

Intelligent traffic enabled advanced road weather infrastructures in Arctic conditions

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In order to enhance the geographical accuracy of road weather services one would need to have access to local observations originating from mobile vehicles and local road weather stations. The Finnish Meteorological Institute (FMI) has long experience of the development of advanced road weather services. However, the pilot testing of services has been moderate. In order to provide carefully configured, reproducible test measurements and analysis, more permanent testing environments and entities are required. Such an infrastructure would also ease the co-operation possibilities with professional vehicle and vehicle equipment manufacturers. FMI has constructed the specific infrastructure ensemble for this purpose. We have set up a vehicle winter testing track, operational truck fleet collecting road weather data, 5G pilot services and secured cloud-based road weather service entity, each one putting the idea of ITS-enabled (Intelligent Traffic Systems) road weather services into real-life scenario.

The entity is composed from several pieces built in different research projects. EU ERDF projects Sod5G and Intelligent Arctic Trucks are focusing on research infrastructures, while Tekes 5G-Safe, Interreg Nord Wirma, Ecsel JU SafeCOP and Celtic Plus CyberWI are building road weather service pilots, exploiting the infrastructures.

Sod5G project builds a test environment for intelligent transport, road weather services and the 5G network in the area of Sodankylä airport in Finnish Lapland. The main objective is to build the 5G and VANET networks piloting environment to serve the needs of dedicated special multi-authority, intelligent traffic and vehicle winter testing. The accurate location-based road weather information and forecast service is implemented throughout the test area road network, to be delivered through advanced 5G development network to authorities, vehicles and road users, in real-time.

The Intelligent Arctic Trucks project comprises a 260 km road stretch along which nine heavy trucks will carry out measurements as the specific mobile real-time test laboratory for studying and developing ITS and road weather applications. The instrumentation consists of surface friction and temperature instruments and the vehicle telematics devices. The data is collected with cellular 4G communication into cloud-based data entity, as well as the service data regularly delivered back to the trucks.

5G-Safe project develops advanced road weather and safety services for the vehicles and exploits the possibilities of 5G. Parallel Wirma project is tailoring the road weather services for the road maintenance purposes. FMI is also participating security methodologies projects. The EU ECSEL JU project SafeCOP introduces additional safety and trust for wireless communication with a specific runtime engine and validation controlling the security. CyberWI generates tailored safety features for pre-defined operational environments and FMI's road weather stations.

FMI can test and analyze the ITS and road weather services first in controlled conditions and later on in operative real-life environment. Research projects employ the infrastructure at the moment, but it is available for similar kind of testing and evaluation purposes for any existing or upcoming partner/co-operator of FMI.