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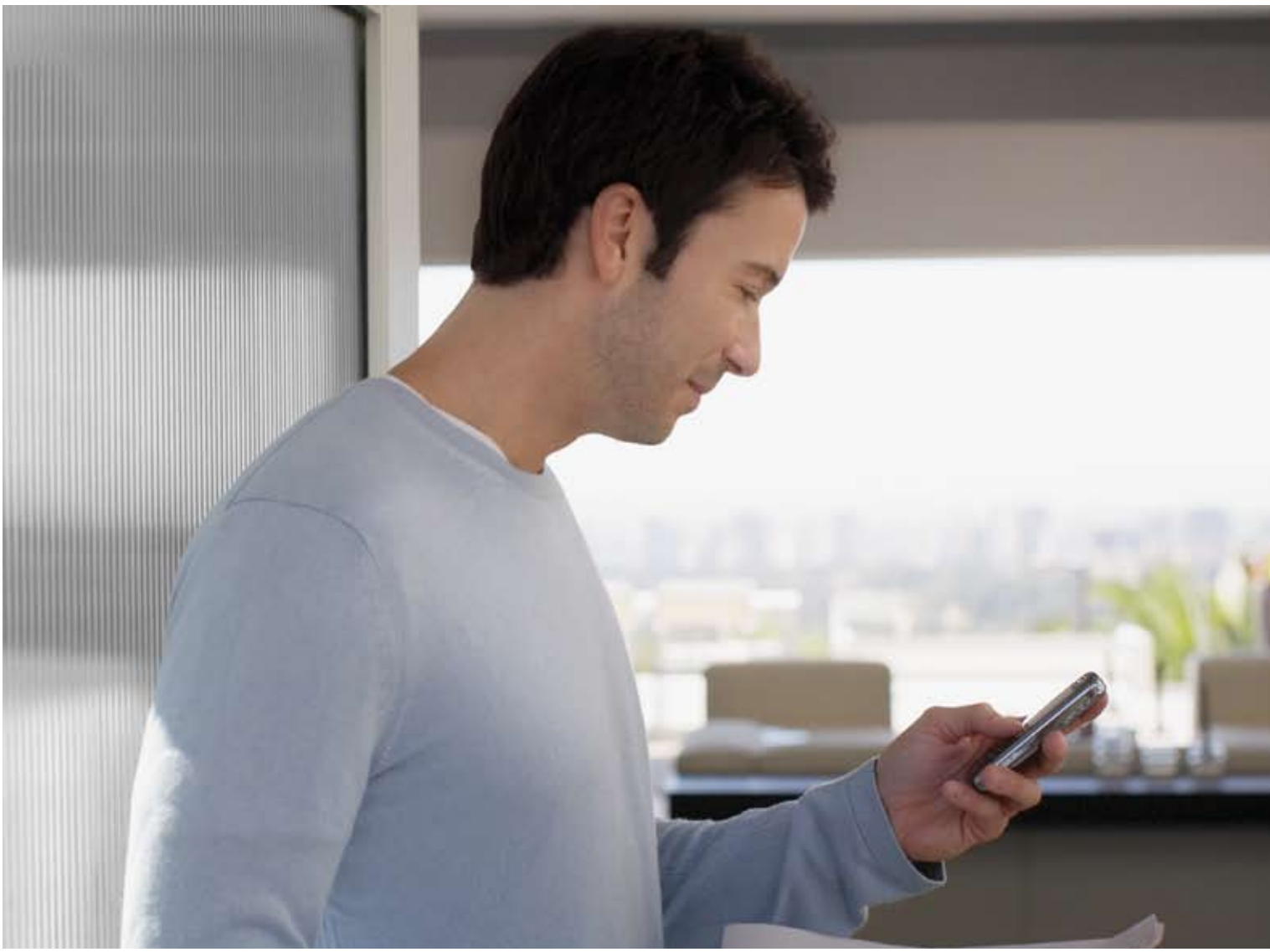

Wi-Fi BRINGING APPLICATIONS TOGETHER, FOR NEXT GENERATION NETWORKS

Abstract

Even as cellular networks are evolving from today's 3G technology to LTE that brings promise of capacity leaps (by account of nearly 4 times), the overall data traffic projection is expected to increase by an annual CAGR of 32% from 2010 to 2015; outpacing LTE network deployments. LTE networks will fill up very quickly. Until then, network operators have to cope with the consumption of over-the-top (OTT) wireless broadband service.

