network operators to the deployment of NGH. This will require a clear articulation of the business case for NGH and evidence of how both operators and venue owners will be able to achieve a return on the round of investment required. A major factor that will undoubtedly have an impact on the overall speed and phasing of NGH deployments will be the availability and sales of Passpoint-certified equipment that is able to exploit the inherent advantages of NGH architecture. In a positive sign for the industry, the first Passpoint-certified smartphones are set to reach the market soon, including a variant of the hugely-popular Samsung Galaxy S3.

The Wi-Fi roaming opportunity

Wi-Fi roaming is expected to be a major focus in 2013. There is a huge demand to use Wi-Fi when travelling, but a major under-indexing in the adoption of Wi-Fi roaming propositions. Although there are more than 340 million roaming trips per year, according to Informa Telecoms & Media, the number of users that make use of Wi-Fi roaming can be counted in the hundreds of thousands. In all, this adds up to a major missed monetization opportunity for the Wi-Fi ecosystem.

“...venue locations are not only becoming more varied, but are also growing in scale and complexity...”

Data roaming take-up is still in its infancy, even in Europe where there has been major regulatory and competitive efforts to drive down pricing, so there is a major opportunity for operators to stimulate usage by laying the foundations for Wi-Fi roaming in terms of agreements with foreign operators and ease of access to Hotspots. Years of entrenched negative perceptions about data roaming has built a...
strong user appetite for using Wi-Fi when abroad and it is up to the Wi-Fi community to take advantage of this.

The transition to free
In the leading markets, there is a strong transition to free-to-end-user models. According to JiWire, more than three quarters of public Hotspots in the US can now be accessed by end users without any additional access fee.

This trend is being accelerated not only by the domino effect within former paid-for venues, but also by the deployment of Wi-Fi into greenfield venues. Added to this, the entrance of new aggressive players is intensifying the overall competitive dynamic, while the bundling of Wi-Fi into tariff plans means that, even where Wi-Fi may not actually be free, it is increasingly perceived as such by the customer.

It is clear, however, that trends in terms of access pricing vary significantly in different regions and markets. In markets where Wi-Fi is still sole form of connectivity, there is still a definite, if perhaps diminishing, willingness to pay for Wi-Fi access.

The move to free by venue owners is underpinned by a strong business rationale. Customers have demonstrated that they are prepared to vote with their feet to get access to free Wi-Fi. And venue owners that are focused on delivering an enhanced customer experience believe that investment in Wi-Fi can deliver a clear return by helping to attract greater footfall of customers, to extend their stay and stimulate spend, and also help to generate loyalty that pays off in the form of repeat custom.

It is important to note, however, that free is far from the only payment model available to venue owners. A variety of interesting new approaches are gaining traction, especially within the hospitality sector, such as the emergence of tiered pricing models based upon different quality-of-service levels. This involves offering a free connection with limited speeds of download volumes, while making a premium service available for a fixed fee that includes faster speeds and, perhaps, unlimited data downloads. Hotel owners and airlines are among the leading groups of companies that are also experimenting by bundling free access into their loyalty schemes to help increase sign-up rates or bundling access to free Wi-Fi into higher-priced room rates or flights to encourage upsell of higher-value products.

The growth of traffic and the impact on total cost of ownership is forcing a rethink of pricing models, especially in terms of unlimited, no-restriction consumption. The evolution to new pricing models offers potential new ways to generate revenue. The integration of pricing for cellular and Wi-Fi access into bundled propositions can enhance monetization opportunities, where value is explicitly tied to the inclusion of Wi-Fi. While bundled Wi-Fi access is proving successful in generating loyalty, operators will need to think carefully about pricing models once Wi-Fi is even more closely integrated. Even where Wi-Fi is integrated, operators have typically not been effective in promoting this value to consumers. But once something is perceived to be free, it’s hard to come back from unless it is sufficiently differentiated from the commoditized service.

The importance of business models
The industry is seeing a huge variety in the types of business models used to underpin broader investment into carrier-grade Wi-Fi. These can be loosely classified into three broad categories (see fig.)

Much of the focus around offload has been around using Wi-Fi as a cost-avoidance strategy, but Informa Telecoms & Media believes that the business case for Wi-Fi has to be centered on a multi-sided value proposition that takes direct and indirect value from both a revenue and a cost-saving perspective. The importance of indirect value is crucial since many operators have built Wi-Fi strategies around simply delivering an enhanced customer experience for core products and services upon which a return is obtained by increased customer satisfaction and, ultimately, lower churn.

### Business models used to underpin broader investment into carrier-grade Wi-Fi

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Source: Informa Telecoms & Media
Conclusions
The key point for operators building out their Wi-Fi business plan is to ensure that they choose the most appropriate business model for their organization, taking into account factors such as the company type and structure (mobile, fixed, integrated, cable), the existing technology and spectrum position, local market characteristics as well as their overall position from a competitive standpoint.

Ultimately, the most successful players in the Wi-Fi space are likely to be those that understand and draw together a diverse range of business models to build a holistic business case. The business case should be engineered to deliver value in a number of ways against a broad set of strategic objectives and to mitigate the complex and inter-related risks tied to a given company’s organizational structure and market position.

It is clear that some approaches will drive value in higher volumes and faster speeds, while others may take longer to deliver a return due to factors such as the investment levels required, the complexity of the value chain or an uncertainty driven by competitive dynamics.

Users increasingly expect Wi-Fi to follow them wherever they go, both at home and abroad. Repeated studies have demonstrated the importance of Wi-Fi to users in making destination choices when they travel.

Strong operator support and the momentum behind the development of inter-carrier roaming across premium “carrier-grade” Hotspots that is driven primarily by activities within the Wireless Broadband Alliance should result in a major industry drive to develop and monetize the Wi-Fi roaming market opportunity, especially from Wi-Fi industry bodies and major aggregators.

