

Cisco Systems

Wireless and Mobility Technology

Background Information

Mobility Solutions Overview

At its most basic, being mobile is being capable of moving from place to place. For business professionals, that means having access to all your work as you move from work to home or go on the road. For the enterprise, that means equipping the workforce with tools to maintain productivity as individuals move about. For the mobile operator and wireless Internet service provider, mobility means providing the underlying technologies and services that enable seamless connectivity to the cellular and Wi-Fi networks as people move from place to place using multiple technology standards.

To Cisco, mobility is a work environment without walls, without barriers, without interruptions. Cisco programs and technology provide professionals, enterprises, and service providers around the globe with end-to-end, secure, reliable, scalable solutions for enabling network connectivity regardless of location.

Cisco also reaches out to the police departments, the stores, the hospitals, and others helping these vertical markets become mobile. To the police department that means keeping connected to a dispatch database while driving around in a patrol car. To stores that means decreasing inventory time from days to hours using handheld scanners instead of pencils. To hospitals it means giving doctors wireless devices for instant access to patient charts.

Cisco was a pioneer of implementing the office anywhere concept when it introduced its Cisco Mobile Office program in November 2000. The company has gone on to become the worldwide leader in wireless local area network technology.

In addition, Cisco applies its IP leadership to the Mobile Internet with the Cisco Mobile Exchange, a standards-based framework that links the radio access network (RAN) to IP networks and their value-added, content-based IP services. The Cisco Mobile Networks solution, which enables entire networks to roam, is one of the more proven Mobile IP technologies of its kind. Cisco also continues to innovate with such solutions as the Mobile Access Router, which is creating networks-in-motion at communities across the country and in airplanes around the globe.

Technology

For information on all Cisco mobility products, please connect to the listed links.

- **Wireless Local Area Networks**
- <http://www.cisco.com/go/aironet>
- **Mobile IP: Cisco Mobile Networks**
- <http://www.cisco.com/warp/public/732/Tech/mobile/ip/>
- **Routing: Networks-in-Motion:**
- <http://www.cisco.com/en/US/products/hw/routers/ps272/index.html>
- **Mobile Wireless: Cisco Mobile Exchange Solution**
- <http://www.cisco.com/go/mobile>
- **Additional Public Access Technology: Cisco Mobile Office**
- <http://www.cisco.com/go/mobility>

Sample List of Customers

Enterprises

AMD
Microsoft
Palm
Pfizer
Sun Microsystems

Service Providers

AT&T Wireless
BT Cellnet, UK
China Unicom, China
NTT DoCoMo, Japan
T-Mobile, US, Germany
Verizon Wireless

Public Venues

Ataturk Airport, Turkey
Copenhagen Airports, Denmark
Fairmont Hotels and Resorts
Munich International Airport, Germany
Starwood Hotels & Resorts

Local, State and Federal Agencies

NASA Glen Research Center
Seal Beach, CA Police Department
South Dakota State Legislature
US Coast Guard
US Marine Corps

Education Institutions

Calhoun County High School
San Lorenzo Unified Schools
Stanford University
University of Akron
University of North Carolina

Healthcare

Antelope Valley Hospital
Children's Hospital in Milwaukee
Lifespan
Sharp Healthcare
St. Luke's Episcopal Hospital

Mobility Background and Definitions

Cisco has seen first hand the value of Internet capabilities like wireless access and on-the-road productivity applications. During FY 2002, Cisco realized \$1.94 billion in savings from Internet capabilities, which was a result of cost avoidance and time efficiencies through the Web-enablement of processes that impact employees. Cisco CEO John Chambers recently expanded on this benefit by saying, "The opportunity for Cisco to meet our business goals, optimize our employees' work environment and grow customer relationships: priceless."

