

# LASER SOURCES AND SPACE OPTICAL COMMUNICATIONS

**J. D. Barry**

**Hughes Aircraft Company**

**Space and Communications Group**

**Los Angeles, California 90009**



## **ABSTRACT**

Intersatellite optical communication systems may be based on a number of conventional laser sources allowing wavelength and operating parameter selection, and system optimization to a particular satellite system. Laser sources which are presently available for satellite use, due to the current status of technical and engineering developments, include the HeNe gas laser operating at 632.8 nm, the GaAlAs diode laser operating at 800 to 900 nm, the Nd:YAG laser operating at 1064.2 nm and 532.1 nm, and the CO<sub>2</sub> laser operating near 10600 nm. The applicability of each laser source to a satellite communication system is determined by on orbit requirements and attitude stability of the satellite, by the performance characteristics and operating needs of the laser source and its associated support equipment, and by the optical propagation properties of the laser system. Two general levels of the optical communication must be considered; initial satellite to satellite acquisition and possible reacquisition, and the transmission of data at the required rate. The general characteristics and system properties must evolve from the interrelated factors and occasionally contradictory requirements. It is the purpose of this presentation to provide insight into the applicability of a laser communication system to space and to indicate the dominating factors in the selection of a laser system.