

National Aeronautics and Space Administration



COMM & NAV 2020 FY ANNUAL REPORT

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EXPLORATION AND SPACE COMMUNICATIONS

From the Associate Director:



2020 was a year of unprecedented challenges and tremendous accomplishments. I want to thank everyone in the Goddard Communications and Navigation Community for their outstanding achievements and resilience throughout the COVID-19 pandemic.

The community pushed the boundaries of space communications and navigation capabilities, achieving numerous critical milestones despite the stresses of the global pandemic and political unrest. None of this could have been achieved without the essential programmatic support from our leaders within the Space Communications and Navigation (SCaN) program office, which the Exploration and Space Communications (ESC) projects division is proud to serve.

Perhaps the most powerful accomplishment of 2020 was the reorganization of the division's portfolio to support NASA's commercialization objectives. The Office of Management and Budget directed SCaN to develop a plan to commercialize as much of its direct-to-Earth network services as possible between Earth and geosynchronous orbit. The Communications and Navigation Community met that need with a robust solution that will assure continuity of mission support and set NASA up for future success.

Through this effort, we reimagined the way we deliver mission-critical services, embracing a new approach that blends commercial providers and government assets while balancing the needs of the users with the opportunities presented by commercialization. This will empower our community to focus on future initiatives while fostering industry partners that can execute everyday functions. The reorganization honors our historical past while empowering our community to be leaders in the delivery of future space communications and navigation services. Our new approach is highlighted throughout this report alongside the organizations that were realigned.

As you will witness throughout this report, the Communications and Navigation Community faces all challenges with an open mind. Our workforce brings innovative solutions to the table, so that when NASA journeys further into space than ever before, everyone has a connection home.

Robert J. Menrad
Associate Director of Flight Projects, ESC

KEEPING EXPLORERS CONNECTED

TABLE OF CONTENTS

2. From the Associate Director
3. Table of Contents
4. Exploration and Space Communications
5. Budget and Workforce
6. Near Space Communications Reimagined
7. Near Space Network Project
8. Commercialization, Innovation, and Synergies Office
9. Advanced Communications Capabilities for Exploration and Science Systems Project
10. Laser Communications Relay Demonstration Project
11. Integrated Laser Communications Relay Demonstration Low-Earth Orbit User
Modem and Amplifier Terminal Project
12. Laser-Enhanced Mission Communications Navigation
and Operations Services Pipeline Project
13. Technology Enterprise and Mission Pathfinder Office
14. Search and Rescue Office
15. Collaborative Organizations
16. Space Network Ground Segment Sustainment Project
17. Space Network Project
18. Near Earth Network Project
19. Exploration Systems Project
20. Networks Integration Management Office
21. Human Space Flight Network
22. Comm and Nav Community Outreach
23. Artemis and The Future

EXPLORATION AND SPACE COMMUNICATIONS

Exploration and Space Communications (ESC) projects division is dedicated to providing full-service communications and navigation services, and cross-cutting technical expertise that drives NASA forward. These services are critical to operating missions and returning ground-breaking data to Earth where it can be used for the benefit of humanity.

Additionally, ESC is a key player in human spaceflight, assisting the agency in its effort to place humans among the stars. ESC networks and systems help ensure that astronauts remain safe and connected as they venture into the hostile environment of space.

As the agency goes forward to the Moon, Mars and beyond, ESC will be there to provide communications and navigation expertise. ESC, based at Goddard Space Flight Center in Greenbelt, Maryland, employs creative problem-solving to deliver bold, forward-thinking solutions for advanced exploration.

MISSION

As a national resource, ESC enables human and robotic endeavors in space by providing innovative and mission-effective communications, navigation and exploration solutions to the largest community of diverse users.

VISION

ESC will be collaborative leaders extending the reach of humanity's quest for discovery and passion for knowledge as sought-out experts worldwide and trusted providers of innovative exploration, communications and navigation solutions.

