Deep Space Network

203
Emergency Control Center (ECC) Capabilities and Services Support

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Review Acknowledgment

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Section 1
Introduction

1.1   Purpose

This document describes the capabilities provided by the Deep Space Network (DSN) Emergency Control Center (ECC) for all customers subscribing to ECC support, in accordance with the 820-100, *DSN Services Catalog*. The ECC support categories include *Contingency Telemetry Tracking & Command (TT&C) Delivery*, which includes Command (CMD), Telemetry (TLM), Tracking (TRK), and Service Management (SM), and *Mission Operations Center (MOC) Equipment Hosting* support. The document includes a list of expected mission user responsibilities required to effectively utilize ECC support. A description of the process flow for missions to subscribe to ECC support, and an ECC subscriber questionnaire are captured in the appendices.

The descriptions given in this document are intended to support those missions who want to use emergency support provided by the DSN, and to aid those missions in developing, designing, and operationally setting up and configuring their Continuity of Operations Plan (COOP). More precisely, this ECC support document provides:

- A standard taxonomy of ECC support. It serves as the basis for DSN service-level agreements and other instruments of commitment between the DSN and missions.
- Descriptions of the capabilities of the ECC. It will assist mission operations personnel in establishing conceptual designs for emergency support operations.
- Basic information regarding how to obtain ECC support, and aids missions in emergency services planning.

1.2   Revision Control and Controlling Documents

This document is maintained by DSN System Engineering and will be revised to reflect new capabilities as those service capabilities become approved by the DSN Project Office (DSNPO). This document is approved for publication under the authority of the cover page signatories. Revisions are indicated by a revision letter following the module designator. Changes are appropriately marked and recorded in a Change Log at the front of this document.

This document is primarily concerned with the ECC and the support it provides for DSN ground data systems, and the interfaces between missions and the DSN. By extension, the Remote Operations Center (ROC) and its emergency capabilities, which are located at the DSN Operations & Maintenance (O&M) contractor facility, is also included. This document is principally organized around the *820-100, DSN Services Catalog*, and includes references to the ECC requirements document.

1.3   Relationship to Other Services

The DSN ECC support to services is requested through the MIMs for each mission needing it. The support to ECC services are documented in the appropriate mission *DSN Service Agreement (DSA)* or *Operations Interface Control Document (OICD)*, and are controlled through the *820-100, DSN Services Catalog*. The two ECC support categories include:

1. **Contingency Telemetry Tracking & Command (TT&C) Delivery**:
   a. CMD Services
   b. TLM Services

      c.   TRK Services
      d.   Service Management

2. MOC Equipment Hosting

1.4   Terminology and Notation

Abbreviations and acronyms used in this document are defined with the first textual use. Abbreviations and acronyms used in this document are defined with the first textual use of the term. Appendix A contains a list of abbreviations and acronyms used in this document. The definitions provided here are intended to clarify the use of certain terms as they apply only to this module.

Throughout this ECC support document, references to external documents are noted by footnotes. (Reference Sect. 1.5).

The reader should be particularly aware of some key terms. They are:

Capability: Used generically in the Services Catalog to refer to any and all services and support used by missions.

Mission Data: Data that are transported via the space-ground communications link, or are derived from observation of that link – including command data (but not all information pertaining to command preparation), telemetry (Level 0 or thereabouts), tracking data (but not navigation data).

User: A person participating in flight project mission operations or an experiment investigation, who interacts directly with services or support provided by the DSN

1.5   References

[1]   820-100, JPL D-19002   *Deep Space Network (DSN) Services Catalog*

[2]   870-xxx   *DSN Service Agreement (per mission basis)*

[3]   841-001, JPL D-02799   *Standard Operations Plan for the Deep Space Network*

Section 2
ECC Capability

2.1   Introduction

This section describes the DSN ECC capabilities to provide continuity of operations to all missions subscribing to ECC support. An overview of the ECC is shown in Figure 2-1. ECC support consists of two different types of support. The first type of support capability is to provide key Telemetry Tracking & Command (TT&C) data services to missions in the event of the loss or unavailability of the Deep Space Operations Center (DSOC), located in the Space Flight Operations Facility (SFOF) within Jet Propulsion Laboratory (JPL) Building 230. A secondary support capability can be negotiated for the ECC to serve as a local backup Mission Support Area (MSA)/Mission Operations Center (MOC) Equipment Hosting, if no Remote Mission Operations Center (RMOC) exists for a mission.

Logical Overview of the ECC

The ECC can support limited Mission Operations either locally at the ECC or remotely
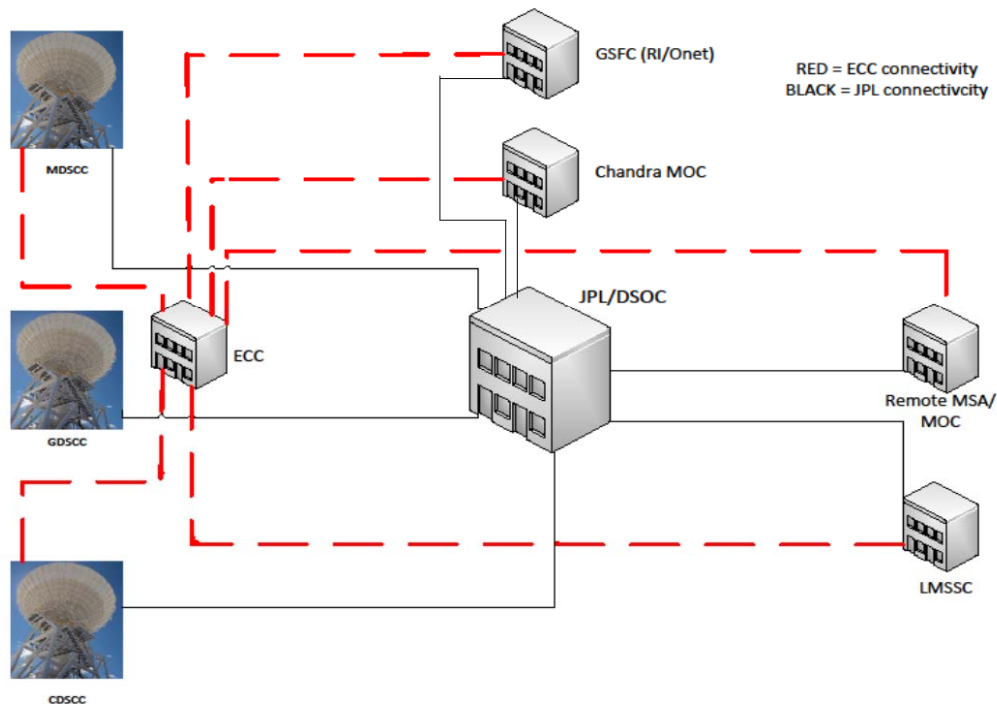
The ECC is a facility that provides limited capability to flight projects to continue operations in the case of a disaster removing JPL capabilities.

