



CGMS, 34, NOAA-WP-38
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Agenda Item: I/1
Discussed in WG1

CURRENT AND FUTURE NOAA SATELLITE NETWORKS

(SFCG AGENDA ITEM 10. MISSION PLANS)

This document provides a description of current and future NOAA satellite networks as well as a list of radio frequencies used/to be used by these networks.

CURRENT AND FUTURE NOAA SATELLITE NETWORKS

1

Network name: Polar Operational Environmental Satellites (POES)

Launch of first satellite: October 1978 (TIROS N)

General objective: Earth observation. Collects numerous Earth atmospheric and surface condition parameters such as ice, snow and vegetation; atmospheric temperatures; moisture, aerosol, and ozone distribution. Monitors solar activity and its effect on the Earth's atmosphere. Also detects and locates Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs) as part of the international COSPAS-SARSAT system.

Orbit: LEO polar at 13:30 and 21:30 (time of ascending node equatorial crossing)

Number of satellites: 2

2

Network name: National Polar-Orbiting Operational Environmental Satellite System (NPOESS)

Expected planning date for launch of first satellite: 2013

General objective: Earth observation. Collects numerous atmospheric and surface condition parameters such as ice, snow and vegetation; atmospheric and surface temperatures, pressures and moisture content; wind speed, cloud characteristics, aerosol, and ozone distribution. Monitors solar activity and its effect on the Earth's atmosphere. Also detects and locates Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs) as part of the international COSPAS-SARSAT system.

Orbit: LEO polar at 13:30 and 17:30 (time of ascending node equatorial crossing)

Number of satellites: $2 \times 2 = 4$

Main ground station(s): Svalbard (Norway) and worldwide receptor sites at 15 locations

3

Network name: National Polar-Orbiting Operational Environmental Satellite System Preparatory Project (NPP)

Expected planning date for launch of satellite: 2009

General objective: Earth observation. Collects and distributes remotely-sensed land, ocean, and atmospheric data to the meteorological and global climate change communities as the responsibility for these measurements transitions from existing Earth-observing missions such as Aqua, Terra and Aura, to the NPOESS. It will provide atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties. NPP will also provide risk reduction with an opportunity to demonstrate and validate new instruments and processing algorithms, as well as to demonstrate and validate aspects of the NPOESS command, control, communications and ground processing capabilities prior to the launch of the first NPOESS spacecraft.

Orbit: LEO polar at 13:30 (time of ascending node equatorial crossing)

Number of satellites: 1

Main ground station(s): Svalbard (Norway)

4

Network name: Geostationary Operational Environmental Satellites (GOES)

Launch of first satellite: April 1994 (GOES-I)

General objective: Earth observation. Collects numerous atmospheric and surface condition parameters such as ice, snow and vegetation; atmospheric temperatures; moisture, aerosol, and ozone distribution using instruments sensing in visible, near-IR, and thermal IR frequencies.

Space and Solar Instruments. Instrumentation on the GOES I-M series monitors the highly-variable solar and near-Earth space environment. These observations are used to protect life and property of those adversely impacted by space weather conditions. The measurements made by these instruments contribute to the global Earth and Solar observations that are used in NOAA's operations to continuously specify and forecast conditions in the space environment.

Other. The satellites also detect Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs) as part of the international COSPAS-SARSAT system.

Orbit: Geostationary; locations: 75W and 135W.

Number of satellites: 5

Main ground station(s): US: Wallops VA (primary), Greenbelt MD (backup), Boulder CO (solar instrument data), Goldstone CA (contingency support).

5

Network name: GOES N-P Satellite series

Launch of first satellite: May 2006

General objective: Earth observation. Collects numerous atmospheric and surface condition parameters such as ice, snow and vegetation; atmospheric temperatures; moisture, aerosol, and ozone distribution using instruments sensing in visible, near-IR, and thermal IR frequencies.

Space and Solar Instruments. Instrumentation on the GOES N-P series to monitor the highly-variable solar and near-Earth space environment will continue a long history of space weather observations collected by the GOES program. These observations are used to protect life and property of those adversely impacted by space weather conditions. The measurements made by these instruments will contribute to the global Earth and Solar observations that are used in NOAA's operations to continuously specify and forecast conditions in the space environment.

Other. The satellites also detect Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs) as part of the international COSPAS-SARSAT system.

Orbit: Geostationary; locations: 75W and 135W.

