THE DEEP SPACE NETWORK CAPABILITIES
FOR RADIO INTERFEROMETRY

J. L. Fanselow

Jet Propulsion Laboratory
California Institute of Technology

ABSTRACT

The Deep Space Network (DSN) consists of very high performance radio tracking stations located in Spain, California, and Australia, together with a ground communications and command facility. As part of the support for deep space tracking, a constantly improving capability for very long baseline interferometry (VLBI) exists at these stations. This paper will describe the current VLBI capability of the DSN and outline the planned capability.
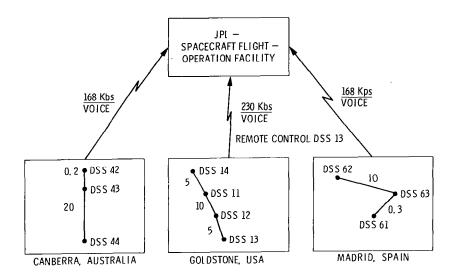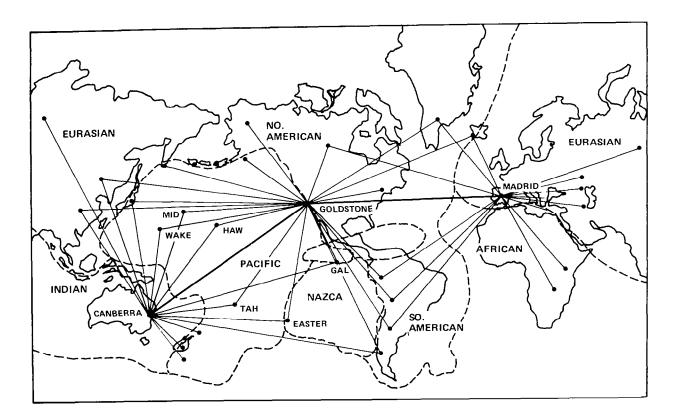
Figure 1. DSN operations facilities.

Figure 2. ARIES/64 m DSN global deployment.

- VLBI DEVELOPMENT

  - DEMONSTRATE ACCURACY LIMITS OF VLBI (1-5 cm ACCURACY IN VECTOR BASELINE MEASUREMENTS IN MID 1980's)

- OPERATIONAL VLBI FOR DSN CALIBRATION (DECEMBER, 1979)

  - UT1, POLAR MOTION WITH 30-50 cm ACCURACY
  - CLOCK EPOCH OFFSET ACCURACY: 10 NSEC
  - $\Delta F/F$ OFFSET ACCURACY: $\leqslant 3 \times 10^{-13}$
  - WEEKLY OBSERVATIONS DSS 14-43, 14-63 BASELINES
  - 24 HOUR DATA THROUGHPUT

- VLBI FOR SPACECRAFT NAVIGATION

  - DEVELOP 0."01 (50 NRAD) GLOBAL SPACECRAFT NAVIGATION INPUT FOR GALILEO (~1981)

  - DEVELOP 0."001 (5 NRAD) LOCAL SPACECRAFT NAVIGATION INPUT FOR VOIR (~1984)
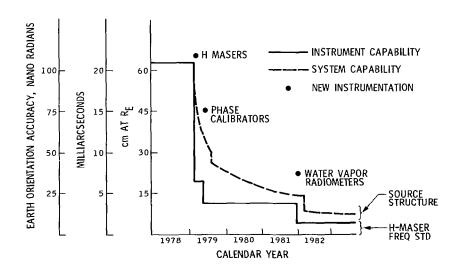
Figure 3. DSN VLBI programs.

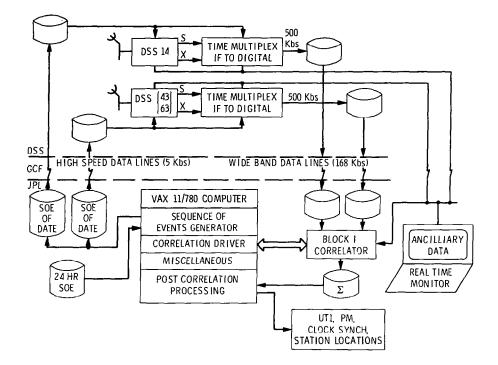Figure 4. "Best efforts" capability for determining Earth orientation with 12 hours of VLBI data on each of 2 baselines: DSS 14-43, DSS 14-63.

Figure 5. DSN configuration for operational VLBI.