



# Why Wi-Fi offload and roaming are key to meeting growing data demands

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## SYNOPSIS:

Data traffic demand is growing rapidly in the wake of operator strategies to encourage mobile broadband adoption. As a result, the industry is talking about offload as a solution but one which takes many forms, leaving many operators unsure of which path to take. The business case for Wi-Fi is evolving, and not just for data offload but also voice and messaging, offering an opportunity for the deeper integration of Wi-Fi with the operator's service portfolio.

However, what are the issues and friction points that operators might envisage, and how might they be overcome? This paper looks at the preferred solutions for implementing offload on today's Wi-Fi networks, including WBA/GSMA recommendations and addresses the future roadmap for Wi-Fi offload through Hotspot 2.0 and NGH.

Offload specialist Accuris Networks also discusses strategies for players to "get in the game," by forming partnerships with Wi-Fi operators both domestically and internationally and looks at the necessary steps operators need to take to succeed with Wi-Fi.

## INTRODUCTION

The explosion in mobile data usage is already well documented and operators have latterly embraced Wi-Fi because it has been proven to help them to manage the upsurge of traffic on their wireless networks. Yet it's really only recently that carriers have welcomed Wi-Fi into the fold and not just because it has evolved from a technology perspective, but because its place in the business model has changed from a home internet gateway and laptop access alternative to an essential part of the operators' data network plans.

During the early 2000s, Wi-Fi technology emerged as an alternative to share broadband connectivity in the home and provide access to nomadic laptop users in coffee shops and airports. Operators were initially wary of the technology and reluctant to see its implementation on smartphones, yet it is now recognised as an important asset to help operators improve both their data coverage and capacity.

Increasingly, devices are driving the market agenda. The penetration of smartphones and tablets with Wi-Fi and the experience it delivers is fast approaching the point of ubiquity in some markets. Moreover, the growth in cloud-based services will only further drive the end user's need for high performance wireless connectivity.

If operators do not provide the required wireless connectivity, then the erosion of their market-share and ARPU will actually accelerate as the market gets dominated by mobile broadband. Mobile broadband is not a replacement for Wi-Fi; rather, the two technologies are complementary. Furthermore, next generation connectivity in the shape of LTE will not decelerate this phenomenon as Wi-Fi is already a de facto technology for the average smartphone/tablet user. So it could be argued that Wi-Fi will be more relevant in the 4G era than it was for 3G.

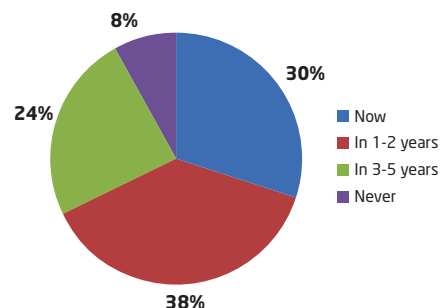
Results published by Informa Telecoms & Media as part of a global survey of mobile and converged operators in November 2011, revealed that 30 per cent of 176 operator respondents see traffic demand as a problem they already have, while an additional 38 per cent see it as a problem in the next 12 – 24 months. There are plenty of scare stories out there but the crux of the matter is that while data demand may not be slowing it's predicted to grow 8-12 fold between 2011 and 2016 traffic growth is not uncontrollable if you act on it now.

It's been acknowledged that as devices become more complex, the traffic mix is moving to smartphones and tablets, of which 85 per cent of the latter's models on the market primarily use Wi-Fi for connectivity some don't even have 3G. Moreover, the "busy hour" has moved into the late evenings, when users are at home, typically in range of a domestic Wi-Fi hotspot, and the traffic mix itself now contains a lot of video something that is particularly perceived as a problem area due to its requirement for high bandwidth and end to end capacity for which 3G as a medium is not ideal.

Under growing pressure from over the top (OTT) players like Skype and What's App, operators are bundling voice, data and SMS to avoid revenue erosion from third party IP services, with the result that the dividing lines between voice, SMS and data services are increasingly blurring. And as operators start deploying Wi-Fi, other services will naturally move over. The carriers need to compete against OTT providers that will deploy services over Wi-Fi.

