Is smarter WiFi the way to extend broadband?

by Selina Lo, President and CEO, Ruckus Wireless

Demand for broadband connectivity is outrunning capacity and operators' costs are rising faster than revenue. Due to costs, many regions still lack broadband connectivity. A new technology, 'Smart WiFi', extends WiFi's range by up to a four-fold and enables a carrier-class WiFi infrastructure that delivers reliable performance. Smart WiFi is an economical way to bolster overloaded 3G networks; it provides the last-mile access needed to expand fixed-line broadband networks at a fraction of the cost of competing solutions.

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The race is on to roll out broadband services in new areas and bolster existing networks, but will mobile operators finally embrace what was until recently a 'dirty little word'- WiFi?

The mobile revolution has taken the world by storm. With a well-publicised barrage of data traffic hitting mobile infrastructures around the world, operators are actively seeking any and every available tool to augment and expand their networks and deliver wireless broadband access to more people, in more places.

Millions of Blackberry and iPhone users already know from painful firsthand experience that mobile operators have a real problem; even in areas where networks are highly developed, demand for connectivity is outstripping supply at an unprecedented rate. The cost of transporting data is rising faster than revenue, and poor user experiences resulting from network congestion are raising churn, one of the largest costs operators incur.

In addition, there are a multitude of suburban and rural areas that still lack the broadband connectivity that many of the UK's cities already enjoy. While the abundance of fixed-line infrastructures in towns and cities made it relatively easy to offer broadband, it is both expensive and disruptive to extend fibre networks beyond these areas.

Despite these frustrations, one thing is clear - there is a massive opportunity for those operators that can increase capacity and extend coverage. The race is on to tackle the problem and find a way of extending broadband services into new and under-served areas - which is why the benefits of robust, flexible WiFi solutions have become increasingly difficult for carriers to ignore.

Smarter WiFi - mirage or miracle?

Given the enormous installed-base of 802.11 silicon embedded in virtually every conceivable device, WiFi is one of the most expedient and cost-effective ways to relieve strained networks and build out into new areas, while keeping a tight focus on where traffic is heaviest.

Traditionally held back by its inability to deliver robust connectivity over large distances, WiFi is both uncontrollable and unpredictable - it has historically been viewed as a flaky solution. This, combined with the notable lack of a complete end-to-end solution, quite rightly put WiFi firmly out of the running as a viable option for extending broadband connectivity.

Contrary to popular opinion, 802.11n has done little to solve the problem so far. The new standard now increases the capacity of WiFi technology from 54 megabits per second (Mbps) to 300 Mbps or more, but it has a nagging blind spot - interference caused by neighbouring devices that operate in the same unlicenced spectrum. Essentially this means that anyone can install an access point wherever they want, or run

interference-generating microwaves, blue-tooth headsets or cordless phones in the vicinity at any time. This flaw means that many WiFi signals are constantly transmitted in all directions, each of which can be interfered with before reaching their destination.

To make matters worse, 802.11n devices are nearly two to three times the cost of older 802.11a/b/g devices. Despite vendor claims to deliver theoretical maximum throughputs of 200, 300 and even 600 Mbps of performance, users never see it. If something could be done to offer 802.11n equipment at 802.11g prices with better range and reliability, then the market will run, not walk, to install the new technology.

Enter a new generation of smarter WiFi technology which can actively ignore interference from competing networks, by constantly steering signals around obstacles and other problems that previously wreaked havoc on WiFi performance. This smarter WiFi technology sees and hears interference, but delivers high bandwidth coverage even in the dense urban markets littered with radio noise.

Dubbed 'Smart WiFi', this revolutionary technology extends signal range up to four-fold without wasting signal on areas where it is not required. Advances in RF technology combine intelligent beam-forming with new 802.11n standards to increase both the range and reliability of WiFi connectivity. This enables, for the first time, a complementary carrier-class WiFi infrastructure capable of delivering consistent performance, adaptable interference mitigation and more reliable WiFi services for latency-sensitive multimedia applications.

These developments present carriers with an exciting prospect. The technology is by far the most economical means to bolster overloaded 3G networks; it can also deliver the crucial last-mile access needed to expand fixed-line broadband networks at a fraction of the cost of competing solutions.

