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SATELLITE COMMUNICATION FOR IIOT

Abstract

Industrial Internet-of-Things (IIoT) is one of the big market trends. However, it relies heavily on the availability of proper communication. While this is the case in urban areas or other areas well served by mobile and fixed networks, there are many situations where terrestrial communication is not available. Thus, satellite-based communication can extend existing services and additionally enable new, modern, global IIoT services with world-wide coverage – also in areas with no or sparse terrestrial communication available. IIoT spans a broad range of potential applications and has requirements which are often quite different from consumer Internet or telecommunications. IIoT nowadays heavily relies on modern IT technologies such as clouds and web technologies but also demands availability and security. This paper elaborates major IIoT requirements by analyzing major use cases and discusses how these requirements can be mapped to existing and upcoming satellite services. This work gives a definition of IIoT and is setting the context to satellite communications. It briefly presents sample use cases and use case categories from different industry domains (e.g. rail automation or SCADA), for different areas (e.g. offshore) and for different terrestrial devices (e.g. cars or trains, constrained sensor devices, surveillance drones and more). Qualitative requirements for the implementation of global space-based applications are listed and discussed from a high-level technical perspective, with a focus on IT service needs and communication. This work also categorizes satellite services in this context and gives a mapping to the elaborated IIoT requirements. This analysis includes coverage, scalability, availability and reliability, performance, user equipment requirements (e.g., max. antenna size). In addition to these connectivity parameters, a major focus here is also on the fit to modern IT services. Thus, not only the air interface is discussed, but also the backend and ground station services and interfaces which are vital components for implementation and integration. From business perspective, a transparent use of any communication service to implement an IIoT service is advantageous. Interoperability or interplay of SatCom with terrestrial mobile communication networks supports the implementation of such scenarios. The work concludes with a qualitative analysis of strengths and weaknesses for the application of space-based communication network for globally available IIoT services. It points out which space-based services are suitable for IIoT and provide insights which new services and technologies in this field will be supportive for future applications.