Networks Consolidation Program

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The Networks Consolidation Program (NCP) was approved by the NASA Administrator in the fall of 1979 to combine the resources of the two NASA ground spacecraft tracking networks (the DSN, operated by JPL, and the GSTDN, operated by GSFC) into one consolidated network. This consolidated network will provide support to both deep space and high earth-orbiting spacecraft which cannot be supported by the TDRSS.

Previous TDA Progress Reports traced the history of activities and events that led to the decision to consolidate the NASA ground tracking and data networks into a single network. This report shows progress of the NCP from the previous report to the present, with special emphasis on planning and budgeting activities which have occurred.

I. Introduction

Initial planning and guidelines for the Network Consolidation Program (NCP) were presented in Ref. 1. Prior reports of progress have appeared in volumes 42-59 and 42-65 of the Telecommunications and Data Acquisition Progress Report (Refs. 2 and 3). They included a history of development of the NCP from initial meetings of the Networks Planning Working Group through activities completed in August 1981. This report addresses management, design, and implementation activities that have occurred from the time of the previous article through April 1982.

II. Program Accomplishments

A. NCP Organization

The Planning Team continues its supporting role to the project, which has had a succession of program guideline, mission support requirement, and budget changes. Also, the System Design Team, which functions as a subteam to the Implementation Planning Team, continues to provide engineering support for necessary design changes. Steering Committee meetings have been discontinued. The group provides support to the NCP Manager on an as-needed basis.

B. Formal Reviews

A fifth formal review was held in January 1982. Formal reviews were established to report on planning, design, and implementation activities of the project. Two reviews were reported in Ref. 2 and two in Ref. 3.

The fifth review described changes to program plans that occurred after January 1981, and presented a revised implementation plan and status report of objectives, budgets, and schedules. The review board recommended that the program proceed according to the implementation plan presented at

the review. Board members noted areas where changes in requirements and budgets may require further revisions to the implementation plan and recommended that another review be scheduled approximately one year hence to assure JPL and NASA management that the program is proceeding in an orderly and appropriate manner.

C. Budgets

Since the last report, changes in program budget levels have occurred as a result of changes in NASA management plans and congressional and executive budget decisions. Some of these changes have occurred because of changes in mission schedules, while others are due to reallocation of funds. The overall effect on the NCP has been to defer some planned capabilities until the post-NCP era and to reduce levels of capability in other areas. However, the program and basic network configuration remain intact. Overall, total NCP costs remain within the boundaries estimated in July 1980, but the expenditure profile has changed.

D. Antenna Array Alternatives

The previous report (Ref. 3) noted that the two existing 26-meter antennas at each consolidated antenna complex would be relocated and enlarged to 34 meters and include an arraying capability with the existing 64-meter and 34-meter antennas.

The comparative antenna analysis, noted in Ref. 3, provided a cost analysis which showed that construction of six new 34-meter antennas was more cost-effective than relocating, enlarging, and adding X-band capability to the six existing 26-meter antennas. Subsequent budget guidelines from NASA reduced the quantity of new 34-meter antennas to two, one each at Goldstone and Canberra. The final configuration is:

Complex	Antenna no. and size	Frequency band	Transmit/Receive or listen-only
Goldstone and Australia	1 64-m	S/X	T/R
	1 34-m	S/X	T/R
	1 34-m	S/X	LO
	1 9-m	S	LO
Spain	1 64-m	S/X	T/R
	1 34-m	S/X	T/R
	1 9-m	S	LO

E. Mission Set

References 2 and 3 noted that initial planning for the NCP included a requirement for support of a set of deep space missions, plus three high earth orbiter missions: ISEE-3, AMPTE and OPEN. After the third formal review, the NCP Parallel Study Team was formed to study effects on the NCP Baseline Design of including requirements in the NCP guidelines to support a number of additional missions. The additional missions were separated into three sets:

Set 1: Space Shuttle (STS), Tracking Data and Relay Satellite System (TDRSS), and Geosynchronous Satellite Transfer Orbits (e.g., GOES).

Set 2: ISEE-1 and -2, Dynamic Explorer-A, and San Marco D/M.

Set 3: Nimbus 7, GOES-D, E, and F, and Solar Maximum Mission.

The study team identified four options to provide support to some or all sets:

Option 1: Set 1 only, starting May 1984.

Option 2: Set 1 only, starting August 1985.

Option 3: All three sets, starting August 1985.

Option 4: Set 1 only, starting 1987.

The final report of the Parallel Study Team recommended that Option 4 be selected. This recommendation was forwarded to NASA OSTDS, but was not approved. A study of a fifth option, which included support for TDRSS, GOES, and STS was requested by OSTDS.

As a result, the mission set to be supported by the consolidated network has been revised to include GOES and emergency backup to the TDRSS. A decision about emergency support for STS has been delayed pending the results of tests that are included on STS-3. This represents a modest increase in support requirements levied on the network. A copy of the latest approved NCP Mission Set is included as Fig. 1 of this report. However, several changes have been made in overall mission planning within NASA which will be reflected in the next issue of this mission set.

At this time it is known that Solar Polar-S (line 9 of Fig. 1) has been removed from the mission set as have all of the Deep Space Missions Under Study (lines 13 through 20). In addition, the AMPTE IRM (line 24) now reflects the addition of the UKS (United Kingdom Satellite) on the same time line and should read AMPTE IRM/UKS.

One other change reflects the delay of the launch dates of the OPEN missions as follows:

OPEN IPL to February 1989

OPEN GTL to February 1989

OPEN PPL to August 1989

OPEN EML to February 1990

F. Project Dependencies

Since the last report several changes have been made in program guidelines due to changes in budget directives from NASA Headquarters, support requirements for ongoing missions, and support requirements for new missions. As the system design process progressed, some design changes have resulted in reductions in the amount of equipment required from GSTDN stations scheduled for closure.

