Agenda Report

DATE: August 15, 2005

TO: CITY COUNCIL

THROUGH: ECONOMIC DEVELOPMENT & TECHNOLOGY COMMITTEE

FROM: CITY MANAGER

SUBJECT: WIRELESS BROADBAND IN PASADENA

RECOMMENDATION

It is recommended that the City Council:

1. Adopt a policy that ensures 99 percent of Pasadena residents will have access to free wireless Internet service within 1.5 miles of their residence.

2. Authorize release of an RFP seeking a private sector wireless service provider to partner with the City in building a citywide wireless network.

BACKGROUND

The past several years have seen the development and evolution of wireless broadband data services – services that allow users to connect to the Internet without a hardwired connection. There are two primary categories of consumer broadband wireless services available in the US today: Wi-Fi; and cellular phone system based data services.

Short for wireless fidelity, Wi-Fi is the technology that allows users with a laptop or wireless device to connect to the Internet through a "hotspot", providing a broadband connection over an unlicensed radio frequency signal within a range of 100 to 300 feet. Advancements in Wi-Fi technology, combined with the shrinking cost of equipment, have now extended network coverage from limited 'hotspots' to 'hotzones' that can cover large downtown areas and entire cities through a wireless broadband network. In large outdoor deployments, Wi-Fi hotspot devices are typically mounted on street light poles, traffic signal arms, and rooftops. They vary in size by manufacturer, but average 12 inches wide by 8 inches deep and 12 inches high.

The second type of wireless service is provided by cellular phone companies using their wireless phone networks. The firms have mounted additional equipment on cell site antennas to support wireless connections to the Internet. The most advanced of these

services provide a broadband connection (defined as a connection of at least 200 Kbps). However, these cellular-based services provide a somewhat lower speed connection to the Internet than Wi-Fi. Another difference between the cellular data services and Wi-Fi is coverage. Hotzone or citywide Wi-Fi deployments strive to cover a geographic area ubiquitously. The cell phone system wireless service coverage is based on the location of the provider's antennas. Where antennas are close together, coverage is fairly good. When antennas are farther apart, there can be gaps in coverage. The coverage of both Wi-Fi and cellular-based wireless services are affected by uneven terrain, dense buildings and trees.

Given the advances in wireless technology and other cities' plans for wireless broadband initiatives, staff undertook a study to evaluate wireless broadband in Pasadena and identify options for the City to support its widespread availability.

Wireless Broadband in Pasadena

At present, several cellular phone companies offer wireless connections to the Internet in Pasadena using their cellular phone networks. Verizon Wireless has deployed a high-speed wireless service across its local cellular phone network over the past year. The service offers residential and business subscribers wireless access to the Internet for a monthly fee of roughly $80. Customers must also purchase a wireless card for their computer for a one-time fee of $44 to $70 (depending on the type of card), which allows the computer to connect wirelessly to Verizon Wireless' broadband network. The company advertises connection speeds of 300 to 500 Kbps. Cingular Wireless and Sprint also are in the process of upgrading the speed of their connections to offer data services to similar to Verizon's. At present, both Cingular and Sprint offer a lower speed wireless data service in Pasadena, with service fees ranging from $20 to $80 per month.

These services likely meet some local needs for wireless connectivity. All three entities indicate their services are available throughout Pasadena. However, based on staff trials, connections were not available citywide. Staff found that connections were strong close to cellular antenna sites, but slowed down or dropped off entirely as the distance from the antenna increased or if hills, tall buildings, or trees were in the way.

There are no local providers of citywide Wi-Fi services today. However, Pasadena is home to dozens of wireless hotspots available to the public. Most are provided by businesses like Starbucks, McDonalds, and local hotels as a service to draw in additional customers. Usually these are for-fee services, offered by local businesses in cooperation with service providers like T-Mobile or SBC. Customers pay a fee for wireless Internet access for a fixed period of time. Local businesses have also deployed Wi-Fi to meet their internal business needs for employee connectivity.