Wi-Fi as we know is vendor neutral and cost effective alternative to operators building high bandwidth data networks which do not suffer from licensing constraints. Wi-Fi as a complementary technology can help ease traffic by 20% with substantial impact of freeing up spectrum. Because of the driving force behind data usage and the ever-increasing popularity of smartphones, Wi-Fi is helping to shape the future of wireless services.

The following sections of this paper present a deep dive into the impact of Wi-Fi deployment as applied for data offloading, service creation and the best practices to emulate. They require being strategic with deployment, device ecosystems and of course, dealing with the challenges that go along with rolling out hybrid networks. User behavior is transforming with greater accessibility to Wi-Fi. Watching video on the trains or metro while on commute is common today as well as streaming video (through varying sizes of smartphones with higher resolution, as opposed to traditional viewing over CD/DVD-player in stationary mode).

It's hard to imagine that any attempt to discredit the popularity of smartphones and tablets to dissociate people's fondness for it, but the fact is that people will want to use these devices to the extent that they trust them reasonably to protect their vital information while at the same allowing the flexibility of accessing various applications and services regardless of the delivery mechanism. Whether that capability exists in total confidence today is still being debated over which technology 3G, Wi-Fi, LTE or hybrid of sorts. One aspect that is obvious is the general acceptance of being offered value added service is enticing and will continue to compel end-users to engage.

[1] Source : Cisco Visual Networking Index: Forecast and Methodology, 2010–2015

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Overview

Globally, data usage continues to grow strongly in part to the driving force of smartphones and tablets into the mainstream market. More and more consumers adopt over-the-top (OTT) services like Netflix, Hulu, Skype, and machine-to-machine (M2M) becoming more widespread. Left unmanaged, the wave of bandwidth intensive traffic can cause negative impact on end-user experience. Operators cannot afford to ignore the capacity constraints nor blindly add capacity, as it is far from a linear relationship to new revenue generation.

According to a recent research study from Infonetics, there will be a significant ramp-up of small cells deployments between 6% in 2011 to 12% in 2012. Similarly, in another report by Strategy Analytics, Wi-Fi deployments are also experiencing a growth and expected to see it fully incorporated as part of the heterogeneous networks (HetNet) design by 2015. Despite the fact that many operators are still finding interference management and support for HetNet a challenge. The small cell and Wi-Fi alternatives are not a panacea to every situation, but it will surely be a critical strategy to deliver their mix of services and revenues.

The change of operator sentiments and vendors alike are testament to Wi-Fi's role to integrate a wholesome 3G-Wi-Fi experience. Major operators like KDDI, SKT, China Telecom are aggressively deploying Wi-Fi hotspots, whether as a transitional period or longer term LTE strategy is seeing to it in pragmatic use. Also, infrastructure vendors such as Alcatel-Lucent and Ericsson have joined the Wi-Fi race in the announcement of lightRadio Wi-Fi and acquisition of BelAir Networks respectively to diversify across the market by integrating Wi-Fi with cellular technology.

