

<b>Invention Title:</b>	Smart City Crowd Parking
<b>Invention Summary:</b>	Defines a method of providing open anonymous crowd-based smart parking solution without incurring the expensive of new infrastructure equipment like cameras and pressure sensors
<b>Invention Description:</b>	see below
<b>Invention Commercial Value/Customers:</b>	Reduces fuel costs for consumers while improving air quality through reduction in emissions Increase revenue for municipal budgets Minimal infrastructure costs to deliver service Value proposition to all stakeholders
<b>Invention Differences:</b>	Provides a private social solution to community problem. Advances the smart city opportunities for the member companies with minimal costs.

### *Smart City Crowd Parking*

This disclosure defines a method of providing open anonymous crowd-based smart parking solution without incurring the expensive of new infrastructure equipment like cameras and pressure sensors. As the proliferation of sensors onboard automobiles expands, the ability utilize collision avoidance system, blind spot monitoring, external cameras and proximity sensors to alleviate economic problems becomes achievable. One recurring cost is the rising levels of fuel and time expended to locate an open public parking spot in urban centers. Some estimates indicate up to 20 minutes per trip are lost attempting to locate a parking spot during peak hours are becoming common in some cities. The problem has become so pronounced that some entrepreneurial individuals are selling their parking to the highest bidder before vacating their public parking space, creating a new legal controversy.

#### POPULATING SMART PARKING SERVER

The Smart Parking Server allows administrators at the city or municipality transportation departments to maintain a database of all of the public parking spaces. The Server allows the loading of geolocational information either individually or in bulk via a file, see Figure 1. In a similar manner, updates to the repository can occur in single occurrences or in a block transaction including removal of space on a temporary or permanent basis.

## City Network

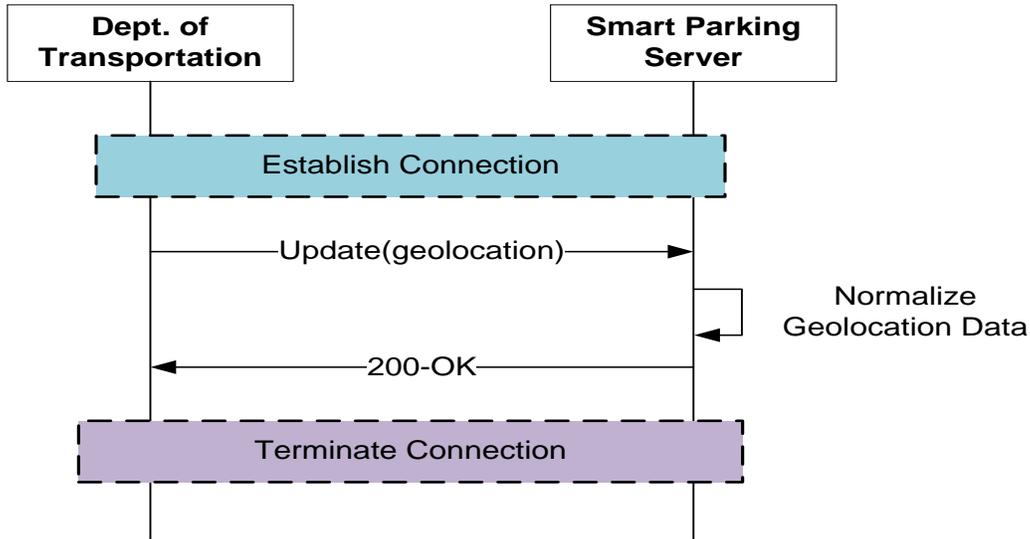


Figure 1 – Maintaining the Smart Parking Server

### PARKING SPACE LEASING

After a vehicle owner or operator opts to utilize the Smart City Crowd Parking Service, not defined within this document though recommended to be an option in the infotainment system embedded within the vehicle to maintain anonymity, the vehicle exchanges its parking information to the server whenever the engine is started or turned off. The communication process is conducted using a two-step process employing any transport technology capable by the vehicle, e.g. cellular, Wi-Fi, or proxy through phone. Upon termination of the ignition, the vehicle sends a request message; see Figure 2, including its current geolocation to the Smart Parking Server to ascertain if it is currently in a public parking space.