Figure 2-1: Overview of the ECC

Here is an overview of the ECC:

- ECC replicates key DSOC central operations TT&C support.
- ECC operational activation within twelve (12) hours of notice.
- ECC activation can be performed remotely from the ROC.
- ECC capable of operating for a minimum of 30 days.
- ECC is located at the Goldstone Deep Space Communication Complex (GDSCC).
- ECC has connectivity to all three (3) DSN complexes.

2.2 ECC Support

This section describes the type of mission support the ECC offers, which will serve as an aid to missions in deciding upon which ECC support to request and subscribe to. The network connections from the ECC to various MSAs or MOCs are described here. Figure 2-2 shows the nominal DSN services configuration. All ECC support requires mission connectivity to the ECC. Missions that have placed their backup MSA/MOC at Lockheed Martin Space Services Company (LMSSC) have funded a 1.5 Mbps connection from LMSSC to ECC, which allows both sending and receiving data. The ECC has a connection to the NASA Communications Service Office (CSO) Restricted Internet Protocol Operational Network (RIONet). Any mission that has connectivity via the RIONet can send and receive data at the ECC. If a mission desires, the DSN can add a connection to a MSA/MOC that is currently not available (e.g. T1, ISDN, etc.). Connectivity costs are a mission responsibility. The mission should negotiate directly with the DSNPO via the Mission Interface Manager (MIM).
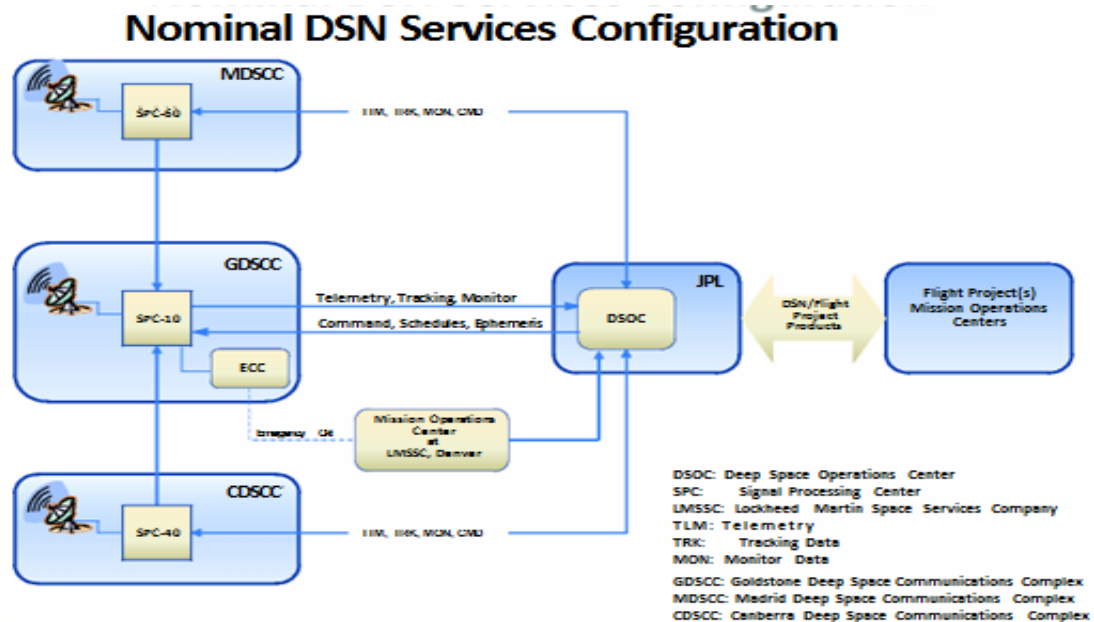
Figure 2-2: Nominal DSN Services Configuration

2.2.1 General

In the event of a DSN emergency in which the DSOC is unavailable for use, the ECC will be utilized to provide emergency support. For missions or flight projects who will be subscribing to ECC support and are planning on using it in an emergency, there some general service support differences that a mission will need to account for. They are as follows:

    a. **Different IP addresses for the Telemetry SLE gateway**

The ECC has a separate Space Link Extension (SLE) Gateway and missions subscribing to ECC support will need to bind to that one once the ECC has been activated. Subscribing to ECC support and participating in Project Interface Tests (PITs) will ensure proper mission configuration and capability from the ECC.

b. **Different IP addresses for the SPS portal**

The ECC has a separate Service Preparation Subsystem (SPS) portal and is accessible through the Flight Operations (FLTOPS) network only. Missions subscribing to ECC support will need to submit Spacecraft and Planet Kernels (SPKs), DSN Keyword File (DKF) or Sequence of Events (SOE) inputs for new support data product processing requests in the event of an ECC activation. Please refer to section 3.5.1 for more details.

c. **Different process for Schedule Changes**

The normal DSN schedule request and change process is through the Service Scheduling System (SSS) and the SPS. In the event of ECC activation, all schedule change requests will go through the DSN Ops Chief, who will make real-time schedule changes using TMOD Integrated Ground Resources Allocation System (TIGRAS). Please refer to section 3.5.1 for additional details differences in scheduling with the ECC.

d. **Contacting the DSN Ops Chief at the ECC**

In the event of an ECC activation, the DSN Ops Chief can be contacted via one of four specific voice nets setup for ECC support, or they can be contacted via the ECC satellite phone. Initial ECC notification will include contact info for the DSN Ops Chief.

e. **IP address support distinctions for Uplink SLE connections**

Missions subscribing to ECC support need to be aware of certain DSN network routing and IP address support distinctions for Uplink SLE connections:

i. For a mission with a shared interface (e.g. LMSSC and RIONet missions), the DSN requires the network Uplink SLE routing path via JPL and the network Uplink routing path via the ECC to be up at the same time, i.e. for purposes of simultaneous testing without impacting other missions operations. To that end, the mission will need two different Internet Protocol (IP) addresses for Uplink Assembly (UPA) SLE connection. The mission can then route the appropriate network Uplink SLE traffic by which IP address is selected.

ii. For a mission with a non-shared interface (e.g. Chandra), the mission can decide if they will have one IP address for network Uplink SLE routing to JPL or the ECC, or if they will have two different IP addresses for simultaneous routing of the Uplink SLE connection to JPL and the ECC.

