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Research Note

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Mobile Internet 2.0: Monetizing Public Wi-Fi via Business-to-Consumer Relationships

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There are two worlds colliding: the mobile cellular voice world and the mobile data Wi-Fi world. These two worlds co-existed but largely ignored each other. But in 2007, everything changed when the iPhone was launched and started the world's next big innovation cycle; that is mobilizing the Internet. This innovation cycle's size and impact is on par with the Internet and social networking but is occurring faster than either of these cycles. Mobile Internet is now a necessity. Consider that 67% of Mobile Internet users use their smartphone to research a purchase and actually visit the store that advertised it, or that 72% have made purchases based on a local advertisement delivered to their smartphone. Mobility and proximity are coming together in the fact that 94% of users who receive location-based services consider them valuable.

Factor in these statistics to a shift in human behavior that demands high-speed mobile Internet access in retail locales, hotels, transportation systems, restaurants, hospitals, sports stadiums, etc., and you have the makings for a new consumer experience and relationship with business, or Mobile Internet 2.0. It's this new consumer-to-business relationship that is accelerating a shift from a mobile voice to a mobile nomadic data world. In fact, people now access the Internet differently than when equipped with mobile voice phones in that traffic is moving indoors, and Wi-Fi is becoming the preferred wireless access method for Mobile Internet, where cellular, be it 3G or 4G, is highly valuable outside a Wi-Fi domain.

The Mobile Internet 2.0 Ecosystem

So, how is this shift toward Mobile Internet 2.0 manifesting itself? First, there is a new ecosystem that's emerging where various companies contribute certain aspects of a mobile experience, such as location services, notification/offer services, indoor blue dot detail, mobile client foot tracking, etc. Firms like Cisco Systems, Nokia and Qualcomm are working on client-network Wi-Fi infrastructure linkage. Small or start-up firms are working on aspects, such as SingleDigits offers a guest portal policy, Frontporch focuses on push advertising, ThinkSmart Technologies provides foot traffic analytics, SITA, an airline IT association, developed a Mobile Internet 2.0 solution for airports, nearby systems provides location based in store analytics, and there are many others. Firms are offering floor layout plans/maps for all kinds of venues to map foot traffic analytics upon. iOS and Android apps, such as the Meridian "App for Places," provide turn-by-turn directions at select in-door locals, etc. This ecosystem is coming together at a fevered pace to deliver a unique Mobile 2.0 Internet experience.

In short, the days of consumer businesses offering free Wi-Fi access to entice patronage is shifting to consumer businesses offering free Wi-Fi in exchange for the opportunity to track your movement through their venue and message to you. For consumer businesses, Mobile Internet 2.0 is becoming a necessity, not a nice-to-have service as it's fundamentally changing their business relationship with customers.

To understand how, think about the "blue dot" that's displayed on a smartphone within a mapping or navigation application. Consider an indoor blue dot that guides you through a museum, hospital, casino, sports center, shopping mall, airport, etc., via your smartphone. A key aspect of Mobile Internet 2.0 is to offer a better indoor mobile experience around delivering a better blue dot, a more accurate blue dot, thanks to round-trip time calculations, and more contexts about the blue dot such as locales next to, behind, beside and in front of you. Indoor blue dot accuracy will only improve as many firms seek to integrate RSSI or Received Signal Strength Indicator fingerprinting, which leverages the information about the walls in the building and use time-based location techniques that work great in line of sight conditions. In the future, angle of arrival techniques will be added where a single Access Point (AP) can locate things around it. For venue owners, it's about market data aggregation, having control of this information and influence as to where the blue dot takes consumers.

The Four Mobile Internet 2.0 Architecture Components

Mobile clients and some Wi-Fi networks will start to work together in an effort to provide a richer and most useful indoor mobile experience. Think of an indoor Wi-Fi network as being a GPS indoor network that's leveraged for location and context to provide smartphone users information about what's around them, such as a sale in a store of their liking that's in close proximity, e.g. There are four major components to the Mobile Internet 2.0 architecture.