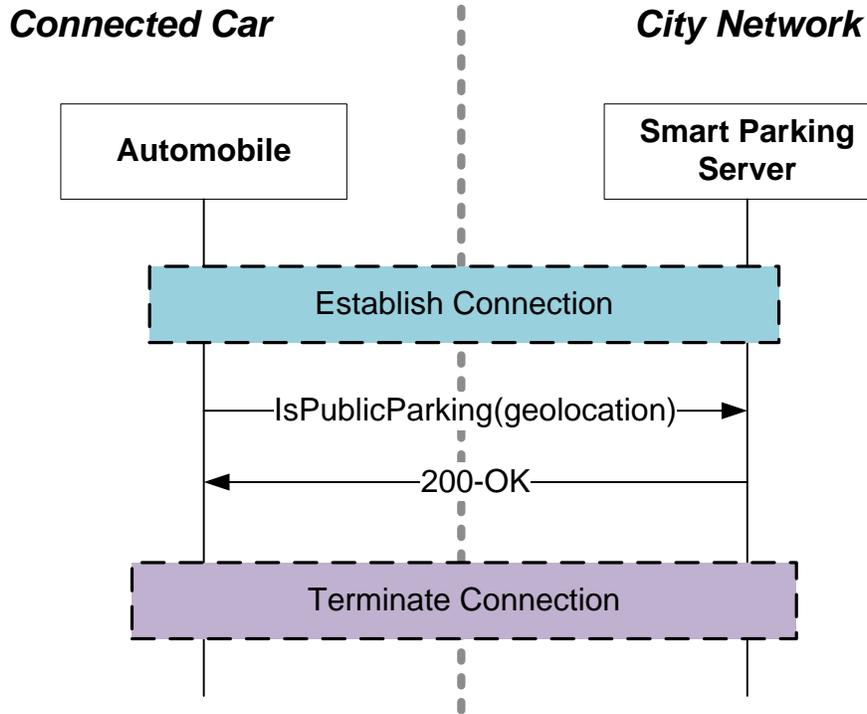


Figure 2 – Evaluating Public Parking Space

The Server responds with either a true or false response. Upon a negative response, the vehicle terminates its connections as shown above. On those occasions when the Server response is in the affirmative the vehicle examines its' surrounding environment using the available sensors and capabilities in the system. Figure 3 illustrates how this data can be gathered for an automobile with cameras and proximity sensors. In this example, there are no other vehicles adjacent to the vehicle therefore it reports that no vehicles in front, behind and beside it to the Server.

Figure 4 shows the message exchange that would follow between the vehicle and the Server. The Server is required to maintain geolocational state information from the original request message in the diagram. A stateless Server is possible with the geolocation of the vehicle included in the Occupy message it sends to the Server.