For those missions who use the DSN Command Tool, the DSN command tool has a different pull down menu when the ECC is used. The pull down menu changes the IP address of the Uplink on the client end between JPL and the ECC. Subscribing to ECC support and participating in PITs will ensure proper mission configuration and capability from the ECC for either of these Uplink SLE connection distinctions.

If the ECC is activated due to the unavailability of DSOC, the ECC will be operating in an emergency support environment, which will in effect mean a reduced service performance capability. The emergency support environment may see an increase in the command radiation latency performance, and an increase in the telemetry data delivery latency performance in on-line timely, on-line complete, and off-line telemetry data flows. The latency increase is mainly due to available bandwidth from the ECC to the project MSA/MOC. Minor impacts to tracking data latency may be seen.

The ECC provides four dedicated voice nets for emergency voice communications. The ECC has an Iridium satellite phone on site to provide emergency voice support in the event that local phone lines or cell service is down.

2.2.2 ECC Logistical Support

In the event of a DSN emergency in which the DSOC is unavailable for use, the ECC will be utilized to provide emergency support. DSN and mission (for those missions who have hosted equipment that need activation) personnel will need to staff and utilize the ECC. To support these personnel in the event of an ECC activation, the ECC will provide the following logistical support:

- Cots and blankets for emergency support personnel
- Access to dormitory facilities on GDSCC
- Pre-stored food supplies to support emergency support personnel for 30 days
- Food preparation facilities
- Restroom facilities and supplies
- Pre-stored water supplies for 30 days of operations
- Business supplies for 30 days of operations

2.3 ECC Activation

The decision to activate the ECC should be made within 1-2 hours from the time of DSNPO/IND notification of a DSN COOP incident. In the event of a COOP event requiring the activation of the ECC, the DSNPO Manager, Deputy Manager, or the Interplanetary Network Directorate (IND) Director will authorize the activation of the ECC in accordance with DSN COOP plans and procedures. Once activation has been authorized by the DSNPO or IND, ECC activation notifications will be sent to all appropriate DSN and subscribing mission personnel announcing ECC activation. The ECC is located on GDSCC within the Ft. Irwin Military Reservation. (See Figure 2-3). The ECC is located in Building G-26 at GDSCC. Access through Ft. Irwin to the GDSCC facility is managed through the GDSCC Security & Services Manager. Pre-authorized badge reader access to the ECC needs to be arranged via the MIM and the DSN Emergency Preparedness Coordinator (DEPC), in accordance with DSN standard operating procedures.
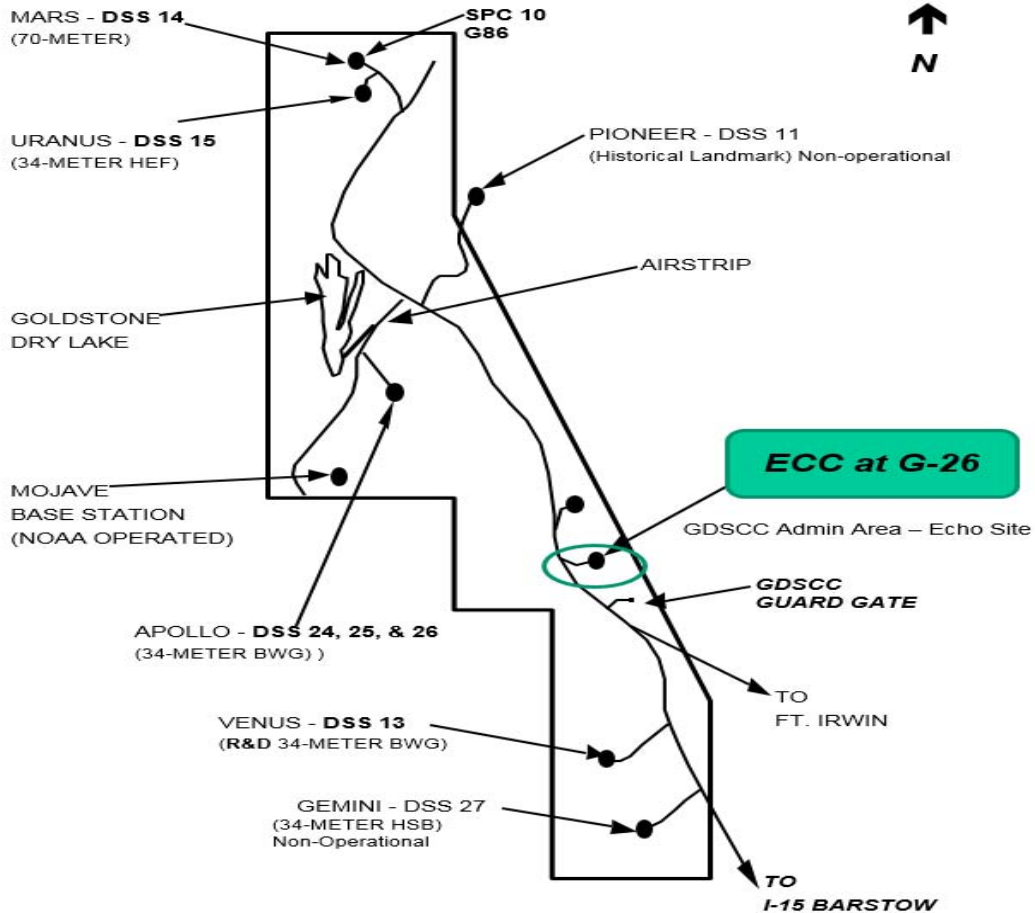
Figure 2-3: Location of ECC

Figure 2-3. Location of ECC

2.3.1 Criteria for ECC Activation

In the event of a major emergency or DSN COOP event, DSNPO or IND Management will use the following criteria in determining when to activate the ECC:

1) Activation of the ECC will be in accordance with DSN COOP plans and procedures in response to:

   a) Actual and potential denial of access to any DSN facility due to known threats and emergencies (with warning). Some threats may afford advance warning that will permit orderly alert, notification, and (if necessary) evacuation of employees. Examples are a wild fire, transportation accident with the potential for the release of hazardous material, or the threat of a terrorist act.

   b) Unanticipated threats and emergencies during non-duty hours (no warning). Earthquake, arson, terrorism or a hazardous material incident may occur, without warning, when the majority of the staff is not at work.

c) Unanticipated threats and emergencies during duty hours (no warning). Incidents may also occur, without warning, during normal office hours. In this case, implementation of the COOP would be preceded by execution of a JPL building occupant emergency evacuation plan.