Momentum has been created by a major expansion of the WBA membership, leading to growth in the addressable footprint to more than 1 million Hotspots. Increasingly, it is the strong ties and inter-working with the GSMA that will bring together GRX and WRIX to replicate the GSM roaming experience in the Wi-Fi world. The key goals are to bring commonalities and “standardized” approaches to network selection, device implementation, security, authentication, service provision, policy and, importantly, billing with SIM-based authentication, which is a major cornerstone.

A key issue is the timing of these activities, which promise a greater overall experience, with more widespread implementation expected from 2013. The Wi-Fi community has a major opportunity to cement Wi-Fi once and for all firmly at the heart of the way consumers access the Internet on the go.
Operator best-practice case studies

Case study: Boingo and Google – Wi-Fi as enabler of services beyond Internet access

Key points
• As public Wi-Fi expands into more venue types to support the proliferation of mobile devices, user expectations increasingly skew toward free-to-the-end-user offerings, especially in consumer-focused venues.
• Sponsored Wi-Fi represents a win-win-win for consumers, advertisers and venues: consumers benefit with free Wi-Fi, advertisers reach a captive audience and venue owners generate meaningful revenue to offset the cost of providing Wi-Fi.
• Google Offers teamed up with Boingo to offer a free-to-the-end-user Wi-Fi promotion in New York City subway stations and Wi-Fi hotzones via a high-value CPE (cost per engagement) sponsorship that allowed Google Offers to reach a captive audience with location-specific advertising.
• With trends pointing to Wi-Fi sponsorships becoming more popular, Boingo recently acquired US-based free Wi-Fi sponsorship company Cloud Nine Media to bring its advertising and sponsorship capability in-house as a core service offering for venues.

Overview
As part of a focused initiative to deliver free-to-the-end-user Wi-Fi in high-traffic locations, Boingo, one of the largest Wi-Fi providers in the US, secured Google Offers as an advertiser to sponsor free Wi-Fi to end users in six New York City subway stations and 200 street-level hotzones near the subway. This sponsored access is built on a cost-per-engagement (CPE) advertising model, where the sponsor – in this case Google Offers – pays a premium for the high-engagement advertising opportunity that delivers 100% share-of-voice to a captive audience.

The Google Offers campaign highlights a significant shift in the industry, particularly in the US, where end-users increasingly expect that Wi-Fi should be free.

To tap into this emerging trend, one of Boingo’s strategies is to focus on securing commercial sponsors to plug the gap between venue-paid and user-paid Wi-Fi. To this end, Boingo bought US-based free Wi-Fi sponsorship company Cloud Nine Media in August to bring its advertising and sponsorship capability in-house.

Business model
Boingo had been offering user-paid Wi-Fi access at the 200-plus hotzones across mid-town Manhattan, as well as in the six subway stations in the Chelsea area of New York City for the previous four to six months. Until the sponsorship launch, usage was light – in part because there had been no signage promoting Wi-Fi availability and no promotional efforts to draw attention to the availability. The nature of the Hotspots – with limited dwell time in the subway stations and above ground as people moved around the city – also had an impact on use of the user-paid system.

The Metropolitan Transportation Authority (MTA), responsible for public transport in New York City, wanted to enable users to have access to free Wi-Fi on the subway. In order to support MTA’s interest, Boingo embarked on an effort to identify companies interested in high-engagement advertising that would give them access to a captive audience. Through a traditional advertising sales cycle, Boingo identified and secured Google Offers for a CPE sponsorship agreement that would promote the company’s special offers in the New York metropolitan area.

While the value of CPE sponsorship programs in high-dwell venues like airports and hotels has been well established for several years, the value proposition for low-dwell, high-frequency locations like subway stations was relatively new.

Before being connected to the Internet, users accessing the network see a series of three Google Offers-branded screens. The goal of these screens is for the user to be “immersed” in the Google Offers brand (100% share of voice) and receive its marketing message; navigating through the branded screens exposes the customer to the sponsor’s message for anywhere between 15 and 45 seconds.

To encourage usage, the MTA committed a considerable amount of marketing real estate within the subway stations to promote the free Wi-Fi offer in order to help raise awareness and add value to the sponsors. This included widespread signage in subway stations (see fig.) as well as allowing teams of “brand ambassadors” on the platforms.
to raise awareness and help advertisers get connected.

While the premiere sponsorship by Google Offers lasted from June 25 to September 7, it was followed immediately by another sponsorship from Google Play that extended the free subway Wi-Fi through to the end of September. The CPE sponsorship approach generates significantly more revenue than a traditional CPM advertising model might, so the venue can better subsidize the costs of providing free Wi-Fi to users. This is especially important as the network usage increases significantly when the service is freely available versus being a paid service.

Results
The combination of sponsored free Wi-Fi, high-visibility signage, a successful public relations launch in New York (154 million editorial impressions) and teams of brand ambassadors on the street and station platforms, led to an increase in sessions of more than 1,000% for the hotzones, which had launched six months previously. The sponsorship was effectively the launch for the subway platforms, and the network went from nearly zero sessions per day before the sponsorship to an average of more than 3,000 sessions per day across six stations during the campaign.

The vast majority of the sessions were redeemed by consumers with mobile devices – 93% mobile phones and 5% tablets in the subway and 62% mobile phones and 16% tablets in the metropolitan hotzones – further reinforcing the assumption that New Yorkers on-the-go are still an accessible audience for advertisers wanting to reach them when they’re out and about.

By tying the sponsorship to a direct call to action, the sponsor can calculate success by measuring conversion ratios of customers captured compared to sessions delivered. Based on Google’s follow-on sponsorship for an additional product line, advertisers appear to find the immersive, high-engagement, 100% share-of-voice CPE sponsorships an attractive way to deliver their message without distractions, and users appear receptive to investing 15-45 seconds with those sponsors in return for quality free Wi-Fi.

Outlook
Boingo believes that Wi-Fi companies will need to continue to pursue CPE sponsorships – as well as develop other creative high-value ad models for free-to-the-user Wi-Fi – in order to maximize Wi-Fi availability and usage in a world that increasingly expects Wi-Fi to be free. As sponsorship becomes an increasingly core part of Wi-Fi service delivery, companies will need to establish alliances with specialty advertising sales partners that can keep their networks sold and committed or develop that capability in-house to maximize revenue generation and enhance sell-through.