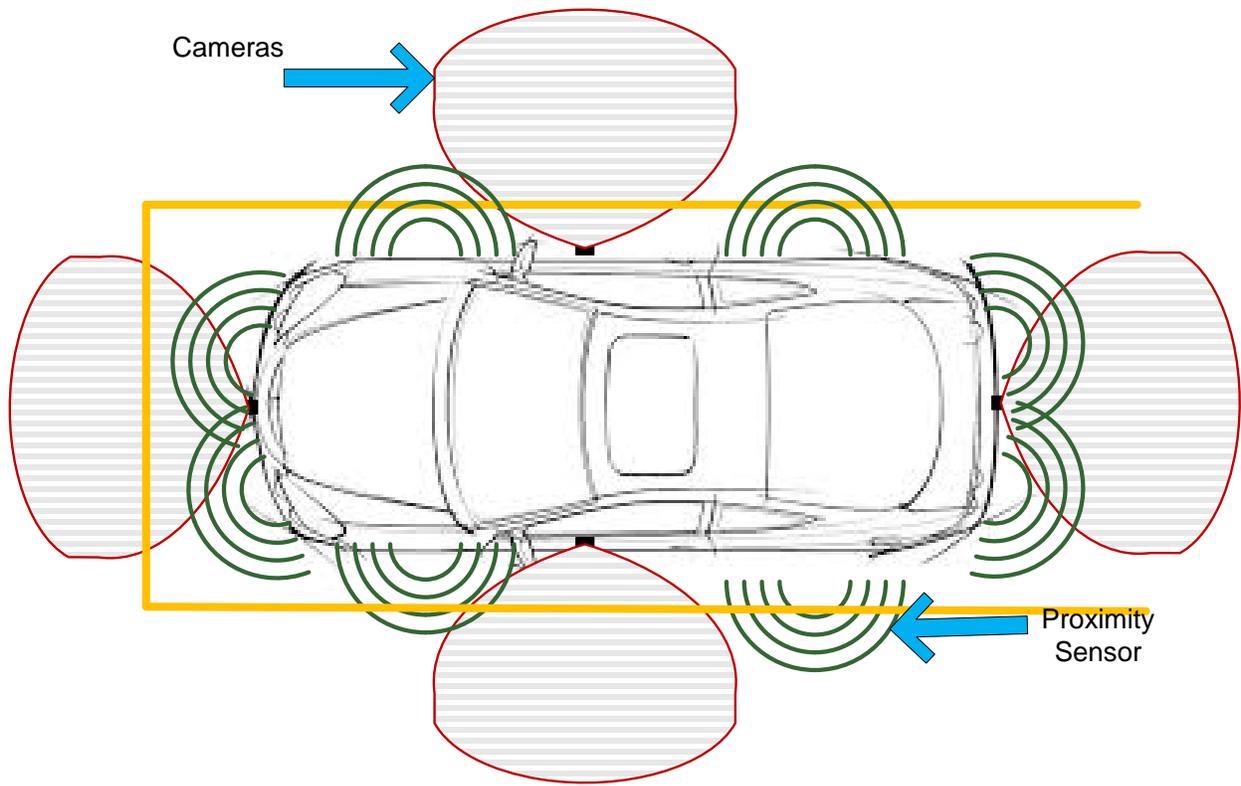


Figure 3 – Public Parking Space Examination

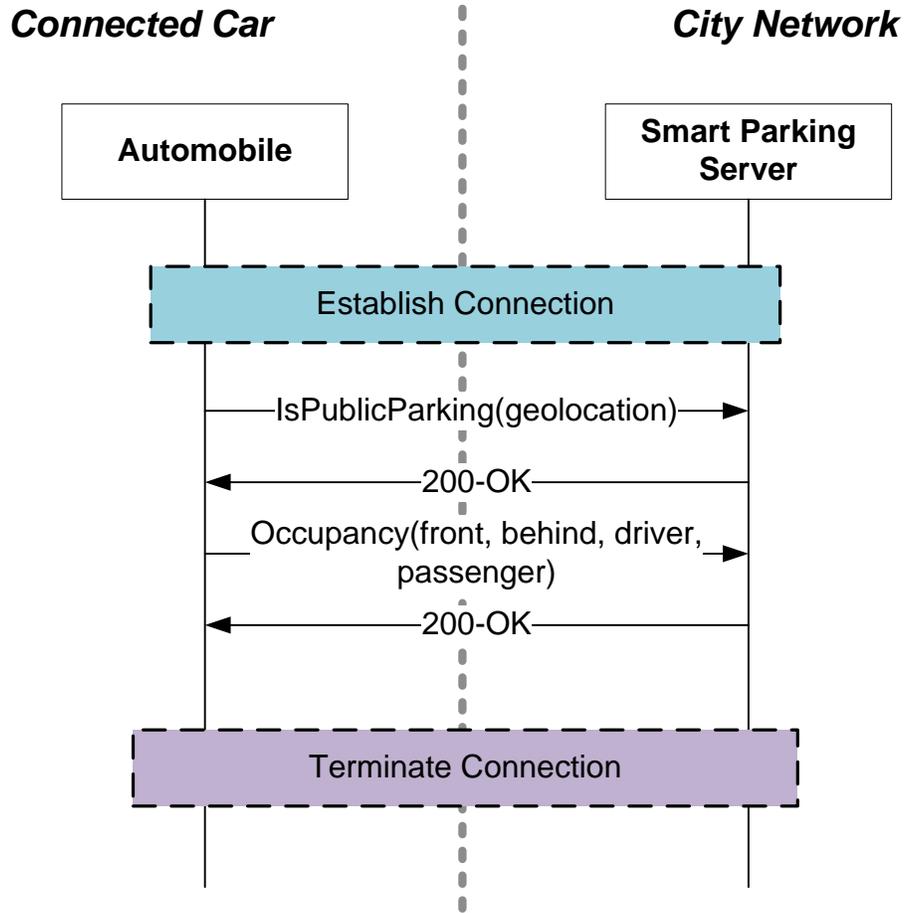


Figure 4 – Surrounding Occupancy State of Vehicle Message

EXITING PARKING SPACE

The process occurs in a similar manner the Parking Space Lease operations. Upon ignition, it establishes a new connection with the Smart Parking Server and request evaluation of the parking space as being a public space. If yes, it sends a new Occupy message with the results of its new examination of the surrounding environment, shown in Figure 5.

