Special Issue

Space-based Laser Communications

Message from the Guest Editor

Laser communication systems have the potential to improve the speed and latency of data downlink and crosslink for space-based applications, such as Earth observation and satellite communications. Laser communications systems also currently have minimal regulatory constraints compared with highly contested and congested radio frequencies. In addition to highly customized, robust, space-qualified systems, laser communications efforts now also focus on qualifying and using commercial terrestrial fiber-optic communications components on space-based platforms to reduce size, weight, power, and cost, as well as developing architectures that involve large constellations of small satellites and distributed ground station networks to improve availability and mitigate the impact of weather on system performance. Ongoing innovations include autonomous and portable ground station technology, advances in pointing, acquisition and tracking systems for both space and ground applications, the incorporation of precision timing capability, and the evolution of link budget and systems engineering tools away from deterministic link budgets and toward dynamic, uncertainty-based algorithms.

Guest Editor

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