Conclusions
• Boingo’s partnership with Google Offers shows that Wi-Fi providers can effectively monetize free-to-end user Wi-Fi access and at the same time significantly drive usage, which in turn provides incremental benefits to advertising partners if executed in the right way.
• Boingo’s acquisition of Cloud Nine Media has enabled it to bring its marketing and advertising capability in-house to more effectively form partnerships to monetize free-to-end user Wi-Fi offerings.
• The effectiveness of Google Offers’ sponsorship of the Boingo network is evidenced by the subsequent deal with Google Play to sponsor free-to-end-user Wi-Fi in 4,000 Boingo Hotspots across the US for a one-month period.
• Boingo’s sponsorship-based free Wi-Fi model will continue to see strong growth and it provides a model for other Wi-Fi providers looking to tap into this market.
Case Study: Oi and iPass - Wi-Fi business models

Key points
• Oi is an excellent example of an operator placing Wi-Fi at the center of its wireless broadband network strategy and taking the necessary moves to execute on this.
• Oi is adopting a market-leading Wi-Fi roaming strategy by bundling access into all its postpaid roaming tariffs rather than charging a premium for Wi-Fi roaming.
• A key goal for Oi is to offer a seamless Wi-Fi experience to end users in terms of authentication and sign-on.
• Oi believes there is lots of work to be done to make the Wi-Fi experience easy for end users.

Overview
Brazilian operator Oi, the largest integrated operator in Brazil, began its Wi-Fi strategy with the acquisition of Latin America Wi-Fi operator Vex, the largest Wi-Fi provider in the country, in 3Q11. Oi’s business strategy is to be an end-to-end Internet access provider and have the country’s most widespread Wi-Fi footprint to seamlessly support the increasing demand for smartphones, tablets and laptops.

Oi finalized integrating its Wi-Fi network with Vex’s Wi-Fi network in July, which means that Vex operations now come under the “Oi Wi-Fi” brand, while Vex’s Hotspots are part of Oi’s network structure. With the integration, Oi’s Wi-Fi network increased to 10,000 Hotspots, of which 1,800 belonged to Vex. Oi will also build out 20,000 new premium Wi-Fi Hotspots in the next 24 months. As well as deploying and owning Hotspots, Oi also has a Wi-Fi network-sharing agreement with international Wi-Fi provider Fon that is helping the network to grow by around 1,000 Hotspots on a weekly basis and also offer more than 7 million Hotspots on a roaming basis.

In April, Oi signed an agreement with US-based international Wi-Fi provider iPass so that its users could access iPass’s 1.1 million Hotspots in 113 countries and territories. Oi is in the process of integrating these Hotspots into its Wi-Fi offering so roaming users can seamlessly connect to the iPass network.

Business model
Oi’s Wi-Fi goals, in order of importance are to:
• Offer the best data experience.
• Differentiate from its rivals.
• Offer the best customer experience.

Notably absent from these objectives is generating revenues from the Wi-Fi network, which Oi says is not one of the main drivers for its Wi-Fi strategy.

Oi bundles Wi-Fi into the service packages of all its postpaid users whether they are on fixed, mobile or broadband contracts. Wi-Fi access is offered across four devices per user, including devices without SIMs (e.g., Wi-Fi-only tablets), as the operator is trying to monetize usage on devices.

A key goal for Oi is to offer a seamless Wi-Fi experience to end users in terms of authentication and sign-on. It has an integrated wireless broadband network strategy because it wants to deliver the best connectivity it can at any given location or time. From the end-user perspective, Oi doesn’t discriminate between 3G, Wi-Fi or any other wireless broadband network.

Oi’s Wi-Fi network has three components:
• Premium-location Hotspot network (e.g., universities, etc.).
• Outdoor coverage.
• The FON network.

Oi says that its postpaid customers increasingly perceive Wi-Fi as a free service, and that it sees considerable momentum to Wi-Fi usage on this basis, with the exception of premium locations. However, the operator thinks that even these premium locations will move to offering free Wi-Fi access options, as a try-and-buy option.

Oi clients with Android-based smartphones can download a new app, which replaced the Vex Connector, while those who are not Oi postpaid customers can download the client and buy plans for either two hours, 24 hours or monthly. The operator only accepts credit cards now, having moved away from scratch cards as people became more willing to register their credit card details online. Oi still uses scratch cards as a promotional tool (e.g., offering airtime minutes for free) and is about to launch an SMS tool.

The new app automatically connects the device to the wireless Internet within Oi’s coverage area, including roaming Hotspots. For former Vex users, package prices and hotspot locations remained the same and they gained network access through the Oi Wi-Fi network, having access to Oi’s entire coverage. Oi is developing its own Wi-Fi client for iOS, Android and the iPad.
network, as well as for BlackBerry and Windows devices, including also laptop devices with Windows and MacOS.

Oi's Wi-Fi roaming strategy
As international data roaming is still expensive for Oi subscribers, the operator will soon offer Wi-Fi roaming to all pre- and postpaid roaming subscribers using the iPass network. It sees Wi-Fi as complementary to its international data roaming revenues, not as a threat. Oi doesn’t plan to generate extra revenues from Wi-Fi roaming; instead it will bundle Wi-Fi into data roaming packages to maximize its competitive advantage over rivals by offering more value to subscribers than rivals. In the Brazilian market, Oi is the only operator offering Wi-Fi roaming, so it helps the operator improve end-user acquisition and retention.

Currently Oi sees that the minority of users, less than 10%, have data roaming switched on, meaning there is a massive opportunity to tap latent demand to access the Internet while its subscribers are traveling.

iPass is selling Wi-Fi roaming access on a wholesale service, leaving Oi to decide how to position Wi-Fi within its portfolio. An Oi-developed Android App was launched and an iOS app will soon be launched and available as a free download. The operator will offer Wi-Fi access to its end-user base for free for three months after launch as a promotional offer.

