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Channel measurements and models for 6G: current status and future outlook

Key words: Channel measurements; Channel models; Sixth generation; Terahertz; Industrial Internet of Things; Space-air-ground integrated network; Machine learning

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Motivation

- Channel properties determine the ultimate performance limit of wireless communication systems. Thus, conducting channel research is a prerequisite to designing 6G wireless communication systems.
- There are several emerging technologies and applications for 6G, such as Terahertz communication, Industrial Internet of Things, space-air-ground integrated network, and machine learning. These technologies and applications have new demands for channel models.
- Until now, there has been no review paper for 6G channel measurements and models.

Contributions

- New technologies and applications for 6G are introduced. Based on the analysis of requirements of these technologies and applications, the developing trends of 6G channel models are presented.
- A review of 6G channel measurements and models is given in terms of different technologies or applications for 6G. Specific channel characteristics and modeling methods are discussed, which should be considered in channel modeling for 6G.
- Combining the review of 6G channel measurements and models with a discussion on the developing trends of 6G channel models, the outlook for future research on channel measurements and models is discussed.

Conclusions

- Both deterministic and stochastic channel modeling methods have their pros and cons. It is still an open issue to choose either method or look for a new mixed method for THz channel modeling.
- Modeling correlation property, blockage, and interference and noise are important for designing a robust wireless network for industrial applications.
- Methods for mapping clusters with scatterers and describing the physical meaning of cluster-nuclei are essential for cluster-nuclei based channel modeling.