Number of satellites: 3

Main ground station(s): US: Wallops VA (primary), Greenbelt MD (backup), Boulder CO (solar instrument data), Goldstone CA (contingency support).

6

Network name: GOES R Series Meteorological Satellites**Expected planning date for launch of first satellite:** 2012**General objective:** Earth observation. Collects numerous atmospheric and surface condition parameters such as ice, snow and vegetation; atmospheric temperatures; moisture, aerosol, and ozone distribution using instruments sensing in visible, near-IR, and thermal IR frequencies.

Space and Solar Instruments. Instrumentation on the GOES R series to monitor the highly-variable solar and near-Earth space environment continues a long history of space weather observations collected by the GOES program. These observations are used to protect life and property of those adversely impacted by space weather conditions. The expanded services from this new series of GSO metsats will improve the opportunity to support forecasters at NOAA's Space Environment Center; customers in other government agencies, such as DOD and NASA; commercial users of space weather services; and international space environment services. The instruments that contribute to new services and products include: the Solar Imaging Suite (SIS), that will measure solar x-rays and solar EUV radiation; a solar coronagraph (SCOR) that is part of the SIS suite of instruments, and is currently designated as a pre-planned product improvement instrument; and the energetic particle instruments, called the SEISS (Space Environment In-Situ Suite), that will provide multiple measurements characterizing the charged particle population, including measurements of the electron, proton, and heavy ion fluxes. Finally, Earth's magnetic field will be measured by a magnetometer (MAG) which is part of the spacecraft procurement. The measurements made by these instruments will contribute to the global Earth and Solar observations that are used in NOAA's operations to continuously specify and forecast conditions in the space environment.

Other. The satellites will also detect Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs) as part of the international COSPAS-SARSAT system.

Orbit: Geostationary; locations: 75W and ~137W.**Number of satellites:** 4**Main ground station(s):** US: Wallops VA, Greenbelt MD (backup).

NOAA SATELLITES

(Status: 25 August 2006)

TABLE 1: EARTH-TO-SPACE & SPACE-TO-SPACE FREQUENCIES
NGSO NETWORKS

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ¹	NOTES
POES	401.65	E-S	4K00G1D	1978	Data Collection Platforms
NPOESS	401.635	E-S	4K00G1D	2013	Data Collection Platforms
POES / NPOESS	406.05	E-S	4K00G1D	1978 / 2013	Search and Rescue EPIRB
NPOESS / NPP	1227.6	S-S Rx	24M0G1D	2013 / 2009	1.1.1 GPS-to- 1.1.2 NP OES S/N PP
NPOESS / NPP	1575.42	S-S Rx	24M0G1D	2013 / 2009	GPS-to-NPOESS/NPP
POES	2026	E-S	2M00G2D	1998	Command
NPP	2067.3	E-S E-S S-S Rx	4K0G7DDT 256K0G7D 6M04G7DDC	2009	Command Command TDRSS FWD
NPOESS	2106.4	E-S E-S S-S Rx	8K0G7DDT 512KG7D 6M16G7DDC	2013	Command Command TDRSS FWD
NPP	2247.5	S-S Tx	6M04G7DDC	2009	TDRSS RTN
NPOESS	2287.5	S-S Tx	6M16G7DDC	2013	TDRSS RTN

¹ DBIU: Date of Bringing In Use

TABLE 2: EARTH-TO-SPACE & SPACE-TO-SPACE FREQUENCIES
GSO NETWORKS

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ²	NOTES
GOES / GOES N / GOES R	401.70 (GOES N and R only) 401.85	E-S	N0N N0N	1994, 2006, 2012	Pilot
GOES / GOES N / GOES R	401.7-402.4	E-S	1K20G1DEN 300HG1DEN 400HG1DBN	1994, 2006, 2012	DCPR
GOES	406.025 406.05	E-S	4K00G7D	1994	Search and Rescue
GOES N	406.025 406.028	E-S	3KG1D	2006	WQSearch and Rescue
GOES R	406-406.1	E-S	1K60G1D	2012	Search and Rescue
GOES GOES N	2027.7	E-S	4M22G9D 4M22G1DBN	1994 2006	PDR
GOES GOES N	2033.0	E-S	50K00F9C 586KG1DCN	1994 2006	LRIT
GOES GOES N	2034.2	E-S	34K00G7D, 2M00G7D, 64K00G9D 36K0G2DBN	1994 2006	Command
GOES N	2034.7	E-S	27K0G1DCN	2006	EMWIN
GOES N	2034.8875 2034.9000 2034.9125	E-S	11K0G1DCN	2006	DCPI
GOES R	2028.4	E-S	586KG1DDN	2012	LRIT
GOES R	2030.7	E-S	96K0G1DDN	2012	EMWIN
GOES	2034.9, 2034.9125	E-S	300K00G9D	1994	DCPI

