



# ADDING A MISSION TO THE JOINT POLAR SATELLITE SYSTEM (JPSS) COMMON GROUND SYSTEM (CGS)

Shawn W. Miller, Raytheon JPSS CGS Chief Architect, Aurora CO  
 Kerry Grant, Raytheon JPSS CGS Chief Scientist, Aurora CO  
 Michael Jamilkowski, Raytheon JPSS CGS Customer Liaison, Greenbelt MD

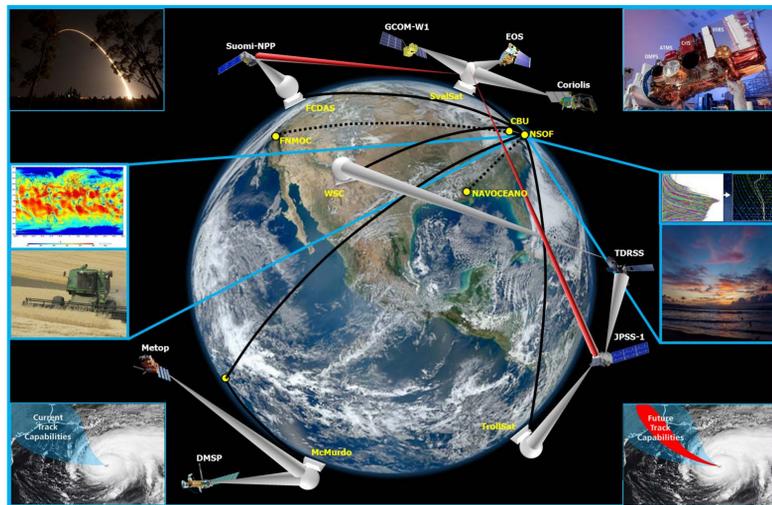


Figure 1. Multi-Mission Operations Concept.

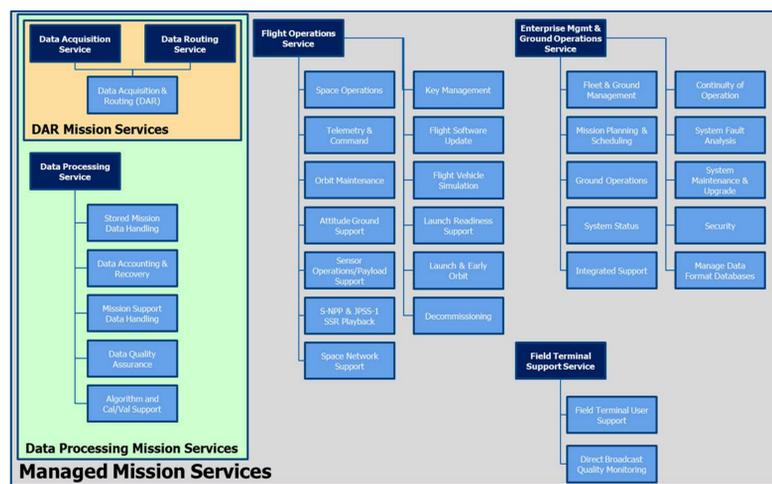


Figure 2. CGS Services

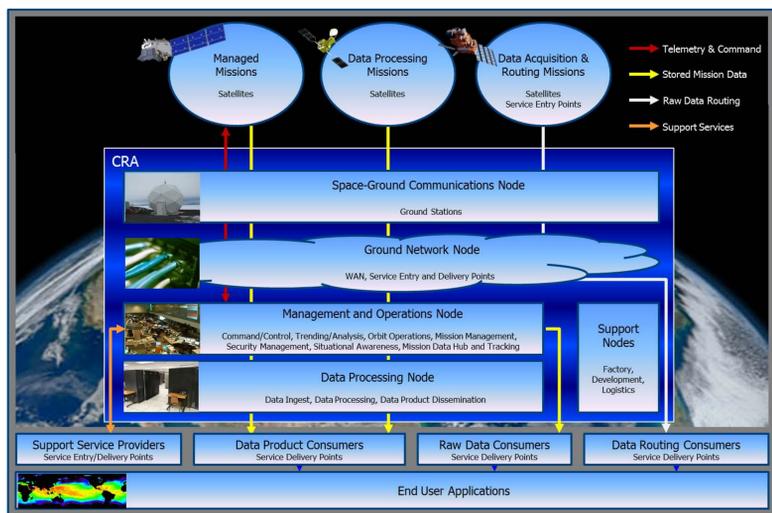


Figure 3. CGS Architecture

## Multi-Mission Support for Current and Future Systems

The Joint Polar Satellite System (JPSS) Common Ground System (CGS), developed and deployed by Raytheon Intelligence, Information and Services (IIS), manages and supports numerous missions, as shown in Figure 1. The CGS architecture is currently being upgraded to:

1. Support JPSS-1 launch in early 2017
2. Increase operational robustness of Suomi NPP (S-NPP) for critical weather forecasting
3. Leverage S-NPP lessons learned for latency and availability performance
4. Take advantage of newer, more reliable and efficient technologies for transporting and transforming space-based observations into environmental data products for end users

Figure 2 summarizes the three different categories of services provided by the CGS:

1. **Managed Mission Services:** CGS flies the satellite, manages mission resources, acquires and/or routes the raw data, and generates and distributes data products
2. **Data Processing Mission Services:** CGS acquires and/or routes the raw data, generates and distributes data products
3. **Data Acquisition and Routing Mission Services:** CGS acquires and/or routes the raw data

Figure 3 shows the high-level architecture of the CGS as it applies to these three categories of services.

