

**Abstract Title:** optical Networks for Earth-Space Communications and Their Performance

**Author List:** Kamran Shaik, 818-354-9400  
Dennis Wonica, 818-354-9402  
Michael Wilhelm, 818-354-2977

**Address:** Jet Propulsion Laboratory  
4800 Oak Grove Dr  
Pasadena, CA 91109

**Submit to:** OE-LASE '94: Free Space laser Communications VI (S. Mecherle)

**Presentation:** oral

### **Abstract**

A recent study at the Jet Propulsion Laboratory explores the possibility of setting up a network of earth optical receivers for communications with spacecraft. Various network concepts are developed to provide full line of sight coverage of the ecliptic, 24 hours a day, and with about 90 percent link availability under existing weather conditions at the possible optical station sites. A simple analytical weather model is developed to calculate the impact of cloud cover on network availability when clear line of sight between one or more earth stations and the spacecraft exists. The characteristics of an earth optical terminal and the effects of cloud cover, atmospheric transmittance, station altitude, optical background noise, and optical spectral filters on the station performance are also reported. Finally, specific geographical sites are identified for some of the network configurations and a realistic link analysis for a Pluto mission in 2015 is performed.

### **Biography:**

Kamran Shaik joined the optical communications group in 1987. After completing his graduate work in electrical engineering from Pennsylvania State University in 1984, he joined Martin Marietta Laboratories for two years in Baltimore, MD, where he was involved in the establishment of an optical signal processing laboratory for image processing and pattern recognition applications, as well as computer generation of holographic filters for such systems. His current interests include optical signal processing, optical communications, laser propagation through the atmosphere, and more recently, optical telescopes and networks for deep space communications.