

Dutch smarts

The Netherlands' Smart Mobility Schiphol project, which is being directed by Noord-Holland province, is testing next-generation systems for connected and autonomous vehicles. Here we get the latest updates from the testbed that will also be showcased at Intertraffic Amsterdam



As part of the Smart Mobility Schiphol pilot, Daimler's Futurebus drove autonomously through a 1.1-mile (1.8km) tunnel without any GPS or roadside information beacons

Practical trials of connected and autonomous vehicle technology are underway on public roads near Amsterdam in the Netherlands, and there is now a plan to upgrade roadside hardware in the coming months.

The trials are being conducted in daily traffic conditions within a testbed area called Smart Mobility Schiphol, named after Amsterdam's nearby Schiphol Airport. The testbed contains regional roads and arteries with different characteristics including a bus rapid transit (BRT) lane.

In 2018 all 48 traffic lights in the testbed will be upgraded to ITS G5 (wifi-p) functionality and will also communicate with connected vehicles through 4G LTE. These traffic light controllers (TLCs) are known as iTLCs. Two of the important day-one use cases, as specified by the European commission, have already been tested, namely GLOSA (green light optimization speed advise) and TSP (traffic signal priority).

Smart foundations

The beginnings of the project can be traced back to 2012, when the province of Noord-Holland opened its traffic management center (TMC),

from which 270 traffic signals, 150 cameras and 25 variable message signs are controlled. "Through collaboration with other road operators like the City of Amsterdam and the highway operator Rijkswaterstaat we were able to analyze road and canal networks as one traffic system," says Jeannet van Arum, director smart mobility for Noord-Holland province. "By focusing on handling traffic incidents, roadworks, events and daily congestion we created a more efficient traffic system that reduced traffic congestion by more than 14%."

With the rise of intelligent transportation systems and everyday connectivity of road users, the province is now investigating new opportunities to enhance safety, traffic efficiency and reduce emissions. Private companies in the telecommunications and automotive

industries are investing heavily in R&D for ITS. As a road authority, spatial developer and provider of public transportation, Noord-Holland province plays an important role in the mobility chain. Therefore it now has a proactive attitude to learning and collaborating with private companies. To do this, the province has created the Smart Mobility program that includes not only theoretical studies, but also the Smart Mobility Schiphol practical pilot, which is being conducted in cooperation with private companies.

Autonomous, connected bus

In 2016 Daimler tested its concept Futurebus at Smart Mobility Schiphol, which used connected and autonomous features to drive between the airport and Haarlem, negotiating 19 traffic lights

and 11 bus stops, without the driver once touching the wheel or pedals.

To enable this, the traffic lights on the route had been upgraded by Vialis, a Volker Wessels company that used ITS G5 to communicate with the bus's onboard unit. Using this wi-fi based communication in practice gave new insights into distance, signal interference and traffic control algorithms and supported further standardization of the ITS G5 messages for SPAT (signal phase and timing) and MAP (road layout data). A Dutch profile for SPAT and MAP is now available for implementation in all traffic lights in the Netherlands.

Traffic signal recognition based on the onboard cameras alone was not sufficient for a safe and comfortable

48

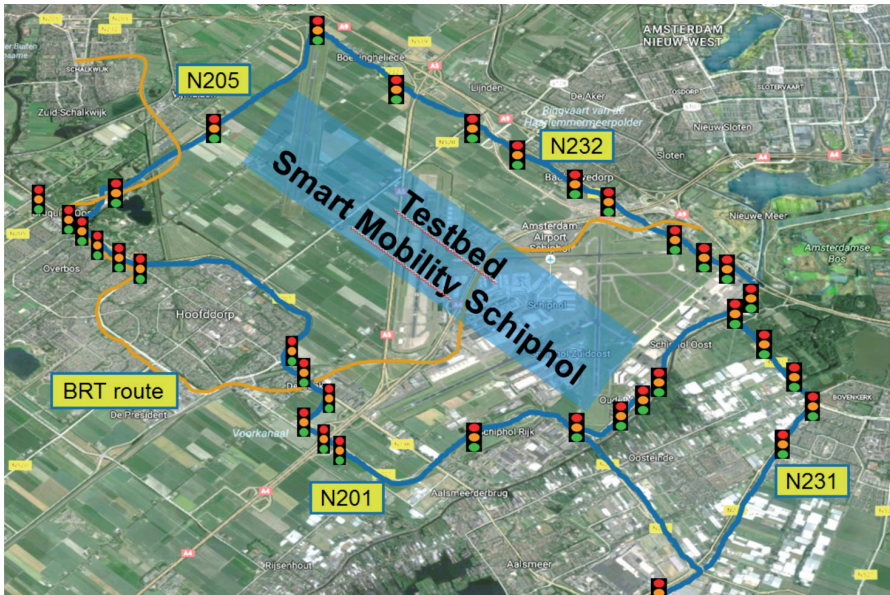
The number of Smart Mobility Schiphol traffic lights that will be equipped with ITS 5G in 2018