Wi-Fi as an offload tool as well as differentiated service enabler is helping to draw consumers to local wireless hotspots. Wi-Fi is growing-up from its original small enterprise and home gateway market into mainstream technology as carrier Wi-Fi, growing into more millions in the next few years. Undoubtedly, most users up to two thirds of their time are connected to some form of Wi-Fi coverage. Regardless of which business strategy, operators intend to include (i.e. Wi-Fi, small cells, macrocells) and they cannot ignore the development of “smarter” pipes. The need for more intelligent networks will be a key driver for operators to approach market position. Smarter networks also benefit both upstream and downstream users that counts in the cost-benefit performance of Wi-Fi to enable personalized services. Operators previously delivered their services through their own tightly controlled networks are now embracing Wi-Fi to provide converged mobile experience.

Transforming Wi-Fi Access Revenue

The proliferation of smartphones and the surge of mobile broadband have undoubtedly paved the way for OTT applications to aggressively compete with mobile operators for consumer loyalty. As OTTs continue to gain traction and key players like Google, Amazon become more involved, operators need to get their act together. Otherwise they run the risk of being left behind in the race for a newer generation of consumers as demand for smartphones and tablets continues to increase, more people become more mobile and mobile service providers are under pressure to grow revenue, customers and market share. With free applications and extremely low revenue from users, it is tricky for carriers without digging deep into their pockets to continue delivering and have a sustainable long-term business model.

The adoption of OTT mobile application and mobile VoIP services is growing rapidly and displacing operators' business model and steeped in challenges. Some mobile service provider has the view of LTE to overcome prevailing issues of data congestion by boosting bandwidth significantly and thus delivering good service levels necessary for those OTTs which are bandwidth hungry. However, two key challenges need to be addressed: commercially available LTE handsets that support VoLTE, being far from it at this stage and inter system roaming so that data connections and voice calls work seamlessly between LTE and legacy networks.

In the meantime, with Wi-Fi as a complementary technology, is seeing pragmatic use of delivering the differentiated experience as demonstrated by Tier 1 operators like China Mobile, Telefonica, AT&T in the Next Generation Hotspot program. Some of the considerations of Wi-Fi access strategy should ideally create and generate value proposition to the users such as:

- Better user experience – simple , secure and seamless access through a common authentication architecture

- Richer and more engaging service – access to various applications without noticeable degradation in terms of data connection speeds

- Bundled data plans- incorporates voice, data, Internet across multiple device usage

The window of opportunity is limited for operators to launch their own application platform solutions and build the experience their customers are seeking. Operators on the other hand, can leverage on Capex and Opex investments by optimizing site-lease sharing and to a certain extent, backhaul infrastructure within the Wi-Fi go-to-market strategy. Although mobile data offload with Wi-Fi is the current priority for most operators, in the mid to longer term, operators require integration of Wi-Fi with the mobile network so that mobile data offload becomes more intelligent, automated, and seamless. Meanwhile, they see the utilization of Wi-Fi effectively to augment mobile services such as adding VoIP to extend voice service, video, messaging and file sharing services. Operators cannot afford to ignore nor block the threat of OTTs, as it will result in backlash, as subscribers won't hesitate to move to more aggressive service provider to seek those services.

OTT apps are beginning to cut into voice and messaging revenues, particularly as demands from data-hungry user increases. As such, operators need to quickly decide how they are going to respond to the evolving mobile landscape. They cannot afford to wait for LTE to rescue their plight, but embrace alternative technology in Wi-Fi that can give them a path to seamlessly integrate hybrid networks that are in line with standards adoption. Partnering with an OTT app developer is another option but also comes with significant risks, such as giving up ownership of the customer's mobile identity and delivering poor service levels.

End-users generally associate familiarity with multiple touch points - smartphone, tablet, powerbooks that support the experience but charged to their subscription in a single phone number rather than multiple plans. Just as voice plans, that previously allowed shared minutes within a single billing that is simple for the users to understand. Similarly, the operators benefit from the integration of billing, charging and provisioning of services.