Results
Oi has a market advantage for retention and acquisition because of Wi-Fi, since its rivals haven’t yet developed a clear Wi-Fi strategy.

The company is also a pioneer in having a full Wi-Fi strategy (FON + premium + outdoor) bundled into its cellular services in order to offer the best data connectivity possible, resulting in an increase in its data usage and its subscription base.

Although it is offering Wi-Fi as a free add-on to its services, Oi expects it to guarantee an increase in the usage of data packages, both domestic and roaming, and also to increase customer loyalty.

Outlook
Wi-Fi will continue to be a high strategic priority for Oi because of the benefits it offers – and at a relatively low cost compared with 3G. The operator will continue to invest in Wi-Fi as it gets ready to begin its LTE network rollout.

Specific strategic Wi-Fi initiatives that Oi is developing include:
• Making the iPass roaming capability available even if roaming isn’t turned on, in other words, make it available for most of its postpaid customers.
• Making Wi-Fi a seamless option, adopting EAP-SIM authentication.
• Offering Wi-Fi with an advertising component to further monetize usage on a specific range of Hotspots.
• How best to offer 3G/Wi-Fi seamless offload.
• Specific offers for prepaid that will offer prepaid Wi-Fi roaming.

Conclusions
• Oi has a highly-evolved Wi-Fi and cellular integration strategy and has a solid platform to build on as new technologies come to the market.
• Oi is using Wi-Fi to clearly differentiate from its rivals and offer a better-quality mobile broadband experience.
• Oi’s Wi-Fi roaming strategy complements its home-market Wi-Fi strategy by positioning it as the go-to provider for high-quality mobile broadband access while traveling.
• By not seeking to directly monetize its Wi-Fi offering, Oi is able to use the service to effectively increase the overall value it offers subscribers, in particular high-ARPU customers, thereby indirectly increasing revenues and improving customer satisfaction.

Case study: The Cloud and Nintendo – using a device-based solution to manage Wi-Fi access

Key points
• The deal between The Cloud and Nintendo for Wi-Fi device connectivity is an example of innovation and dynamism in Wi-Fi business models between traditional Wi-Fi providers and companies looking to connect new devices for which the old data-roaming models don’t apply.
• The deal between The Cloud and Nintendo is a great example of enabling a new generation of Wi-Fi enabled devices and helping structure innovative business models.
• For Nintendo, Wi-Fi connectivity is about creating a competitive advantage for its devices.
• The Cloud believes that an integrated approach and ease of activation is the key to stimulating Wi-Fi-enabled usage.
• Nintendo can update its devices so they recognise any Hotspot within The Cloud’s network without any user interaction. In order to support this, it is essential that The Cloud’s Wi-Fi network presents a consistent service at all locations.

Overview
In 2004, The Cloud started allowing non-traditional providers of Wi-Fi services access to its network as part of a device-agnostic approach. The Cloud was bought by BSkyB in 2011, but remains an autonomous part of the UK satellite broadcasting company. For Sky, offering Wi-Fi was a compelling add-on to its core TV and broadband services and, in 2011, it invested in a large expansion of The Cloud’s Wi-Fi network in the UK as well as in the Nordic countries and Germany.

Gaming console manufacturer Nintendo’s deal with The Cloud for Wi-Fi connectivity of its 3DS devices went live in early 2011. Nintendo is seeking to extend the capability of its devices through Wi-Fi connectivity and The Cloud’s large UK Wi-Fi footprint was a key reason for Nintendo striking the deal.

Business model
Although The Cloud and Nintendo approached the deal like a Wi-Fi roaming agreement, it presented a challenge because the usage behavior of gaming devices in public locations was unknown. The legacy per-minute roaming agreement concept makes less sense for these usage scenarios, although they are still widespread in the industry. However, to devise a more effective pricing model, the companies addressed the question of: “How does the device connect with the network and how does it behave on the network?” The companies structured their deal on a fixed-term fixed-fee model, which works well until take-up rates and usage profiles are better understood.

The Cloud and Nintendo have found that provisioning the device to connect seamlessly is the key to uptake and usage. The less the consumer needs to do to connect to the network, the more likely usage will occur. The companies need to ensure that users don’t need to download anything to their device for seamless access to The Cloud’s UK Wi-Fi network.

Nintendo can also update its devices so they know about the latest changes in The Cloud’s network. Because the devices only need to connect to specific back-end systems, it makes the service very easy to scale from The Cloud’s perspective and removes some of the challenges usually presented by Internet-connected devices. The Cloud performs all the required device recognition and authentication using industry-standard processes. No new platform development is required. Once a 3DS device is connected to Wi-Fi, Nintendo automatically downloads gaming-related data, including its exclusive content and promotions, and unique content. The 3DS also brings players together over Wi-Fi, allowing them to exchange information such as game data and high scores with other Wi-Fi connected users. Nintendo can see the Wi-Fi gaming data, which becomes part of the game-build process. The company promotes the Wi-Fi capability of the device: “This is Wi-Fi enabled.”

Results
Around 7% of devices currently connecting to The Cloud’s network fall into the Wi-Fi-only gaming or entertainment-device groups. Non-laptop devices currently account for over 80% of devices on The Cloud’s Wi-Fi network.

Outlook
The Cloud is looking at how it enables more devices to seamlessly connect to the network.

The number of e-readers and tablets is growing rapidly but they are still a relatively small part of the overall group of connected devices. That said, they are in a similar position as the iPhone and Android devices were when they first launched.
Conclusions
• The Cloud’s deal with Nintendo demonstrates the scope that Wi-Fi operators have to form close relationships with non-traditional device manufactures.
• The success of The Cloud’s deal with Nintendo should indicate to Wi-Fi operators that they should be open-minded about forming Wi-Fi partnerships with new and emerging Wi-Fi connectivity models. M2M and cloud services are just two fast-growing areas that will require Wi-Fi connectivity and operators that strike deals at the early stage of market development stand to benefit.
• The Cloud’s deal with Nintendo shows that, for a partnership to be successful, the companies need to co-operate closely on all aspects of the service. This partnership shows that the closer the collaboration, the more chances there are of success.
• The Wi-Fi operators that will be most attractive to companies will be the ones with the most coherent and best-quality Hotspot coverage. Moreover, these Wi-Fi operators will be able to charge more. They will also have the capacity to add more partners while maintaining a better quality of service than operators that have a patchy and lower-quality network.
• The partnership shows how value-added services can be built on top of basic Internet connectivity to the mutual benefit of both partners.