There still is the question of whether the program will use 9-meter antennas or 26-meter antennas to track the residual high earth-orbiting spacecraft. This question will be resolved within the next six months.

Mission schedules, including launches of the Space Shuttle and the TDRSS, have settled to the point where the program can depend on them, and develop implementation and mission support schedules in an orderly manner with a high degree of confidence.

The NCP Baseline Mission Set (Fig. 1) identifies several mission critical events, including the Voyager-Uranus encounter, and the launches of several spacecraft such as AMPTE, Galileo and GOES which continue to represent major constraints on the development of the consolidated network.

Modifications in funding profiles have continued to require changes in the sequence and timing of tasks. These changes will be reflected in the level of mission support that the DSN can provide during some implementation periods, and the ground aperture available to support Voyager Uranus will be less than originally planned. In addition, some network improvements, particularly in the area of monitor and control, will be delayed until after the NCP/MARK IVA implementation.

G. Documentation

The NCP Management Plan, Transition Plan, and Mission Support Plan were published and distributed in accordance with initial program plans. Publication of the one remaining planned document, the NCP Implementation Plan, was delayed due to the large number of changes in program plans that were required in response to budget and mission support directives. The document was published in April 1982.

References

1. Layland, J. W., OSTDS Networks Planning for the TDRSS Era, OSTDS Report, January 1980.
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3. Yeater, M. L., and Herrman, D. T., "Networks Consolidation Program," *TDA Progress Report 42-65, July and August 1981*, p. 19, Jet Propulsion Laboratory, Pasadena, Calif., Oct. 15, 1981.

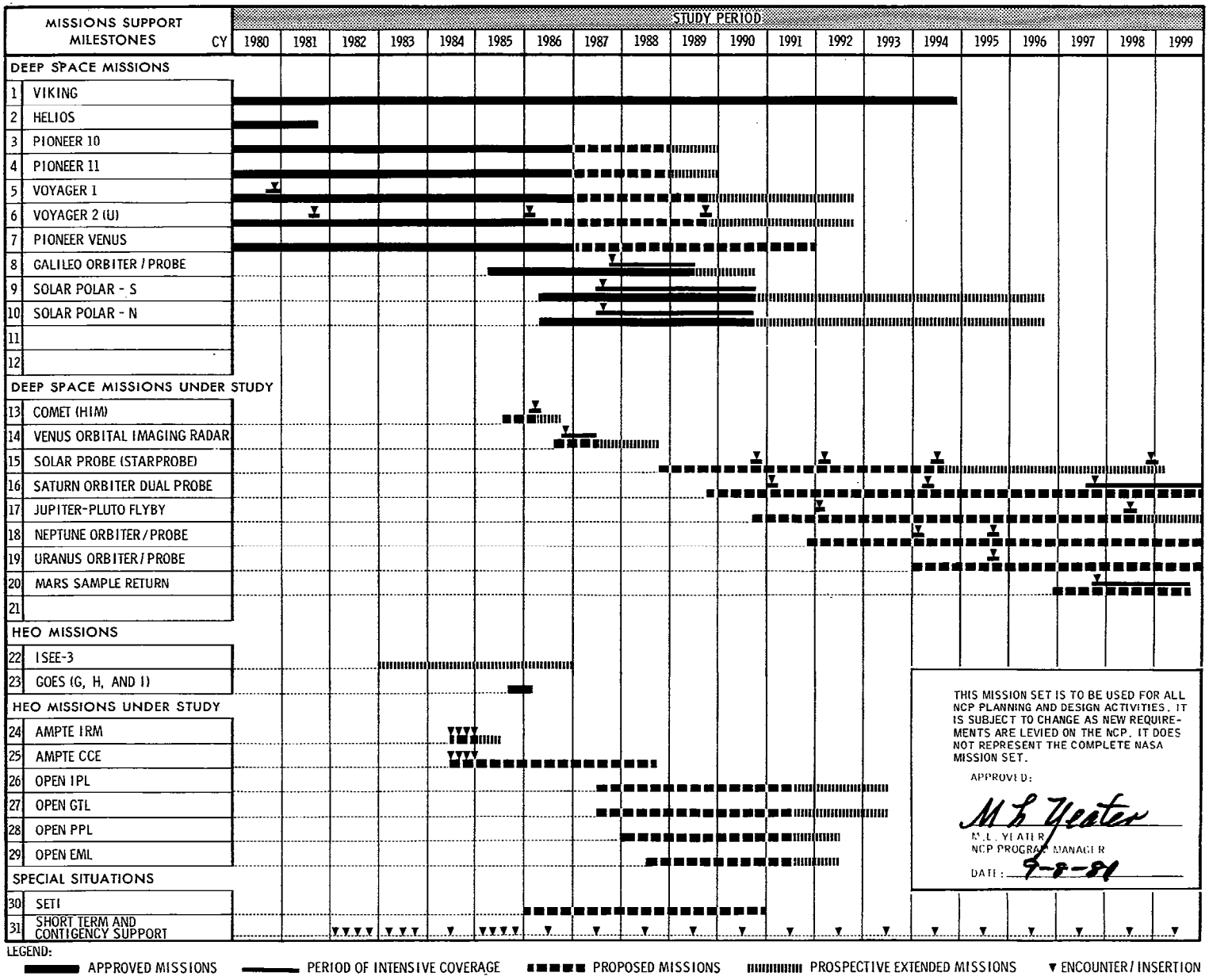

Fig. 1. NCP flight mission set