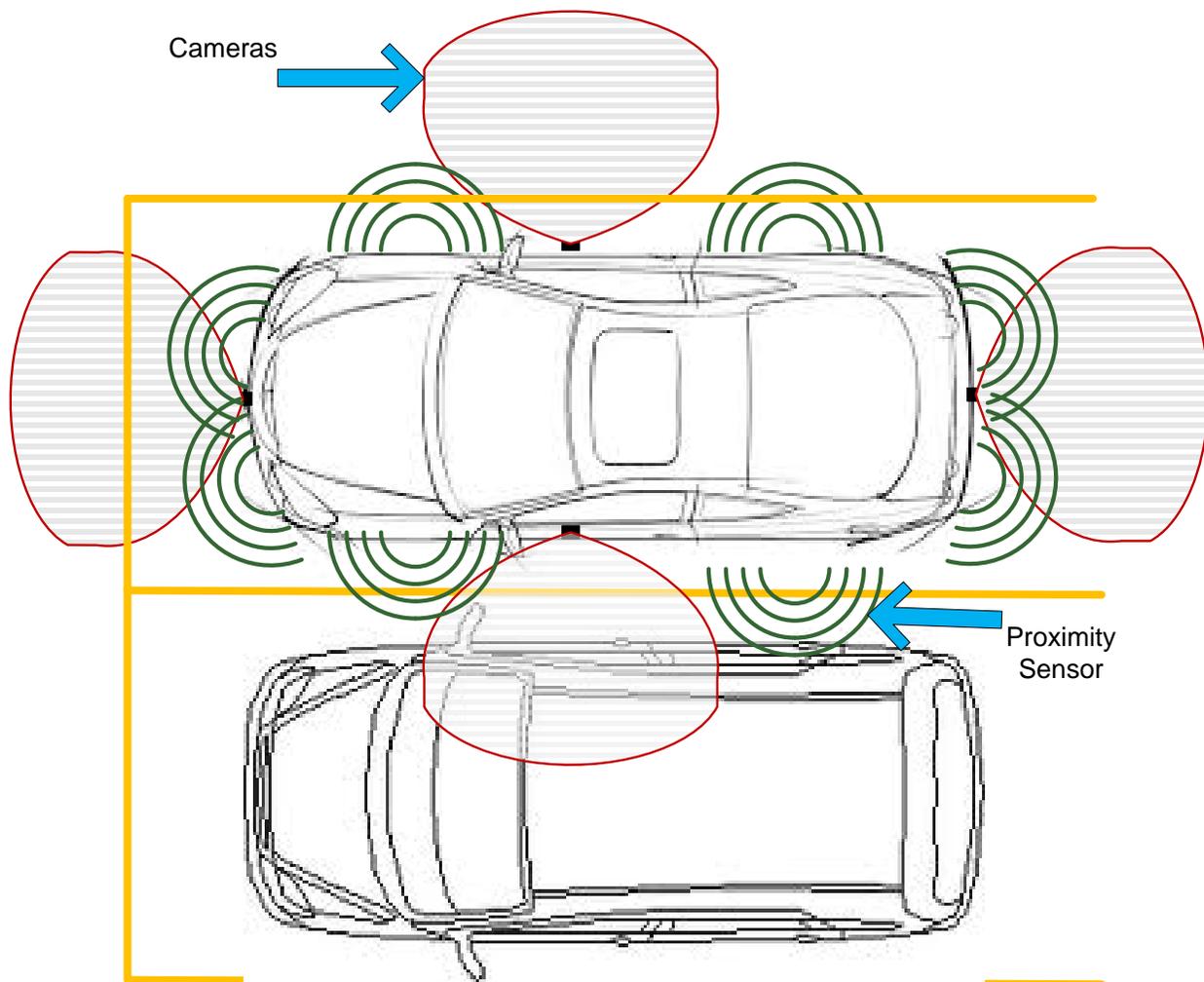


Figure 5 – Vehicle Leaving Public Parking Space

LOCATING OPEN PUBLIC PARKING SPACE

The process allows for the operator to locate the nearest open public parking space by requesting directions to the space through the navigation system on the vehicle. The vehicle sends a request to the Smart Parking Server with the current vehicle location and the destination location. The Smart Parking Server calculates the optimal parking availability from the current information. It returns a prioritized