## CGS Scalability for Adding Missions

Scalability is a key tenet of the CGS. Table 1 summarizes the CGS scalability requirements and associated architectural enablers. Figure 4 shows a level-deeper picture of the architecture, annotated with a mapping to the Joint Architecture Reference Model (JARM) and locations of CGS extension points for scalability. These extension points enable the addition of new missions to the CGS, and essentially serve as a “checklist” per each new mission, which has been demonstrated in expanded CGS multi-mission support to date.

For example, the addition of Data Acquisition and Routing support for DMSP required the use of extension points 1 (configuration of CGS receptors at McMurdo) and 6 (connection to the service delivery point for the 557<sup>th</sup> Weather Wing). The addition of Data Acquisition and Routing support for Metop required the use of extension points 1 (shared antenna usage at SvalSat), 2 (routing to the NSOF for data processing), 4 (code to package the raw data into HDF) and 5 (delivery of the raw data to a local delivery point at the NSOF).

Table 1. CGS Scalability Requirements and Enablers

Mission Services	Baseline Support	Scalability Requirement	Architectural Enablers
Managed Missions	<ul style="list-style-type: none"> <li>• S-NPP</li> <li>• JPSS-1</li> <li>• JPSS-2</li> </ul>	<ul style="list-style-type: none"> <li>• 2 Solar Irradiance Missions</li> <li>• DoD Weather Mission</li> <li>• JPSS-equivalent Mission</li> </ul>	<ul style="list-style-type: none"> <li>• Scalable hardware</li> <li>• Virtualization</li> <li>• Mission-specific software slots</li> <li>• Global scalable WAN</li> </ul>
Data Processing	<ul style="list-style-type: none"> <li>• GCOM-W1</li> </ul>	<ul style="list-style-type: none"> <li>• GCOM-W2</li> <li>• GCOM-W3</li> <li>• GCOM-C1</li> <li>• GCOM-C-equivalent Mission</li> </ul>	<ul style="list-style-type: none"> <li>• Scalable hardware</li> <li>• Virtualization</li> <li>• Global scalable WAN</li> </ul>
Data Acquisition & Routing	<ul style="list-style-type: none"> <li>• NSF</li> <li>• DMSP</li> <li>• Metop</li> <li>• ScAN</li> <li>• Coriolis</li> </ul>	<ul style="list-style-type: none"> <li>• Metop-equivalent Mission</li> <li>• POES-equivalent Mission</li> </ul>	<ul style="list-style-type: none"> <li>• Scalable hardware</li> <li>• Global scalable WAN</li> </ul>

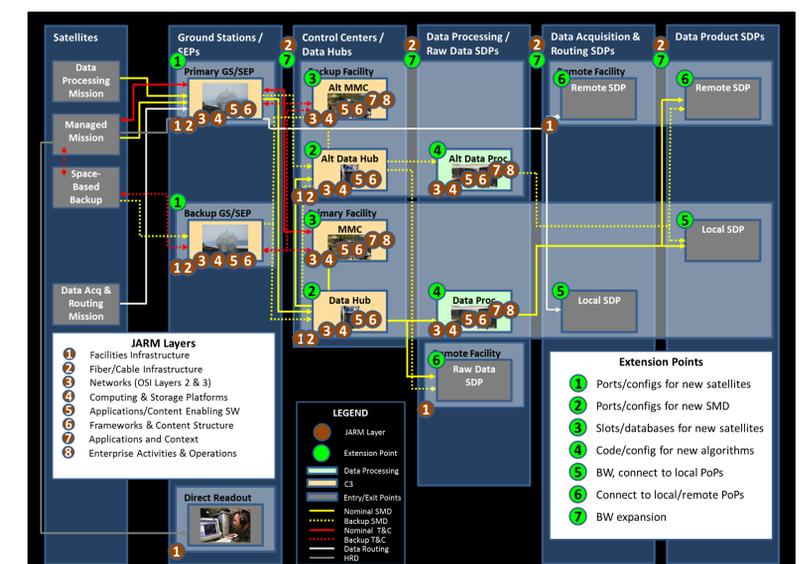


Figure 4. CGS Architectural Extension Points

## Summary

The CGS provides support to multiple national and international missions today, and the processes used to build this portfolio can be easily extended to new missions in the future.