Secure Seamless Roaming: The first component is secure seamless roaming in an effort to make authentication interoperable and standard between cellular and Wi-Fi networks. Cisco has been leading in this space with its Hotspot 2.0 initiative. Secure roaming utilized 802.11u technology that enables hotspots to distribute information to mobile clients before being associated to a Wi-Fi network. This enables a new roaming experience plus whole monetization of a service experience beyond just roaming, more on this later.

Guest Portal Policy: The second component is a guest portal policy that provides the first impression to a smartphone user when entering a venue. For example, what first impression does a business want to make upon a customer or prospect, and what policy should be implemented to deliver the service?

Today, for example, when entering a hotel, a smartphone guest may be offered basic Internet access for reading email for free and video streaming via Wi-Fi for a fee. In the hospitality market, Wi-Fi is mostly treated like a service that must be offered at the lowest possible cost or free. As such, Wi-Fi access quality in many hotels is questionable. In most hospitalities, there are three bottlenecks: 1) the portal policy where the policy refers to a gateway, 2) usually there's a small Wi-Fi box that's easily overwhelmed by traffic load and 3) the size of Wide Area Network Internet access. To provide an excellent Mobile Internet experience inside a hotel, an appropriately-sized Internet connection is needed.

Many hotels appropriate small and large Internet access links so that if a guest requests Internet access to a large pipe to watch Netflix, for example, then the hotel will charge the guest accordingly. The policy portal sets guest access speed. In essence, guests are buying either the 10 Mbs or the 256Kbs plan. The portal page is how services are delivered to guests inside the venue. The gateway function is a router with control knobs such as throughput, type of service, filters to block websites, etc.

For example, in a Mobile Internet 2.0 environment to increase the user experience, the portal page provides what's called "session management," which delivers unique service to each individual customer. A family may enter the hotel with parents' settings to unlimited access but children's access is restricted to between the hours of 6 am and 9 pm. e.g. The gateway function delivers the unique services to each individual based upon session management, which allows hotels to extract revenue based upon customized services per customer. In essence, session management enables multi-tiered services.

Mobile Client: The third component of the Mobile Internet 2.0 architecture is a tighter linkage between mobile client and Wi-Fi network infrastructure. To deliver on the next generation mobile experience, a sliver of the smartphone client becomes part of the infrastructure to determine more precise location based services, for example. For network architects who are implementing Mobile Internet 2.0 infrastructure, it's important to be aware of the very fast rate of change occurring in mobile client standardization. The hot activity here is to make indoor location services on par with outdoor GPS in term ubiquity.

Context Aware Platform: The fourth component is a context aware platform that maps a smartphone or Wi-Fi device location to an indoor floor plan of services, thereby providing the smartphone user the basis for being aware of his/her surroundings. Taking this one step further, the Wi-Fi network can push

information to the smartphone based upon its location context. The WiFi network is able to push information to a smartphone or Wi-Fi device based upon its radio beacon signal within the smartphone before it associates or connects with a Wi-Fi network. Context aware builds upon the Wi-Fi network to offer SSID advertisements by being able to track movement and push offers via notification to smartphone users while roaming in a shopping mall, sport stadium, museum, hosp**ital, coffee shop, airport etc.**

In this world where Mobile Internet is a necessity, Googling for information is too slow. Consumers want their mobile device to be aware of their location and preferences, thus making it easier to get the information they need. Consider that you're sitting in a sports stadium. If your smartphone is letting you know that pretzels are half price, then that's useful; however letting you know that pretzels at Safeway are half price is annoying.

The Commerce Power of Mobile Internet 2.0

Context aware is one of the most powerful components to Mobile Internet 2.0 architecture. Consider the analytics afforded by a shopping mall marketing team in that they will now have information that tracks how many people walked into the mall and which stores are most visited. Companies like ThinkSmart Technologies aggregate this information to show mall owners high frequent foot traffic patterns, which may be used to create storefront-leasing priorities or rental rates, for example. In addition, consider a sale notification being distributed to smartphone users at a certain location in a mall where foot traffic is then monitored to measure the notification result. In short, did the sale or offer notification drive a change in foot traffic flow to a particular storefront and result in a transaction?