list of likely available parking spaces and reserves those spaces from further responses using estimated arrival time for the vehicle. If the vehicle doesn't park in one of the reserved parking spaces in the estimated time, the reservation is released and the space is made available to any subsequent requests from any vehicle. Upon receipt of the list of available parking spaces, the navigation system updates to direct the operator to the most optimal space.

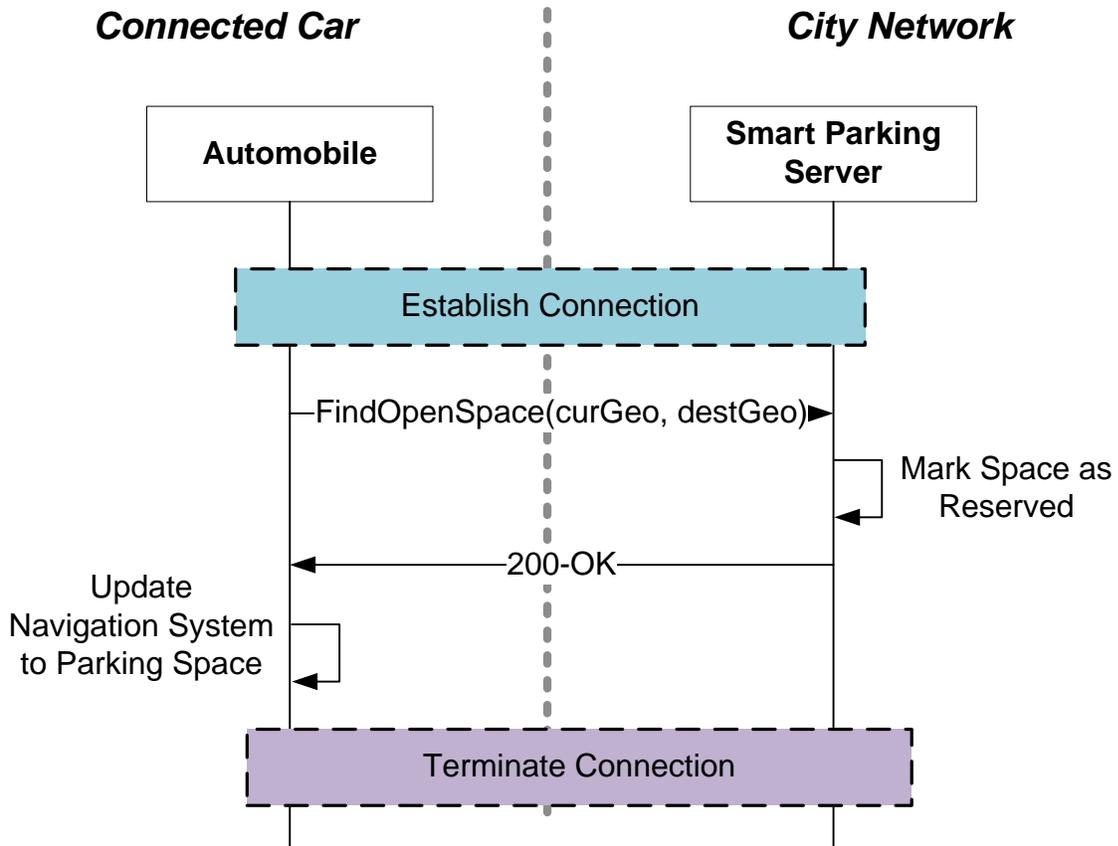


Figure 6 – Locating Open Parking Space