

WI-FI HOT-SPOTS – HOT, COLD OR WARMING UP?

*An overview by Gopi Sundaram, Graduate Research Assistant**

December 6, 2002: *IBM, AT&T and Intel, along with a couple of other venture partners announced the launch of their joint-venture Cometa Networks – with the ambitious goal of launching a single nation-wide Wi-Fi¹ network of “Hot Spots”.*

Starting January 10, 2003: *Visitors to Pine Avenue, Long Beach, CA’s restaurant row, will have free wireless Internet Access thanks to the Wi-Fi Hot Zone jointly developed by Long Beach’s Economic Development Bureau in partnership with the city’s hi-tech businesses.*

January 28, 2003: *AT&T Wireless announces its partnership with Wayport to roll-out its GoPort service for wireless broadband internet access through Wayport’s existing Wi-Fi Hot Spots.*

March 12, 2003: *Intel Corporation introduces Intel® Centrino™ mobile technology, integrating wireless capability into a new generation of mobile PCs that will bring business users and consumers greater freedom to connect in new places and in new ways.*

A flurry of such headlines, in the past few weeks and months, has catapulted the Wi-Fi Hot Spot phenomenon into the limelight. So, what are Wi-Fi Hot Spots? Are they a conduit for unprecedented consumer experiences? What are service providers attempting to do and what are the hurdles in their path? In this article we seek to find answers to some of these questions as we unravel the power of an innovation that is seeing remarkably rapid proliferation.

THE TECHNOLOGY

A Hot Spot is an area that falls within the range of a wireless hub or a cluster of hubs, within which Wi-Fi (Wireless Fidelity)-enabled devices can connect wirelessly at high speeds (ranging from 11Mbps to 54 Mbps)². The cluster of hubs in turn is connected to the Internet through a broadband connection. At the core of Wi-Fi is the IEEE 802.1x set of specifications. Though players like Wayport developed wireless LANs even before these standards came into existence, the standards helped to get away from the proprietary nature of vendor implementations which in turn resulted in greater interoperability and thus enhanced product and service adoption. In functionality, the technology is not very different from a regular local-area network, except that the LAN does not have to be wired anymore. While, this progression from a wired LAN to a wireless one may seem logical and predictable, the markets and business models this has unearthed has significantly exceeded expectations.

¹ Wi-Fi is the certification mark issued by the Wireless Ethernet Compatibility Alliance to certify that a product conforms to the IEEE 802.11b standard for WLANs. The advanced Wi-Fi5 certification mark is issued to those products that conform to the more recent IEEE 802.11a standard for WLANs.

² The bandwidths mentioned need to be shared among all the devices connecting to that particular hub. However, the presence of multiple hubs and a “channel”-technology that is part of the protocol ensure that the effective bandwidth is still in the Mbps range.

THE POSSIBILITIES

What the Hot-Spot providers are attempting to do is to give consumers unprecedented mobility in their multimedia communication needs. With the recent announcement from McDonald's about providing 1 hour of Wi-Fi access with a Happy Meal (this is only being rolled out in 3 cities right now)³ a fast-food stop off the highway could soon become an opportunity to quickly download a few more MP3 clips for the rest of the trip. Soon, a gas station's Hot Spot could be providing a portal that offers localized yellow pages – including restaurant guides and directions to them – all at the fill-up stop and in the convenience of a palm-device.

As Wi-Fi and broadband connectivity become more ubiquitous a soccer-mom could be making a “live transmission” of a goal-scoring opportunity or her middle-schooler's graduation ceremony to grandma on the other coast, using her Wi-Fi enabled, camera-embedded mobile-phone and the Wi-Fi hub in the soccer field or the school auditorium as the case may be. Lufthansa has recently announced Wi-Fi trials on select flights. Pretty soon a handheld device could be doubling up as a cyber-gaming station allowing commuting gamers the pleasure of a round of poker, or even something as media heavy as Quake, with their gaming buddies on their subway-ride in to work or school. The opportunities seem limitless!

While the average consumer seems to be on the verge of experiencing the benefits of Wi-Fi sprawl, corporate users have already begun reaping some of them. Airport lounges, restaurants and highway stops are rapidly transforming into watering-holes for executives craving fast access to corporate networks, to catch up on email or the latest business data from back-end systems. No more modems, no more hunting for Ethernet jacks and now with Intel's Centrino family of chips that builds Wi-Fi into a laptop, no more Wi-Fi adapters either. With broadband in the air and vendors like Cometa targeting the corporate user, one can even envision Wi-Fi booths on the lines of phone-booths that could serve as podiums for impromptu video conferences using laptop or even handheld cameras.