This is a huge advance as it provides businesses a means to measure effectiveness of offers, which is just not possible in today's brick and mortar stores. Context aware brings commerce Web site like traffic measurement to physical locations. Commercial websites are able to measure how many people click on an ad and how many people enter into a transaction. Physical stores will be able to do the same shortly; that is, they will know how many people walk by the front door, how many people came through the front door and what does it take to make the cash register ring. Just like websites keep track of traffic and response to offers, so too will physical commerce sites or establishments in the new Mobile Internet 2.0 environment.

Measuring Push Notification with Foot Traffic Analytics to Drive Transactions

And foot traffic analytics is getting more granular as its shifts from post processing, meaning traffic reports at the end of a day, to real time. The question is: can marketing executives watch real-time foot traffic move in their desired direction after a series of offer notifications are made? Consider an MGM casino where a notification is distributed to smartphone users who are relaxing at its pool with an offer for low-price cocktails at a certain bar. If the offer is effective, the response will be foot traffic from the pool to the bar, which they would see on a computer screen, perhaps miles or cities away. Another example is a sports stadium where a Groupon-type notification offer was distributed to smartphone users that advertised hotdogs at 50% below the regular asking price. The offer resulted in a 30 to 40% hit rate; that's one out of three or four people took the offer!

This response rate offers hope to mobile advertising, which generated some $1.6B in 2011 compared to desktop advertising's $30B according to IAB and recently reported by Kleiner Perkins partner Mary Meeker. In short, context, including location information, mobile notification and foot traffic analytics, adds effective value to indoor mobile advertising campaigns. It's important to note that by 2015, Morgan Stanley predicts that there will be more mobile users on the Internet than desktop users, thus those who unlock the secret to mobile advertising will be rewarded with at least a $20B advertising opportunity in the United States alone that will keep growing.

The Value of Indoor Spectrum

This begs the question: where is the mobile advertising market and what is the value of local spectrum? Current mobile ads that randomly place advertisements within mobile applications are ineffective. However, it seems that context aware mobile advertisement is the recipe for mobile advertising success. In other words, mobile advertisement needs local context. Put another way, mobile advertising is a massive localized market. If this is the case, then what is the value of local spectrum? Firms that own real estate where large numbers of people gather are and will become service providers. Ultimately, when a company owns a venue, it owns the spectrum inside the venue, and some are starting to realize just how valuable that spectrum is.

Public spectrum is valued at auction based upon dollars per megahertz times population coverage, which can easily grow into billions and tens of billions of dollars in highly-populated areas. So how much is indoor spectrum worth on this metric? While the population coverage within a venue is certainly smaller than cities, the cost per MHz would be substantially higher. If the Mobile Internet 2.0 experience happens indoors or inside venues, as all trends point to, then there is tremendous value in the spectrum inside of buildings.

Sunglass Hut

Consider Sunglass Hut, a popular franchise within shopping malls. If a storeowner can see which side of the store people tend to aggregate over the course of a day, then that could provide valuable information. For example, if most people gather around the right side of the store during the day, then she/he knows that what's on the left side is not very interesting to the local market. Therefore, the owner would be smart to put different glasses on the left-side store display that resonates with the local market. The owner is able to capture this information thanks to the Mobile Internet 2.0 knowing which side of an Access Point (AP) people are located at or their AOA Angle of Arrival to an AP. In short, APs are being equipped with AoA angular information for precision blue dot location identification.

Starbucks

Consider a Starbucks coffee shop and its use of AoA. An owner wants to know how many people walk into Starbucks, stand in line for a period of time to order their coffee only to leave out of frustration, thanks to a long delay. What is the length of time that tips to frustration per local market? From a franchise point of view, they want to know how much business they're losing because of line delay. AoA equipped APs with a Mobile Internet 2.0 infrastructure can provide this business information so that appropriate strategies can be put in place to reduce lost revenue and increase the user experience.

The Museum of Natural History

The Museum of Natural History in New York offers a great example of the context aware value delivered by Mobile Internet 2.0. When strolling through a museum, every person is interested to know about his or her surroundings; that is, what kind of art is in the room and around me. Thanks to the Museum of Natural History's Mobile Internet 2.0 deployment, it is able to offer mobile users a range of new services on their smartphones, such as requested exhibition descriptions as a guest approaches, blue dot navigation to a piece of art of interest, etc. The Museum of Natural History's Mobile Internet 2.0 infrastructure leverages location services to provide context of the user's surroundings to push appropriate exhibit information to him/her. The Meridian app for iOS and Android devices links to the Museum's Mobile Internet 2.0 delivering this new and enhanced experience.