The ECC shall be activated if the following Recovery Time Objectives (RTOs) are expected to exceed:

Table 2-1. Essential Functions for Tracking Operations at the DSOC

Item #	Essential functions; Tracking Operations at DSCCs	RTO (Hours)
1	Receive, process, archive/deliver spacecraft telemetry data to flight projects.	12
2	Provide command radiation control.	12
3	Receive, process, and archive radio metric data.	12
4	Generate and deliver support data products required by the Deep Space Stations (DSSs) conduct tracking operations; 7-day Operations Schedule, antenna pointing predictions, downlink frequency predictions, uplink frequency predictions.	12
5	Provide monitor and control functions for DSOC support, including voice and data communications with the Deep Space Communication Complexes (DSCCs).	12

2.3.2 ECC Activation via Remote Operations Center (ROC)

In the event of an emergency or COOP incident requiring the activation of the ECC, the ECC can be activated either by DSN personnel physically residing at the ECC or remotely from the ROC. The use of the ROC allows DSN personnel who are prevented from going to the ECC due to restricted road access to speed up the ECC start up time. DSN personnel will utilize workstations and systems in the ROC to remotely access and login to ECC systems, via the ROC-ECC communication line, to startup and activate the ECC.

DSN personnel will follow standard ECC activation procedures, but they will perform the activation remotely from the ROC.

Note

The ROC does have the capability to support a limited number of flight project personnel should a mission's prime MOC be rendered inoperable. The use of the ROC in this fashion would need to be discussed and negotiated with the DSNPO, MIM, and the Mission.

2.3.3 ECC Subscribers Notification of ECC Activation

To ensure that the DSNPO can respond effectively to any DSN COOP or emergency event requiring ECC activation, several alternatives are available for alerting personnel and maintaining communications during a DSN emergency. These are JPL Emergency Notification System (ENS), operational voice

circuits, land lines, cell phones, satellite phones, email, or text messages. Depending on the availability of these services, some or all of these alternatives may be used.

2.4　　　　Summary of Support Provided

During an emergency or COOP event, the ECC will not provide the full set of services nominally provided at the DSOC. It will provide the following two support category limited set of services:

1. **Contingency TT&C Delivery:**
   a. Command (CMD) Services (Reference Section 3.2)
   b. Telemetry (TLM) Services (Reference Section 3.3)
   c. Tracking (TRK) Services (Reference Section 3.4)
   d. Service Management (SM) (Reference Section 3.5)
2. **MOC Equipment Hosting**
   a. Project MSA/MOC Hosting (Reference Section 3.6)

The following DSN services are not supported in the event of an ECC activation:

Calibration and Modeling:
   a. Platform Calibration Service
   b. Media Calibration Service
      i. Earth Orientation Parameters (EOPs)
      ii. Ionosphere Calibration
      iii. Troposphere Calibration

Radio Science:
   a. Experiment Access Service
   b. Data Acquisition Service

Radio Astronomy – Very Long Baseline Astronomy (RA-VLBI):
   a. Signal Capturing Service
   b. VLBI Data Acquisition Service
   c. VLBI Data Correlation Service

Radar Science:
   a. Experiment Access Service
   b. Data Acquisition Service

Section 3
ECC Services Support

3.1   Introduction

In the standard nominal operations environment at DSOC, the DSN provides all services listed in the *820-100, DSN Services Catalog.*
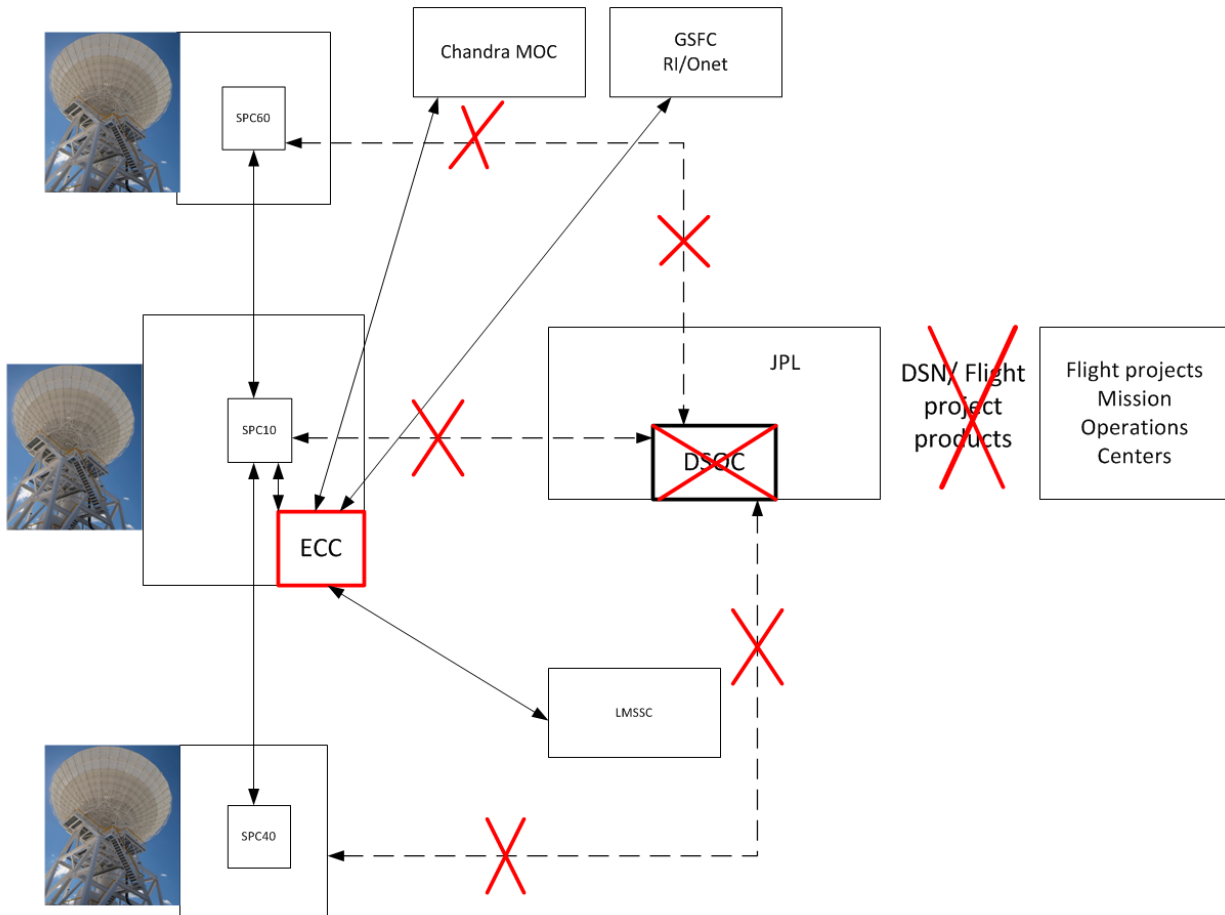
Figure 3-1: Interruption of DSN Services

