



# Transportation Issue Brief

## Smart Parking in Downtown DC

### Overview

The Downtown Business Improvement District (BID) works to make Downtown DC accessible and inviting by promoting smart transportation. Smart parking is part of the Downtown BID's vision for a convenient, innovative and environmentally sustainable transportation system. Smart parking is shorthand for systems that provide off-street parking location and availability information using multiple means of communication. The 2004 Downtown Congestion Task Force recommendations for better travel information and better off-street parking management are realized in a smart parking system.

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Smart parking is a win, win, win proposition. It improves the visitor's experience driving downtown because it reduces the uncertainty of parking location and availability. Because motorists have information to guide them directly to available parking, the environmental impact of that trip is reduced. Smart parking systems also give garage owners more management control and increased revenue potential.

The Downtown BID, in collaboration with other D.C. BIDs and the District Department of Transportation (DDOT), began developing a smart parking system for Downtown DC by creating goDCgo.com, the DC government's travel information web site. The site includes parking location and operating information. Parking availability information is a missing component of the existing travel information on goDCgo.com, as well as on parking companies' websites.

A public-private partnership between DDOT, building owners, and parking management companies is needed to fill this information gap. The Downtown BID is facilitating a dialogue between the potential partners for a smart parking system for Downtown DC. This guide provides information relevant to that discussion:

- Public and private benefits of smart parking,
- Smart parking system description
- Challenges and opportunities that lie ahead,
- Existing smart parking practices in Downtown DC and other U.S. cities, and
- A phased action plan that provides benefits near term while developing a more complete system.

Smart parking applications offer an array of benefits for parking industry operators and owners. Participating in a larger network of information available for the end user offers more advanced internal management systems, better outreach for access to customers, as well as invaluable benefits such as convenience and efficiency. Smart parking applications in individual facilities allow for better information collection. When a system is in place that manages the garage capacity in real time, the result is better auditing capability as well as better tracking of customer behavior. This, in turn, allows management to change their practices to increase revenue, and serve the customer base better to encourage loyalty.



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## Private Sector Smart Parking Benefits

Quicker processing of transactions means shorter entry and exit lines. Some smart parking applications are capable of multiple payment options and multiple rate options, which result in less cash handling and wider management possibilities, therefore a smaller margin of error in revenue and greater profit potential. The revenue is also better controlled through the computerized system offering improved cashier monitoring and accountability, as well as statistical reporting to improve efficiencies, staffing, and planning.

Smart parking offers benefits to the private parking industry in the form of improved auditing and management capabilities, better information on business as well as customer practices, and better customer service to gain more patrons and sustain existing loyalty.

## Smart Parking Public Benefits

Parking in Downtown DC has a public perception problem. In 2006 the Washington Parking Association (WPA) estimated that there were 199 parking garage locations in the Downtown and Golden Triangle BID areas providing 45,721 spaces. Despite this significant number of parking facilities, a Downtown BID survey in 2006 revealed that 50% of the respondents agreed that "Parking is hard to find."

Providing real time parking availability information for motorists can reduce the amount of time and air emissions that they expend trying to locate parking. The University of California's Donald Shoup has popularized the estimate that 20% of congestion is attributed to motorists cruising for parking.

Providing parking availability information in advance also may encourage a different choice of transportation modes during peak periods when parking is less abundant downtown.

## Smart Parking Description

The nature of parking information is two-dimensional. Off-street parking location information is static. Off-street parking availability is dynamic. Information on location and availability can be communicated to travelers via several different methods:

- Static sign guidance system
- Dynamic availability message signs
- Combinations of static and dynamic information on the same sign
- Hand held devices
- In-dash technology
- Personal computers

Various combinations of these methods are possible and even desirable. Static sign guidance systems to parking locations support dynamic message signs with availability information. Personal computer applications can be viewed on web-enabled cell phones. These methods of communication are not mutually exclusive and an unconstrained smart parking system conceivably could use all of them.