End-user Experience

- Seamless
- Simple
- Secure
- High Bandwidth

Service Provider Benefits

- Increase Coverage and Capacity
- Optimize Network Investments
- Expand Revenue Potential

Figure 1 : Wi-Fi Transforming Mobile Experiences

Intelligent Device Client Based Wi-Fi Access: Why Device Client is Important

The economics of different approaches and operator strategies to successfully navigate the transition from cellular to heterogeneous network is high on the priority of carriers and operators. Let us examine how the client approach plays in 3G-Wi-Fi experience. With an intelligent device client control, the way a user access applications and how those applications reach the user will change. As the number of application multiplies by the dozens, so does the mix of traffic becomes more complicated. Built on a foundation of global standards-based internetworking protocols and interfaces, 3G-Wi-Fi inter-connectivity enable network operators to dramatically reduce time-to-market when deploying enriched services. It also helps to provide a defined user experience through auto-login, seamless authentication and roaming abilities as expected in cellular environment. The importance of intelligent device client covers functionalities lacking in native device utilities.

- Traffic management – responding effectively to changes of dynamic offload policies closely with policy management to execute selective offload; prioritizing services and allow the user flexibility of premium service selection and bandwidth boost on demand.

- Seamless network access – transparently switches radio (3G-Wi-Fi) per operator policies that can be tightly coupled with ANDSF-type use case for policy aware control or extend parental content filtering enforcement when in use of iWLAN tethering.

- Richer communications interface to applications - extend user interaction with informative dashboard with some network function that is important, such finding the state presence (home, busy, office), location of user or pay per use charging for content.

To remain relevant and profitable in today's volatile mobile market, operators must be able to differentiate service offerings and meet diverse customer demands. Integrating policy and charging mechanism enables operators to evolve beyond one-dimensional business plans to deliver a wealth of innovative, feature-rich use cases that is relevant to the customers' lifestyles and improve ARPU. Truly engaging brand experiences become possible with support of diverse platforms for games, video and messaging dashboards and create abundance bandwidth. The ability to implement creative and innovative policy solutions without delay allows operators to shift their focus from the network to the customer and thus an intelligent device client that is closely integrated to the network level is closing the gaps of mobile, automated and seamless experience.

And by focusing on delivering a compelling user experience, users will spend more minutes of use engaged in the application, which will lead to greater opportunities for monetization. Those who lead the way to focus on developing an inter-connected solution that provides popular features, delivers a consistent user experience, is primed and is ready for future environments.

