Viking Mission Support

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DSN support for Viking has been reexamined in the light of new budget constraints. Some impact on existing plans and schedules is expected to result. An earlier decision to use the single-station configuration for providing dual-carrier capability was abandoned in favor of the more predictable dual-station approach. The first Viking/DSN Progress Review has been postponed to permit the impact of the changes necessitated by the budget constraints to be evaluated.

I. Introduction

The period covered in this report has been notable mainly because of the impact of unexpected budget cuts on the previous plans and schedules for Viking support. A considerable amount of effort was devoted to renegotiating these changes with the Viking Project and with JPL implementing divisions. The nature and outcome of this work is discussed in succeeding paragraphs.

As a consequence of this activity, it was decided to defer the first Viking/DSN Progress Review, previously scheduled for February 1, 1973, to March 22, 1973 to permit a more realistic presentation of Viking configurations and capabilities to be made.

II. Network Configurations

Immediate previous issues of the DSN Progress Report have covered each of the DSN systems configurations with the exception of the Command System. In November 1972, the Command System was redesigned to improve the operational capability of the System in the Viking Mission Control and Computing Center (VMCCC) to improve the DSS/VMCCC interface and to effectively improve the command storage capability at the DSSs.

The new configuration resulting from the redesign will be presented at the DSN Progress Review on March 22, 1973, and subsequently reported in the DSN Progress Report.

III. Interfaces

The telecommunications interfaces between the DSN and the Orbiter and Lander have now been formally approved by Project Management and are identified in Refs. 1 and 2.

The data interfaces between the DSN and the Viking Mission Control and Computing System have been defined in Ref. 3, which still remains in the final review cycle.

IV. Schedules

The previous issue of the DSN Progress Report presented the final version of a DSN implementation schedule and the agreed upon Viking readiness dates.

The extent to which the January budget revisions have impacted these agreements is not known at this time. However, any changes that result will be consistent with the constraint to have "all Viking hardware and software in place prior to launch." Therefore, with one or two exceptions, it is expected that the impact will be minor.

The revised schedules will be presented at the March Progress Review and reported in the next issue of the DSN Progress Report.

V. Problem Areas

In December, an in depth review of the progress made at DSS 13 in investigating the uplink and downlink interference effects inherent in a high power dual carrier environment was held. It was shown that meticulous attention to waveguide component cleanliness, welding of all joints in the cone, hyperbola, and quadripod, and conductive taping of all antenna panel joints reduced the interference of concern to an insignificant level. On these grounds it was decided to:

(1) Assume the dual-carrier signal antenna configuration for Viking support at all 64-m-diameter antenna DSSs.

(2) Investigate possible ways to reduce the Viking requirement from four carrier frequencies to three.

(3) Immediately apply the above techniques to the DSS 14 antenna.

(4) Review the progress on the DSS 14 64-m-diameter antenna in April 1973.

These recommendations were accepted by the Project and further DSN planning commenced on this basis.

However, during the course of the January budget review, the decision to commit the single-station approach to Viking support was rescinded on the basis that it represented an undemonstrated capability and an indeterminate cost.

The dual-station approach was recommended for formal commitment at this time, while the application of the DSS 13 techniques to the 64-m-diameter antennas was to be continued at a reduced level under the DSN development program with the intent of making this capability available to the Project to enhance the mission, if the development program is successful.

This change in plans will complicate network operations somewhat, since all orbital operations will now require two stations (one 64-m DSS and one 26-m DSS) for each view period. Further evaluation of the operational consequences of this configuration is in progress.

A detailed technical review by D. A. Bathker and D. W. Brown of the dual-carrier investigations at DSS 13 is contained elsewhere in this issue.

References

1. *Viking 75 Project Orbiter System, Lander System, and Viking Mission Control and Computing Center System to TDS Interface Requirements Document, Volume II, Viking Orbiter System to Deep Space Network,* Project Document ID-3703111. NASA Langley Research Center, Hampton, Va., Dec. 19, 1972.

2. *Viking 75 Project Orbiter System, Lander System, and Viking Mission Control and Computing Center System to TDS Interface Requirements Document, Volume III, Viking Lander System to Deep Space Network,* Project Document ID-3703111. NASA Langley Research Center, Hampton, Va., Nov. 29, 1972.

3. *Viking 75 Project Orbiter System, Lander System, and Viking Mission Control and Computing Center System to TDS Interface Requirements Document, Volume IV, Viking Mission Control and Computing Center System to Deep Space Network,* Project Document ID-3703111. NASA Langley Research Center, Hampton, Va., in preparation.