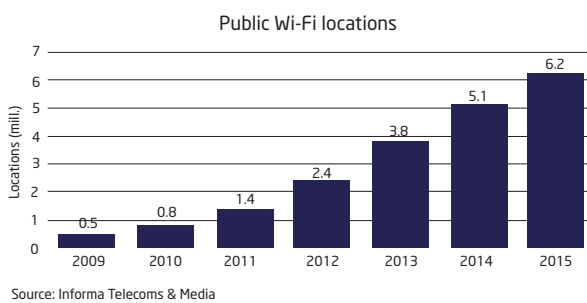
But as users become more accustomed to using Wi-Fi on their devices, there is ample opportunity for them to buy Wi-Fi roaming accounts or day passes from other providers, putting operators in the risky position of being relegated to a secondary provider of mobile connectivity. Clearly there is an opportunity for the operators to realise greater market potential.

Q. When do you expect traffic demand to overtake network supply and cause congestion?



## WHERE DOES WI-FI SIT IN THE CARRIER PORTFOLIO?

So with network operators potentially struggling to economically provide sufficient capacity, is Wi-Fi offloading an opportunity to reduce traffic load on 3G networks? Certainly the statistics seem to say so. According to research house IHS iSuppli, the number of Wi-Fi chipset shipments continues to grow rapidly and is expected to hit 1.2 billion in 2012, reaching more than two billion units by 2014. Carrier deployed Wi-Fi installations, or public hotspots, are predicted to rise from 2.4 million in 2012 to 6.2 million in 2015, according to Informa's 'Global developments in public Wi-Fi report 2011'.



In part, this is due to the rise of the heterogeneous network, or HetNet, which is being adopted as the clear industry direction to increasing cellular capacity and coverage be it through picocells, femtocells, small-cell RAN, Wi-Fi or a combination of these. The ultimate goal is for multiple small-cell technologies to provide seamless layers of coverage in the network. But far from being purely vendor driven, the push to rethink the macro network model is getting equally strong support from mobile operators, as a means of offloading data traffic from the cellular network or extending coverage.

At the Small Cells World Congress, in Berlin in October 2011, it was clear that Wi-Fi remains very much on the agenda for many mobile operators, although there is a clear desire to integrate the technology more closely with cellular both in terms of ease of use through network discovery, authentication and log-on, and at the core-network level.

With a view to the future, a survey conducted by Informa, found that the single most important offload technology for LTE networks would be Wi-Fi at 37 per cent of the vote, compared to femtocells at 11 per cent, although there is of course room for both.

The same research discovered that some tier one carriers are already reporting that around 20 per cent of data traffic is being offloaded in congested public locations via Wi-Fi, while Korea Telecom has claimed it offloads over 60 per cent of its data traffic. Large scale deployments by the likes of PCCW in Hong Kong and Japan's KDDI are using dense Wi-Fi coverage to provide fast wireless data access, offload peak data traffic from cellular networks and support the delivery of new content and value-added services. China's operators have raised the stakes further, with both China Mobile and China Telecom intending to deploy one million Wi-Fi hot spots by 2013.

In high traffic areas, Wi-Fi's potential as a means of offloading both data and signalling traffic is often being realised, assisted by vendors' efforts to deliver a consistent customer experience by more closely integrating Wi-Fi with cellular networks. Deployments are frequently aimed at applications beyond those geared toward notebook/dongle users, to provide an improved broadband experience for operators' growing smartphone and tablet customer bases, since Wi-Fi is well suited to the demands of applications that use data in bursts and for functions such as video and music streaming.

Standards work is improving the performance of Wi-Fi, but agreeing on a common model for integrating cellular and Wi-Fi networks is proving more challenging. Mobile operators, meanwhile, are eager to extend their deployments and need to closely integrate them with the cellular environment sooner rather than later.