² DBIU: Date of Bringing In Use



TABLE 2 (Cont'd): EARTH-TO-SPACE & SPACE-TO-SPACE FREQUENCIES

GSO NETWORKS

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ³	NOTES
GOES R	2032.8125 2032.8250 2032.8375	E-S	11K0G1DCN	2012	DCPI
GOES R	2034.2	E-S	128KG1DCN 40K0G2DCN 34K0G2DCN	2012	Command
GOES R	2034.6	E-S		2012	Command
GOES R	2035.0	E-S		2012	Command
GOES R	2035.4	E-S		2012	Command
GOES R	2036.0	E-S	40K0G2DCN 1M00G3N	2012	Command/ Ranging
GOES R	7224	E-S	12M0G1DEN	2012	GRB

³ DBIU: Date of Bringing In Use



TABLE 3: SPACE-TO-EARTH FREQUENCIES

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ⁴	NOTES
POES	137.35 and 137.77 (or 137.1 and 137.9125) 137.50 and 137.62	S-E	38K00F1D	1978	APT
			46K00G1D	1978	TIP Data
NPOESS	465.9875	S-E	5K00G1D	2013	1.1.3 D a t a 1.1.4 C o l l e c t i o n 1.1.5 P l a t f o r m s
POES / NPOESS	1544.5	S-E	750KG2D	1978/2013	1.1.6 S e a r c h a n d R e s c u e
POES	1698, 1702.5, 1707	S-E	5M34G7D	1978	1.1.7 H R P T
NPOESS	1707	S-E	6M0G7D	2013	LRD
POES NPP	2247.5	S-E	4M55G7D	1978	TT&C
			6M04G7DDC	2009	
NPOESS	2287.5	S-E	6M16G7DDC	2013	TT&C
NPOESS	5300	S-E	100MP0N	2013	Altimeter
NPP	7812	S-E	30M0G7D	2009	HRD
NPOESS	7834	S-E	32M0G7D	2013	HRD
NPP	8212.5	S-E	300M0G7D	2009	SMD
NPOESS	13575	S-E	320MP0N	2013	Altimeter
NPOESS	26700	S-E	300MG7D	2013	SMD (RHCP)

⁴ DBIU. Date of Bringing In Use



NGSO NETWORKS



**TABLE 4: SPACE-TO-EARTH FREQUENCIES
GSO NETWORKS**

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ⁵	NOTES
CGMS GOES / GOES N / GOES R	468.8125 468.8250 468.8375	S-E	CGMS, 11K0G1DCN	34, NOAA-WP-38 1994, 2006, 2012	1.1.8 D C P I
GOES GOES N	1544.5	S-E	300K00G2D 500KG7DBF	1994 2006	SAR
GOES R	1544.55	S-E	100KG7DBF	2012	1.1.9 S A R
GOES R	1672	S-E	64K0G1DCN 8K0G1DCN	2012	1.1.10 T e l e m e t r y
GOES R	1672.25	S-E		2012	1.1.11 T e l e m e t r y
GOES R	1672.5	S-E		2012	1.1.12 T e l e m e t r y
GOES R	1672.75	S-E		2012	1.1.13 T e l e m e t r y
GOES GOES N	1676	S-E		5M20G9D 5M20G7DDX	1994 2006
GOES GOES N	1681.478	S-E	200K00G9D 400KG7DDX	1994 2006	MDL

TABLE 4 (Cont'd): SPACE-TO-EARTH FREQUENCIES
GSO NETWORKS

SATELLITE	FREQUENCY (MHz)	DIRECTION	EMISSION DESIGNATOR	D.B.I.U. ⁶	NOTES
GOES R	1697.4	S-E	400KG7DBF 400KG7DEF	2012	DCPR (Domestic)
GOES R	1697.7	S-E	400KG7DBF 400KG7DEF	2012	DCPR (Internat'l)
GOES	2208.586	S-E	2M50G2D	1994	Telemetry/ Ranging
GOES	2209.086	S-E	2M00G2D	1994	Telemetry/ Ranging
GOES N	2209.086	S-E	2M10G2DBN 2M00G3N 2M10G9W	2006	Telemetry/ Ranging
GOES R	2211.041	S-E	2M10G2DCN 1M00G3N 2M10G9W	2012	Telemetry/ Ranging
GOES R	8200	S-E	180MG1DEN	2012	SD