Sustainable growth

Of course, delivering robust connectivity is only half the battle - operators need a solution that can help them to drive down capital costs and operating expenses in the midst of spiralling demand, while at the same time retaining existing customers and fighting for market share amid cut-throat competition.

To achieve the full promise of WiFi, operators need a well-conceived, carrier-built, architectural approach that spans the radio access network, backhaul and core cellular infrastructure - addressing issues such as provisioning, seamless authentication and IP mobility. Such an approach allows operators to both offer a high quality service to subscribers and monetise services that travel over WiFi.

For example, PCCW deployed a 7,500-node high-speed WiFi network to offload its 3G network infrastructure and to support the distribution of IP-based video content to handheld devices. PCCW says that WiFi is off-loading up to 20 per cent of the data traffic that would have otherwise been destined for their 3G networks. At peak times in dense urban locations, data traffic offload to WiFi can reach up to 80 per cent.

The advantages of using WiFi are available in either self-build or partnered models. For tier two and three operators, partnering with a third-party wholesaler, building out standard WiFi networks or acquiring networks from another provider offers the benefits of lower data transport costs by shifting traffic onto WiFi networks - but these processes will of course take time.

Conversely, tier one operators can benefit today, and in the long-term, through operator-built carrier-class WiFi networks. This allows carriers to address the two essential priorities related to network operation and expansion: control and cost. However, this requires a comprehensive and well thought through architectural approach that spans the radio access network, backhaul and core infrastructure - addressing issues such as provisioning, traffic flow, seamless authentication, lawful intercept, IP mobility and policy control and management.

With a controlled and cooperative WiFi/cellular infrastructure, operators can deliver service capacity in WiFi mode and, as well, monetise applications enabled by higher-bandwidth connections. This allows them to reduce the costs associated with offloading data and signalling traffic onto WiFi while simultaneously generating revenues.

Lower cost backhaul, plus the sheer reliability of solutions, gives operators the freedom to extend WiFi networks quickly and scale them easily as mobile data traffic increases - an approach which delivers much faster times to revenue and ROI than alternative options. This will undoubtedly make it a winner in markets where installing alternatives such as fibre is too expensive or too difficult.

In India, the Tikona Digital Network has done what few thought possible. They have quietly built the world's largest outdoor WiFi mesh network - with over 35,000 WiFi access points - in less than 18 months. Tikona's Smart WiFi network offers tiered broadband services over the unlicenced 2.4GHz band to hundreds of thousands of subscribers in dozens of cities.

Ultimately, by providing wire-like reliability at a much lower cost than competing technologies, WiFi will undoubtedly be the most economical way for operators to extend their networks into new areas, fill the gaping holes in 3G coverage, and deliver a positive mobile experience to end-users over the next decade.

WiFi - from underdog to major player

Until recently, end-to-end WiFi access solutions have been the missing link operators needed to extend broadband data services in rural and less developed areas. Without end-to-end access solutions, WiFi could not reliably deliver the necessary range needed to extend services beyond the realms of wired networks.

However, the timely arrival of smarter WiFi solutions has sparked a welcome departure from traditional broadband access solutions that simply blanket large areas with expensive access and backhaul equipment that takes years to deploy.

In addition to solving data offload woes, this new breed of complete end-to-end solutions are ideally suited for under-served areas where there are still huge opportunities for broadband access, but where installing fixed-line or traditional wireless broadband technologies is so often impossible or cost-prohibitive. Designed to let operators quickly deploy reliable wireless coverage and capacity at the lowest possible cost per bit, WiFi can now address the massive opportunity for high-speed data services that alternatives, such as WiMAX, cannot due to the huge start-up costs and deployment complexities involved.

Cost-effective 'build-as-you-grow' models for wireless broadband data services dramatically cut the capital costs of broadband infrastructure, therefore giving operators solutions that can scale-up quickly and easily as mobile data usage increases - particularly given the surge of affordable devices such as smartphones and iPads.

Of the many tools at operators' disposal, smarter WiFi is among the easiest to put to work quickly. Based on the accelerating activity of the past six months, the industry can expect to see rapid expansion of WiFi networks worldwide that will open up new markets and enable broadband users to enjoy the truly reliable, affordable, high-bandwidth experience they've been waiting for. ●