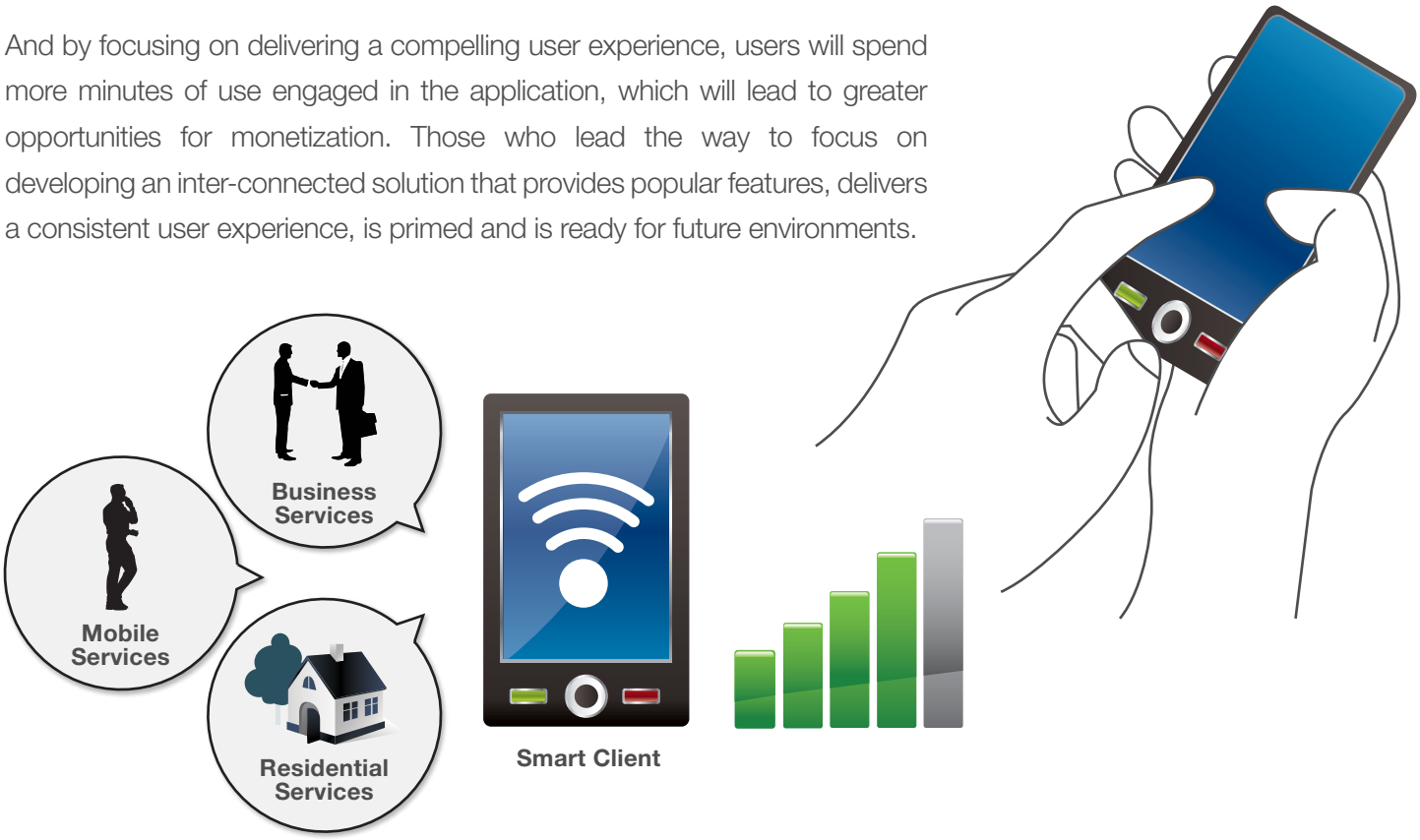


Figure 2 : Smart Client for Smarter Wi-Fi Experience

An intelligent device client allow users to move freely between preferred devices and operators can take advantage of contextual knowledge of local network connectivity and device capabilities while instantly sharing content that is related to the users' actions, surrounding or needs. These solutions enable operators to tackle the value-add challenge head-on, sharpening the competitive edge to differentiate from the OTT apps and competitors.

The mix of traffic gets more complicated as more applications continue to enter the market which eventually will interact with the network and allowing subscribers much richer interactions with other users and information exchange which may become more important, such as geo-location, application-awareness or billing chargeable content. To offset the complexity of managing those interactions, an intelligent device client is central to the success of seamlessly harmonizing the various access networks to work as one. A well defined interfacing that is designed to be standards-wide compliant will see operators, vendors, device makers more willing to expose their network through developer partnership programs, application platforms and portals to grow services instead of creating fragmentation.

How Device Client Enforces Smart Decisions

Through device client solution, operators can remove complexity and make devices more accessible with freedom of choice for the users to offload or onload at the right time and to the right network through smart notifications. Operators need to be able to create offload policies based on traffic type, time, subscriber information, location and other contextual information such as application aware sessions e.g., YouTube streams offloaded to Wi-Fi, while VoIP is retained on 3G.

