UTC Project Information	
Project Title	A Hierarchical priority-based Control of Signalized Intersections in Semi-Connected Corridors
University	Washington State University
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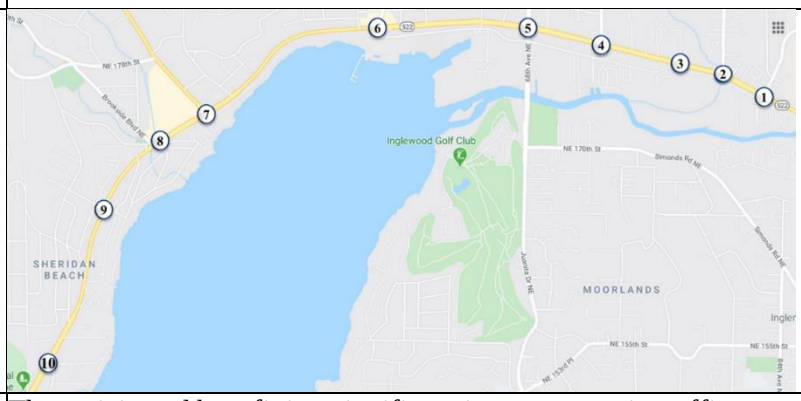
Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $180,000 University of Idaho $80,000 WSDOT $100,000
Total Project Cost	$360,000
Agency ID or Contract Number	69A3551747110
Start and End Dates	September 1, 2018-August 31, 2020
Brief Description of Research Project	The main objective of this research is to develop efficient distributed yet coordinated algorithms to control signalized intersections in connected and semi-connected (when not all vehicles have connectivity capability or refrain from sharing intentions for privacy reasons) corridors. The research will enhance traffic signal optimization formulations to allow for the incorporation of connected vehicles and existing point detector data in the models, the distribution of decisions at both the intersection and the corridor levels to reduce computational complexity, and the coordination of control decisions among various intersections by a distributed cloud-fog based communication network to push solutions towards global optimality. The research will address computation and communication needs required to implement the proposed optimization system in the field by developing, testing, and validating a hierarchical cloud-fog architecture. We utilize a hierarchical priority-based control using fog-cloud architecture to achieve this objective. The fog component will consist of micro-datacenters with limited computational capabilities collocated with the Road-Side Units (RSUs), responsible for computing optimal timings of traffic signals in real-time utilizing their limited capabilities. A cloud backbone will be connected to all fog components of the city or each city zone to exchange information among the neighboring fog components to enable coordinated yet distributed optimization of traffic signal timings.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The original research plan included field tests, which were canceled due to the COVID-19 pandemic. As a result, the introduced methodologies were implemented in a simulated environment and have shown a significant improvement in traffic operations and reduction in computational complexity.
	
Impacts/Benefits of Implementation (actual, or anticipated)	The anticipated benefit is a significant improvement in traffic operations while reducing the computational complexity of signal timing optimization. The main anticipate benefit is eliminating the need for a central traffic control unit with significant computation and communication resources as the developed methodology utilizes local communications among adjacent intersections to improve the entire system.
Web Links • Reports • Project Website	