## STANDARDS AND DEVELOPMENT

While the IEEE is primarily responsible for extending the technology's capabilities from a device and access point perspective, by focusing on enhancements to the 802.11n standard, there are also a number of related industry initiatives addressing aspects such as network discovery, identification, connection, authentication and security, all of which are critical for the successful integration of Wi-Fi with cellular networks.

This work is primarily designed to improve and simplify processes such as hot-spot discovery and selection, manual user authentication and log-in, and roaming-partner-network selection and makes use of the Access Network Query Protocol (ANQP) to identify relevant providers and roaming partners. The 3GPP is active in this area as well, especially in the definition of the Access Network Discovery and Selection Function (ANDSF), typically used on mobile networks to assist user equipment in discovering non-3GPP access networks.

From an operator's point of view, carrier grade Wi-Fi also requires strong security; strong trust through authentication and billing credentials; quality of service; network discovery and policy control.

Fortunately there is an increasing alignment of standards generated by the GSMA and the Wireless Broadband Alliance (WBA) with corresponding cooperation between bodies like the 3GPP and the Wi-Fi Alliance as well as the wider ecosystem.

In late 2010 the Wireless Broadband Alliance launched its Next Generation Hotspot (NGH) program which focuses on interoperability and roaming between operators' Wi-Fi networks. While around the same time, the Wi-Fi Alliance launched the Hotspot 2.0 initiative, which is based the IEEE 802.11u standard and facilitates an automatic network discovery and selection of carrier operated Wi-Fi networks.

A next generation hotspot proposal initiative, based on these two schemes, is currently being trialled worldwide. The main focus of which is to allow users to seamlessly roam between cellular and Wi-Fi networks using their mobile handset's SIM card as authentication a standard known as Extensible Authentication Protocol Method for GSM Subscriber Identity Module, or EAP-SIM. The focus in EAP is strong automatic authentication. The idea is to take the manual login process, which may include; hotspot location; a landing page requiring credentials; the sending of a password by SMS; followed by actual login, and turn it into zero click login.

Of most concern to an operator, when several standards are still in development, is the expectation that all these technologies will be around for some time to come, so operators need to be able to consider them all. Moreover, the business case for Wi-Fi dictates that it has scope beyond data offload but can also be used for voice and messaging.

The very success of Wi-Fi access, and it's cost-effective fixed-price end-pricing model, drives the need to increase the end-user's Wi-Fi service-footprint to use publicly available Wi-Fi service with zero or weak subscriber authentication at time of access. The mobile service-provider will need to exploit this footprint, while at the same time having the assurance of strong authentication and service-authorisation.

This need grows all the more when the mobile service-provider needs to provide services beyond data. The standard way of dealing with hand over between cellular and Wi-Fi is through the 3GPP's Voice Call Continuity (VCC) specification, which allows a call to persist as a mobile phone moves between circuit switched and packet switched radio domains.

## THE IMPORTANCE OF ROAMING

The requirement to handle voice and messaging is underscored when roaming is taken into account. Informa has published research to suggest that mobile data roaming is predominately carried out over Wi-Fi while in hotels and cafes, with aggregators like iPass reporting circumstantial evidence in this regard.

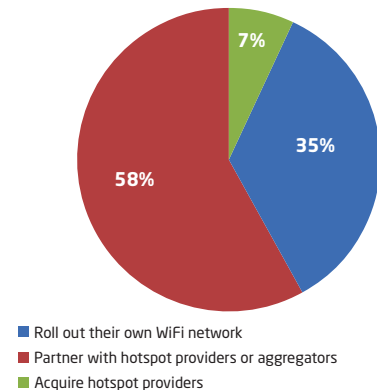
The trend is such that data roaming prices are unattractive for the mass market, especially prepaid users, and as a result, customers tend to fight the bill by switching off data roaming and relying on Wi-Fi. And indeed, in order to avoid end-user bill-shock, expensive customer-service contacts and bad publicity, many service-providers disable data roaming for their end-users by default.