In addition, three City library facilities – Central Library, and the La Pintoresca, and Hasting Ranch branch libraries -- are "unwired". Free Wi-Fi access has been available in the main hall, patio, and coffee shop areas of the Central Library since July 2003. The Information Services Department recently expanded its Wi-Fi coverage to all public areas of the Central Library, and added the service at its two largest branch libraries. A free Wi-Fi hotspot is available at the city's Senior Center as well.

Current Plans to Expand Wi-Fi in Pasadena

With the wireless data services provided locally by Verizon Wireless, Cingular, and Sprint, as well as local Wi-Fi hotspots (nearly 20 in the Old Pasadena area alone), those who can afford wireless broadband service already have some options in Pasadena. To expand availability to those who may not be able to afford the service fee or choose not to incur that expense, the City's FY2006 operating budget includes $40,000 to install Wi-Fi service at the remaining branch libraries and community centers. Installation is scheduled for completion in December of this year. Along with the existing library Wi-Fi installations, these locations will provide 99 percent of residents a place to go for free wireless Internet access within 1.5 miles of their residence. The Wi-Fi service at each location will support up to 50 wireless users at a time. Appendix A shows the libraries and community centers, and the neighborhoods within 1.5 miles of each facility.

Other Cities' Wireless Initiatives

Cities across the country have been investigating and implementing Wi-Fi networks to achieve a variety of policy goals. Several models have emerged, with varying policy objectives. These include: fulfilling telecommunications needs unmet by local cable and DSL providers; stimulating economic growth by attracting visitors and businesses; and reducing the digital divide (the disparity between the rich and the poor in access to high speed Internet services).

Cerritos, California is an example of a city that looked to Wi-Fi to supplement meager broadband service offerings by the local telephone and cable TV companies. With broadband Internet service unavailable in much of the city, Cerritos officials pursued an agreement with a private sector Wi-Fi company to deploy a citywide wireless network there. Cerritos allowed the company to place wireless transmitters throughout the city, while waiving most fees. The private sector company incurred the vast majority of the implementation expense, while the city agreed to become an anchor customer of the wireless service. The project has given Cerritos residents and businesses broadband access that was previously lacking.

The City of Tempe, Arizona has followed a similar private sector approach. The City solicited bids through a Request for Proposals (RFP) process for a private sector firm to build and operate a network to serve residents, businesses, local institutions, and the city itself. As part of the agreement between the City and the private sector telecom firm, Tempe agreed to limited use of the City right-of-way and fiber backbone in exchange for service to City departments. Roll-out of the network is scheduled to start this summer.

The Cities of Long Beach, Fullerton, and Hermosa Beach have taken a different approach. Wi-Fi has been deployed in limited areas in those cities as a free community service and convenience to residents and visitors. Wi-Fi coverage is targeted towards locations with a high concentration of public gatherings, such as business districts, airports, restaurants and retail areas.

Last fall, the City of Chaska, Minnesota deployed a citywide multi-purpose wireless network for use by residents, businesses, and city departments. Wireless broadband service is offered through Chaska.net, the city-owned Internet service provider (ISP),

which was formed five years ago to bring broadband to local schools. Service is available to the city's 18,000 residents at a charge of about $16 per month.

The most ambitious deployment of a citywide wireless broadband network to date is underway in Philadelphia. The City plans to create a non-profit organization whose task is to build a wireless network by contracting out to private parties. The non-profit will get $10 million toward the cost of building the wireless network through foundation grants and bank loans; it plans to earn revenue by selling access to private ISPs at wholesale prices. The City is in the final stages of selecting a private sector firm to design, build, and operate the network, covering the city's entire 135 square miles. Philadelphia's primary goal is to reduce the digital divide by making very low cost broadband service available to the city's residents and businesses. With the non-profit paying for development of the wireless infrastructure, the private sector operator will be able to extend low wholesale prices to ISPs that will deliver service to residents and businesses. Philadelphia's project is well-known not only for its scope, but also for sparking strong opposition from Verizon, the incumbent telephone company. Verizon was unable to stop Philadelphia's project, but was successful in sponsoring state legislation that makes it much more difficult for other Pennsylvania cities to follow Philadelphia's example.