Case study: Mobily and Aruba Networks – cellular-to-Wi-Fi offload

Key points
• Mobily sees Wi-Fi as an efficient way to reduce cellular capex requirements and improve the quality of experience. The operator is pursuing a pioneering cellular-to-Wi-Fi offload strategy.
• Mobily sees Wi-Fi as the next big broadband-communication service as the technology becomes more mature.
• Mobily believes that Wi-Fi can offer a carrier-grade broadband level of service.
• Mobily is undertaking a Next Generation Hotspot (NGH) trial with Aruba Networks and aims to be the first operator in the Middle East to launch NGH-based services. NGH opens the door for inbound roamers to connect seamlessly to the Mobily Wi-Fi network while their usage is being charged back to their home operator.

Overview
Mobily is the trade name of Saudi Arabia’s second telecommunications company, the Ethad-Etisalat consortium. The company, as the winning bidder for Saudi Arabia’s second GSM license, provides mobile telecoms services nationwide and is the second-largest mobile operator in Saudi Arabia. Its strategy has always been to pursue broadband services. Mobily pioneered cellular broadband technology in the Middle East; it launched 3.5G services in June 2006 and LTE services in September 2011.

Mobily has recently begun offering a new broadband service using Wi-Fi. Currently, Mobily has around 350-400 public Hotspots, with each Hotspot comprising multiple Wi-Fi access points covering multiple business verticals including cafes, hotels, hospitals and outdoors, and some challenging venues such as stadiums and Holy Hajj areas.

In 2010, the operator began to see a massive increase in data usage, fuelled by offering unlimited data subscriptions. Many of its subscribers have multiple broadband subscriptions across different technologies (e.g., WiMAX/3G/LTE). In July 2011, Mobily launched the first TD-LTE commercial network in the world. Against this backdrop of increasing data usage, Mobily sees Wi-Fi as an efficient way to reduce the cellular capex investment in broadband infrastructure needed to match this spike in data usage. The operator is pursuing a pioneering cellular-to-Wi-Fi offload strategy to efficiently manage cellular and mobile traffic in terms of opex/capex and offer the best mobile broadband experience possible. It is working with Wi-Fi vendor Aruba Networks to implement its cellular-to-Wi-Fi offload strategy.

Business model
There are two main strands to Mobily’s Wi-Fi Hotspot strategy:
1. A Hotspot portal based on a Wi-Fi virtual network with multiple service monetization models for both Mobily and non-Mobily subscribers.
2. A cellular-to-Wi-Fi offloading virtual network, offering a seamless user experience with the use of EAP-SIM protocol and WiSpR clients. This virtual network targets smartphones and smart pads.

Mobily will capitalize on a packaging approach that will allow its
subscribers to connect to any of the available broadband network services on site, or to choose between multiple available ones, without being driven into complex cost choices.

The offload services were due to be soft-launched by the end of September and hard-launched in 1Q13.

Mobily has completed an embedded configuration for RIM BlackBerry devices and Apple iPhone/iPad devices. The configuration challenge came mainly from the Android-based devices that did not support EAP-SIM. The solution was to use WISPr clients that were uploaded to Google Play market.

When to offload from cellular to Wi-Fi is a key consideration facing Mobily as it seeks for the best way to implement its cellular-to-Wi-Fi offload strategy. It is using different criteria, the location and number of users on the cell site, and will use a radio-planning solution to monitor the quality of the connection on the devices to ensure users are receiving the best-quality connection.

Mobily is currently building this infrastructure using managed 3G offload architecture, with the existing 3G backend systems being reused for authentication and policy enforcement, while the user traffic is being dropped off to the Internet over a parallel dedicated Internet core. This architecture is designed to ensure the fastest and easiest deployment method – and hence the fastest and least-costly to its subscribers – which, at the same time, increases its reliability for those mobile users accessing 3G or Wi-Fi in case there is an outage of one of the networks.

**Results**

Mobily has only recently soft-launched the cellular-to-WiFi offload service for smartphone users, and it did this without communicating it to the public. Initial results have been very encouraging with 65,000 unique connected users on the first week of the soft service launch, and with 410GB of data consumed.

**Outlook**

Mobily intends to “offload” at least 20% of its current mobile-broadband traffic onto Wi-Fi networks and is designing the Wi-Fi network to meet this key performance objective. It is looking to put in place robust and accurate KPIs for the cellular-to-Wi-Fi offload service; these are two key KPIs that are being examined:

- Cellular-to-Wi-Fi offload rate.
- Average volume usage per month of Wi-Fi vs. cellular.

As Mobily wants to differentiate itself by offering the best mobile broadband experience possible, these two common KPIs are not, by themselves, sufficient to measure the performance of the offload. KPIs related to the measurement of the user experience will be adopted as well.

Mobily will test Hotspot 2.0 (WFA Passpoint) devices as the technology becomes more widely available in equipment.

