

Signal Transmission and Networking Improvements of the SLR Telescope Systems in Kunming Station

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Abstract: The Satellite Laser Ranging (SLR) telescope systems at the Kunming station are versatile facilities, featuring a 53cm binocular for regular observation and a 1.2m telescope for DLR and LLR missions. These systems play a crucial role in geodetic research, space debris monitoring, and astrometric observations. While these telescopes have been in operation for decades, their infrastructure has undergone several upgrades. However, the systems have previously been limited by high latency and outdated telescope structures, hindering their adaptability to new experimental requirements and technological integrations. This report provides a comprehensive overview of recent enhancements aimed at improving the system's performance and expanding its functional capabilities.

The main focus has been on signal transmission, with the replacement of coaxial cables with high-performance alternatives significantly reducing system latency. Another improvement is the integration of Internet of Things (IoT) devices, enhancing data bandwidth and enabling more efficient remote management of the telescope system.

Furthermore, to improve the system's modularity and scalability, modular approaches are introduced so that the SLR system can accommodate future advancements with more new devices.

The improvements in signal transmission, networking, and modularity are expected to significantly benefit the scientific infrastructure, enabling more flexible space observations, and supporting the station's role in global space surveillance initiatives.