Additional examples of municipal wireless initiatives are presented in Appendix B.

City Department Wireless Needs

Like the public, City departments have identified growing needs for wireless connectivity. A recently complete study identified a number of pressing departmental requirements for wireless access to City business data. Key needs include:

- The Police Department is in the process of upgrading its computer-aided dispatch and records management systems (CAD/RMS). The new systems require officers to access information over a faster connection than the radio system can provide. A new means of connecting officers in the field to police dispatch and records data must be implemented.

- The Planning & Development, Fire, Health, and Public Works Departments require wireless connections to streamline their inspection activities. Being able to connect at the inspection sites will reduce the need for inspectors to return to the office to access information, take action on permits, and complete reports.

- The Water & Power and Public Works Departments also require access to the GIS system and other databases to support operations in the field.

- Pasadena's Water & Power and Transportation Departments would like to use wireless service to provide remote monitoring and control of assets in the field such as water sites and changeable message signs.

Additional examples of how City departments would use Wi-Fi to support business operations are presented in Appendix C.

Wireless connectivity will improve staff efficiency by:

- Increasing the amount of time field staff can spend in the field by reducing the need to go back to the office to access information, receive work orders, complete police reports, etc.;

- Reducing the need for staff managing assets to travel to the site of the changeable message sign, utility meter, etc.; and

- Improving the quality of information, allowing staff to gather and transmit current information from the field rather than returning to the office.

Options to Meet Local Wireless Needs

The City could take a number of different approaches to meeting local needs for wireless service. With the assistance of a telecommunications business consultant, staff reviewed a number of options, reaching the conclusions that follow.

Option 1: Rely on Private Sector Services – Current cellular-based wireless services do not provide complete coverage of Pasadena. While Sprint and Cingular plan to upgrade the speed of their data services, it is unlikely that the coverage offered by the cellular phone carriers would improve to the point of providing truly citywide access.

Option 2: Build and Operate a Wireless Network – With this option, the City would build a wireless network and operate it, providing service directly to the public in competition with other wireless service providers. Staff estimates that network development and first year support costs for this model would require an initial investment of approximately $5.5 million. This approach requires a significant addition of staff to support the business as well as investment in equipment to make service available at homes and businesses. Given the initial investment, operating expenses, and projected revenues, the project appears to have negative cash flow in each of its first five years. The negative cash flow would need to be covered by the City. It appears that City advances could be paid back over the next five years. Beginning in approximately Year 11, there would be net cash flow to the project.

Option 3: Build a Wireless Network and Outsource Its Operation – In this scenario, the City designs and builds a wireless network to meet public and internal needs, but looks to an experienced third party to operate, market, and support the system. This approach would involve an upfront investment of approximately $3.1 million, with the City's private sector partner taking responsibility for marketing, staffing, and customer equipment costs. The system operator would split revenues with the City. Based on the business case analysis, the project would experience negative cash flow for the first two to three years. Advances by the City to cover that negative cash flow would likely be repaid by Year 5, and the project would experience net cash flow thereafter.
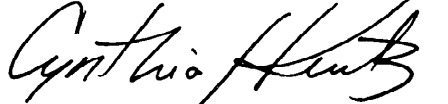
Option 4: Build a Wireless Network Backbone – This scenario is similar to the approach the City followed with its fiber optic backbone. The City would build the backbone of the wireless system, and would lease capacity to providers that build off of it to serve the public and City departments. The costs associated with development of the backbone would be much lower than for development of a full network. However, the market for this kind of infrastructure is uncertain. This scenario might serve a single provider, or would pit multiple providers, trying to serve a limited local market, against each other.

