

## An Introduction to Very Large Arrays for the Deep Space Network

Michael J. Connally  
William J. Hurd  
David J. Recce  
Jet Propulsion Laboratory  
Pasadena, California  
[Michael.J.Connally@jpl.nasa.gov](mailto:Michael.J.Connally@jpl.nasa.gov)  
[William.J.Hurd@jpl.nasa.gov](mailto:William.J.Hurd@jpl.nasa.gov)  
[David.J.Recce@jpl.nasa.gov](mailto:David.J.Recce@jpl.nasa.gov)

Development of very large arrays of small antennas has been proposed as a way to increase the downlink capability of the NASA Deep Space Network by two to three orders of magnitude. This would enable much greater science data return from deep space missions than at present, at greatly decreased cost per bit. It would also enable new mission concepts that result in signals too weak to be received by the current DSN. Arrays would be deployed at two or three different longitudes, and in the northern and southern hemispheres. Each array would have thousands of antennas, located at several different sites. The sites would be selected to provide weather diversity to overcome the atmospheric propagation losses encountered at Ka-band in high humidity or rain, and to provide long and orthogonal baselines for the delta differential one-way range (delta DOR) navigation data type. This paper discusses the array architecture, the resulting challenges in operations, maintenance and sustaining engineering, and preliminary operations concepts to overcome these challenges.