Network Operations Control

R. J. Amorose
DSN Engineering and Operations

The DSN Operations Control Team controls and operates the DSN in real-time to support Flight Project Operations. DSN Operational Control, a mission-independent organization, is headed by the DSN Operations Chief, who is supported by the DSIF Operations Chief, GCF Operations Chief, Network Operations Analysis Chief, and Network Operations Support Chief. The real-time operation is supported by two non-real-time functions, with liaison provided by: (1) the DSN Operations Representative, who represents the DSN organization to the DSN manager and Flight Project Chief of Mission Operations, (2) the DSN Scheduling Representative, who schedules DSN resources for flight projects.

I. Introduction

The DSN Operations Control Team (OCT), headed by the DSN Operations Chief (OC), controls and operates the DSN in real-time to support Project flight operations. On July 1, 1972, real-time DSN Operations was reorganized as illustrated in Fig. 1. The DSN Operations organization ensures that standardized methods will be used for support of each flight project, while at the same time maintaining the capability for responding in real-time to nonstandard anomalies and emergencies.

II. Responsibilities

DSN operational control is provided by the mission-independent DSN Operations organization. Functional responsibilities of the DSN OCT are as follows:

(1) Operate the network to meet the requirements of several flight projects simultaneously.

(2) Operate the DSN Monitor System.

(3) Operate the DSN in support of project simulation activities.

(4) Operate the DSN in support of compatibility testing.

(5) Support maintenance of the operational network.

(6) Produce the Original Data Records (ODRs).

(7) Perform real-time (through the 7-day schedule) allocation of resources based on guidelines of the DSN Network Allocation System.

(8) Respond to the requirements of Tracking Data System (TDS)/flight project interface documentation.

(9) Perform, in real-time, analyses of telemetry, tracking, and command operations to ensure that the network has met its commitment.

III. DSN Operations Control Team Organization

The operating positions and organizational responsibilities of the key members of the OCT are described in the following paragraphs.

A. DSN Operations Chief

The DSN Operations Chief (OC) is responsible to the DSN Operations Manager for the overall direction of DSN operations and is specifically responsible for proper operation of the DSN resources committed to the Project. The DSN OC directs and coordinates the activities of the Network Operations Analysis Chief, DSIF Operations Chief, GCF Operations Chief, and the Network Operations Support Chief in the real-time operation of committed resources. The DSN OC is the controlling interface for the DSN with the Mission Control and Computing Center (MCCC) Operations Controller (OPSCON). The DSN OC coordinates the isolation of equipment or procedural problems and any required corrective or contingency actions. The DSN OC controls the real-time configuration of the DSN and resolves any conflicts in the use of DSN resources that arise during periods of operational support. He is responsible for the coordination of end-to-end systems data flow. He is also responsible for keeping the flight projects advised of DSN status.

B. DSIF Operations Chief

The DSIF Operations Chief provides real-time direction and control of DSIF operations. He controls committed DSIF resources and the real-time configuration of DSIF equipment and procedures.

C. GCF Operations Chief

The GCF Operations Chief directs and controls the operations of the GCF in real-time. He coordinates circuit requirements with the NASA Communications Network (NASCOM) and controls the real-time configuration of the GCF.

D. Network Operations Analysis Chief

The Network Operations Analysis Chief supervises and coordinates the activities of the real-time Tracking, Telemetry, Command, and Monitor Systems Analysts (described below).

1. Tracking System Analyst. The real-time Tracking System Analyst determines the performance of the Tracking System and recommends corrective action in case of failure or substandard performance. He is also responsible for the generation of tracking predictions and providing real-time recommendations in support of spacecraft acquisitions and tracking. He provides a real-time technical interface with the Project navigation area and Project telecommunications analyst.

2. Telemetry System Analyst. The real-time Telemetry System Analyst determines the performance of the Telemetry System and recommends corrective action in case of failure or substandard performance. He is also responsible for the generation of DSN telecommunication predictions and provides real-time recommendations to isolate the problem in the case of any nonstandard acquisition. He provides a real-time technical interface with the Project telecommunication analyst.

3. Command System Analyst. The real-time Command System Analyst is responsible for monitoring and analyzing the operation of the DSN Command System. He is responsible to the DSN Operations Chief for defining, isolating, and recommending solutions to problems that occur in the DSN Command System. In addition to this monitoring function, the Command System Analyst generates and transmits the standards and limits, configuration, and test commands utilized at the Deep Space Stations. The Command System Analyst determines the DSN data record outages and coordinates the required playback from the DSS digital ODR. He provides a real-time technical interface with the Project Command Team.

4. Monitor System Analyst. The Monitor System provides the capability for sensing certain characteristics of the various elements of the network and for processing and displaying these data for use by the network operations personnel. Monitor data are used for determining status and configurations, for guidance in directing network operations, for furnishing alarms of nonstandard conditions, and for analysis of quality and quantity of data provided to the Project.

5. Real-Time Monitor Analysis Team. The Real-Time Monitor Analysis Team is responsible for the following tasks:

(1) Maintain continuous operational control of the Monitor System.

(2) Monitor and analyze the performance of the Monitor System.

(3) Gather and validate standards and limits for all network systems.

(4) Maintain continuous interface with the Operations Control Chief.