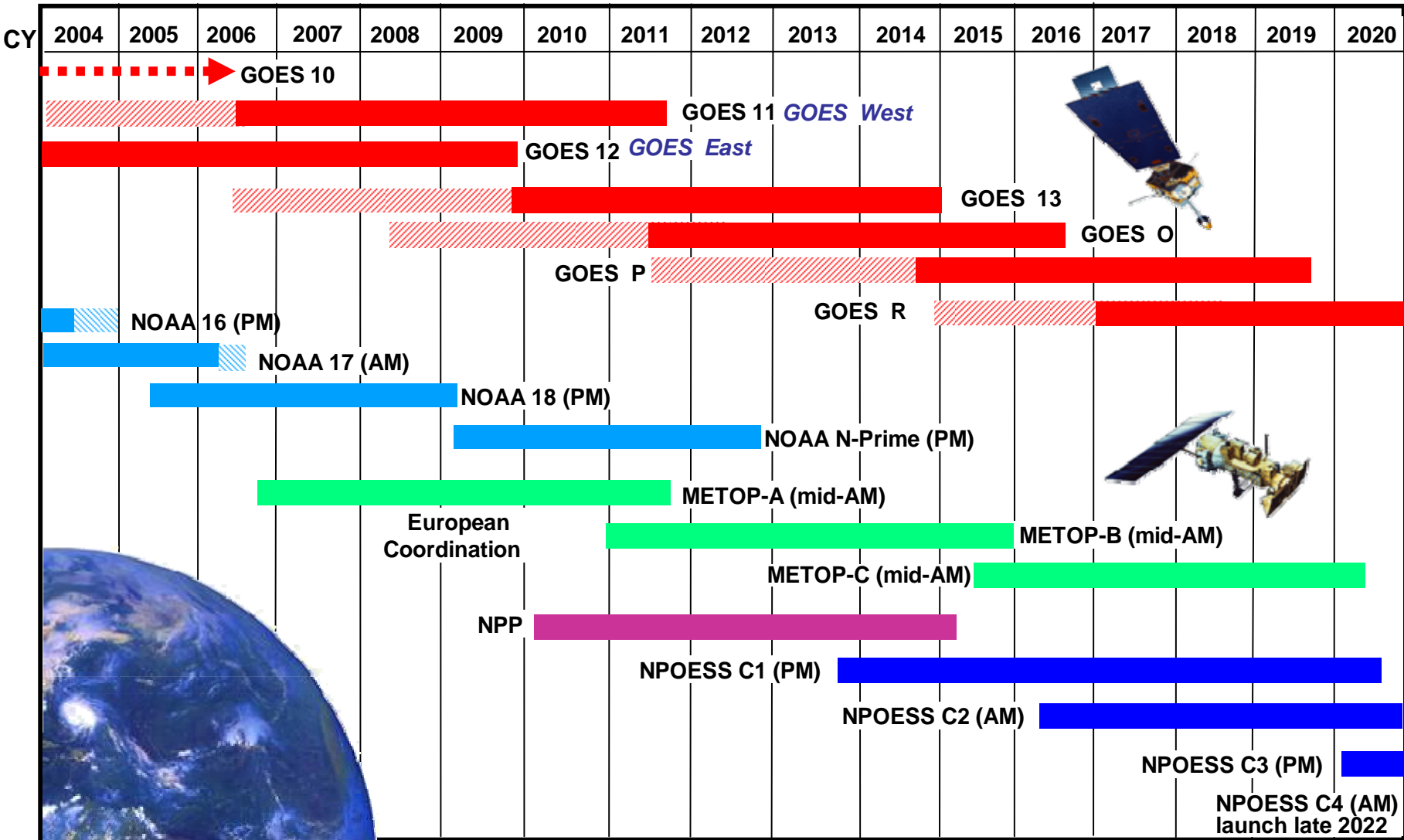
ACRONYMS LIST

APT	Automatic Picture Transmission
DCPI	Data Collection Platform Interrogation
DCPR	Data Collection Platform Report
EMWIN	Emergency Mangers' Weather Information Network
EPIRB	Emergency Position-Indicating Radio Beacon
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GRB	GOES-R <u>Re</u> Broadcast
HRD	High Rate Data
HRPT	High Resolution Picture Transmission
LEO	Low Earth Orbit
LRD	Low Rate Data
LRIT	Low Rate Information Transmission
MDL	Multi-use Data Link
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP	NPOESS Preparatory Project
