Viking Mission Support

D. J. Mudgway
Mission Support Office

Until recently, DSN configuration intended for support of the Viking 1975 mission included the SFOF, with its Central Processing System, Mission Support Areas, and Simulation Center.

In response to the NASA Headquarters directive of October 1, 1971, the Project/DSN interface was changed to delete the SFOF from the scope of DSN responsibility. As a consequence, many existing understandings between the DSN and the Project must now be renegotiated with resulting impact on schedules, documentation, and resources.

This report identifies areas where rework is necessary and describes progress toward defining the new DSN configuration for Viking and reestablishing a mutually acceptable interface between the Project and DSN.

I. General

The DSN configuration intended for support of *Viking* has been described in detail in previous issues of this document (Refs. 1, 2). This configuration was comprised of the DSIF, GCF, and SFOF, the latter facility including the 360/75/1108 complex of computers known collectively as the Central Processing System, the Mission Support Areas with pertinent I/O and display devices, and the Simulation Center. The disposition of all these resources in support of the *Viking* 1975 mission was the responsibility of the DSN Manager for *Viking*.

In accordance with existing practice, the schedules, interface agreements, and capabilities had been negotiated with various elements of the Project and had been formally documented and approved. A Support Instrumentation Requirements Document had been prepared and delivered to the DSN, and a response in the form of a NASA Support Plan had been prepared by the DSN and reviewed in preliminary form by the Project.

In January 1972, the DSN/Flight Project interfaces were redefined in such a way as to exclude the SFOF from the areas of DSN responsibility, and to assign responsibility for SFOF support to the Office of Computing and Information Systems (OCIS). As a consequence, many of the existing understandings between the DSN and Project described in Refs. 1 and 2 are no longer valid and must therefore be renegotiated. New interfaces between both the Project and DSN, and between the DSN and OCIS must be established, and new schedules and statements of capability must be developed and documented. The more significant areas in which rework will be necessary are described in the following sections.

II. Configuration

The new DSN configuration for *Viking* is shown in conceptual form in Fig. 1. The *Viking* Mission Control Center (VMCC) includes the SFOF Central Processing System, the Mission Support Areas, and the *Viking* Simulation System, and is the joint responsibility of the OCIS and the *Viking* Flight Operations System (FOS). The Deep Space Stations include the 64-m and 26-m subnets. They transfer data to and from the VMCC via the high-speed and wideband data lines of the GCF.

Control and monitoring of Network performance, and validations of the data streams flowing between the VMCC and the DSSs will be accomplished by a separate data processing capability which will be independent of the mission computers in the SFOF. These functions may be accommodated in a Network Operations Control Facility which is in the process of being designed at this time.

The capabilities of the DSSs and GCF remain as described previously (Ref. 3), but the capability of the Network Operations Control Facility and its relationship with FOS activity, particularly in regard to the production of data records and simulation, has not yet been decided.

III. Interfaces

As mentioned above, the DSS capabilities are unchanged in the new configuration and interface agreements have been documented (Ref. 1) and formally signed off between the DSN and the *Viking* Orbiter System, and between the DSN and *Viking* Lander System. However, the interface between the VMCC and the GCF is entirely new and remains to be developed. Of particular concern in this regard is the question as yet undecided of whether responsibility for the VMCC side of the interface properly rests with OCIS or the *Viking* Flight Operations System.

IV. Schedules

The *Viking* Tracking and Data System (TDS) Level 3 Schedule is the controlling schedule for all TDS planning in support of *Viking*. A previous issue (Ref. 2) described a rather complex addition to this schedule to cover *Viking* Mission Demonstration tests in January, February and March of 1974. The SFOF support of these tests is now the responsibility of OCIS and has been deleted from the TDS schedule although support from CTA 21, DSS 12 and DSS 14 is still required from TDS.

As soon as the amended TDS Level 3 Schedule is approved, development of the lower level DSN implementation schedules will commence.

V. Documentation

As previously reported, the majority of the Project documents in which the TDS is involved have been completed although not all have been formally signed off. The principal documents in this category are:

Support Instrumentation Requirement Document

NASA Support Plan

Viking Project Specification

Viking Mission Requirements and System Design

Viking Configuration Management Plan

Viking Data Management Plan

In addition, there are a number of DSN mission-independent documents which have been used by the Project as a basis for much of its Orbiter, Lander and Flight Operations systems design.

Typical documents in this category are:

DSN/Project Interface Design Handbook

DSN/Project Interface Compatibility Test Design Handbook

All of the foregoing documents are impacted by the redefined interfaces and must be revised to reflect the new DSN responsibilities. Of these, the NSP has already been revised and is presently out for review with a June 1 goal for JPL approval and signoff. The others will follow in due course.

VI. Organization

In the past the DSN has carried out its planning and implementation function through the medium of a DSN Manager, DSN Project Engineer (PE), Capabilities Planning Team and Interface Teams. This organization was geared to the DSIF/GCF/SFOF configuration and included representatives at all levels from each of these facilities. The change in DSN responsibilities, together with the deletion of the DSN PE position, makes it necessary for the DSN to develop a new method of working with the technical support divisions.

This will undoubtedly lead to more direct working relationships between the DSN Manager and the facility representatives, and a significant reduction in the hither-to standard family of DSN mission-dependent documents.

VII. Conclusion

The recent re-definition of the DSN/Flight Project interfaces has a significant impact on previously established understandings between *Viking* and the DSN in regard to configurations, capabilities, interfaces, schedules, documentation, and interface organization.

Effort is now being directed to each of these areas in order to reestablish DSN/Project relationships as soon as possible. Progress in this direction will be reported in subsequent issues of this report.

References

1. Mudgway, D. J., "*Viking* Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. V, pp. 24–28. Jet Propulsion Laboratory, Pasadena, Calif., Oct. 15, 1971.
2. Mudgway, D. J., "*Viking* Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. VI, pp. 37–62. Jet Propulsion Laboratory, Pasadena, Calif., Dec. 15, 1971.
3. Mudgway, D. J., "*Viking* Mission Support" in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. III, pp. 38–45. Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1971.

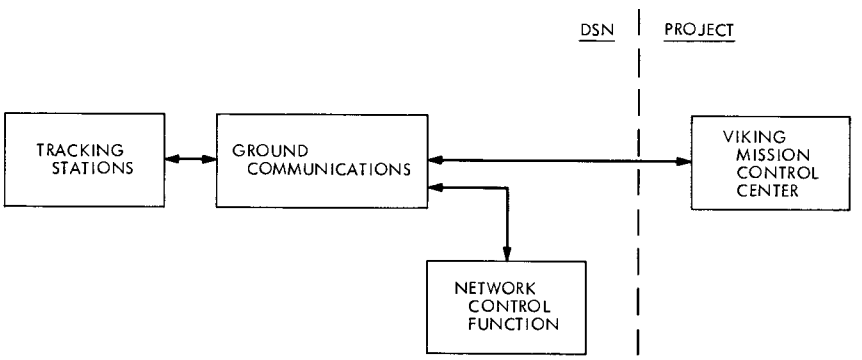

Fig. 1. DSN configuration for *Viking* (conceptual form)