In addition to the Museum of Natural History, the Meridian app now allows users to browse through more than 200 works of contemporary art found throughout the New York City Subway, Long Island Rail Road, Metro-North Railroad, and MTA Bridges and Tunnels. Select a work of art, and the app provides still images, text information on the background, inspiration and significance of each work, and at selected

stations, video and audio clips featuring its artists. For the New York subway stations with Wi-Fi Internet connectivity, the Meridian app also provides turn-by-turn directions at select large stations to the precise locations of the art works. This indoor-navigation feature will continue to develop as the MTA adds cell and data service throughout the MTA network.

MGM

MGM is on the forefront of delivering a better experience inside MGM through Mobile Internet 2.0. MGM's initiative is driven top down from business executives to IT business leaders, as most Mobile Internet 2.0 projects are now CEO level discussions. Note, that for context, MGM covers half of Las Vegas, a very large space indeed.

MGM and many hospitality executives now believe that providing guests a great mobile Internet experience has become a necessity on par with clean sheets and shampoo. In fact, Mobile Internet is now a strategic CIO IT problem to be solved quickly. Guests expect mobile access to their email and social network during their hotel stay but if it's not available then they will find a hotel where it is. In addition, hospitality industry guests are creatures of habit; that is once they find a hotel chain they like, it is hard to get them to change. Factor in the huge adoption ramp up of smartphones plus tables and what you find is that hospitality CIOs are very concerned that their organizations can move fast enough to deploy mobile Internet. The longer it takes, the more guests they lose.

MGM, like many hotels and resorts, has been pressured into offering Wi-Fi service, as it's become a need to have service to retain customers. But Wi-Fi access alone offered little value to the MGM business as guests spent most of their online time at Google, Facebook, watching videos on YouTube, etc., while MGM financed the service. To solve this problem, MGM thinks of Wi-Fi like a gourmet restaurant inside the resort. At MGM, Wi-Fi should carry its own financial weight. MGM sought a Wi-Fi chef that can serve various flavors of Wi-Fi and monetize it. And that's where MGM is breaking ground while other hotels and casinos still treat Wi-Fi as shampoo.

MGM has launched what's called "billboard exchange" for Mobile Internet 2.0 users that greets guest upon arrival with information specifically about what's around them and has personalized that information for each guest. Click on a service that's of interest, and the blue dot will navigate the guest around MGM to it.

HealthCare

The healthcare industry, and hospitals in particular, has always had a navigation issue; that is how to guide patients, staff and guest around a complex hospital multi-floor plan. The healthcare industry is now looking to Mobile Internet 2.0 for waypoint mapping. Waypoint mapping navigates people around and within hospitals traveling between different departments with a detailed indoor blue dot that knows of walls, floors and other obstructions so as to provide appropriate indoor navigational guidance and welcome.

Museums were the first proof point of how Mobile Internet 2.0 technologies come together. Hospitals are now stepping up to waypoint mapping by providing a deeper, richer blue dot to navigate within buildings. Shopping malls, as well entertainment venues such as MGM, are layering on top of this with foot traffic location analytics and push advertising to mobile devices based upon location in an effort to modify behavior or incite individuals to engage in offers. This is perhaps the holy grail of Mobile Internet 2.0.

The Unique Mobile Internet 2.0 Experience

In the above examples, people want to know what's in the space/location with them and have it displayed on their mobile device. Then they want the ability to touch or click on the items they want to learn about or be navigated to it. They don't want to learn what's around them by doing Google searches. There is a unique Mobile Internet 2.0 experience, which seems to be "tell me what's around me and make it relevant to my preferences." This experience

contains aspects of pushing information to a mobile device to serve needs based upon preferences, which could be obtained via social networking such as Facebook, LinkedIn, Twitter, etc.

What New Big Company Will Emerge to Deliver Mobile Internet 2.0?