PDR	Processed Data Relay
RHCP	Right Hand Circular Polarzation
SAR	Search and Rescue
SD	Sensor Data
SMD	Stored Mission Data
TDRSS	Tracking and Data Relay Satellite System
TIROS	Television <u>I</u> n <u>f</u> r <u>a</u> <u>R</u> e <u>d</u> Observation Satellite
TIP	TIROS Information Processor
TT&C	Tracking, Telemetry and Command



Continuity of Operational Satellite Programs

NOAA Satellite Launches* Scheduled to Maintain Continuity

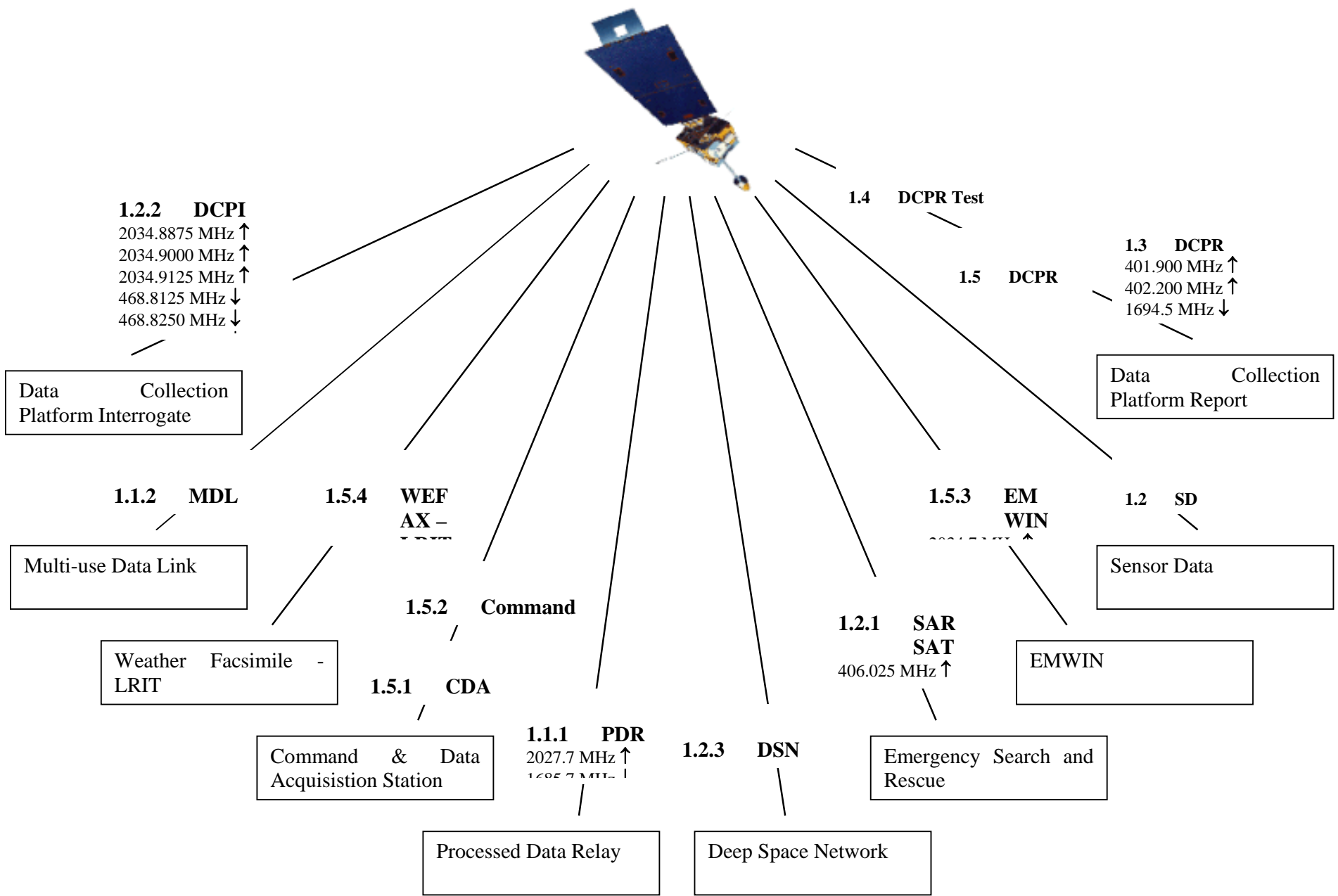
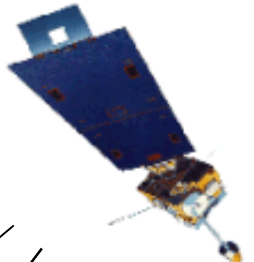


