# DrayQ Smartphone Application

**Calculating and communicating port facility wait time and queue length information to help truckers, port operators, and freight planners.**

*CASE STUDY*

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| **Freight Challenges** | Congestion, Last Mile Access |
| **Data Sources Used** | Wireless Address Matching, Administrative Records |
| **Analytical Approaches** | Speed, Re-Identification |



**DrayQ User Interface**

*Source: The Northwest Seaport Alliance, DrayQ and DrayLink ready for nationwide rollout (2016). [Online]. Available: https://www.nwseaportalliance.com/news/10242016/nwsa-launch-mobile-apps-speed-cargo-flow-reduce-idling-related-air-emissions-and-save*

## WHAT ARE THE FREIGHT CHALLENGES?

Many major freight generators, including maritime ports, are located in densely populated urban areas. The large volume of freight traffic that serves these major freight generators must share the road with passenger traffic. Urban freight generators both contribute to and suffer from urban congestion. Additionally, long queues of trucks waiting to enter port facilities may extend onto local "last mile" streets, where stopped trucks further inhibit the free movement of traffic. Long queues are also unfavorable for trucking companies, because of the time spent waiting in a queue. Advanced notice about queue lengths and waiting times can help drivers plan their trips, and public agencies anticipate potential congestion events.

## WHAT WAS THE GOAL OF THE PROJECT?

The ports of Seattle and Tacoma sought to measure the performance of truck-related port operations such as wait times and queue lengths for trucks entering the ports. This information is communicated to drivers in real time through a smart phone application with the intention of helping them plan their trips and avoid local road congestion associated with long truck queues.

## WHAT DATA SOURCES WERE USED?

To collect information on queue length and wait time, the ports utilized WiFi and Bluetooth detectors capable of collecting information from wireless devices in trucks. This data source was complemented by administrative records on the volume of traffic entering and leaving the port.

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**Trucks Lining at The Port of Seattle**
*Source: CityLab "Why Seattle and Tacoma, Maritime Rivals, Merged Their Ports", 2017. Available: https://www.citylab.com/life/2017/01/why-seattle-and-tacoma-maritime-rivals-merged-their-ports/513482/*

## Contact Information

Northwest Seaport Alliance
info@nwseaportalliance.com
800-657-9808

## WHAT ANALYTICAL APPROACHES WERE APPLIED?

Wireless devices such as Bluetooth and WiFi-enabled smartphones have unique Media Access Code (MAC) addresses that are used to facilitate networking with other devices. The ports used Bluetooth and WiFi detectors to query MAC addresses from devices within trucks as they waited in the queue to enter the port. By comparing the time of specific observations of device addresses against the location where the address was observed, monitoring software can determine the speed at which vehicle is moving through the queue. This speed data can also be used to determine queue length: the location at which truck speed drops to near zero indicates where the queue begins. Information about wait times and queue lengths was compared against administrative records such as port bookings and traffic volumes. This comparison of wait time for reservations and cargo volume helps planners understand the relationship between cargo volumes and wait times, and anticipate days or times when queues may be longest.

## WHAT WERE THE RESULTS?

The ports partnered with engineering firm Leidos to communicate with truckers via Leidos' DrayQ mobile application. The DrayQ application provides truckers with estimates of wait times on local streets as well as on port property, and trends in wait times at specific port entrance gates. Truckers may quickly query this information for specific gates at the port. The figure on previous page shows how the application provides high-level wait time information for each gate, as well as additional information about wait time and pictures at specific gates.

## HOW WERE THE RESULTS VISUALIZED OR COMMUNICATED?

The DrayQ mobile application which is specifically designed for use in the port industry provides real-time queue information to truckers to increase the predictability of operations for both on-port and commercial carriers. Best practices from this project are the use of phone or other wireless device-based applications to both collect and display performance metrics, and the use of administrative data to further improve understanding of how port transactions and cargo volumes affect wait times.