Out of every major innovation cycle, one large company emerges. IBM emerged from computing and won that innovation cycle; Microsoft emerged from desktop computing and won that innovation cycle; Oracle from enterprise software; Cisco from computer networking; Google from the internet; Apple from mobile computing; Facebook from social networking, etc. The question is what company will emerge from Mobile Internet 2.0? Will Google, Apple or Facebook dominate Mobile Internet 2.0 or will a new company emerge? It's usually hard for past winners of innovation cycles to win the next one, so chances are there will be an emergence of a very large Mobile Internet 2.0 firm over the next several years.

Recommendations

For IT architects and designers, Mobile Internet 2.0 is usually a top-down executive directive. The following recommendations are offered:

1. Look to implement hotspot 2.0 technologies especially around secure seamless roaming between cellular and Wi-Fi networks as the basis for a Mobile Internet 2.0 solution,
2. For hospitality concerns, look for a guest portal policy and gateways that offer granularity of services down to the individual,
3. Implement a context aware platform based upon precision location services, as this is the baseline for Mobile Internet 2.0,
4. Stay abreast of mobile client standards such as 802.11u and unique inter-vendor antenna designs for increased location precision,
5. Compile a list of firms that are offering unique push services that are appropriate for your business, be it retail, entertainment, healthcare, to implement mobile offer notifications, etc.,
6. For retail, shopping malls, entertainment venues, etc., explore foot traffic analytics to deliver the same type of click metrics available on commercial websites for your brick and mortar facilities,
7. For custom Mobile Internet 2.0 applications services such as the NY Museum of Natural History, seek professional services organizations experienced in such designs,
8. For shopping malls, entertainment venues, etc., explore real-time foot traffic analytics with push notification to measure the effectiveness of mobile offers to drive transactions and revenue.

The mobile cellular voice and mobile data Wi-Fi worlds are colliding to create Mobile Internet 2.0. As this market develops, a few new very large firms will emerge along with a growing and robust ecosystem that transforms the mobile Internet experience into one based upon location, context and preferences. Welcome to the new mobile world.

About Nick Lippis

Nicholas J. Lippis III is a world-renowned authority on advanced IP networks, communications and their benefits to business objectives. He is the publisher of the Lippis Report, a resource for network and IT business decision makers to which over 35,000 executive IT business leaders subscribe. Its Lippis Report podcasts have been downloaded over 160,000 times; i-Tunes reports that listeners also download the Wall Street Journal's Money Matters, Business Week's Climbing the Ladder, The Economist and The Harvard Business Review's IdeaCast. Mr. Lippis is currently working with clients to design their private and public virtualized data center cloud computing network architectures to reap maximum business value and outcome.

He has advised numerous Global 2000 firms on network architecture, design, implementation, vendor selection and budgeting, with clients including Barclays Bank, Eastman Kodak Company, Federal Deposit Insurance Corporation (FDIC), Hughes Aerospace, Liberty Mutual, Schering-Plough, Camp Dresser McKee, the state of Alaska, Microsoft, Kaiser Permanente, Sprint, Worldcom, Cigitel, Cisco Systems, Hewlett Packet, IBM, Avaya and many others. He works exclusively with CIOs and their direct reports. Mr. Lippis possesses a unique perspective of market forces and trends occurring within the computer networking industry derived from his experience with both supply and demand side clients.

Mr. Lippis received the prestigious Boston University College of Engineering Alumni award for advancing the profession. He has been named one of the top 40 most powerful and influential people in the networking industry by Network World. TechTarget an industry on-line publication has named him a network design guru while Network Computing Magazine has called him a star IT guru.

Mr. Lippis founded Strategic Networks Consulting, Inc., a well-respected and influential computer networking industry-consulting concern, which was purchased by Softbank/Ziff-Davis in 1996. He is a frequent keynote speaker at industry events and is widely quoted in the business and industry press. He serves on the Dean of Boston University's College of Engineering Board of Advisors as well as many start-up venture firm's advisory boards. He delivered the commencement speech to Boston University College of Engineering graduates in 2007. Mr. Lippis received his Bachelor of Science in Electrical Engineering and his Master of Science in Systems Engineering from Boston University. His Masters' thesis work included selected technical courses and advisors from Massachusetts Institute of Technology on optical communications and computing.