AURORA BOREALIS - INTELLIGENT CORRIDOR

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January snow belt in Europe, Canada and USA

Source: FMA
AUTOMATED DRIVING IN ALL CONDITIONS
- Some disruptive components

“All driving conditions”

- Seasonal changes
- Weather conditions
- Road type, paved, unpaved
- Other road users, like pedestrians, cyclists...
- Malfunctions, like accidents, parked vehicles
- Crossing the borders county, country...
- Geo-fenced test areas

Safety

Infrastructure
WHY AURORA?

• Future trends and innovations must be verified in the Arctic environment.

• Robotisation and evolution of mobile technologies, like 5G, will impact heavily to transportation.

• Maps and location technologies (like GPS/GNSS/FinnRef) are foundation for co-operative ITS (intelligent transport services).

• C-ITS enables new innovations like MaaS and autonomous driving.
E8 - the Aurora Borealis Corridor
European digital cross-border corridor for CAD testing

Test sections

NORWAY
FINLAND

Arctic Circle
- 6 months winter season
- Polar night 25 days
- 116 days below 14 F (-10°C)
- 51 days below -4 F (-20°C)
- 10 days below -22 F (-30°C)
- Snow thickness between 2-4 ft (0.5 – 1 m)

Source: FTA
PUBLIC SERVICE PLATFORM FOR TESTING

- 10 km of instrumented road on the E8
- Instrumentation and information services supporting testing of ITS, CAD and asset management in road traffic
- Open test ecosystem creating opportunities for developing technologies to work in all conditions
- Testers can utilise the test ecosystem free of charge.
DATA GENERATED BY THE INSTRUMENTATION

- All data available as open data through Digitraffic service (Aurora PoC)
- Sensors: vibration, weight, pressure, acceleration, oscillation frequency, road surface slipperiness, measuring and monitoring of the road structure and condition, traffic volumes
- Real-time information about road conditions (incl. frost sensor and radiometer) generated by road weather stations
- HD Map Services, laser-scanned data
FINNREF STATIONS IN AURORA TEST AREA

- Map shows an example of the tailored FinnRef network for research and development
- Aurora test site purchased 4 extra stations:
  - One in test site
  - Three along test road E8
  - All installed year 2017

Source: NLS
FIRST TESTS COMPLETED
Dec 2017 - Jan 2018, next session is now ongoing...
FIRST TESTS

- **Field trials using automated vehicles**
  Sensible 4 coalition automated vehicle "Juto" and VTT automated vehicle "Martti" driving in icy and snowy conditions

- **Communication infrastructure**
  Commercial and private cellular network coverage tests

- **Hybrid communication**
  Cooperative ITS Day 1 services of slow or stationary vehicles trials using ITS-G5 with cellular connectivity demonstrated.

- **Vehicle positioning**
  Ultra-wideband (UWB) poles, Global Navigation Satellite System (GNSS) incl FinnRef, Inertial Measure Unit (IMU) and Real Time Kinematic (RTK), Simultaneous localization and mapping (SLAM), sensor testing with Light Detection and Ranging (LIDAR), creation of different High Definition Maps (HD Maps)
The Borealis project

- Unified notification of weather, snow, road conditions and traffic incidences on both sides of the border
- Borealis is a project where the Norwegian Public Road Administration (NPRA) will do testing of ITS solutions
- Borealis is a cooperation with Finland and the Aurora project to develop cross border solutions
- Today there are **different challenges on this road**, as accidents, with or without animals, poor availability in wintertime etc.
- ITS shall be considered for meeting these challenges
Goal of the project

- Test of new technology
  - Identify technology and solutions that can be used in the whole country
  - Some of the technology will be considered for further use but not necessarily all of the technology that we tests on

- Research and development on technology shall result in use of ITS systems to:
  - Increase traffic safety
  - Increase mobility
  - Increase efficiency and improve operation and maintenance of the road
  - Provide better information to the drivers
  - Eventually provide the opportunity for automated driving