**Conclusions**

- Mobily is pioneering cellular-to-Wi-Fi offload to offer the best mobile broadband experience while at the same time optimizing opex and capex.
- End users can be expected to perceive a tangible benefit as the cellular-to-Wi-Fi offload service is rolled out.
- After deployment, Mobily is looking to optimize the performance of the offload solution to improve its performance, something which could enable it to further differentiate itself from its rivals’ mobile-broadband services.
- By integrating Wi-Fi so tightly into its mobile broadband offering, Mobily will need to ensure it offers as widespread a Wi-Fi footprint as possible, including through partnerships.
- As Mobily end users become accustomed to Wi-Fi in their home market, the operator should develop Wi-Fi roaming agreements to ensure that its users experience comparable access while traveling.
An overview of WBA member companies

The WBA currently includes a mix of leading Wi-Fi, mobile and broadband network operators; service providers and media players from across the Americas, Europe & Asia Pacific, as well as technology providers and partners. It is conducting NGH trials that will allow SIM and non-SIM based mobile devices, such as phones, notebooks and tablets, to simply roam from the cellular network on to Wi-Fi Hotspots using a secure connection, thereby augmenting the coverage and capacity of both. Many of the world’s largest operators and vendors have participated in these trial projects including AT&T, BT, Orange, NTT DoCoMo, China Mobile, Cisco, LG, Intel, Hewlett Packard and Ericsson.
## Member companies

### Mobile operators

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<th>Aircel</th>
<th>Bell</th>
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### Integrated & fixed broadband operators

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### Wi-Fi operators/aggregators

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<th>Comfone</th>
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<th>Fon</th>
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### Vendors & other industry players

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The Wireless Broadband Association, in conjunction with Informa Telecoms & Media, carried out an Industry Survey during 3Q12 to gauge the status of the Wi-Fi market. The survey drew 386 responses from the industry; the largest proportion (23%) of the respondents were integrated operators (see fig.1).

There was a broad geographic spread among the respondents to the survey (see fig. 2).

Just under 27% of the respondents were based in Western Europe, with the same amount in Asia Pacific, while 15% came from North America. Over 70% of the respondents had strategy-based roles while 20% had technical roles (see fig. 3).

**Market status**
Reflecting the ongoing commitment that operators are making to integrate Wi-Fi into their overall mobile broadband proposition, the telecoms industry has become more bullish about investment into public Wi-Fi over the last 12 months (see fig. 4). This is not only in terms of increasing Hotspot numbers, operators are also pursuing Wi-Fi/ cellular integration at the pricing-model level (integrating Wi-Fi access into cellular) and also at the network-integration level. Japan’s NTT DoCoMo is a great example of operator commitment to Wi-Fi. Despite its highly-developed 3G network and fast-developing LTE network DoCoMo’s Wi-Fi Hotspot network stood at 70,500 Hotspots as of end-June, a massive increase on end-March numbers, which

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**Fig. 1: What is your company’s primary area of business?**

- Pure-play Wi-Fi operator: 2.6%
- Wi-Fi aggregator: 2.3%
- Systems integrator: 3.9%
- Consultant, industry observer, etc: 6.2%
- Mobile operator: 17.9%
- Fixed line operator: 8.8%
- Cable operator: 2.8%
- Network equipment vendor: 10.1%
- MVNO: 1.0%
- Integrated operator (fixed/mobile): 22.8%
- Content provider: 1.0%
- Device vendor: 1.3%
- Chipset vendor: 1.8%
- Other (please specify): 17.4%

n=386
Source: WBA-ITM survey, Oct-12

**Fig. 2: In which region are you based?**

- Asia Pacific: 26.4%
- Latin America: 5.4%
- Africa: 5.4%
- North America: 15.3%
- Western Europe: 26.7%
- Middle East: 10.9%
- Central & Eastern Europe: 9.8%
- Other (please specify): 3.9%

n=386
Source: WBA-ITM survey, Oct-12

**Fig. 3: What is your area of work?**

- Business development, sales and marketing: 31.6%
- Executive, professional, management: 31.6%
- Services management (e.g. content delivery): 1.8%
- Technical, R&D, engineering: 20.2%
- Other (please specify): 3.9%
- Board member (CEO etc): 10.9%

n=386
Source: WBA-ITM survey, Oct-12
stood at 8,400 (see fig. 5). The operator is aiming to have around 120,000-150,000 Hotspots by end-March 2013.

Among venue types, outdoor hotzones (both local-area and wide-area) are expected to see the biggest increase in Wi-Fi Hotspot numbers over the next 12 months, according to the survey (see fig. 6).

This shift in operators’ attitudes to embracing Wi-Fi as part of their core broadband strategy has already caused a material impact on Wi-Fi usage behavior. The amount that mobile users are using Wi-Fi networks increased significantly over the year in ways that show users are making Wi-Fi a more important way to access the Internet while on the go. For instance, UK fixed-line operator and Wi-Fi pioneer BT, which operates a total of more than 4.5 million Wi-Fi Hotspots, saw an impressive 80% year-on-year increase in the number of Wi-Fi minutes to 1.7 billion in 2012. Similarly, China Mobile saw a 102.5% year-on-year increase in Wi-Fi traffic in 1H12, to 267 billion MBs, with Wi-Fi as a percentage of total mobile traffic increasing from 59.1% in 1H11 to 68.8% in 1H12.

The trend of increasing Wi-Fi usage reflects not only an increasing operator commitment to Wi-Fi in terms of increasing the number of Wi-Fi Hotspots they offer access to, but also the effects of bundling access to mobile data price plans which makes Wi-Fi a more cost-effective way for end users to access the Internet than cellular. Allied to this is an increasing perception among end users that Wi-Fi typically offers a better connection experience than cellular. For instance, US vendor Cisco carried out a survey which indicated that consumers perceive Wi-Fi to offer faster speeds than cellular, and at a lower cost than cellular. As LTE networks are rolled out, however, Wi-Fi may not have as much of demonstrable performance advantage over cellular and users may be less proactive about connecting to Wi-Fi networks in preference to cellular.
Last year, 66% of operators saw less than 20% of smartphone-originated traffic offloaded via public and/or private Wi-Fi networks, with the greatest proportion (28%) seeing less than 5% of their smartphone traffic carried over Wi-Fi. In 2012, however, the largest proportion of respondents (27%) saw between 21-40% of smartphone-originated traffic offloaded via Wi-Fi networks (see fig. 7).

As smartphone ownership becomes increasingly widespread, end users are connecting to Wi-Fi networks in different ways: Wi-Fi usage by device type changed during the year, moving away from laptop-based to smartphone-based. While the majority of Wi-Fi usage last year was laptop-based (48%), this year the majority of Wi-Fi usage was smartphone-based (40%), with laptop-based Wi-Fi usage falling to 39% (see fig. 8).

