

Satellite Connectivity for Sustainable Mobility

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Abstract : As the climate crisis becomes unignorable, it is imperative that new services are developed addressing not only the needs of customers but also taking into account its impact on the environment. The Telecommunication and Integrated Application (TIA) Directorate of ESA is supporting the green transition with particular attention to the sustainable mobility. "Accelerating the shift to sustainable and smart mobility" is at the core of the European Green Deal strategy, which seeks a 90% reduction in related emissions by 2050 . Transforming the way that people and goods move is essential to increasing mobility while decreasing environmental impact, and transport must be considered holistically to produce a shared vision of green intermodal mobility. The use of space technologies, integrated with terrestrial technologies, is an enabler of smarter traffic management and increased transport efficiency for automated and connected multimodal mobility. Satellite connectivity, including future 5G networks, and digital technologies such as Digital Twin, AI, Machine Learning, and cloud-based applications are key enablers of sustainable mobility. SatCom is essential to ensure that connectivity is ubiquitously available, even in remote and rural areas, or in case of a failure, by the convergence of terrestrial and SatCom connectivity networks. This is especially crucial when there are risks of network failures or cyber-attacks targeting terrestrial communication. SatCom ensures communication network robustness and resilience. The combination of terrestrial and satellite communication networks is making possible intelligent and ubiquitous V2X systems and PNT services with significantly enhanced reliability and security, hyper-fast wireless access, as well as much seamless communication coverage. SatNav is essential in providing accurate tracking and tracing capabilities for automated vehicles and in guiding them to target locations. SatNav can also enable location-based services like car sharing applications, parking assistance, and fare payment. In addition to GNSS receivers, wireless connections, radar, lidar, and other installed sensors can enable automated vehicles to monitor surroundings, to 'talk to each other' and with infrastructure in real-time, and to respond to changes instantaneously. SatEO can be used to provide the maps required by the traffic management, as well as evaluate the conditions on the ground, assess changes and provide key data for monitoring and forecasting air pollution and other important parameters. Earth Observation derived data are used to provide meteorological information such as wind speed and direction, humidity, and others that must be considered into models contributing to traffic management services. The paper will provide examples of services and applications that have been developed aiming to identify innovative solutions and new business models that are allowed by new digital technologies engaging space and non space ecosystem together to deliver value and providing innovative, greener solutions in the mobility sector. Examples include Connected Autonomous Vehicles, electric vehicles, green logistics, and others. For the technologies relevant are the hybrid satcom and 5G providing ubiquitous coverage, IoT integration with non space technologies, as well as navigation, PNT technology, and other space data.

Keywords : sustainability, connectivity, mobility, satellites

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