CURRENT APPLICATIONS OF ANALOG FIBER OPTICS IN THE NASA/JPL DEEP SPACE NETWORK*

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INTRODUCTION

This paper will:

- Describe the NASA/JPL Deep Space Network (DSN)
- Describe the Goldstone Deep Space Communications Complex
- Describe analog fiber optic capabilities and applications at Goldstone and other DSN complexes
- Discuss future fiber optic applications in the DSN
Fiber optic interstation
Wideband IF distribution

Fiber optic links

Pioneer receiver

Signal processing center

400 MHz bandwidth IF signals

Fiber optic links

HRMS processor

Echo

Venus

Apollo

Mars
FIBER OPTIC INTRASTATION
ANALOG SIGNAL DISTRIBUTION
VENUS STATION

34 METER

ANTENNA PEDESTAL
● 400 MHz BANDWIDTH
IF DISTRIBUTION

3 METER
12 GHz FIBER OPTIC LINK
FOR ANTENNA STABILITY MEASUREMENTS

CONTROL ROOM
○ 100 MHz FREQUENCY REFERENCE DISTRIBUTION

ANALOG FIBER OPTIC LINKS
ANTENNA ARRAY NG EXPERIMENT

34 m

FREQ. MULT.

E/O

OUT

∑

O/E

FREQ. MULT.

SYNTH.

STATION F&T

E/O

E/O

100 MHz

10C +/- 1 MHz

70 +/- 5 MHz

22 km

34 m
TEST OF THE ISOTROPY OF THE ONE WAY SPEED OF LIGHT

KRISHER, ETC. 1990
CONTROLLED
SIGNAL PROCESSING CENTER

FIBER OPTIC MICROWAVE TRANSMISSION LINKS

SPU

ANTRAY
CONCLUSIONS

- ANALOG FIBER OPTIC TECHNOLOGY
  - ENABLES A FULLY INTEGRATED DEEP SPACE COMMUNICATIONS COMPLEX
  - ENABLES SHARING OF EXPENSIVE SUBSYSTEMS
  - ENABLES RF CARRIER ARRAYING OF ANTENNAS SEPARATED BY TENS OF KILOMETERS
  - PROVIDES IMPROVED COMPLEX RELIABILITY AND FLEXIBILITY
  - ENABLES IMPROVED PERFORMANCE
  - PROVIDES SIGNIFICANT COST REDUCTIONS