Wi-Fi usage will continue to see strong growth as more operators worldwide integrate Wi-Fi into their overall mobile broadband proposition and as access to Wi-Fi networks becomes easier. An indication of the headroom Wi-Fi has to grow is offered by Chunghwa in Taiwan, which is seeing as much as 75% of traffic in the home being carried over the Wi-Fi network compared with just 5% outdoors. As public Wi-Fi network sign-on becomes easier, the percentage of Wi-Fi-based Internet accesses outdoors can only be expected to grow.

An example in an emerging market is Vodafone Romania, which recently deployed a network of 80 Wi-Fi Hotspots across 26 cities. It was responding to earlier moves by Orange and RCS & RDS which already had 1,500 Hotspots – around 400 of these in Bucharest, the capital. To encourage usage, Vodafone is allowing subscribers of any mobile network to access its Wi-Fi Hotspots for free as a promotional offer, showing how operators are using Wi-Fi to improve their competitive positioning.

In another emerging market, Indian cellular operators, including Bharti Airtel and Idea Cellular, are looking to free up scarce 2G and 3G spectrum by building Wi-Fi Hotspots to alleviate capacity on cellular networks. Bharti Airtel has already set up more than 1,000 Hotspots in three major cities where data consumption is very high.

**Industry challenges**

The 2012 Industry Survey analyzed what the industry needs to do to make Wi-Fi an even more integral part of operators’ mobile broadband strategies and end-user expectations. Signing on to networks is clearly the biggest hurdle to using a Wi-Fi Hotspot from the end-user perspective, but there are a myriad of commercial and technical factors underpinning this which we also looked into.

According to the survey, the top three barriers to wider adoption

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**Fig. 7: According to your best estimates, approximately what percentage of smartphone-originated traffic is currently transmitted via public and/or private Wi-Fi networks?**

<table>
<thead>
<tr>
<th>Smartphone-originated traffic (%)</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>5</td>
</tr>
<tr>
<td>6-10</td>
<td>10</td>
</tr>
<tr>
<td>10-20</td>
<td>20</td>
</tr>
<tr>
<td>21-40</td>
<td>25</td>
</tr>
<tr>
<td>41-60</td>
<td>15</td>
</tr>
<tr>
<td>61-80</td>
<td>5</td>
</tr>
<tr>
<td>81-100</td>
<td>5</td>
</tr>
</tbody>
</table>

*n=103  
Source: WBA-ITM survey, Oct-12

**Fig. 8: Approximately, what percentage of connections to your Wi-Fi network is generated by the following devices? Your answers must sum to 100%.

<table>
<thead>
<tr>
<th>Device</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphones</td>
<td>40.4%</td>
</tr>
<tr>
<td>Laptops</td>
<td>38.7%</td>
</tr>
<tr>
<td>Tablets</td>
<td>16.6%</td>
</tr>
<tr>
<td>Other devices</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

*n=103  
Source: WBA-ITM survey, Oct-12
and usage of public Wi-Fi are authentication, availability of a common roaming standard, and 3G/Wi-Fi inter-working (see fig. 9).

The survey respondents believe that Wi-Fi network discovery & selection should be managed by a combination of the network operator and the device, although end-user authentication is unlikely to drop out of the picture (see fig. 10).

There are different approaches to make connecting to Wi-Fi networks easier in order to drive an increase in mobile traffic over Wi-Fi networks (see fig. 11).

Recent examples of operators optimizing Wi-Fi connection management to drive usage include US Cellular introducing a new Wi-Fi app, "Wi-Fi Now", to help customers access Wi-Fi networks and also manage mobile Internet usage. Wi-Fi Now detects and automatically connects US Cellular customers to quality public Wi-Fi networks as well as the customers’ home networks. Future Android devices from US Cellular will come pre-loaded with the app. Similarly, DoCoMo is in the process of developing technology that will enable it promote Wi-Fi usage over cellular by deploying applications that manage Wi-Fi access as seamlessly as possible.

The industry is moving toward new standards to make it easier to access Wi-Fi networks at home and abroad. Operators want to deploy NGH technology to make it easier for end users to access Wi-Fi Hotspots and replicate the cellular mobile broadband experience in terms of ease of access and security. Of those 103 survey respondents that revealed their plans, 61% said that they plan to launch NGH-compliant networks, and 54% of the 66 respondents that gave a date said that they plan to launch next year (see fig. 12). When this is compared with the total number of respondents, this is 19% of all the operators who participated in our survey.

The main driver for deploying NGH networks is to increase offload from cellular networks to reduce or defer opex/capex, while the largest obstacle hindering investment in these networks is lack of clear ROI for NGH investments (see figs. 13 and 14).

To realize the opportunities and potential of NGH standards and
technology, the industry must work together to identify and communicate examples of best practice to give operators confidence they will be able to make a return on investment on NGH equipment.

**Roaming**

Offering Wi-Fi users the ability to connect to Wi-Fi networks while travelling is crucial to enable operators to monetize actual and latent demand for mobile broadband access. There is a demand for Wi-Fi roaming among a broad base of consumers, including those who don’t use data at all while roaming for fear of bill shock. This latent demand represents an opportunity for operators to increase the attractiveness of their offers by bundling access to Wi-Fi to stimulate usage where there currently is little or none. The Passpoint initiative aims to facilitate Wi-Fi roaming by offering standards for certifying devices and equipment.

According to the survey, a slight majority of the operators (50.3%) negotiate roaming agreements via roaming hubs, while 49.7% are negotiated bilaterally. The survey shows that there is significant potential for operators to increase the number of users that connect to roaming Wi-Fi Hotspots offered as a result of negotiations with foreign operators. Three-quarters of the respondents have less than 10% of their overall user base connecting to negotiated Wi-Fi Hotspots while traveling (see fig. 15).

