Hot Spots: Hot New Idea for Serving Customers and Generating Revenue?

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If you're looking for a hot new idea that will generate customer satisfaction as well as revenue, you may be looking for a Hot Spot. Wireless ISPs or WISPs—also called Hot Spots—are coming to a crowded corner near you. Starbucks offers more than 350 locations. Wayport, a WISP vendor, serves 450 hotels and nine airports. Soon WISPs will be found in train stations, hotels, restaurants, stores, stadiums, and conference centers.

A Hot Spot is a limited-distance wireless LAN (WLAN) with public access using IEEE 802.11 standard technology. Access can be accomplished from laptops, notebooks, pocket PCs and, eventually, PDAs at megabit speed. A Hot Spot can provide full access to the Internet and the user's personal networks without providing access to the campus network. It can also be a revenue producer for colleges and universities with sites at fraternity and sorority houses, off-campus residences, libraries, eateries, and cafes—wherever students congregate.

Hot Spot Services

What you can do over an 802.11 LAN will depend on the device used to access the LAN. Laptops, notebooks, and pocket PCs are the likely initial candidates. Services can include the capability to:

- Access e-mail or perform instant messaging
- Register online or participate in online classes
- Submit class assignments or correspond with professors
- Access databases, libraries, the Internet, or student chat
- Make voice-over-IP calls
- Download music/entertainment or receive streaming video

Educational institution users will probably go beyond corporate user applications. Students will invent uses rapidly and will expand upon the list.

Vendors Move Forward

The IEEE 802.11 standard comes in different flavors. (See sidebar.) At present, the IEEE 802.11b standard enjoys the most sales and is supported by many vendors such as Cisco, Proxim, Nortel, Aironet, Avaya, and Symbol. The newer 802.11a and pending 802.11g technologies will be replacing the slower 802.11b products rapidly. The primary concern with 802.11a is the cost of network interface cards/access points and the lack of interoperability with 802.11b

The 802.11 Family

802.11 refers to a family of specifications developed by the IEEE for wireless LAN technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. There are several specifications in the 802.11 family:

802.11 — applies to wireless LANs and provides 1 or 2 Mbps transmission in the 2.4 GHz band using either frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS).

802.11a — an extension to 802.11 that applies to wireless LANs and provides up to 54 Mbps in the 5GHz band. 802.11a uses an orthogonal frequency division multiplexing encoding scheme rather than FHSS or DSSS.

802.11b (also referred to as *802.11 High Rate* or *Wi-Fi*) — an extension to 802.11 that applies to wireless LANS and provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1 Mbps) in the 2.4 GHz band. 802.11b uses only DSSS. 802.11b was a 1999 ratification to the original 802.11 standard, allowing wireless functionality comparable to Ethernet.

802.11g — applies to wireless LANs and provides 20+ Mbps in the 2.4 GHz band.

Source: http://80211-planet.webopedia.com/TERM/8/802_11.html

devices. Intel will introduce new low-power consumption chips for combined 802.11a/b operation soon. Microsoft is going to integrate its .NET Internet appliance strategy with Hot Spot networks.

Already a national conference called the Wireless Hot Spots Conference and Expo has convened, in San Jose in September 2002. Enough interest has been generated to stimulate the creation of the Open Mobile Alliance (OMA), an organization of approximately 200 companies that will set standards for wireless communications.

The cost of adding WLAN as an integrated part of a new laptop is about $50. Adding a wireless card to an existing laptop costs about $200. Both prices are steadily falling. Seven million 802.11 cards were sold in 2001.

At What Price?

There is no historical precedence for pricing Hot Spot services. There are two schools of thought: measured usage (per access) or a flat monthly fee. Starbucks has begun by offering two plans: 20¢ per minute or $15.95 per month. T-Mobile has several plans ranging from $2.55 for usage service to $29.99 per month for unlimited local use or $49.99 per month for unlimited national use. Success in the corporate world appears to favor fixed low pricing. Charging for off-campus access could be a combination of a connection or bandwidth (T1, T3, 10/100 Mbps) charge plus a charge for each access point rather than a charge per user. This appears to be better suited for the university access charges.

There are several operating Hot Spot services. It is worthwhile to access their Web sites to learn their pricing structures. Five of these sites are:

1. Airpath Wireless (http://www.signup.airpath.com/portal/getservice.asp)
2. Boingo (http://www2.boingo.com/whatdoesitcost.html)
3. Surf and Sip (http://surfandsip.com/sign_up.htm)
4. T-Mobile (the largest so far) (http://www.accounts. hotspot.t-mobile.com/services_plans.htm)
5. Wayport (wayport.net/chart)

Getting from Here to There

Connecting to the off-campus building can be the most expensive part of the network. Traditional T1 circuits can do the job but may cost $500 to $700 per month after installation. Educational discounts will help defray these costs. A T1 or fractional T1 at 768 Bps is the minimum access speed. SDSL and HDSL service at half- and full-T1 speed may also be available. Although it is less common today, you may be able to lease a metallic (or unloaded) copper circuit from your local carrier. Some short-haul modems that operate at T1 or greater speed over this circuit could significantly reduce the carrier's charges.