When an interruption of DSN services occurs due to an emergency or COOP event requiring ECC activation (see Figure 3-1), the ECC will provide a limited set of services support for a minimum of 30-days. (See Figure 3-2). Sections 3.2 - 3.6 describe the services support provided at the ECC.

Note

If a mission desires to use a service not currently provided by the ECC, the DSNPO will work with the mission through the MIM to determine if the

service can be implemented at an affordable cost and rate, with the allocation of costs determined through negotiation with the DSNPO, MIM and Mission.
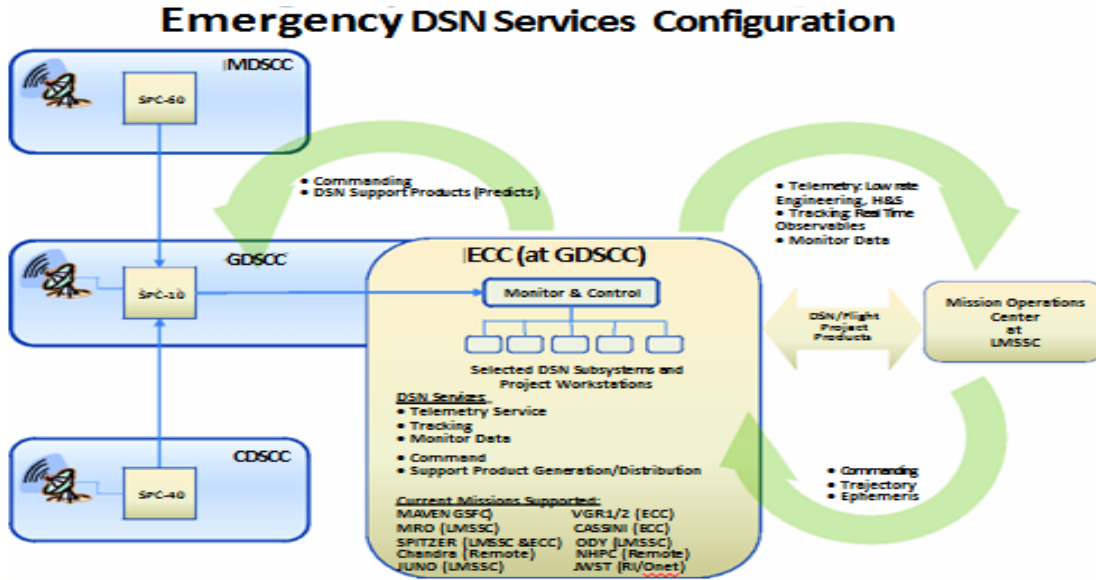
Figure 3-2: Emergency DSN Support Configuration

3.2 CMD Services

As part of ECC Contingency TT&C Delivery support, the ECC provides the following command services:

1) Command Radiation Service:
   a) Stream mode
   b) File mode.

   Characteristics:
   o Low-rate and Medium-rate command data rates.
   o Forward Command Link Transmission Unit (CLTU) via Space Link Extension (SLE)
2) Command Delivery Service:
   c) Commands stored on Distributed Object Manager (DOM) file manager

3.2.1 Customer-Provided CMD Inputs

1) Project command files must be pre-stored on the ECC CMD DOM file storage. Missions must store the files in advance.

3.3 TLM Services

As part of ECC Contingency TT&C Delivery support, the ECC provides the following telemetry services:

1) Telemetry Return Frame Services – via SLE Delivery.
2) Telemetry Frame Services – Non-SLE Delivery.

3) Telemetry Packet Service: Packet Service for all subscribed missions.

Characteristics:

- o Low rate Engineering TLM data.
- o Spacecraft (S/C) Health & Safety Data rate.

3.3.1 TLM Service Limitations

In an emergency environment, the priority of DSN operations will be to provide TLM services to all subscribed missions in order to maintain their spacecraft (S/C) health and safety. Due to the smaller bandwidth available from the ECC, the TLM data rate throughput from the ECC to the project MOC/MSA will be on a per mission basis with a maximum service data rate of 120kbps per mission. Exceptions to this will be handled on a case-by-case basis through negotiation with the DSNPO. Telemetry science data will be available for retrieval after DSOC returns to nominal operations.

TLM data received at the DSCC will be recorded on-site on the Data Capture & Delivery (DCD) subsystem. The DCD provides for storage and recovery of TLM data for a 30-day period.

3.4 TRK Services

As part of ECC Contingency TT&C Delivery support, the following ECC tracking services are provided:

1) Real-time (R/T) 820-13, TRK-2-34 provided via GIF-SFG.
2) Quick-Look (QL) file delivery to Oscar-X server:
   a) TRK-2-34
   b) TRK-2-18
   c) TDM
3) Delta Differential One-way Ranging (Delta-DOR) support at the DSCC only if an analyst is available. Missions can negotiate for ECC support if it is a 841-001, Section 4, Level-1 event.

