

SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (4)

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COMPARING ARCHITECTURE AND SYSTEMS DESIGN OF VARIOUS DEEP SPACE NETWORKS

Abstract

As more and more inter-planetary and deep-space spacecraft missions, and manned missions in future, are sent to nearby planets / comets / space more and more sensitive global communication system is need. A true global coverage is desirable in this scenario since communication with the mission round the clock is desirable in a timely manner and using most of the bandwidth available. The distributed nature of the architecture adds an additional layer of complexity of synchronization between the stations. In addition to DSN ground stations segments, a number of on-orbit data relay satellites are also an important link in DSN architecture. Communication standards (CCSDS) have been designed over the years to efficiently utilize limited link budget available in deep space missions.

Soviet Union and United States started there comprehensive programs for DSN almost at the same time, during the space race. Since then we have seen European Union, China, and India developing their own versions of DSN supporting different types of missions.

This paper takes a step back and gives a bird's eye view of these various DSN networks. The paper presents a comparative study of various DSN characteristics and segments which eventually reflects the types of missions they support.