Option 5: Partner with a Private Sector Service Provider – This option is the lowest risk, lowest cost approach to making wireless service more broadly available in Pasadena. Using an RFP process, the City could select a private sector company to build and operate a citywide wireless network. The private sector firm would be responsible for system development and ongoing operational costs, and would have the opportunity to generate revenue by serving residents and businesses. The City could also meet departmental wireless needs with this approach by trading access to street light poles and right-of-ways to place wireless equipment for wireless service to support City field operations. Other cities, such as Tempe, Arizona and Minneapolis have followed this approach. In addition, a number of telecommunications firms, including Earthlink, have expressed interest in this model. This option entails staff costs of approximately $30,000 for management of the RFP process to select a partner and implementation of the partnership, as well as consulting support of approximately $35,000.
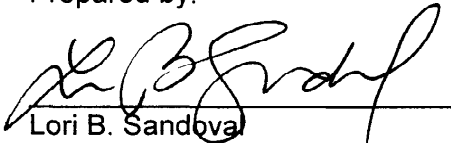
FISCAL IMPACT

Funds in the amount of $40,000 have been included in the FY2006 operating budget for deployment of free Wi-Fi services at the remaining branch libraries and community centers.   In addition, $35,000 has been allocated for Wi-Fi consulting support. These funds will be used to assist staff in defining and implementing an agreement with a private sector telecom firm to provide expanded wireless services in Pasadena. Staff costs to manage the RFP process and implement a partnership agreement are already budgeted in the Information Technology Services Division FY2006 operating budget.
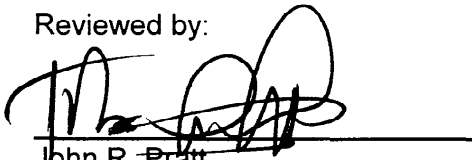
Respectfully submitted,

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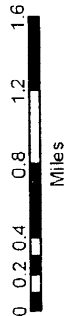
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APPENDIX A

Wi-Fi Hotspot Facilities
City of Pasadena
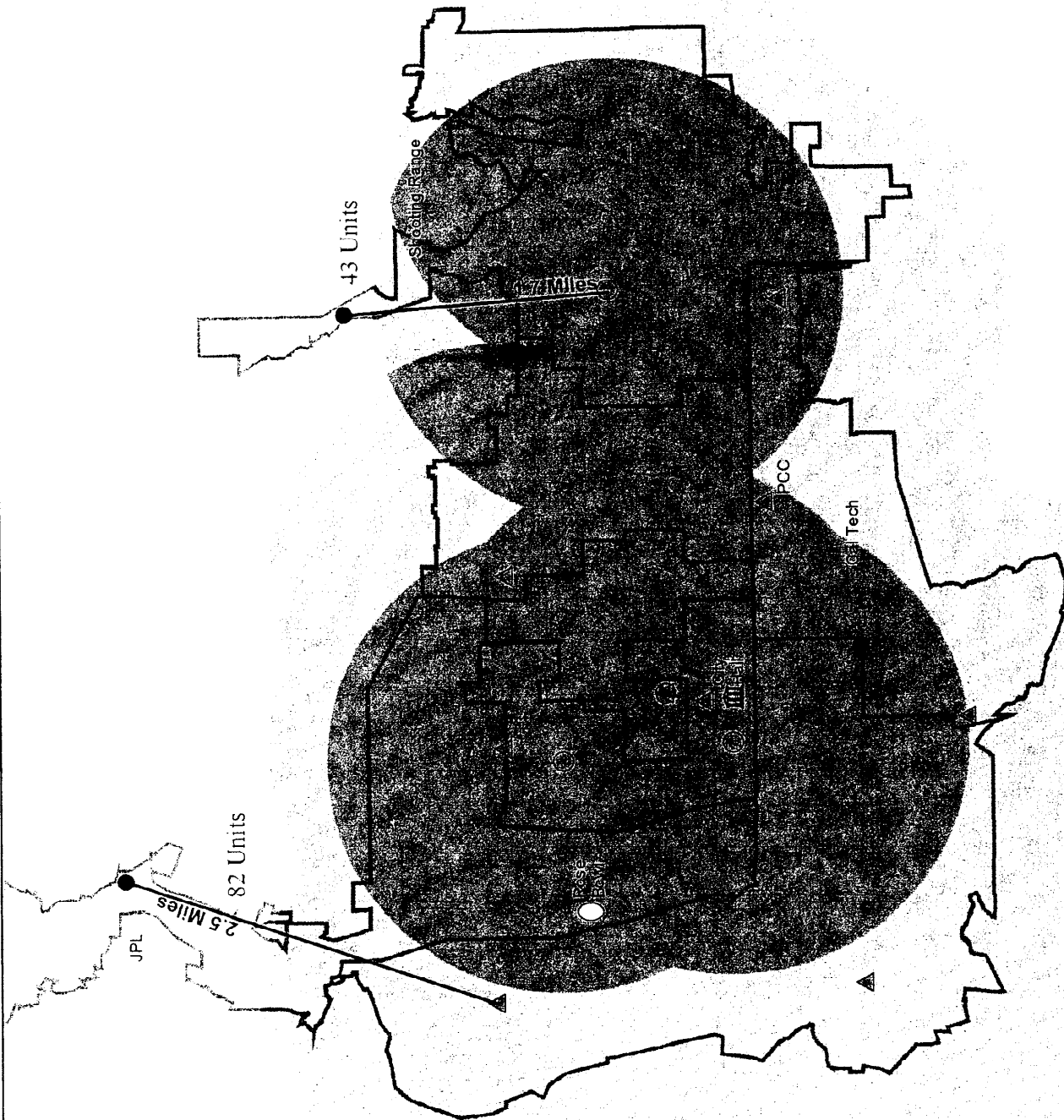
Legend