The first step in creating a parking availability information network is installing electronic counting equipment in privately owned parking facilities. The two most promising types of counting equipment for Downtown DC are parking space sensors and parking access and revenue control (PARC) systems

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Sensors provide more specific availability information that can support dynamic directional signage inside a facility for customers. Sensors have to communicate to a facility's information processing system, therefore, sensor systems are most economically installed during the construction of new facilities. There are several options related to sensor technology and the advent of wireless sensor technologies in the past few years is changing this landscape dramatically. There are single space sensor options, such as those used at BWI airport that are used to help guide parkers to available spaces within a large parking facility.

More in line with the needs for providing parking availability information in public and privately owned parking facilities is a type of ultra-sonic directional sensor that can be installed overhead at key locations within a parking structure to track incoming and outgoing vehicles. An example of a system currently employed in a Microsoft facility in Redmond WA is pictured here

PARC systems can either be stationary pieces of equipment at the entrances and exits of a facility or handheld devices operated by attendants. A typical stationary PARC system for a garage with one entrance and one exit is approximately \$25,000 - \$50,000 depending on the type of equipment used. In these systems, vehicle counts are typically determined by vehicle loop detectors imbedded in the entry/exit lanes or in some cases by the gate equipment and/or the fee computer software. More sophisticated counting systems for parking facilities cost between \$400 - \$1,000 per space. The ongoing development work in the wireless sensor arena will likely bring these prices down significantly in the coming years.



The counts of available parking in private parking facilities have to be communicated to a information collection center that distributes that information through some combination of the communications methods described at the beginning of this section. The information collection and redistribution center could be a DC government entity or a contractor to the DC government. A smart parking system with dynamic availability information and directional information displayed in the public space might cost as much as \$5.5M for a system of approximately 40 garages, 60 static signs and approximately 36 dynamic message signs. This cost estimate also includes \$150,000 for an informational/educational campaign to launch the new system. The exact cost will depend on the number of parking garages and signs included in the system and the technologies used, among other considerations.

### Smart Parking Opportunities & Challenges

*Parking Business Practices* - Building owners manage their parking facilities in different ways. Owners that lease or contract their parking facilities with parking management companies have various revenue and cost sharing arrangements. Building owners will determine the distribution of benefits and costs associated with implementing smart parking systems.



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*Collaboration* - There are technical and organizational challenges to get the necessary cooperation between the potentially numerous private providers of parking availability information and the disseminator of that information. The smart parking systems that exist in the U.S. primarily involve publicly owned parking facilities. The public/private collaborations that exist or that are being planned, involve a much smaller number of private parking facilities than exist in Downtown D.C.

*Branding* - There are many sources of traffic information and many providers of parking services in Downtown DC. A smart parking system requires a brand to distinguish the information it provides. Expanding the goDCgo brand to meet this challenge would leverage the resources invested in this system to date. Using the goDCgo brand to deliver smart parking information through mobile handsets will build on goDCgo's image of being a one-stop shop for all transportation-related information within the District of Columbia.

*Hand Held Technology* - If goDCgo.com were redesigned to be accessible to web-enabled cell phones, the existing parking facility location information could be put into consumers' hands sooner rather than later. When a partnership for real-time availability information is established, the numbers of available parking spaces at a facility could be integrated into mobile goDCgo.com.

*In-Dash Navigation Technology* - Telematics refers to systems combining wireless communication with telecommunication functions that originate or end in automobiles, e.g. global positioning systems (GPS) tracking. In the next year, one in four vehicles sold in the U.S. will have monitored telematics systems for safety, vehicle diagnostics, and navigation services. Telematic Research Group estimates that by 2010 more than 30 million telematics-enabled cars will be on the road in the U.S. alone.

Many of these cars have built-in GPS technology that delivers static information based on vehicle location. GPS units also are available to purchase separately through electronics retailers. The units use pre-loaded information to provide distances to surrounding restaurants, gas stations and parking garages. Relevant information is delivered to the driver based on the location that is tracked using GPS technology.

Delivering dynamic information such as parking availability to in-dash units requires that they have a means to connect to the Internet wirelessly. With this connection, the units could connect to a central server to download up-to-the-minute parking information. Currently units are not able to make this connection and therefore are unable to download real-time information.