3.4.1 Customer-Provided Ephemeris Inputs

Mission spacecraft ephemeris (SPK) files received at the DSOC SPS, prior to a system failure, will be automatically transferred to the ECC. When the SPK inputs are no longer available on the ECC SPS, missions need to provide updated SPK inputs via the SPS Portal at the ECC.

3.5 Service Management

As part of ECC Contingency TT&C Delivery support, the following ECC service management capabilities are supported:

1) Real-time (R/T) Network Communications monitoring
2) Real-time (R/T) Scheduling
3) Service Preparation Subsystem (SPS) Portal Support
4) SPS Database
5) SPS Support Data Products Generation
6) Configure, monitor, and control of Telemetry, Tracking & Command (TT&C) Real-time support software.

7) Operates and manages the processing, generation, and distribution of 820-13, TRK-2-34 radiometric data through the GIF-SFG to subscribing missions.

8) Provides Real-Time Data Broadcasts and Multicast services.

9) Provides Automatic Real-Time Delivery of telemetry data from Telemetry Delivery Service (TDS) to remote LMSSC workstations.

10) Provides SLE Return-All-Frames (RAF)/Return-Channel-Frames (RCF) Telemetry Services.

11) Provides and manages 820-013, MON-0158 Data Processing and Distribution services. The 820-13, MON-0158 monitor data is provided via the TDS interface to RIONet users and Ground Interface (GIF) - Special Function Gateway (SFG) users.

12) Provides CMD_DOM file storage services.

3.5.1 Service Preparation

As part of Service Management (SM) services, service preparation is done by DSN O&M operations support personnel. If the ECC is activated, DSN O&M support personnel will utilize previously submitted schedules, ephemeris files, and sequence of events (SOE) inputs. The SPS database at the DSOC is mirrored and/or replicated twice weekly to the ECC as a service database back up. The SPS database at these two points will be utilized as recovery points if necessary. The SPS Portal at the ECC will allow the projects to submit SPKs, DSN Keyword File (DKF) or SOE sequence inputs, or project schedule updates for new support data product processing requests.

DSN Scheduling will support reduced schedule data generation. A real-time change of the DSN 7-Day schedule will only be performed by the Ops Chief at the ECC. The Telecommunications Missions Operations Directorate (TMOD) Integrated Ground Resource Allocation System (TIGRAS) Scheduling tool will be used for ECC real-time scheduling purposes. The Service Schedule Software (SSS) Mid-Range scheduling tool will not be available at the ECC. DSN O&M will provide limited Support Data Package (SDP) generation capabilities. Multiple Spacecraft per Antenna (MSPA) and Antenna ARRAYs will be supported if they are in the DSN schedule prior to ECC activation. New MSPA and ARRAY supports will be scheduled only if sufficient resources are available during the emergency.

3.5.1.1 Customer-Provided Service Management Inputs

The ECC will rely on Nominal SOEs (NSOEs) for SDP generation if no DSN Keyword File (DKF) is provided.

3.6 ECC Mission MSA Hosting

As part of ECC MOC Equipment Hosting support, the ECC can provide space for missions to install ground data systems equipment as an alternate for their prime MSA or MOC. If missions require equipment to be installed at the ECC, the missions shall assume the expenses for installing the equipment. Physical access to the ECC will require approved access privileges through the Ft. Irwin Military Reservation to GDSCC and to the ECC. Personnel needing access to the ECC must adhere to DSN ECC badging process. Since mission command radiation is reliant on an operator at a MOC, command binds can be supported for missions with equipment at the ECC. Missions must supply project support personnel to run their ECC equipment. The ECC provides a reduced capability only for Radio Metric Data Conditioning (RMDC) personnel. Missions must install navigation equipment at the ECC to access the navigation files.

3.7 ECC Support Cost Model

The DSNPO utilizes a cost model for determining the cost of ECC support provided to the missions. The ECC model takes into account such service items as connection fees, communication line installation fees, hardware installation costs, and indirect costs such as operational tests and checkout relevant to the mission. The exact costs will be worked with the specific Mission, MIM, and DSNPO management. The agreed upon cost will be documented by the MIM into the appropriate mission DSA or OICD.

Section 4
Mission ECC Subscriber Responsibilities

As part of ECC MOC Equipment Hosting support, this section describes the responsibilities or actions that missions who subscribe to the ECC need to take to ensure ECC support is available when needed in the event of an emergency or COOP event. The MIM must document the responsibilities in the DSA or OICD with concurrence of the mission.

4.1 All ECC Users/Subscribers

As an integral part of subscribing to ECC services, all users must agree to and accept the following conditions and responsibilities:

1) Mission must complete an ECC Services Questionnaire to document the requested ECC support.
2) Missions must coordinate their project emergency operations or COOP plans with the DSN.
3) Missions must support periodic, biannual tests with their project interface with the ECC.
4) Missions must cover the expenses for their communication circuits to the ECC for those not using the RI/O Net.
5) Missions must provide a list of engineering Virtual Channel (VC) numbers, which will be the VCs that are available to the mission during ECC operations.
6) In the event of an emergency requiring ECC activation, missions must be aware that they may be asked by the Ops Chief at the ECC to reduce their scheduled tracking time to an amount of time needed to only support spacecraft health and safety operations.

4.2 MSA/MOC Users/Subscribers

For those missions who subscribe to use the ECC as a local backup MSA/MOC in the absence of alternate RMOC, these users must agree to and accept the following conditions and responsibilities:

1) Missions using the ECC must follow and adhere to JPL Information Technology (IT) Security requirements.
2) Missions using the hosting of project hardware capability must perform regular maintenance and hardware sustaining updates as necessary.
3) Missions must provide trained project operations support personnel to effectively run mission supplied hardware and equipment.
4) For missions who have equipment at the ECC, personnel requiring access to the ECC must notify the DSN and complete the required ECC badge reader access authorization process for unescorted access.