We are finally on the verge of realizing the dream of wireless broadband that 3G has kept promising and is yet to deliver. And isn't this exactly what the telcos wanted - to flood all that excess data capacity built up? Wouldn't this be the perfect way for beleaguered wireless providers to generate both air-time and data revenue through compelling communication experiences? From the clamor we're seeing to get into this market (T-Mobile offering Hot-Spots through StarBucks, AT&T partnering with Intel and IBM on Cometa) Wi-Fi seems to be coming through as the savior for telecom and wireless providers. However, the Wi-Fi path to the next generation of wireless experiences is strewn with a variety of hurdles – technological, operational and even behavioral. How well the players will negotiate them will determine how successful they will be with this technology.

³ McDonald's in partnership with Cometa Networks, a Hot Spot wholesaler, has rolled out this service at select locations in Manhattan.

THE CHALLENGES

Technology Concerns

Most Wi-Fi networks currently comply with the 802.11b standard which operates in the 2.4 GHz spectrum. This spectrum is utilized by myriad other devices including microwaves and cordless phones, thus presenting a significant interference risk for Wi-Fi communication. Though the newer 802.11a standard addresses this issue by operating in the 5GHz spectrum, this automatically prevents backward compatibility with 802.11b devices. In addition, the lack of availability of 802.11a gear and the varying upgrade cycles at domestic and vendor-hosted sites will delay widespread solution to the radio-interference problem.

Radio frequency operation also makes Wi-Fi power hungry. For example, Forrester Research estimates battery-life of a Wi-Fi enabled PDA to be about 2 hours. Competing technologies like Bluetooth, which though shorter in range and bandwidth provide significantly superior power characteristics. In addition, Bluetooth offers better support for real-time applications like voice conversations. Forrester predicts Bluetooth to be the dominant technology in power-constrained mobile devices like mobile-phones and PDAs. This will require Hot Spots to accommodate non-Wi-Fi wireless technologies as well, in order to maximize data and revenue flow. Either that or Wi-Fi evolves to be less power hungry, or battery technologies improve significantly to compensate for the higher power needs – all possibilities, but none of which have been identified as to-do's for the short term.

Convenience

In today's highly fragmented Hot Spot market, moving from one spot to another gets complicated. Users have to re-authenticate and often tweak their device settings as they move between vendor locations. For the corporate traveler, this makes life messy as a two-minute email and data-check will have to be preceded by 3 minutes of twiddling laptop settings – a hassle that could negate the speed and convenience of wireless broadband. To the average mobile-phone user, who is accustomed to effortless roaming across networks and will expect the same across Wi-Fi zones too, this makes the technology a non-starter. Mobile-phone users will even intuitively expect a "Wi-Fi" caption on their devices that indicates the detection of a broadband Hot Spot – much on the lines of the all too familiar "Roam" caption that informs them when they leave their service area. Motorola, Nortel and Lucent have all recently announced efforts to develop prototypes that support Cellular to Wi-Fi roaming. Unfortunately, it will be several months if not years before such devices mature and become cost-effective enough for average consumer use.

Cost

The cost issues involved are two-fold. First, device costs – a D-Link Wireless Card for a \$500 HP iPaq 39 Series costs \$80. This does not include the add-ons such as cameras that

can enable multimedia communication. While such prices maybe steep for executives and other corporate users they are well beyond the price range needed for mass adoption. If telcos and wireless carriers need to see the data traffic that they are hoping for, the devices that generate them need to be affordable for soccer-moms and teenagers. Camera-embedded mobile phones however are approaching price-points that help them hit the mainstream. But, there are no Wi-Fi enabled models available on the market. Both Motorola and Qualcomm have recently announced intentions to develop hybrid phones that combine cellular and Wi-Fi technologies, but there is no clear picture on when such devices will start shipping and if they do, how effective their features and pricing will be in creating mainstream adopters.