Navteq, a digital mapping firm, is one of the largest data suppliers for the geographic data that is loaded onto the different branded units of automotive navigation systems. To date, seven out of 10 of the in-dash car navigation systems in Western Europe and the U.S. use Navteq. Additionally, more than half of the GPS-equipped mobile devices sold in Western Europe and North America have Navteq maps embedded in them. The Finnish telecom company Nokia recently announced it will soon be acquiring Navteq. With this acquisition it is believed that Nokia will be adding the functionality of wireless communications with Navteq's map products, in an effort to deliver dynamic and real-time information to consumers. This would include creating the technological capacity for in-dash units to receive parking availability information within the downtown area, and throughout the city at large.



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## Smart Parking Practices In Downtown

*Web-Based Parking Information* - The Downtown BID researched 31 websites of the parking management entities in downtown to determine how much information is currently available on parking location and availability. Thirteen companies had a website at the time the research was conducted and nine of them provided parking location information. No company provides dynamic, real-time availability information.

This finding of limited web-based parking information supported the decision to incorporate parking location information on DDOT's traveler information website goDCgo.com. The site incorporates information on parking facilities provided by private parking management companies either through their websites or directly from the management offices. That information is put into a layer that travelers can select in an interactive map that plots travelers' origin and destination in greater Downtown DC. The site was launched in September 2006.

*Static Signage* - The international "P" signage for directing motorists to parking has been installed in downtown locations on an ad hoc basis over the years, diminishing its usefulness as a true guidance system for motorists. The Downtown BID made an effort in 2005 and 2006 to take a systematic approach to the installation of 25 signs in cooperation with DDOT.

The Downtown Congestion Task Force identified the congested corridors where signs were located. The purpose of the signage was to guide motorists from major roads to parking facilities that are open weekdays, evenings and weekends. Because of the concentration of parking facilities in the downtown, the signs also lead to other facilities that are only open during the day. Signs also were located outside of facilities in congested corridors where the entrance was difficult to identify and where there was an existing light pole to place a sign.

*Parking and Revenue Control Systems* - Parking access and revenue control systems (PARC) have been part of the management practices of the larger parking management companies in Downtown DC for the past two decades. Colonial, PMI, Hines, and Central Parking have developed their own systems over the years for internal information purposes. These systems enable the management companies to track entrances and exits of their facilities over time and in real time. These PARC systems may be the building blocks for real time availability information, the missing component in a Downtown smart parking system.

*Space Availability* - Hines Development is planning a 1,700 vehicle parking garage as part of their project on the old Convention Center site at 9th and H Streets, NW. This site will be built using a parking space sensor that will enable parking management to pinpoint available spots within the facility. The project planners expect that the efficiencies achieved in directing vehicle movement will mean that less space has to be dedicated for vehicles maneuvering to locate available spaces. If the guidance system reduces as little as 5% of the space needed for parking operations, it will pay for the system by putting that space into revenue generating parking.



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## Smart Parking Practices In The United States

Innovations in parking management are taking place in several center cities on the West Coast. Each city has its own approach to applying technology to the issue that is the result of the uniqueness of each city's parking environment. None of the cities offer a "cut and paste" solution for Downtown DC, but their experiences may accelerate the learning curve that we have to climb in such a complex project. A brief review is provided below.

### *Berkeley, CA*

Parking lots and garages owned by the city, University of California, Berkeley and private entities will be part of a \$2 million system of electronic signs providing real-time information on available spaces. The contract for completing this system with TCS International went to the City Council in early November 2007.

The impetus for launching the project is the city's desire to reduce fuel consumption and air emissions caused by drivers cruising for parking. It's also a way to help downtown and south-of-UC businesses capture more customers who might otherwise leave the area because they don't know where to look for parking.

It will take two years from the contract signing until the system is operational. The project involves installing sensors in 40 area parking lots and garages and networking them into a computer system that runs the 15 electronic signs. Another 18 non-electronic signs with directions for parking are included in the plan.

The signs will send drivers toward lots with open spaces but won't tell them exactly how many are available. When garages in a particular area are full, the signs will change arrows, directing drivers to other lots that are open.

In an article in the Oakland Tribune (10-18-07) Sarah Syed, chair of the Berkeley Transportation Commission, summarized the community's expectations for the new signage this way:

"We see the real-time electronic signs as a key strategy to reducing cruising for parking. There's a big perception that there isn't parking available in Berkeley, but the reality is there is always parking available that's underutilized. This was our top recommendation [as an alternative to] building a new parking garage."