There are a number of new wireless choices that can be used to connect to the remote sites. Western Multiplex produces a wireless (microwave) product that can support 100 Mbps Ethernet transmission up to five miles. It can operate for greater distances but the speed will be reduced. It operates in an unlicensed frequency range; therefore FCC approval is not required.

Four other companies—Adtran, Cisco, Speedcom, and Proxim—have introduced similar products that also operate at unlicensed frequencies. They all require line-of-sight transmission and support full-duplex operation. (See Figure 1.)

Figure 1: Wireless products

PRODUCT	SPEED	DISTANCE
Tracer by Adtran	2xT1	30 miles
Cisco WT-2710	T1, T3, 10BASE-T	20 miles
Speedcom SC5800	T1, 10BASE-T	25 miles
Proxim DS-3	T1, T3	5 miles

Actelis Networks has announced an unusual product, the Meta Light 1500, that works over multiple carrier-grade copper pairs and can support up to 50 Mbps using four to 20 pairs at 18,000 feet. It looks very attractive for 10 Mbps Ethernet access.

A good reference for wireless point-to-point links is found at http://www.nwc.com/shared/printArticle.jhtml?article=/1318/1318ws.

Implementing the Remote Site

There will be multiple access points per site, connected together with a LAN switch at each site. The LAN switch resident at the remote site should provide in-line power to the access point. The power is produced by the LAN switch and carried over the data cable (category 3/5). There is an IEEE 802.3af standard pending for in-line power, or so-called Power Source Equipment (PSE). Power can be delivered over an unused pair (called midspan PSE) or over the data pairs (called end-point PSE). Most larger and sophisticated LAN switches can be PSE. The cheap LAN switches will require a separate power bar, such as PowerDsine's product, to power the access points. In either case, this

eliminates the $200 to $400 required to pay an electrician to install power to each access point.

Network management will be a major issue. Access points and LAN switches will have to be remotely managed. This increases the capital cost but can reduce labor costs in the long run. Selecting the products that can operate with a common management platform will take time and limit the number of vendors. Cheap LAN switches and access points have little or no remote management capabilities. A separate management station with staff trained in WLAN technology will probably be required.

It's Not All Perfect

How well Hot Spots perform will depend on several factors:

1. Whether 802.11b (up to 11 Mbps) or 802.11a (up to 54 Mbps) is used
2. The antenna type used: Rubber DiPole, Ceiling Mount, Ceiling Mount High Gain, Patch Wall, Pillar Mount, Ground Plane
3. Antenna distribution and placement
4. Distance from the antenna (access point or AP)
5. Number of simultaneous users
6. The bandwidth used from the remote facility to the university campus
7. The materials in the room

Even if everything is done properly, users will experience slower transfer speeds than they would with a wired LAN connection. Distance plays an important role. The highest speed available for 802.11b in an open room (no walls) is 11 Mbps at 100 to 150 feet. As distance increases (150 to 250 feet), the speed reduces by half to 5.5 Mbps. And at 250 to 350 feet, it decreases to 2 Mbps. If users choose to work outdoors, then walls will become involved and the speed could be as low as 1 Mbps.

Access point (antenna) locations will have to be selected and probably changed to ensure there are no blackout areas in a room. Line-of-sight may be achieved, but multipath (reflected) signals from walls, ceilings, or other obstructions may cancel out the signal.

The WLAN may not be as reliable as the wired LAN. Access points may lock up causing a manual or automatic restart when overloaded by too many users. The WLAN access card may have to be restarted in the laptop. Finally, the laptop may have to be rebooted.

Notes from the Field

The first installation should be small, as a learning experience. This is a radio environment; therefore you will probably have had less experience. A resource for learning more about this environment would be schools for the deaf. They have been using radio-looped classrooms for years. Also, the physical buildings and their construction materials will vary. Adjacent buildings with Hot Spots may interfere with each other, so the channel selections for the access points will have to be coordinated to eliminate contention. It takes time to locate, and possibly relocate, access points and to fine-tune them.

There are several other considerations:

1. Use only proven standard-based products to avoid interoperability problems between access points and access devices such as laptops.
2. Always perform a site survey first.
3. Remember that access points can point vertically, horizontally, in 180 degrees and 360 degrees.
4. Laptop battery life can be cut in half with a WLAN card.
5. Co-located access points should be separated by three to five channels when installed.
6. The maximum number of users per access point should be limited to 15 to 20.

If you want to sell this service, you must announce it, demonstrate it, and then have enough product to install it quickly.

Organizations with useful information include:

- IEEE Wireless Standards (802.11)
- Wireless LAN Association (WLANA)
- Wireless LAN Interoperability Forum (WIF)
- University of New Hampshire Interoperability Laboratory

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