Table 1 : Smart Device Client Control in Relation to Device, Network and Environmental Information

Events	Conditions	Call to Action
Time	Policy	Radio on/off (Wi-Fi, 3G)
Location	Connection type	User interface (profiles)
Data Usage	Batter power	Service Notification
Applications	Available networks (Wi-Fi,3G LTE)	Service Subscription
Roaming	Location (operator, roaming partner)	Seamless Mobility

Non-optimized Experience

Optimized Experience

Ideally, operators want to selectively switch the user only under certain conditions in order to effectively manage congestion. These conditions could vary based on the type of content the user is consuming, the time of the day, the mobile network conditions, the available alternate Wi-Fi networks etc. For example, an operator may wish that a subscriber only offloads at certain times of the day, or only when using certain applications, or only when in range of a particular set of Wi-Fi hotspots.

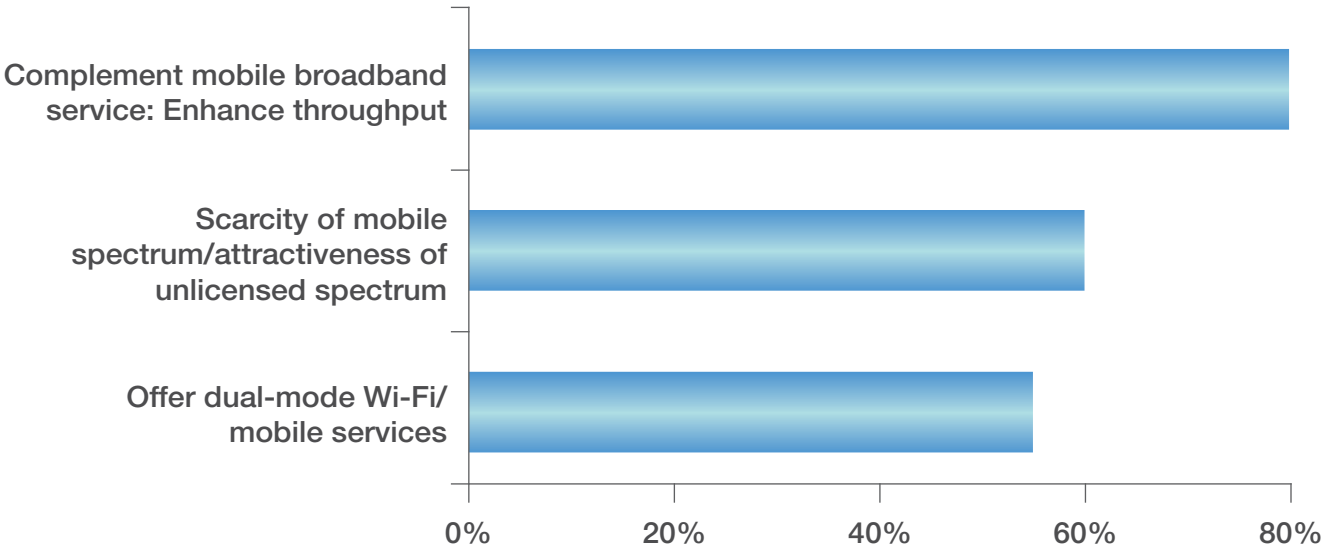
Zero Complications

Go from complications to uncomplicated. Traditionally, end-user experience was non-seamless, whereby the end-user is confused with the multitude of SSIDs to choose from, locked Wi-Fi, unlocked Wi-Fi, authentication challenges and security considerations and troubled by multiple log-ins that is a little less than frustrating.

A smart client in this case, allows mobile operators to automatically and securely connect their subscribers to any type of Wi-Fi networks using WISPr or EAP 802.1x type authentication wherever supported on the device. Additionally, it acts as a central dashboard to map out the way mobile experience is delivered to the users through smart notifications to enable a closely integrated Wi-Fi ability with mobile networks, not just for authentication and data connections but all services the subscriber receive on the cellular environment such as billing, policy enforcement, voice, messaging and roaming. Although native device connection utilities support multiple radio connectivity, it lacks the added intelligence to direct/re-direct value added services optimally. Wi-Fi Alliance and the Wireless Broadband Alliance WBA are working together to simplify inter-system roaming. Essentially, the end-user perspective does not matter whether on Wi-Fi or cellular- what matters is one simple and seamless experience.