### *Santa Monica, CA*

The City of Santa Monica California has created real time availability for their most heavily used parking facilities. The city has 46 parking facilities that are identified in on static maps on their website. Fourteen of these facilities located in downtown and the area known as Beach City have real time availability information on the city website: <http://parkingspacenow.smgov.net>.

### *San Francisco, CA*

The San Francisco Urban Partnership Project received \$158M this summer from the U.S. Department of Transportation. The project has several components including a Parking Guidance System.

The guidance system will use a combination of variable message signs (VMS) and supplemental static guide signs to direct travelers to garages with available spaces. Most garages are clustered in six areas within Downtown: North Beach, Chinatown, Financial



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District, Central Business District and Convention Center, and Civic Center. There are a total of 20 garages, all of which the San Francisco Municipal Transportation Authority owns and operates. All the garages currently have parking and revenue control (PARC) systems in place.

The VMS will be placed strategically on streets traveled by motorists coming off freeway off-ramps to the garages. The names of three garages and the number of spaces that are available at each garage will appear on the VMS. A central parking computer server will collect space availability information and feed it to the VMS. The information displayed on the VMS will be available on the Internet. Mobile access to the information will occur through cell phone call to the regional travel information system 511 or city information system 311.

### *St. Paul, MN*

There was a growing perception in the early 90's that downtown St. Paul was lacking in parking accommodations. The city's Public Works and Planning and Economic Development Departments determined that the problem wasn't the lack of parking spaces, but that the public simply did not know where available parking was located. The city proceeded to implement a real time parking system.

Initially, the system had 10 parking facilities that included a combination of surface lots and parking structures. The initial count was about 4600 spaces. Now there are eight facilities in the system and approximately 4700 spaces (smaller facilities were replaced with two new, larger, facilities). The ownership of the facilities is half public and half private.

The system was installed in the mid-90's at a cost of around \$1.2 million dollars. Operating costs are minimal, as the city now owns the entire communications infrastructure. Initially the city leased wireless communications system. The system requires very little hands on attention. Generally just a few minutes a day are required to confirm communications and validate outgoing numbers. Operation costs are rolled into the Department of Public Works' incidental activities. A few thousand dollars are spent annually on maintenance.

There are 10 strategically placed electronic sign masts with an average of four electronic sign panels on each mast. Many of the panels are shared by two facilities, typically managed or owned by the same entity. Six of the masts also have full matrix panels that are capable of displaying real time and pre-programmed messages. The masts are placed in advance of the parking facilities, along the major routes into the downtown St. Paul entertainment district. The masts are followed up by a system of static signs that guide the motorists to the different facilities. There is then a static sign located at the facility. All the signing, both electronic and static, is distinctive with a unique design, and is color-coded for the different facilities.

As a result of minimal financial and innovation investments over time, the city is now looking to refurbish the system. The St. Paul system was designed to be stand-alone. Future considerations to be explored by the city include an expansion of the system to include other information outlets and whether to add more parking facilities to the system.



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### Downtown BID DC Smart Parking Action Plan

- Expand the goDCgo brand to include all sources of parking information in the public realm (i.e., public space signage and DC government print and electronic communications).
- Encourage parking companies to provide availability information on their websites that link to the goDCgo.com parking layer.
- Collaborate with DDOT to plan a comprehensive smart parking system that includes static parking location information signs and dynamic availability information signs for priority corridors. This system would also provide information on the Internet for existing and emerging hand-held and in-dash technologies.
- Solicit the cooperation of providers in parking priority corridors in developing a comprehensive parking guidance system.
- Support DDOT's efforts to secure funding for a comprehensive smart parking system.

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*The Downtown DC Business Improvement District (BID) is a private, non-profit organization that provides safety, hospitality, maintenance and beautification, homeless, economic development, transportation, streetscape and marketing services to Washington's urban core. Property owners agree to tax themselves to provide services to the Downtown BID area, which covers 138 blocks from Massachusetts Avenue on the north to Constitution Avenue on the south, and from Louisiana Avenue on the east to 16th Street on the west. For more information, visit [www.downtowndc.org](http://www.downtowndc.org).*