Rather than deal with roaming data service as a negative, the opportunity here is multi-faceted. As well as bringing the cost of roaming down for the end user, which will have a positive impact on churn rate, a mobile service provider maintains relevancy with consumers on a global scale. One option is to make the Wi-Fi connectivity element look like a roaming partner, so users can get same services they are used too. Alternatively, through tie-ins with regional and global Wi-Fi providers, operators can offer discounted services, with a better long-term proposition making data roaming plans more competitive. Bundling roaming services is a natural evolution of the bundling of voice, messaging and data services.

In fact, the industry thinks it is inevitable that roaming and interconnection functions will fuse in the near future. A survey of operators by Informa, found 68 per cent of mobile carriers believe roaming and interconnect functions will merge within the next three years, while 23 per cent think they have already become amalgamated.

Ultimately, Wi-Fi products and services should not be positioned as a separate business by the operator but should instead be integrated as part of the overall network strategy, perhaps by way of offering seamless international connectivity. Wi-Fi also needs to be included in the usual mobile data plans, not just on a prepaid model. Aidan Dillon, CTO of Accuris Networks, is aware of many operators which are deploying their own Wi-Fi networks in and around their mobile service footprint but are also working to develop roaming partnerships with Wi-Fi operators around the world following the same model they used to establish mobile roaming.

Q. How do you expect mobile operators to use WiFi for offload?



## PLANS AND PARTNERSHIPS

One of the big questions is whether mobile operators should invest in their own Wi-Fi networks, or form partnerships? Although Informa believes there is a trend developing where operators are starting to implement their own Wi-Fi network or acquire providers, there is still plenty of room for partnerships.

According to Dillon, the likelihood is that some operators will deploy their own Wi-Fi networks in their domestic market but will also need to form international partnerships. As a result, there is a place for Wi-Fi access aggregation companies like iPass, just as there is a place for roaming hubs in the circuit switched world.

In this regard, operators not only take the advantage of the current agreement the aggregators have with several different venues, but also benefit from their global reach and agreements making roaming less of an issue. What's important to bear in mind is that the end user doesn't care how this relationship works, it just has to work.

## CONCLUSION

What we're seeing is that different players are adopting Wi-Fi using very distinct strategies, ranging from hot-spot aggregators, such as iPass, We Roam and Trustive to operators taking advantage of their current installed base to increase their coverage, while convergent players are applying the technology as an off-load alternative or even for generating a new business line, such as O2 UK.

It's also clear that the attraction of Wi-Fi is not just based on offload. There are opportunities to build Wi-Fi access revenues; and to use it as a customer acquisition tool as well as a churn reduction tool. Operators' perceptions of Wi-Fi have changed from seeing the technology as a threat that was stealing traffic and revenue to a significant opportunity for growing data services usage. The full integration of Wi-Fi with mobile networks is critical to an operator's success. Not just for authentication and data but for all the services the end users currently receive on cellular networks as well as those they are likely to in the future, including billing, voice, messaging and roaming.

As the business case evolves, the threat to operators' roaming revenues should evolve as well. Carriers need to shift their focus on to offering an improved experience to customers when they are travelling abroad, not just for access but for converged billing too, with a greater emphasis on more snackable content that plays to Wi-Fi's unique strengths. This allows operators to build a long term proposition, making data and eventually voice roaming plans more competitive.



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Accuris Networks is a leading provider of Wi-Fi Offload and Roaming solutions not just for data offload but voice and messaging also. This allows GSM and CDMA operators to automatically and securely connect their subscribers to preferred Wi-Fi networks using SIM based authentication.

In addition Accuris Networks also provide solutions for CDMA to GSM roaming, dual-IMSI roaming and Over-The-Air device management.

Established in 1997, Accuris Networks is headquartered in Dublin, Ireland with offices in the United States and Malaysia. Led by a team with unrivalled experience in service convergence and service continuity, our AccuROAM, AccuProfile and AccuGuard solutions provide competitive, cost effective platforms that deliver carrier grade performance.

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