(5) Perform computer I/O functions necessary for the support of system operation.

(6) Participate in system tests and analyze results.

(7) Maintain system logs and records.

(8) Generate pass folder and transfer to ODC.

(9) Generate postpass reports.

(10) Maintain status display board.

(11) Monitor technical information service.

E. Network Operations Support Chief

The Network Operations Support Chief is responsible to the DSN Operations Chief for the direction and coordination of real-time and near-real-time operational support functions that are performed by elements of the DSN Scheduling and Discrepancy Reporting Group and the DSN Operational Data Control Group. These functions include real-time scheduling, sequence of events generation, data traceability and reporting, and discrepancy reporting.

IV. Non-Real-Time Operational Roles

A. DSN Operations Representative

A DSN Operations Representative is appointed for each flight project utilizing the DSN. His function is to represent the mission-independent DSN operations organization to (1) the DSN Manager and his DSN Support Team and (2) the Flight Project Chief of Mission Operations (CMO) and his mission operations team.

Responsibilities are defined for the periods before and after formal transfer of operational responsibility from the DSN Manager to the DSN Operations Chief (OC). This transfer will nominally occur approximately 6 months prior to launch. Responsibilities before operational transfer are as follows:

(1) Provide liaison between the DSN Manager and the DSN OC.

(2) Act as operations advisor to the DSN Support Team.

(3) Flag conflicts between planned activities and DSN operational capabilities; assist in resolving these conflicts.

(4) Review integration schedules prepared by the support team; ensure that all milestones are in agreement with DSN operational implementation schedules.

(5) Interpret DSN operational philosophy, capabilities, and requirements to other DSN/TDS elements and to flight project mission operations teams.

Responsibilities after operational transfer are as follows:

(1) Act as DSN operations advisor to the flight project mission operations team.

(2) Participate in mission operations planning meetings; flag conflicts between planned activities and DSN operational commitments; assist in resolving these conflicts.

(3) Coordinate planned activities with the DSN operations organization; transmit necessary instruction and information to the DSN OC.

(4) Act as operations advisor to the DSN Manager in planning and developing support for nonstandard operations.

(5) Provide sequence of events (SOE) inputs, necessary for flight project support, to the DSN Scheduling Group.

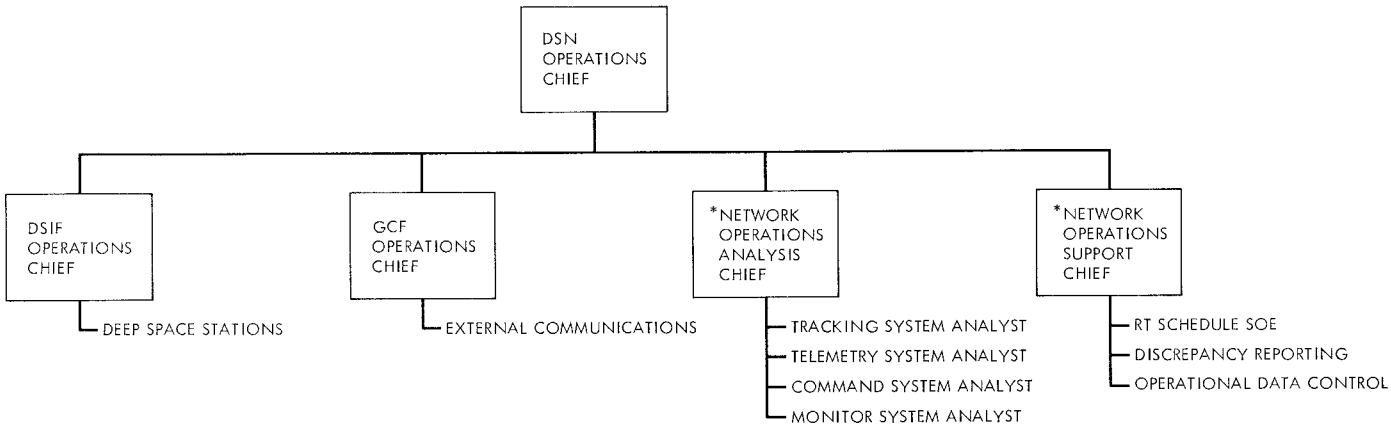
B. DSN Scheduling Representative

Each major project that uses the DSN will be assigned a Scheduling Representative by the DSN Scheduling Office. The duties and responsibilities of the Scheduling Representative are as follows:

(1) Be responsible for scheduling, within the framework of the DSN Network Allocation System, all Project activities and Project-related DSN activities from the establishment of DSN configuration control at (nominally) launch minus 6 months until the end of the operational mission and for the duration of extended mission operations, if any.

(2) Following the establishment of DSN configuration control, interface with the DSN Operations Representative for all special operational scheduling requirements and for Project-related DSN Operations Control Team scheduling requirements.

(3) Interface with the Supervisor of DSN scheduling for overall and Project-related ground rules, priorities and constraints.



*THESE GROUPS FUNCTION IN REAL-TIME AND NEAR-REAL-TIME AS ELEMENTS OF THE OCT. THEY ALSO HAVE NON-REAL-TIME OFF-LINE RESPONSIBILITIES.

Fig. 1. DSN operations control team