Meaningful Experiences

Mobile operators are firmly behind carrier Wi-Fi as a key solution for mobile data offload, even as they continue to investigate other small cell possibilities. A closely integrated 3G-Wi-Fi approach is central to the core objective of converged mobile experience. How Wi-Fi plays out in the overall operator strategy is broadly categorized as shown in Figure 3.



Source : Infonetics Research, Carrier Wi-Fi Offload and Hotspot Strategies, Global Service Provider Survey, April 2012

Figure 3 : Wi-Fi Strategy

Adding another dimension, central to the theme of mobile data offload with Wi-Fi, operators today demand for intelligent and meaningful interpretation. The first generations of policy control solution were focused on the network centric approach, operating in silo. In the second generation of policy control and management, the accuracy and relevance of enforcement of policy is more transparent by coupling the upstream and downstream elements in the network. Similarly, users appreciate visibility on the usage of their data allowances in terms of which activities, email, video downloads that is important to the users.

Through the extension of dynamic policy controls, operators can truly benefit from alleviating mobile data burden it places on the mobile network. Coupling policy control with subscriber plans brings forth new pricing models and operators should ensure the backend processes must be agile enough to unify the charging, billing and rating engine in an integrated manner to policy management mechanism. By indentifying the correct subscriber profile and aligning them to personalized services can build greater understanding and successful pricing strategies.

The device client is net neutral and may also apply optimization enforcement actions corresponding to operator defined network, subscriber, and application policy rules, to give a more granular, fine-tuned traffic management function within the device. Both the consumer and operators benefit from bandwidth boost and service excellence.

Figure 4 : Flexible Pricing Plan Option Provisioning

Rethinking Communications and Connectivity

Mobile device innovations are being introduced at an accelerated pace, with new categories and subcategories emerging every few months (e.g. enterprise-focused tablets, entry level smartphones, augmented super smartphones). Each innovation brings a new set of uses and opportunities. Tablets, for instance, are having a large and growing impact on both enterprises and traditional PC manufacturers, while smartphones are turning to larger screen sizes, form and functionality of tablets. The distinction between a smartphone and tablet becomes vaguely demarcated, with those in-between devices like the Samsung note series.

The enabling of rich communications is by far the greatest influence, Wi-Fi have had on the user experience. Despite Wi-Fi offload featuring significantly on the operator's agenda, other aspects that Wi-Fi play out in the cellular network is far and wide in between. Operators should not underestimate device client behaviour, as it brings a range of use cases, imminent in today's diverse networks and avoid falling into the trap of building networks in silo – they must instead use methodologies that exhibit true performance and measure user experience through connectivity, mobility and inter-operability. In the race for smarter, simpler and automated connectivity not just for voice, data and VoIP but putting data roaming services on their roadmap – users will be able to keep the same number they have for home mobile services and abroad without having pay exorbitant charges and compromising security.

Wi-Fi Ready for Applications

Bundled Wi-Fi has become common and effective value-add tool, unleashing a host of accessible content flowing freely. Instead of blocking such traffic deemed to be of non-revenue generating or desperately developing proprietary applications platforms to fight the masses, they should concentrate on exhibiting greater variability in their performance characteristics which they do best.

The benefits of a fully converged 3G-Wi-Fi experience is apparent with the capacity boost from Wi-Fi to continue to deliver value added services and support OTT applications better through optimization of scarce 3G spectrum for mission critical applications. Users will unlikely waver in their thirst for more OTT applications and carriers alike would have to find innovative means to ensure optimal delivery of those applications while battling revenue decline.

Leave the content development to the geeks and programmers. What the operators should realize is the sharing of their APIs and interfacing technology which they own rights to. The role of APIs was previously heavily network-centric and protected stringently, but transgressing to a more application/service centric role. The crucial link in today's evolving telco space is to offset the invasion of OTT applications from taking a "free ride" on the telco's networks. Another way is to partner these application developers, but entails some risks as to who owns the customer relationship and responsibility of customer details.

