# Proposed Planning & Scheduling Services for the SNC in the CDOS Era

December 1990

Todd Welden CSC/520

---

### Agenda

- Introduction
- Proposed SNC data flow for CDOS era customers
- Generic Scheduling Concept
- P&S services SNC could provide in the CDOS era
  - Provide security
  - Maintain a data base
  - Generate universal time interval sets
  - Process queries
  - Process a robust generic request language
Motivation for this presentation

- Studies indicate that the current NCC mode of operation needs to be enhanced to meet the needs of the mid to late 1990s.
  - CDOS Operations Management Service (COMS) Planning and Scheduling Concept Assessment (DSTL-90-010, CSC/TM-90/6079)
  - EOS Planning/Scheduling/Command Management Study (CSC/TM-90/6054)
- There is a need to simplify the request interface for SN services
  - More complex missions
  - More flexible spacecraft operations
  - More scheduling data volume
  - Events per spacecraft and scheduling period
Motivation for Generic Scheduling Use

- Proposed for all missions in the CDOS era, in some form
  - COBE is using a customized "generic" request interface for user requests
  - ERBS is using a customized "generic" request interface for user requests
  - UARS will be using generic scheduling
  - EOS plans to use generic scheduling

Generic Scheduling Concept

Encompasses four major classifications of requests

- Requests for multiple activities with no flexibility
  - Schedule an activity each day starting at exactly noon
  - Schedule an activity sometime during every other orbit

- Requests for a single activity with no flexibility
  - Schedule one activity starting at 90:123:12:00:00 ± 15 minutes

- Requests for multiple activities that are flexible

- Requests for a single activity that are flexible
Generic Scheduling

- Generic scheduling is a viable mode of operation for the SNC
  - Supports specific / inflexible requests
  - Allows a great deal of customer flexibility
  - Allows customers to symbolically define and reference constraints
  - Allows the expression of complex relationships
  - Allows single requests for multiple instances of the same activities
  - Allows flexible resource requirements
  - Allows requests with flexible durations
  - Allows the scheduler more flexibility when scheduling
  - Leads to less impact when rescheduling or adding new events

December 1990

Provide Security

Motivation:
- Access to mission data must be restricted to only the owner

Service:
- Access to mission data only by owner
- Current NCC restrictions are adequate
Maintain a Data Base

Motivation:
- SNC is always on-line
- Missions require the same type of data maintained by SNC
- Provides a centralized repository for data
- Ensures data compatibility between customers and SNC
- Reduces redundancy of data flows

Service:
- Maintain a data base of
  - Configuration codes
  - UAV data
  - PSAT data
  - Ephemeris data
  - Previously submitted requests
  - Time interval sets

Generate Universal Time Interval Sets

Motivation:
- All customers will need the universal time interval sets
- Standardizes format and contents
- Leads to a standardized mode of operation with SNC

Service:
- Generate time interval sets from UAV, PSAT, Ephemeris data
  - TDRS contacts
  - Orbit starts/stops
  - Spacecraft days/night
P&S services SNC could provide in the CDOS era

Process Queries

Motivation:
- Reduces customer and SNC asynchronous data traffic
- Provides customers with correct and current information

Service:
- Send to the customer
  - TDRSS schedules
  - Configuration codes
  - UAV data
  - PSAT data
  - Ephemeris data
  - Previously submitted requests
  - Time interval sets

December 1990

GSFC / CSC

P&S services SNC could provide in the CDOS era

Process a Robust Generic Scheduling Language

Motivation:
- Allows all missions to use the same flexible, robust language
- Standardizes the scheduling language and SNC interface
- Most CDOS era missions will have their own scheduler for mission activities
- Leads to standardization of the scheduling engine core
- Leads to a standard scheduling language for
  - Mission scheduling
  - Investigator to mission interface
- Allows customers to specify multiple options for support
- Allows the scheduler flexibility in the scheduling of the requests
- Allows the scheduler to produce a schedule that retains as much of the flexibility as possible based on the final resource usage
- Allows schedule modification with minimal perturbation
- Rescheduling causes less impact and can be mostly automated

December 1990

GSFC / CSC
**P&S services SNC could provide in the CDOS era**

**Process a Robust Generic Scheduling Language**

**Service:**
- Allow additions, deletions, and replacements of:
  - Generic and specific requests
  - Individual request instances (events)
  - Pending (i.e. not yet scheduled) events
  - Scheduled events
  - Customer-defined time interval sets
- Allow one generic request to generate multiple events
- Allow flexible time intervals (time tolerance / windows)
- Allow flexible request durations
- Allow preferred and alternate sets of resource requirements
- Allow a "wildcard" TDRS ID and antenna ID

Dec. 1990

GSFC / CSC