

NASA Near Earth Network (NEN) Support for Lunar and L1/L2 CubeSats

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The NASA Near Earth Network (NEN) consists of globally distributed tracking stations, including NASA, commercial, and partner ground stations, that are strategically located to maximize the coverage provided to a variety of orbital and suborbital missions, including those in LEO, GEO, HEO, lunar and L1/L2 orbits. The NEN's future mission set includes and will continue to include CubeSat missions.

The majority of the CubeSat missions destined to fly on EM-1, launching in late 2018, many in a lunar orbit, will communicate with ground based stations via X-band and will utilize the NASA Jet Propulsion Laboratory (JPL) developed IRIS radio. The NEN recognizes the important role CubeSats are beginning to play in carrying out NASA's mission and is therefore investigating the modifications needed to provide IRIS radio compatibility. With modification, the NEN could potentially expand support to the EM-1 lunar CubeSats.

The NEN could begin providing significant coverage to lunar CubeSat missions utilizing three to four of the NEN's mid-latitude sites. This coverage would supplement coverage provided by the JPL Deep Space Network (DSN). The NEN, with smaller apertures than DSN, provides the benefit of a larger beamwidth that could be beneficial in the event of uncertain ephemeris data. In order to realize these benefits the NEN would need to upgrade stations targeted based on coverage ability and current configuration/ease of upgrade, to ensure compatibility with the IRIS radio.

In addition, the NEN is working with CubeSat radio developers to ensure NEN compatibility with alternative CubeSat radios for Lunar and L1/L2 CubeSats. The NEN has provided NEN compatibility requirements to several radio developers who are developing radios that offer lower cost and, in some cases, more capabilities with fewer constraints.

The NEN is ready to begin supporting CubeSat missions. The NEN is considering network upgrades to broaden the types of CubeSat missions that can be supported and is supporting both the CubeSat community and radio developers to ensure future CubeSat missions have multiple options when choosing a network for their communications support.

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