Section 5
ECC Future Capabilities

The following list of items are being considered for future delivery and implementation at the ECC, but are not necessarily committed:

1) Auto SPS Replication
2) Relay/CFDP Processing
3) Additional TRK capabilities (RMDC automation)

Appendix A
Acronyms and Abbreviations

AMMOS	Advanced Multi-Mission Operations System
B/W	bandwidth
CCSDS	Consultative Committee for Space Data Systems
CDE	Cognizant Development Engineer
CFDP	Command File Delivery Protocol
CLTU	Command Link Transmission Unit
CMD	Command (DSN Subsystem)
COOP	Continuity of Operations Plan
CSO	Communications Services Office
DCD	Data Capture & Delivery (DSN Subsystem)
DDOR	Delta-Differential One-Way Ranging
DEPC	DSN Emergency Preparedness Coordinator
DKF	DSN Keyword File
DLS	DSN LAN Switch
DOM	Distributed Object Manager
DSCC	Deep Space Communications Complex
DSA	DSN Service Agreement
DSN	Deep Space Network
DSNPO	DSN Project Office (JPL Office 920)
DSN O&M	DSN Operations & Maintenance
DSN SE	DSN Systems Engineer
DSOC	Deep Space Operations Center
DSOT	Data System Operations Team
DSS	Deep Space Station
DTT	Downlink Tracking and Telemetry Subsystem
ECC	Emergency Control Center
EOP	Earth Orientation Parameter
ESA	European Space Agency
FDF	Flight Dynamics Facility (Goddard, MD)
GCF	Ground Communications Facility

GCR	Ground Communications Routing
GDSCC	Goldstone Deep Space Control Center
GIF	GCF Interface (Software)
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
IND	Interplanetary Network Directorate (JPL 9X Organization)
ISDN	Integrated Services Digital Network
IT	Information Technology
JAXA	Japan Aerospace Exploration Agency
JPL	Jet Propulsion Laboratory
kb	kilo-bit
LAN	Local Area Network
LMSSC	Lockheed Martin Space Services Company (Denver, CO)
Mb	Mega-bit
MIM	Mission Interface Manager
MOC	Mission Operations Center
MON	Monitor
M&C	Monitor & Control (DSN Subsystem)
MOVE	Mission Operational Voice Enhancement
MSA	Mission Support Area
MSPA	Multiple Spacecraft Per Antenna
NASA	National Aeronautics and Space Administration
NAV	Navigation
NMC	Network Monitor & Control (DSN Subsystem)
NOCT	Network Operations Control Team
NOPE	Network Operations Project Engineer
NSOE	Nominal Sequence of Events
O&M	Operations & Maintenance
OEM	Orbit Ephemeris Message
OICD	Operations Interface Control Document
QL	Quick-Look

RA	Radio Astronomy
RAF	Return All Frames
RCF	Return Channel Frames
RIONet	Restricted Internet Protocol Operational Network
RMDC	Radio Metric Data Conditioning
RMOC	Remote Mission Operations Center
ROC	Remote Operations Center
RPDU	Return Protocol Data Units
R/S	Radio Science
R/T	Real-time
RTLT	Round-Trip Light Time
RTO	Recovery Time Objective
S/C	spacecraft
SCMF	Spacecraft Command Message File
SDP	Support Data Package
SE	Systems Engineer
SFG	Special Function Gateway
SFOF	Space Flight Operations Facility
SIS	Software Interface Specification
SLE	Space Link Extension
SM	Service Management
SOE	Sequence of events
SOP	Standard operating procedure
SPC	Signal Processing Center
SPK	Spacecraft and Planet Kernel
SPS	Service Preparation Subsystem
SSF	Software Support Files
SSS	Service Scheduling Software
TDDS	Tracking Data Delivery Software
TDS	Telemetry Delivery Service
TIGRAS	TMOD Integrated Ground Resources Allocation Systems

TLM	Telemetry (DSN subsystem)
TMOD	Telecommunications Mission Operations Directorate (old name for IND Office)
TRK	Tracking (DSN Subsystem)
TRK TDS	Tracking Telemetry Delivery Software
TSS	Tracking Support Specialist
TT&C	Telemetry, Tracking & Command
UDP	User Datagram Protocol
UPA	Uplink Processing Assembly
UPL	Uplink Tracking and Command Subsystem
URL	Universal Reference Locator
UTC	Universal Time Coordinated
UTP	Unified Telecomm Predictions (i.e. Telemetry Predictions
VC	Virtual Channel
VLBI	Very Long Baseline Interferometry

Appendix B
Process for Subscribing to ECC Support

For any new or current missions who want to subscribe to DSN ECC support, the subscription process is shown in Figure B-1. The MIM is the key initial DSN interface to any missions who are interested in obtaining and subscribing to ECC support.

