SATELLITE CONFIGURATIONS FOR EHF* COMMUNICATIONS FOR MOBILE TERMINALS

D.R. McElroy
C.W. Niessen
Lincoln Laboratory
Massachusetts Institute of Technology
Lexington, Massachusetts 02173

ABSTRACT

The planners of military and commercial satellite communications (SATCOM) systems for the 1980's are considering the use of the Extremely High Frequency (EHF) band, especially those allocations from 17- to-45 GHz[1]. The wide bandwidths available at EHF can be used for higher capacity systems to meet projected future service requirements and for spread spectrum modulation techniques for interference rejection and/or multiple access purposes. Evolution into these higher frequencies also offers the opportunity to develop systems and signalling structures which are functionally common across multiple user communities. Such techniques provide interoperability possibilities while allowing more efficient use of space assets and minimizing the number of unique terminal developments.

Due to user-platform space and prime power limitations as well as to terminal production, installation, and maintenance costs for large user populations, it is also important that EHF system configurations accommodate small, low-power terminals. One such approach involves departing from traditional SATCOM designs by incorporating increased satellite sophistication for reduced terminal size and complexity requirements. The associated spacecraft would employ advanced technologies such as uplink antenna discrimination., on-board signal processing, and downlink beamhopping.

---

* This work was sponsored by the Department of the Air Force, the Department of the Navy, the Department of the Army and the Defense Communications Agency.

[1] Although the 17.7-to-21.2 Ghz band is actually in the upper SHF portions of the frequency spectrum, this paper uses the term EHF to refer to all potential satellite communications frequencies in the 17-to-45 Ghz range.

This paper presents some system configuration options for providing EHF service to mobile terminals and indicates implementation possibilities for the major spaccraft payload subsystems, with emphasis on some configuration options for the on-board signal processing unit.