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Preparing a Roadmap for Connected Vehicle/Cooperative Systems Deployment Scenarios: Case Study of the State of Oregon, USA

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Abstract

Safety remains a problem on U.S. roadways, with more than 32,000 fatalities, 2.2 million injuries and 6 million crashes each year. Travelers, shippers and the economy are exposed to increasing amounts of congestion, unreliability, delay, emissions and excess energy consumption, which impede the efficient movement of people and goods. The U.S. Department of Transportation (DOT) had embarked upon a major research program toward implementing connected vehicle safety technologies, applications and systems using dedicated, short-range wireless communications (DSRC). Previous research by the National Highway Traffic Safety Administration (NHTSA) demonstrated that 80% of unimpaired driver crash types could be addressed by the connected vehicle technology. Through the year-long Safety Pilot that took place in Michigan from 2012 to 2013, U.S. DOT tested the effectiveness of wireless connected vehicle technology in real-world, multimodal driving conditions; collecting data about how ordinary drivers adapt to the use of connected vehicle technology; and identifying the potential safety benefits of connected vehicle technology. This work was performed in recognition of a February 3, 2014 NHTSA agency decision for light vehicles and a similar decision expected soon for commercial vehicles that will likely launch regulatory processes to require or incentivize all new vehicles to be equipped with DSRC devices. Communication among and between vehicles and the infrastructure (including traffic signals, work zone equipment, or pavement sensors, and other infrastructure elements) would also have data and mobility benefits (including data-driven applications such as traveler information for freight and passengers, transit operations, network flow optimization, traffic signal systems and incident response, emergency staging, and evacuation as well as sustainability-related applications). This paper describes an ongoing effort to explore opportunities for the state of Oregon, USA, to participate in future funded pilot deployments of mobility and environmental related applications in the coming years—possibly including a set of regional pilots as well as smaller, more self-contained projects focused on priority applications. As connected vehicle research moves into deployment, state, local and transit agencies, Metropolitan Planning

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Organizations and the private sector will start experiencing the effects of vehicles, after-market devices, mobile devices, and infrastructure with DSRC and other wireless connectivity at their cores. Along with other states and regions, the Oregon Department of Transportation (ODOT) can benefit from preliminary scoping, evaluation, and assessment of the impact of connected vehicles and infrastructure and a wide range of potential cooperative system applications. With this in mind, ODOT can determine whether or not to pursue the next phases of federal connected vehicle application funding. It can also make an informed choice about taking a potential national leadership role in the connected vehicle arena, and assess opportunities to join projects with other partners. This paper provides a summary of an internal survey conducted within ODOT along with insights gained from the analysis of the survey results. Next steps in the process are also described.

Keywords: *connected vehicles, cooperative systems, state department of transportation, deployment roadmap*

1 Introduction

The U.S. Department of Transportation (DOT) is currently making decisions on funding future pilot deployments of mobility and environmentally related connected vehicle applications (DOT ITSJPO). With connected vehicle research transitioning into the deployment stage, the private sector, MPOs, and state, local, and transit agencies will start experiencing pressure to incorporate these vehicles into the public fleet. This pressure is due to aftermarket devices, mobile devices, and infrastructure with dedicated short range communications (DSRC) and other wireless connectivity at their cores.

The Oregon Department of Transportation (ODOT) has been laying the groundwork for Oregon to be prepared for the future implementation of a connected vehicle/cooperative systems transportation portfolio. Through several avenues, including a funded research project and an internal working group, ODOT is considering whether to take an early national leadership role and/or to avoid being caught by surprise as developments in this area evolve quickly. This has been done by assessing ODOT's current internal mechanisms for addressing connected vehicle/cooperative systems including consideration of technical readiness/compatibility, planning, operational, maintenance, and governance perspectives. Included is attention to ODOT's fleet, and potential for connection to Driver and Motor Vehicle Services Division (DMV) operations. With this in mind, Oregon can determine whether or not to pursue the next phases of federal connected vehicle application funding, among other initiatives.

The objective of this paper is to describe the development and results of an internal survey that contributes towards the establishment of an internal inventory of the current technical and "cultural" status of ODOT activities in the context of connected and automated vehicles. From this assessment, we will gain a sense of interest and readiness for potential alignment with potential applications and the future of connected vehicles. Existing internal organizations were leveraged for input on survey questions and have received the survey results. This analysis may be useful for other states and transportation agencies that are currently grappling with these issues.

The research team worked closely with ODOT staff to design the survey. The first set of surveys were distributed at meetings of the Intelligent Transportation Systems (ITS) Opportunities Team (ITOT), the Technical Leadership Team, the Planning Business Leadership Team, the Maintenance and Operations Meeting, the Traffic Operations Leadership Team and key players from the Intermodal Leadership Team. Further contacts with ODOT staff from all regions (urban/rural) were performed via an online version of the survey. In total, there were 115 survey responses collected including 47 paper-based survey and 68 online responses. As a caveat, we note that there are about 4,600 total ODOT employees, so this was not a scientific or random sample of employees, but rather a means of providing education about the ongoing connected vehicle research project and obtaining feedback from key staff.