By selectively opening their APIs, operators can have control over the type of preferred software components that dictate specifications for data procedures, data structures, object classes and variables necessary in the design of interface communications. Efficient use of APIs within the network and service/application layer can drive revenue opportunities - as simple as activation of application (e.g., games, ads, updates, video, chat) via the user's device to that extent of either in-app payment or pay per download and inter-working mechanism to ensure the right type of policy, context, location specific variables linked directly to bill. Other important aspects of exposing APIs also brings light to compatibility - characteristics and behavior of applications may differ in different access network. Also, the experience on a smartphone and tablet can be distinctively different as it is in the device operating system that it runs on.

The mutually beneficial model will see more innovative applications flourish and operators keeping the users happily engaged. Consequently, both operators and developers see faster monetization of their services and products. Of course, this entail interoperability and integration that requires some figuring out including the core concerns of QoS, authentication, roaming, security, unified billing and provisioning.

It is well worth the effort, considering the potential mobile wallet market is huge, where there are already significant interactions related to mobile web transactions even without mass adoption out there in the market today.

Conclusion

Mobile traffic demands will likely exceed network capacities in the short to medium term, despite planned LTE deployments. Operators are addressing this capacity crunch in a number of ways, some of which are enforcing policy control on existing networks at a greater granular level or exploiting heterogeneous access networks, i.e. Wi-Fi offload, femto cells to manage load balancing.

Many Wi-Fi Networks began as networks of convenience, intended to supplement wired connectivity wherever necessary in niche markets. Now we are seeing Wi-Fi as partner to both wired and wireless network many types of users, applications and usage. This fundamental change in use brings a fundamental change in expectations. Networks must now offer not only secure access, but must also be able to support multimedia applications, the type and number of which will continue to grow rapidly.

By moving traffic from the cellular network to a cheaper alternative in Wi-Fi connections in the aim for better user experience, perceived as reasonably accepted without noticeable visual impairments or delay interruption is not enough. Rich applications communication goes beyond the variant quality measure of pricing, augmented service with context and location-based services and direct appeal of freemium content to some extent. Wi-Fi is seen as an access technology to deliver a comprehensive solution for easy integration into heterogeneous networks – as well as a service offering.

The use of Wi-Fi hotspots also includes a diverse range of pricing options, including many free and pay-per-use options. The prohibitively expensive cellular data roaming in cellular networks is a strong driver to make Wi-Fi a de facto choice wireless data use globally. The expectation of converged mobile experience is already apparent with initiatives for reduced data roaming charges and success with Wi-Fi roaming is becoming a reality with the Wireless Broadband Alliance (WBA) and Wi-Fi Alliance engagement with operators and carriers alike to standardize inter-systems roaming frameworks through the Next Generation Hotspot program and Hotspot 2.0 respectively. These Wi-Fi technology standards will allow devices to more easily discover Wi-Fi roaming relationships, determine and automate network discovery, registration, provisioning and network connectivity securely.

Wi-Fi Bringing Life to Applications

Wi-Fi has undoubtedly changed wireless experience beyond imagination. The countless revelations by industry purists that Wi-Fi will run out of style are swapping sides to turn around radically. Wi-Fi has such a strong following that even legacy 3GPP vendors are taking an interest in Wi-Fi seriously to re-evaluate the value it brings to their telecom business. Be it to grow revenues through applications diversity, delivering more cost effective roaming service or complement their bundled offerings, operators are realizing the power of Wi-Fi.

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Free Consultation

If you would like a free consultation on how you can leverage Wi-Fi solutions for enhanced performance and experience, feel free to contact us at marketing.gp@greenpacket.com. Kindly quote the reference code, SWP1211-F when you contact us.

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