Mobility Market Data:

- Worldwide WLAN hardware revenue hit \$481.9 million in the first quarter of 2003, and is expected to reach \$2.01 billion this full year according to Infonetics (Q103). During the same time period, Dell'Oro Group estimates the total market revenue will reach \$1.9B while Synergy Research estimates \$2.1B (Q103).
- According to In-Stat/MDR (Dec. 2002), the total number of remote and mobile workers is 78 million, rising to 106 million by 2006.
- According to Morgan Stanley, the wireless infrastructure market is expected to be approximately \$40 billion in 2003, with CDMA representing 18% of this market.
- The market for enterprise wireless data services in the U.S. alone is estimated to grow at 100% per year and will reach \$16 billion by 2006. (IDC)
- U.S. business customers currently represent 36% (54.5 million) of total wireless users, approximately 20% of whom are part of a corporate-sponsored account. (The Yankee Group, 6/1/2002)
- There are currently 12,000 hotspots worldwide, an aggregate growth rate of 551% since 2001. The forecast is 113,555 by 2006. (In-Stat/MDR, Dec. 2002)

Definitions:

- **802.11a** - An IEEE specification for wireless networking that operates in the 5 GHz frequency range (5.725 GHz to 5.850 GHz) with a maximum 54 Mbps data transfer rate. The 5 GHz frequency band is in "clear air" as it avoids 2.4 GHz devices such as cordless phones, and also offers more radio channels than the 802.11b. These additional channels can help avoid radio and microwave interference.
- **802.11b** - International standard for wireless networking that operates in the 2.4 GHz frequency range (2.4 GHz to 2.4835 GHz) and provides a throughput of up to 11 Mbps. This is a very commonly used frequency. Cordless phones and medical and scientific equipment, as well as Bluetooth devices, all work within the 2.4 GHz frequency band.
- **802.11g** - An IEEE specialization that provides a throughput of up to 54 Mbps and offers backward compatibility to 802.11b. It also operates in the 2.4 GHz frequency band but uses a different radio technology in order to boost overall bandwidth.
- **Media gateway** - Any device, such as a circuit switch, IP gateway, or channel bank that converts data from the format required for one type of network to the format required for another.
- **PDSN (Packet Data Serving Node)** - Connects the Internet, intranets and applications servers to mobile stations (mobile nodes). The PDSN performs two basic functions: 1). Exchanging packet data with the mobile station over the radio network and 2). Exchanging packet data with other IP networks.
- **CDMA (Code Division Multiple Access)** - A form of multiplexing, which allows numerous signals to occupy a single transmission channel, optimizing the use of available bandwidth. The technology is used in ultra-high-frequency (UHF) cellular telephone systems in the 800-MHz and 1.9-GHz bands. The CDMA2000 standard is third-generation (3G) mobile wireless technology and delivers data at speeds ranging from 144 Kbps to 2 Mbps.

- **GPRS** (General Packet Radio Services) - A packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. The higher data rates will allow users to take part in video conferences and interact with multimedia Web sites.
- **GSM**(Global System for Mobile Communication) - A digital mobile telephone system that is widely used in Europe and other parts of the world. GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.
- **HotSpot*** - A place where you can access Wi-Fi service. This can be for free or for a fee. HotSpots can be inside a coffee shop, airport lounge, train station, convention center, hotel or any other public meeting area. Corporations and campuses are also implementing HotSpots to provide wireless Internet access to their visitors and guests.
- **Networks in Motion** - Refers to entire networks of communication devices in moving vehicles such as law enforcement and public safety vehicles.
- **Time Division Multiple Access (TDMA)** - A technology used in digital cellular telephone communication that divides each cellular channel into three time slots in order to increase the amount of data that can be carried.
- **Wi-Fi Protected Access (WPA) *** - A specification of standards-based, interoperable security enhancements, which strongly increase the level of data protection (encryption) and access control (authentication) for existing and future Wi-Fi wireless LAN systems.

* Source: Wi-Fi Alliance

What is Mobile IP?

Mobile IP, an IETF standard (RFC 2002), allows a host device to be identified by a single IP address even though the device may move its physical point of attachment from one network to another. Regardless of movement between different networks, connectivity at the different points is achieved seamlessly without user intervention. Roaming from a wired network to a wireless or wide-area network is also done with ease. Mobile IP provides ubiquitous connectivity for users, whether they are within their enterprise networks or away from home.

How is Mobile Wireless Different from Wireless LANs (Wi-Fi)

The primary differences are in the areas of range of the wireless connection, speed (the data throughput) and the applications. Whereas mobile wireless communications technology provides users with cellular access to voice, short message service, paging and other services from their PDAs and mobile phones, the primary usage for Wireless LANs (Wi-Fi) is laptop/notebook connectivity to more bandwidth intensive business applications on the corporate LAN and the Internet.