Is Carrier Wi-Fi Monetization Built On A House Of Cards?

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Wi-Fi hotspots are springing up like weeds. The latest high-profile example is in New York, where 10,000 former payphone sites will be converted to Internet kiosks equipped with an 802.11ac access point broadcasting Wi-Fi signals down the street. The first "Links" as they are called will go live by the end of 2015. Not to be outdone, the New York waste management company, Bigbelly, is proposing to upgrade several hundred garbage and recycling bins in New York City into Wi-Fi hotspots as well.

Carrier Wi-Fi is booming worldwide

Wi-Fi is everywhere, from restaurants to bus, rail and airport terminals, even trains and planes. The list goes on. Meanwhile broadband service providers have realized they are sitting on something big. With residential fixed broadband penetration in North America at approximately 80 percent and much higher in most of Northern Europe, the idea of upgrading each home's Wi-Fi enabled cable- or DSL-modem, to do double-duty with one SSID serving home users, and the other being part of Wi-Fi hotspot network, has caught fire.

The Cable Wi-Fi Alliance which consists of the five largest U.S. cable operators already has a Wi-Fi roaming network of about seven million such "homespots" which may double by 2018. British Telecom claims about five million across the UK. Every major service provider is following suit, eager for a Wi-Fi footprint they can use to horse-trade roaming agreements with other providers. Same goes in the Asia-Pacific region, with KDDI, China Mobile, SingTel and many others rolling out hotspots in the millions.

Wi-Fi Spectrum is getting Crowded

But there's a dark side to this rosy picture. Wi-Fi spectrum is getting crowded. The competition for spectrum that has existed for years in Wi-Fi's 2.4 GHz band is now manifesting in the five gigahertz band as well. Today, unless you live in a rural area, the 2.4 GHz band is next to useless. Enterprises have already relegated 2.4 GHz to a "life-line" service for legacy devices. In homes, especially in multi-tenant buildings there are often many neighbors competing for the same few channels. This phenomenon is now appearing in the five gigahertz band.

802.11ac Exacerbates the Problem

Enter 802.11ac, the latest Wi-Fi standard which only operates on the five gigahertz band. Only 18-20 months on the market, 802.11ac already accounts for 70 percent of consumer access point shipments, and about 40 percent

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of enterprise and carrier access point shipments. By 2018, 90 percent of Carrier Wi-Fi units will be 802.11ac predicts Infonetics Research. Besides the sheer volume of access points competing for spectrum, there are new features in 802.11ac which allow four of the available 21 channels to be bonded into a single 80 MHz wideband channel, or 8 channels into a 160 MHz wideband channel. Indiscriminate use of these features poses a major threat to the stability of adjacent networks.

Wi-Fi unlicensed spectrum is both a gift, in that it's free, and a curse, in that no-one has control over how the spectrum is used–anyone can deploy Wi-Fi wherever they like, enable wide channels and crank up the power, with complete disregard for the interference it may cause on neighboring networks–and they will. Several service providers have revealed to us at embedUR that they already face interference issues in certain dense metro areas including parts of New York, Chicago and Los Angeles, yet we've barely scratched the surface of where Wi-Fi is headed.

LTE-U Exacerbates the Problem, More

If "homespots" and city-wide hotspots are not enough, consider the mobile operators. MSOs are running out of licensed spectrum, and the cost of more, is astronomic. So they want to exploit Wi-Fi too, and why not–It's free! To scale network capacity they are augmenting the macro-cell network with Wi-Fi enabled 4G/LTE small-cells hoping to offload mobile data traffic to Wi-Fi wherever possible. And there's yet another fly in the ointment–LTE-Unlicensed (LTE-U)–a new flavor of LTE which selectively blends, supposedly unused, Wi-Fi channels with LTE licensed spectrum. LTE-U gives mobile operators access to more spectrum for free, while avoiding having to operate separate LTE and Wi-Fi networks, as would be the case with Wi-Fi enabled small cells. Like it or not, LTE-U small cell spending will reach nearly two billion dollars by the end of 2020, says SNS Research. The Wi-Fi community is up in arms, due to real fears that LTE-U will not play nicely with neighboring Wi-Fi networks. Despite heavily promoted "research" reports from chipset vendor Qualcomm, its strongest proponent, many including Cablelabs strongly disagree with Qualcomm's claims, and have their own "proof", that LTE-U does not co-exist well with Wi-Fi networks.

Wi-Fi Monetization on a Crash Course

Why does all this matter? Well, it matters because service providers are betting large on monetizing Carrier Wi-Fi. But if they can't control the stability of their networks, their monetization plans may be built on a house of cards. The bottom line – if service providers are to successfully monetize their Wi-Fi networks, they need to do more than install hotspots and pray. They will need to take steps to monitor the RF spectrum around them and dynamically implement interference avoidance strategies, such as changing channel or reducing transmit power, and bandwidth management strategies such as limiting the number of connections, or turning off a public SSID, whenever the Wi-Fi performance is compromised by interference.

Radio Resource Management is Crucial

Truck rolls would be the kiss of death to any service, so any interference mitigation solution must be fully automated, and it must scale for millions of nodes. This is the problem we've been solving for the past two years at embedUR with our cloud-based Radio Resource Management (RRM) system. By continuously sampling the RF conditions at every access point in a service provider's network, when conditions change for the worse, our RRM engine in the cloud can automatically compute an alternative configuration and it push down to the affected node, with no human intervention required.