information, and context information.

5 Conclusions

We propose that 6G provides a unified data collection framework through a DP to meet the ubiquitous data collection requirements. The DP protocol stack consists of a DSAP, simplified L2 and optimized L1. The reduction in processing delay by the DP in UL was validated by test results based on a 6G UE prototype. Moreover, the efficiency improvement of the DP protocol stack increases as the data length increases. For data representation and serialization methods, ASN.1 and Probobuf are suitable for small and large amounts of data respectively. The proposed two-sided data collection mode increases the willingness of data providers to provide data, enabling the possibility of DT UEs. DT UEs can reuse a large number of UEs in the physical network to reduce the infrastructure resource overhead of the DT network. However, some of the rewards (e.g., data or voice quotas) in the two-sided data collection mode may involve billing systems and business models that need to be further validated and refined in commercial networks. We will continue to simulate and analyze the performance of joint source-channel coding and semantic communication for 6G data collection. The DP-based unified data collection framework provides pervasive data functionalities to realize the full potential of the 6G system. Therefore, it is expected to become an important part of 6G system architecture, providing the data foundation for sensing, AI and DT networks.

Contributors

Yannan Yuan and Fei Qin designed the research. Jiankang Liu, Yuanyuan Wang and Jianan Cai developed a prototype of 6G UE and finished the test of the proposed protocol stack. Yannan Yuan drafted the manuscript. Xiang Pan helped organize 5G standard status. Yannan Yuan and Dajie Jiang revised and finalized the paper.

Compliance with ethics guidelines

Yannan Yuan, Fei Qin, Jiankang Liu, Yuanyuan Wang, Jianan Cai, Xiang Pan and Dajie Jiang declare that they have no conflict of interest.

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