* Actual launch dates are determined by the failure of on-orbit assets
 ** Assumes METOP will provide the morning orbit and NOAA-N' will provide afternoon orbit instruments

Satellite is operational beyond design life
 On-orbit GOES storage



GOES N - RF Link Diagram

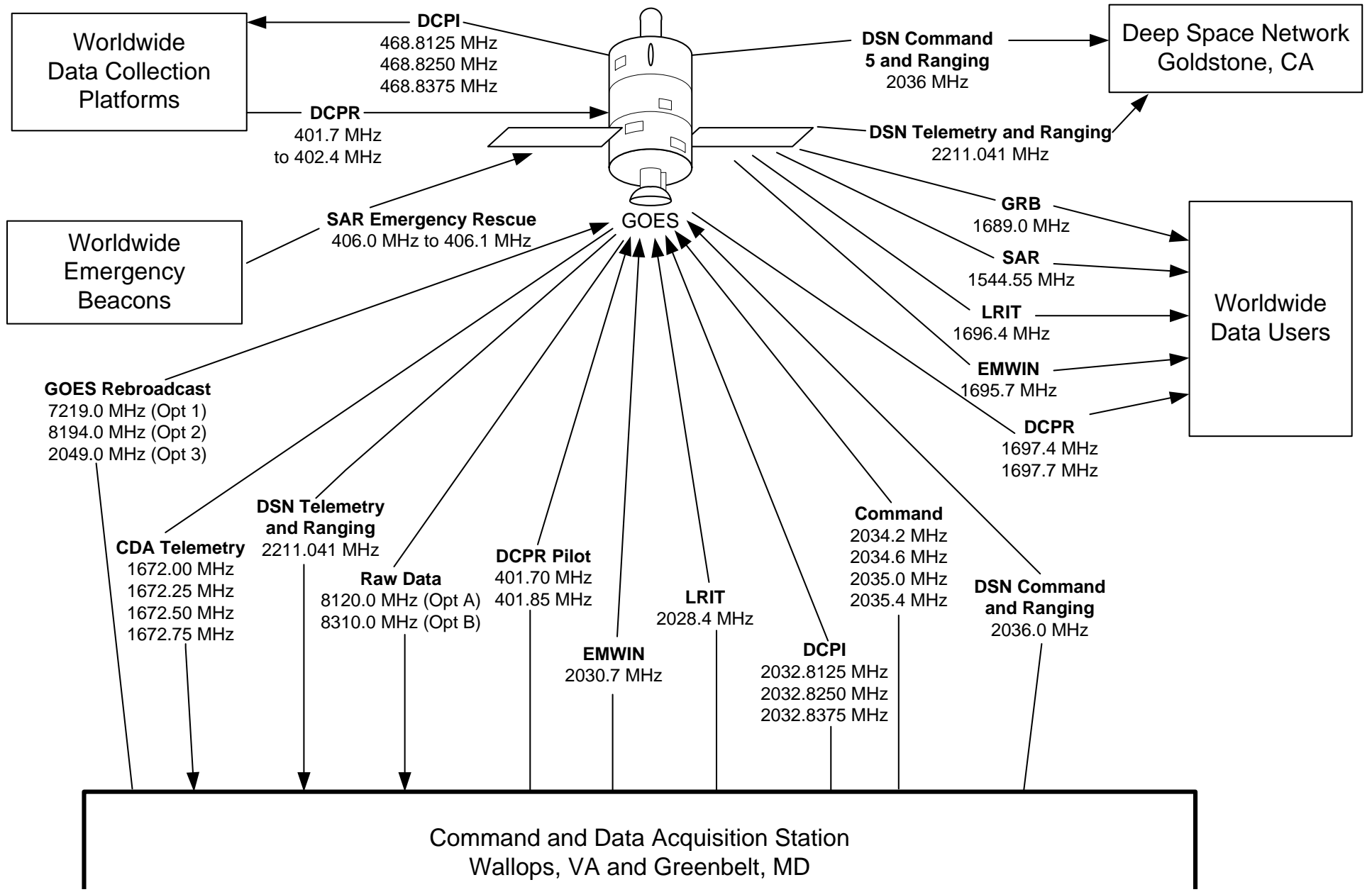




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GOES-R Series – RF Link Diagram

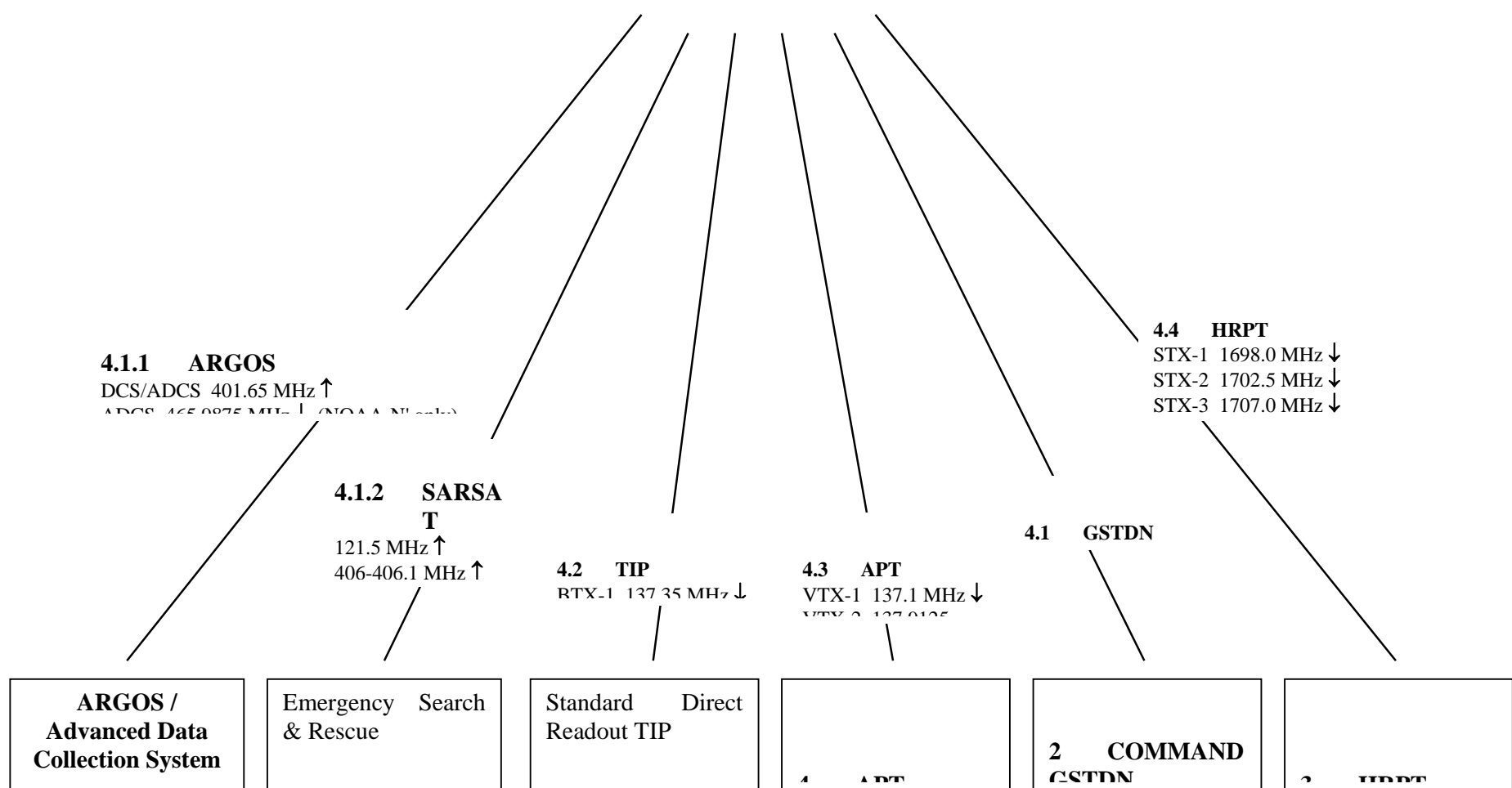




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NOAA N & N' - RF Link Diagram

