

The CCSDS Space Data Link Security protocol (SDLS) and its extended procedures (SDLS-EP) provide frame level confidentiality, integrity, replay protection and operational key management for space data links, however, their keying model remains fundamentally static and does not provide post-compromise recovery. This paper proposes SDLS-DR, a ratcheted extension to SDLS-EP that embeds a Double Ratchet style key evolution mechanism into telecommand and telemetry traffic. In the proposed design both TC and TM frames carry ephemeral Diffie-Hellman material and advance a shared ratchet state, allowing fresh symmetric keys to be derived continuously from normal link traffic. The result is a protocol that preserves the SDLS framing and security association model while adding forward secrecy and the ability to recover security after a compromise. We describe the protocol design, security association changes, header extensions and recovery logic, and we evaluate the extension against the baseline SDLS and SDLS-EP designs with respect to security properties, overhead, and operational suitability for space TT&C links.