14%
The reduction in congestion levels after Noord-Holland's TMC opened in 2012

“Through collaboration with other road operators, we were able to analyze road and canal networks as one traffic system,

Jeannet van Arum, director of smart mobility, Noord-Holland province





The pilot scheme, taking place at the Smart Mobility Schiphol testbed, aims to keep traffic flowing more efficiently by providing trucks with information about traffic signals' exact green times

“Although introducing 4G LTE in traffic lights will further complicate the chain of data, it is promising for the future,” says van Arum. “Different transportation providers in the Schiphol area are willing to adjust their onboard systems to the new features if the coverage of traffic lights is close to 100%. Therefore the next step is to scale up these use cases to the 48 traffic lights in the Smart Mobility Schiphol area. In this area 20% of all vehicles are freight-related, so the impact will be substantial.

crossing of intersections. The radio beacons ETSI G5 (European Telecommunications Standard Institute G5) were needed to create a redundant and safe system.

Another new feature within the Daimler pilot was an automated drive through a 1.1-mile (1.8km) tunnel. During the drive, the location of the bus was determined by using map-matching technologies without any GPS and without any other roadside information beacons. Extra facilities for communication in the tunnel were not needed. On the other hand, test rides showed that road markings are very important for driving safely in automated mode.

20
The percentage of traffic that is freight-related in the Schiphol area

Future solutions

As a regional government, Noord-Holland province has the option to set up traffic management systems. By collaborating with over 20 private companies for learning and testing new mobility and traffic management features, it has the tools to get to know the users and improve their travel experience. Another important result is the reduction of travel costs for society. In a world of connectivity, mobility operations (demand) and traffic operations (supply) have to benefit each other. Therefore the province focuses on the interfaces of those worlds. In the center are many cloud services that will provide parts of the mobility puzzle. Researchers focus on the parts in which the province has an important role: delivery of road capacity, traffic management rules and user policy strategies.

“Will future mobility services grow and make our traffic system smoother and more reliable? Or do we have to add a few rules and policies to reduce negative external effects such as the growing distance between work and home?” asks van Arum. “In the end it is the user we have to focus on.”

For all parties involved, the first question in the conversation will naturally be: “What’s in it for me?” Noord-Holland province is convinced it has use cases that will boost business development and also have a positive societal impact. ○

Traffic signal priority

In the spring of 2017 a collaboration with six private companies resulted in a pilot with two ETSI-based use cases – traffic signal priority and green light optimization speed advisory (GLOSA) – on the road. Its main goal is to reduce stops of trucks near traffic lights by giving them information about green lights. The current onboard systems of Dobbe Transport trucks were adjusted to communicate with traffic lights through 4G LTE. This was done with the cooperation of KPN, Vialis, Dynniq and Rietveld fleet management. The results of this pilot convinced the province that 4G LTE is useful for time-critical (<300ms) use cases such as GLOSA and traffic signal priority. Transportation provider Dobbe is satisfied with the service and the potential fuel savings.

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Jeannet van Arum, director of smart mobility, Noord-Holland province



The Smart Mobility Schiphol project will be showcased at Intertraffic Amsterdam on the Metropolitan Region of Amsterdam stand in the Smart Mobility Hall (08.308)