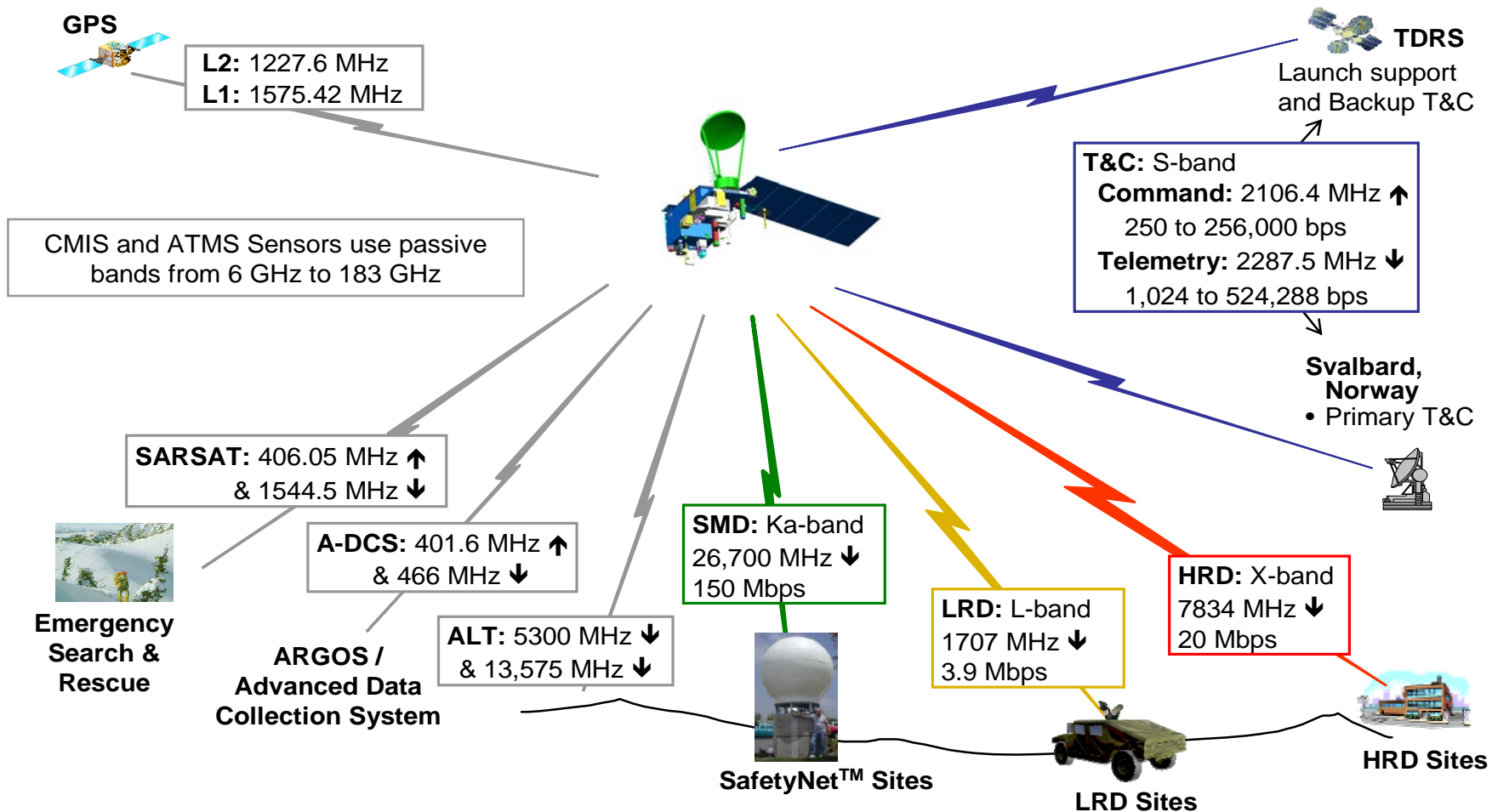




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NPOESS RF Summary



NOTE: Downlink CADU data rates listed are prior to convolutional error correction coding (R=1/2)