Note: The planning cycle for missions wanting ECC support should begin approximately eighteen (18) months prior to the actual need date for ECC support.
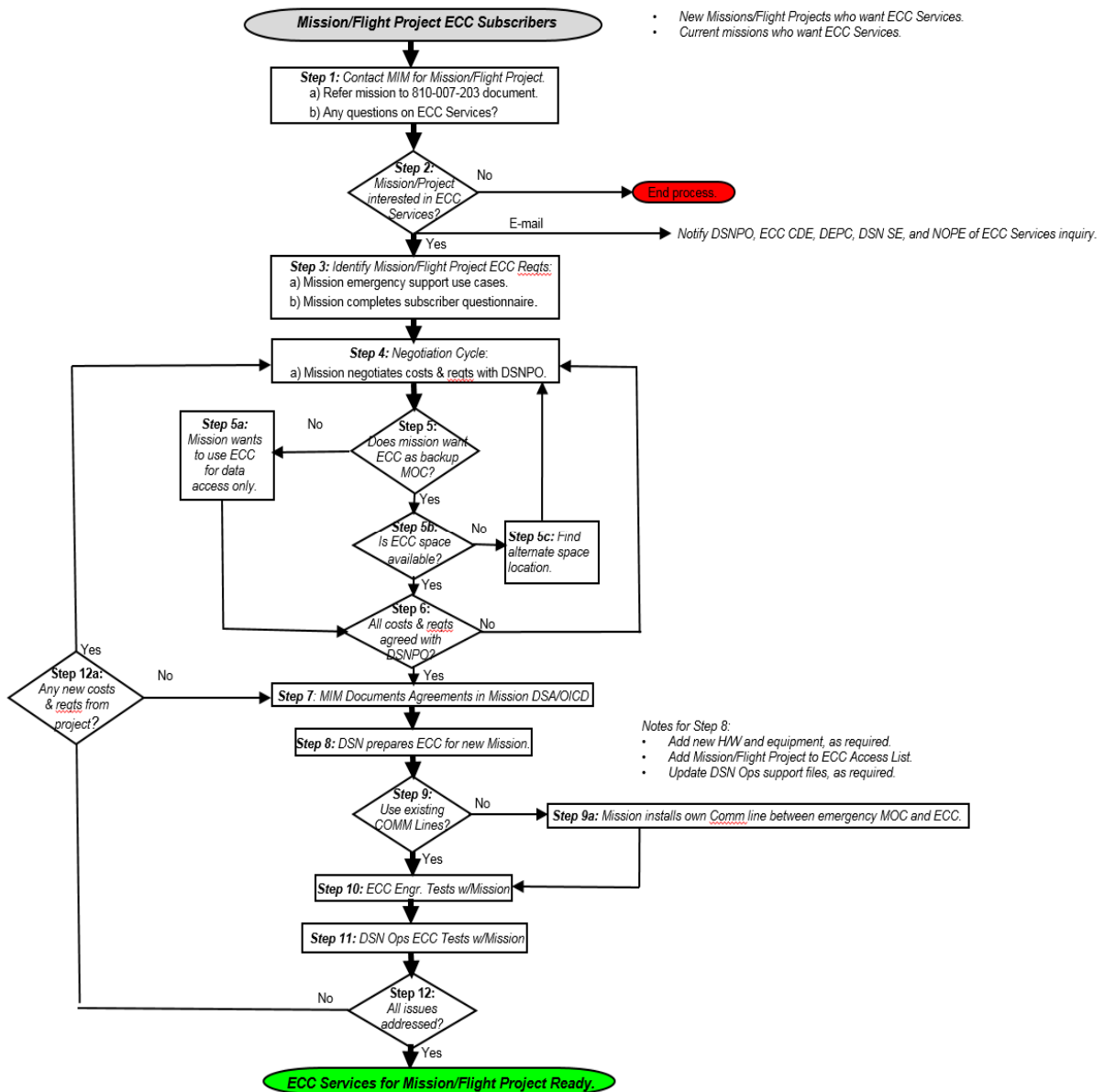

Figure B-1. ECC Subscription Process for Missions

Appendix C
ECC Subscriber Questionnaire

Missions/Flight Projects who want to obtain ECC support must complete a questionnaire. The latest version of the questionnaire can be found on the DSN COOP website at: http://dsn.jpl.nasa.gov/DSN-COOP/

An example of the questionnaire is shown below:

Mission/Flight Project:	
POC:	
Title/Function:	
Email:	

During a DSN Continuity of Operations Plan (COOP) or Emergency Control Center (ECC) activation event, the DSN will need to operate in a reduced level of services mode, in which the focus of DSN operations will be to provide a limited set of emergency services and support to enable each mission to maintain their spacecraft in a healthy and safe condition. To that end, the DSN needs to understand the minimum support requirements for each mission subscribing to ECC support services in order to help prioritize necessary DSN emergency services and support. The information gathered from this questionnaire will be used by the DSN to better allocate ECC support services equipment and resources. The ECC support services provided to a mission will be documented in the mission's respective DSN Service Agreement (DSA) or Operations Interface Control Document (OICD) by the MIM.

Note: The DSN recommends that each mission perform a thorough spacecraft emergency operations use case study and emergency scenarios analysis prior to completing this questionnaire.

Item No.	Question	Response
Section 1: Telemetry Services		
1.1	What is the mission's minimum telemetry data rate to maintain spacecraft health and status?	
1.2	How often must telemetry be monitored by the mission in a spacecraft emergency? (Hourly, daily, twice a day, every other day, weekly, monthly, etc.)	
1.3	What is the mission's minimum acceptable telemetry data latency in the event of an emergency?	
Section 2: Command Services		

Item No.	Question	Response
2.1	If applicable, what is the mission's command loss timer expiration requirement?	
2.2	Does the mission have any emergency command file storage requirements? If so, please list them here.	
Section 3: Tracking Services		
3.1	Does the mission have any unique tracking data emergency support requirements? If so, please list them here.	
Section 4: Service Management		
4.1	Does the mission have any unique monitor data support requirements in the event of an emergency? If so, please list them here.	
4.2	Does the mission have any unique sequencing requirements in an emergency? If so, please list them here.	
4.3	Will the mission provide a Nominal Sequence of Events (NSOE) for use in generating support products in the ECC?	
4.4	What is the mission's minimum daily scheduled track activity time necessary to maintain spacecraft health and status?	
4.5	Does the mission have any unique view period support requirements? If so, please list them here.	
4.6	What is the missions minimum DSN Scheduling Configuration Code for supports during an emergency?	
Section 5: Voice Communication		
5.1	Does the mission have any unique emergency voice communication requirements? If so, please list them here.	
Section 6: Mission MSA/MOC Hosting		
6.1	If the primary mission MSA or MOC were destroyed or rendered inoperable, would the mission utilize the ECC hosting services and physically relocate to the ECC or use ECC services remotely from an alternate MSA?	
6.2	If using ECC hosting services physically on-site, what is the minimum number of mission support staff required to operate from the ECC?	

Item No.	Question	Response
6.3	If using ECC hosting services physically on-site, what is the number of mission personnel who may require housing or lodging in the event of ECC activation?	
6.4	If using ECC hosting services physically on-site, does the mission require wireless access? If so, how many laptops or wireless access devices would need access?	
Section 7: General		
7.1	Does the mission have any unique critical science data collection requirements? (i.e., risk if science data lost, etc.). If so, please list them here.	
7.2	Does the mission have any unique critical uplink issues or requirements? (i.e., critical commanding on a daily basis, etc.). If so, please list them here.	
7.3	Does the mission have any critical downlink issues or requirements? (i.e., downlink data volume per day, downlink process execution issue, etc.). If so, please list them here.	
7.4	Does the mission have any critical on-board storage issues that the DSN should be aware of? (i.e., risk of filling the on-board storage before or after ECC activation, etc.). If so, please list them here.	
7.5	In an emergency, what is the missions preferred method of notification for ECC activation?	☐ Email: _____ ☐ Cell Phone:_____ ☐ Text Message:_____ ☐ Satellite Phone:_____ ☐ Business Phone: _____ ☐ JPL ENS: _____ ☐ Other:_____
7.6	Any other unique mission support requirements during a spacecraft emergency or ECC activation?	
Additional Comments:		