These findings point to the scope that operators have to:
- Increase their number of Wi-Fi roaming agreements.
- Make it easier for subscribers to connect to Wi-Fi Hotspots offered as part of roaming negotiations.
- Implement technology that automatically connects users to Wi-Fi Hotspots while roaming.
- Make users aware they can access Wi-Fi Hotspots while traveling.
- Include Wi-Fi roaming as part of customers’ international data roaming service plans, or offer it at incremental cost.
- Develop applications that allow users to monitor data-roaming.

**Fig. 12: When are you planning to deploy NGH-compliant network in your market?**

<table>
<thead>
<tr>
<th>Year</th>
<th>Response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>7.6</td>
</tr>
<tr>
<td>2013</td>
<td>54.4</td>
</tr>
<tr>
<td>2014</td>
<td>25.8</td>
</tr>
<tr>
<td>2015</td>
<td>12.1</td>
</tr>
</tbody>
</table>

n=66. *On a scale of 1-5, where 1 = not important and 5 = critical. Source: WBA-ITM survey, Oct-12

**Fig. 13: What do you consider is the main driver for investing in NGH-compliant networks?**

- Increase offload from cellular networks to reduce or defer opex/capex: 45.9%
- Increase customer satisfaction and reduce churn: 35.1%
- Increase revenue opportunities: 17.4%
- Other (please specify): 1.5%

n=259. Source: WBA-ITM survey, Oct-12

**Fig. 14: What do you consider to be the largest obstacle hindering the investment into NGH-compliant networks?**

- Cost of NGH deployment: 23.2%
- Lack of clear ROI for NGH investments: 42.1%
- Existing equipment not yet fully depreciated: 9.3%
- Change to Passport-compliant equipment: 3.1%
- Lack of understanding of the requirements of migration path to NGH: 19.7%
- Other (please specify): 2.7%

n=259. Source: WBA-ITM survey, Oct-12
expenditure as well as manage log-ins to Wi-Fi roaming access points that are offered as part of the home operator’s negotiated Wi-Fi roaming offering.

The survey highlights the extent to which operators can increase the number of Wi-Fi roaming agreements, with around two-thirds having fewer than 20 Wi-Fi roaming agreements in place (see fig. 16).

There is significant disparity in the number of Wi-Fi Hotspots available to subscribers via roaming agreements. The largest proportion (30%) of operators have between 1,000 to 4,999 Wi-Fi Hotspots available to customers via international Wi-Fi roaming agreements; 9% have as many as one million to two million (see fig. 17).

Outlook
What will the impact of LTE be on operators’ Wi-Fi strategies? Will operators increase or decrease their Wi-Fi investments? Among some of the leading LTE operators that have launched the technology, AT&T, SKT and DoCoMo each have extensive Wi-Fi networks which they can be expected to integrate tightly with their LTE networks.

Among the survey respondents, we found that the overwhelming majority (69.5%) plan to continue investing in Wi-Fi in parallel with LTE, a finding that points to an increasing relevance of Wi-Fi as part of the operators’ overall mobile broadband strategies (see fig. 18).

The majority of respondents believe that cellular-to-Wi-Fi offload will play a significant role in managing mobile network traffic volumes (see fig. 19).

Standards will play a crucial role in the future of Wi-Fi. The availability of common standards in tandem with seamless connection to Hotspots without user action will be key sources of competitive differentiation as competition between Wi-Fi operators evolve (see fig. 20).
Other (please specify) 

Operators will continue investing in Wi-Fi in parallel with LTE 

LTE will not have any material impact on Wi-Fi investment levels 

The arrival of LTE will reduce investments into Wi-Fi 

Fig. 18: What impact do you expect the deployment of LTE to have on Wi-Fi investments by operators?

n=259
Source: WBA-ITM survey, Oct-12

Fig. 19: How important do you think each of the following strategies to manage mobile network traffic volumes will be?

- Wi-Fi offloading
- Small cell deployments (femtocells, picocells)
- Data pricing strategy
- Optimization & compression
- LTE deployment

Note: On a scale of 1-5, where 1 = not important and 5 = critical
Source: WBA-ITM survey, Oct-12

Fig. 20: How important will each of the following sources of competitive differentiation be as competition between Wi-Fi operators evolves?

- SIM-based authentication
- Seamless connection to hotspots without user action
- Deployment of “carrier grade” Wi-Fi networks
- Availability of cheaper Wi-Fi enabled handsets
- Ease of roaming between operators
- Availability of common standards
- Enhanced security and privacy measures
- Wide selection of low-cost Wi-Fi-enabled devices

Note: On a scale of 1-5, where 1 = not important and 5 = critical
Source: WBA-ITM survey, Oct-12
Conclusions

- Wi-Fi is playing an increasingly fundamental role in the operators’ overall mobile broadband experience as they move toward offering the best end-user experience possible.
- Offering Wi-Fi is becoming a more important factor for end users when choosing operators. Wi-Fi is already a real differentiator for operators and will become more so over the next 12 months. Operators that integrate Wi-Fi into their overall mobile broadband experience best will be able to realize competitive advantages that will have a positive impact on KPIs.
- Wi-Fi will play an increasingly central role in operators’ mobile broadband experience as cellular-to-Wi-Fi offload becomes a reality.

As this happens, operators will look to Wi-Fi to offer end users a DSL-like experience on-the-go and, even where LTE is available, to offload traffic to Wi-Fi to maximize cost-per-GB efficiency and reduce opex and capex.
- Operators must work to increase the number of Wi-Fi roaming agreements to improve the Wi-Fi roaming experience. They need to consider whether to offer Wi-Fi roaming as part of their overall data roaming service package or whether to try and generate incremental revenues from Wi-Fi roaming. They should closely consider bundling Wi-Fi roaming into their data-roaming packages to drive overall usage and to increase competitive positioning rather than as a stand-alone revenue stream.
- The industry must continue working closely together to ensure common standards offer a seamless, cellular-like Wi-Fi experience to end users and also to lay a solid foundation for operators to compete on. Standards are essential to enable operators are to realize the Wi-Fi roaming opportunity.
- To realize the opportunities and potential of NGH standards and technology, the industry must also work together to identify and communicate examples of best practice to give operators confidence that they will be able to make a return on investment on NGH equipment.