△ Library

⊛ Community Center

▓ 1.5 Mile Buffer

☐ Council District

☐ City Boundary

+3 Units

Shooting Range

1.7 Miles

82 Units

2.5 Miles

JPL

PCC

Cal Tech

Rose Bowl

Miles
0 0.2 0.4   0.8   1.2   1.6

APPENDIX B

Many cities and counties have adopted Wi-Fi initiatives, following varying models. A sampling of municipal involvement with Wi-Fi deployments is presented below.

Community (population)	Wi-Fi Approach	Scope	Target Audience	Comments
Burbank, CA (104,000)	City-sponsored free hotspot area	One sq. mile downtown	Visitors to downtown business district	Funded by Redevelopment Agency & downtown business improvement district
West Hollywood, CA (37,000)	City-sponsored outdoor pilot project	Limited pilot area	Residents, businesses, visitors	City will evaluate results of pilot, and determine feasibility of extending the network citywide (1.9 sq. miles)
Hermosa Beach, CA (21,000)	City-operated free service	Approx. 40% of city	Residents, businesses, city staff	Free service in small city, with operating costs paid through advertising revenues
Long Beach, CA (476,000)	City/private sector sponsored free hotspots	3 free hotspots – airport, Pine Avenue area, marina	Visitors (first two hotspots) and marina residents	
Cerritos, CA (52,000)	Private-sector for-fee service with city as anchor tenant	Citywide (8 sq. miles)	Residents and businesses	Initiated as broadband alternative to DSL and cable modem services, which were unavailable in much of the city
Fullerton, CA (133,000)	City-operated free service	24 block downtown area (2.5 sq. miles)	Residents, businesses, and visitors	Funded by the redevelopment agency, with the hope that downtown businesses will support the service after the first year
Lompoc, CA (40,000)	City-operated for-fee service	Citywide (5.5 sq. miles)	Residents and businesses	$1.9 million deployment, which is part of a broader $27 million project including fiber to the home (FTTH). Ultimately, will be used for public safety and utility applications as well