Besides device costs, service costs (and levels) too serve as inhibitors. Wi-Fi plans like T-Mobile's \$6/hour (dropped from \$14/hour) pale in comparison to \$30/month type cell-phone deals. While wireless providers like T-Mobile do offer monthly plans in this price-range the fact that the service can be utilized only at Starbucks or some such franchise offering that particular carrier's Wi-Fi, significantly diminishes the bang for the buck. Low usage will correspondingly force retailers like Starbucks to scale down from expensive T1-based backhaul to more affordable mechanisms like DSL – squashing telco hopes of a revival through backhaul revenue.

Billing

Wireless operators are already struggling to figure out how to bill for data services. One approach is to bill by the byte, for data transferred. But this is counter-intuitive to the average wireless voice consumer who is accustomed to by-the-minute billing or flat monthly fees on a pre-set number of minutes. Wi-Fi services will add a new dimension to the billing problem. Besides having to figure out billing methods for their own networks, wireless operators will now need to perform the same exercise for traffic through Wi-Fi Hot Spots and their backhaul networks. Failure to do this could result in service piracy – users leveraging Wi-Fi services for their wireless communication needs (including voice), thus short-circuiting the mobile carrier's network – a development that can have devastating business consequences to the carrier.

Then there is the issue of roaming. The low cost of entry in the unlicensed Wi-Fi spectrum is resulting in too many Hot Spot operators. The lack of interoperability among their billing plans presents a serious obstacle to consumer adoption. This is similar to the proliferation of ISPs in the 90s. However, unlike the ISP situation, Wi-Fi users will need to use multiple service providers as they move between different operator domains. Aggregators like Boingo who offer over 1100 locations nationwide, offer some consolation. But what is really needed is greater consolidation among service providers, and an ability to establish “peering” relationships among themselves that permit subscriber-sharing. Expertise of integrators like iPass, who specialize in providing consolidated billing over multiple ISPs may be a saving grace – especially for corporate users, who have already established business relationships with them. However it is still unclear as to how the issue of interoperability among service providers, will be addressed.

Behavioral

The opportunity that Wi-Fi offers for developing unprecedented consumer behaviors is also the biggest challenge that the industry faces. People need to fundamentally change their perspective on a mobile communication device. It needs to transition from being a conduit for voice-communication and value added voice services to an affordable on-the-go lifeline for personal productivity, communication and entertainment. According to Forrester, productivity and entertainment motivated consumers are the most valuable in terms of adoption and revenue generation, while family-oriented ones are the least. Yet the latter offer the biggest market. How well service providers are able to transform one into the other – and make wireless broadband usage as mainstream as TV and radio are today – remains to be seen.

CONCLUSION

Due to relatively high costs of service, the lack of Wi-Fi enabled handheld devices and the limited coverage and interoperability of Hot Spots, operators will still be dependent on traveling corporate users for revenue. However, in order to truly realize the revenue potential for wireless broadband, carriers and infrastructure providers need to look beyond the corporate world. They need to be able to bring the power of mobile broadband to the consumer's fingertips. Ease of use of Wi-Fi services through ubiquitous Hot Spots must become as valuable to video clipping tourists and interactive gamers as they are currently to tech-savvy, laptop wielding road-warriors. Recently, Intel announced its partnership with industry heavyweights like Fujitsu in setting up a non-profit organization for the promotion of wireless broadband. Specifically, the organization hopes to promote the next generation IEEE standard, 802.16, that can provide wireless broadband connectivity over a 30 mile distance! Such rapid transitions in technology will result in rapidly evolving business models, which could even cannibalize the Hot Spot proliferation phenomenon. However, two constants clearly emerge from these developments – the potential that wireless broadband holds to revolutionize digital interaction is too huge to be ignored and the big players are here to stay, weathering the hassles of market and technology evolution, till they cash in on this potential. What they need to succeed is well summarized in this quote from Stephen Wellman, Editor, Fierce Wireless (www.fiercewireless.com):

”Understand what consumers want, and how they want it..... then build it for them. If they say ‘No’, don’t force what you have, on them.”

For more information on the Wi-Fi Hot Spot phenomenon please visit:

1. www.80211report.com – Offer weekly emails on the latest business and technology developments in wireless networking
2. www.80211-planet.com – For latest news, insights, device reviews and tutorials on Wi-Fi technologies.
3. www.computerworld.com – For news, reviews and discussion groups on Wi-Fi/wireless and, in general, on most IT topics.
4. www.forrester.com – Industry leader in research on and analysis of emerging trends in technology.

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