Community (population)	Wi-Fi Approach	Scope	Target Audience	Comments
				as public access.
San Mateo, CA (91,000)	City-operated for public safety uses	Central city	Public safety personnel	
Medford, OR (70,000)	City-operated for city department use	24 sq. miles	Public safety and public works personnel	Project costs supported in part by Homeland Security funds
Portland, OR (533,000)	Private sector for-fee service with City as anchor tenant	Ultimately citywide	Residents, businesses, city staff	City issuing RFP for private sector wireless network deployment, including free access to city property.
Spokane, WA (197,000)	City/private sector operated for public and city department use	100-block area in downtown (1 mile long, 1/3 mile wide)	Short duration users in downtown area & city staff	Private sector ISP manages public use of the network
Benton County, WA (156,000)	Public utility built network, outsourced operations, for fee service to public	40 sq. miles	Residents, businesses, public safety	For profit offering of the Public Utility District, linked to its fiber network. Wholesale services provided to multiple ISPs, competing for customers.
Tempe, AZ (160,000)	Private sector for-fee service with city as anchor tenant	Citywide	Residents, businesses, city staff, university staff and students	City issued RFP for private sector vendor to build and operate a network, trading access to City street lights and fiber for service to city departments
Rio Rancho, NM (62,000)	Private sector for-fee service	Ultimately 103 sq. miles	Businesses, residents, public safety, schools, hospitals	25 year license agreement between the City and private sector network builder/service provider, including use of city rights-of-way
Garland, TX (221,000)	City-operated for public safety uses	Citywide (57 sq. miles)	Public safety personnel	
Chaska, MN (18,000)	City-operated for-fee service to public	Citywide	Residents, businesses, city staff	
Minneapolis, MN	Private-sector for fee service	Citywide	Residents, businesses,	City issuing RFP for private sector

Community (population)	Wi-Fi Approach	Scope	Target Audience	Comments
(374,000)	with City as customer		public safety and building inspection staff	vendor to build wireless and fiber network. Contract award planned for 1/06 and full deployment for 2/07.
Madison, WI (220,000)	Private sector for-fee service with city as customer	Citywide, plus airport area and possibly other cities in the county	Residents, businesses, visitors, city staff	City is setting up a preferred bid list for other area cities to work from, expanding wireless network beyond Madison city borders.
Cook County, IL (5.3 million)	County-sponsored for public safety use	Ultimately 940 sq. miles	Public safety personnel	County plans to spend $12.1 million for network infrastructure
Allegany Co., MD (74,000)	County created municipal carrier to build wireless network	550 sq. miles	Residents, businesses, industrial parks	The $4.7 million project will allow the county to build its own network. The County will then sell wholesale access to the network to ISPs that will serve residents and businesses.
St. Cloud, FL (28,000)	City provided free service	12 block area downtown initially, ultimately citywide (15 sq. miles)	Residents, businesses, visitors, city departments and public safety agencies	Initial development funded through an economic development fund. Ongoing operations funded through productivity efficiencies in department operations.

Staff conducted an evaluation of departmental needs for wireless connectivity in the spring of this year. Interviews were conducted with the following City departments that have staff working in the field or that manage resources in the field:

- Fire
- Health
- Planning & Development
- Police
- Public Works
- Transportation
- Water & Power

Departments identified a wide variety of uses for wireless connections in the field. These needs are summarized below by department.

Fire

- Emergency Management Services – Paramedics currently record all patient data on laptops in the field during their response activities. A wireless connection in the field would allow paramedics to transfer information directly to hospitals and to the Los Angeles County Department of Health.

- Firefighting – A wireless connection in the field would enable firefighting staff to access building plans and information from the Internet.

- Fire Prevention – Fire inspection staff would access the fire inspection report management system and Tidemark (the City's parcel and inspection application) in the field rather than requiring them to return to their offices.

Health

- Emergency Communications – Health is very interested in communications alternatives in the event of a catastrophic event like a bio-terrorism attack. A wireless system would support establishment of a command post anywhere in the city, and would be used for communications among departments as well as with agencies outside Pasadena.

- Access for Field Personnel – The Health Department has a number of functions requiring personnel to work in the field, including health inspectors, investigators, and visiting nurses. These staff members would use a wireless system to access past inspection records, patient records, and the Internet for medical information.

Planning & Development

- Inspection Activities – Planning & Development conducts extensive building permit and code enforcement inspection activities in the field. Inspection staff require access to Tidemark, iMap (the City's GIS system), and the business

license system in the field to streamline their inspection activities. The department would also like to use wireless connectivity to transmit photos taken in the field, to access email, and print forms used during the inspection process.

Police

- Access to the Dispatch and Records Systems for Field Officers – With upgrades to the Police Department's Computer Aided Dispatch and Records Management Systems (CAD/RMS), the Department requires a wireless link from each police vehicle in the field back to CAD/RMS systems located in the Police Building. The current radio-based access to the old CAD/RMS system does not provide sufficient bandwidth to use the new systems. A higher-bandwidth connection is critical for Dispatch functions. It also will greatly increase the efficiency of reporting, allowing officers to complete reports in the field rather than returning to the office for each reporting activity. As part of the CAD/RMS project, the Department is purchasing new mobile data terminals with the latest laptop computer capabilities.

- Other uses – Police would also like to use a wireless system to allow download of photos for field line-ups and to send and receive real time video feeds to and from police vehicles.

Public Works

- Engineering – Like the Planning & Development and Health Departments, Public Works has inspection staff working in the field that requires access to Tidemark, iMap, and other reference information. Construction inspectors also would use a wireless connection to access plans and maps, specifications, and digital photos to improve their efficiency and effectiveness in the field.

- Street Maintenance and Integrated Waste Management – Wireless connectivity in the field would allow staff to access work order management systems, street light information, asset databases for sewer and sidewalk systems, and other reference documents. Waste Management is implementing a computerized program to track customer trash containers that requires wireless connectivity in the field.

- Parks and Natural Resources – Staff would use a citywide wireless system to access the street tree database, work order management systems, send and retrieve digital photos of trouble issues (e.g., tree trimming disputes), and control park lighting and irrigation systems remotely.

- Building Systems and Fleet Management – Like their counterparts in other parts of Public Works, staff in Building Systems and Fleet Management would benefit from remote control of systems (building lighting and HVAC), and access to maps, work order management systems, iMap, and building blueprints.

Transportation

- Parking – The department would like to provide real time wireless access to motor vehicle and violations systems so officers can check the status of vehicles. In addition, Parking would use a wireless system to monitor parking meters.

- Transit – A citywide wireless system could be used to improve the timeliness and efficacy of the bus system in Pasadena, tracking buses for adherence to their schedules and providing bus schedule and other information to riders at interactive kiosks.

- Traffic Management – The Department's traffic management center controls an increasing number of traffic management and monitoring devices. A wireless system would allow some of these devices to be managed remotely without sending a staff person into the field or installing a hard-wired connection from the traffic equipment back to the Traffic Management Center.

Water & Power

- Field Access to Business Data and Systems – Pasadena Water & Power would use a wireless system to access the following systems and business data to improve its operations:
    - Inspection data
    - Billing system for large customer information during sales calls
    - Warehouse inventory (from field sites)
    - Service orders for connects and disconnects (instead of paper orders from the main office)

- Meter Reading – A wireless system would also benefit the Department's meter reading functions. Wireless connectivity would support remote meter reading and commercial and industrial meter monitoring for time-of-use arrangements.

- Other Monitoring and Control Functions – Wireless connections could help extend the Department's ability to monitor sites and systems that cannot be connected economically to the fiber network. These include surveillance systems, monitoring and control of the power distribution system, and cameras and motion detectors at water supply locations.