ESC MANAGEMENT

ASSOCIATE DIRECTOR:
BOB MENRAD

DEPUTY PROGRAM MANAGER/
STRATEGIC PARTNERSHIPS:
MARK BRUMFIELD

DEPUTY PROGRAM MANAGER/
EXECUTION:
LANETRA TATE

ASSOCIATE PROGRAM MANAGER:
LA VIDA COOPER

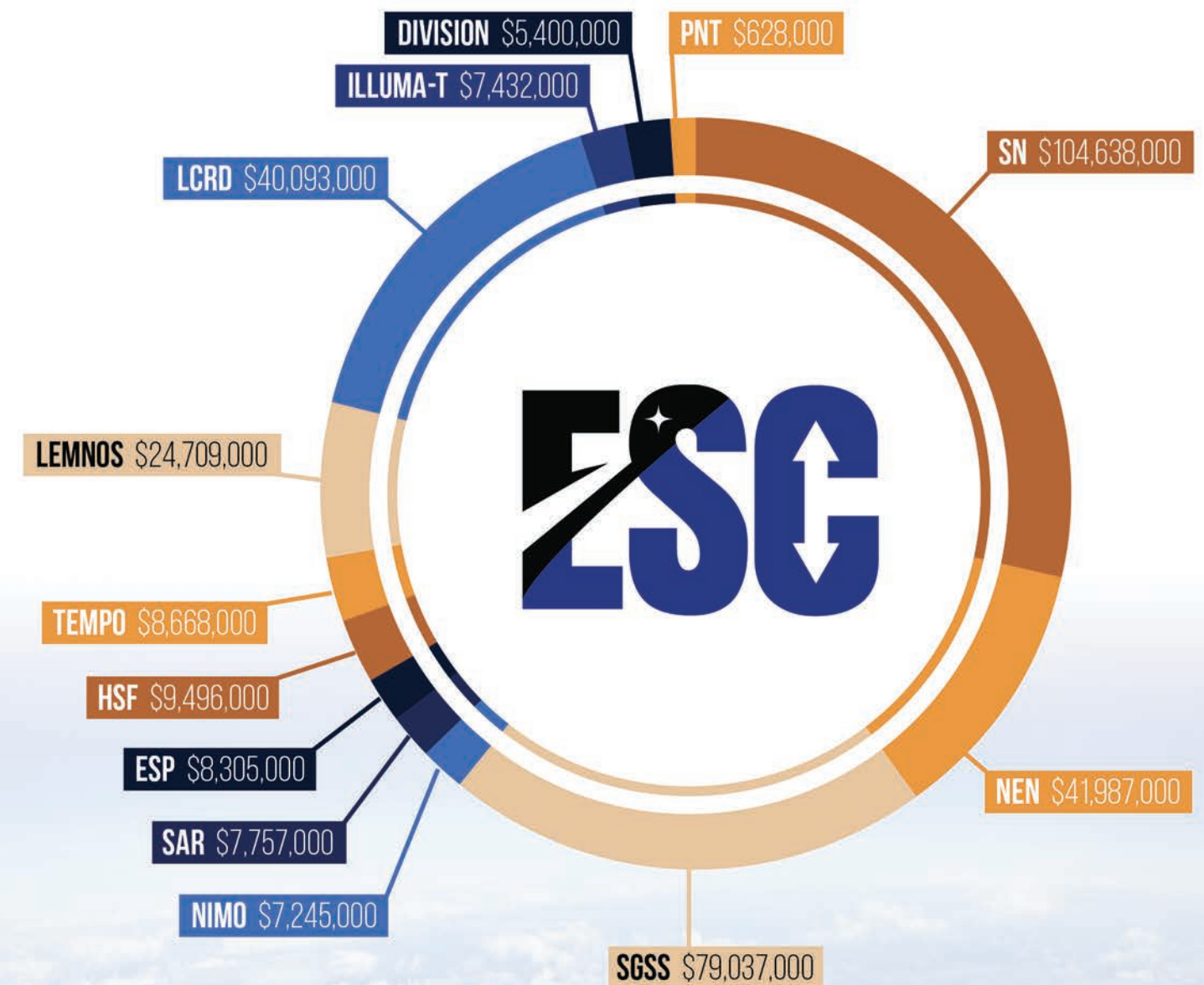
PROGRAM BUSINESS MANAGER:
CHRIS GRAU

ESC ARCHITECT:
DAVE ISRAEL

ESC BUDGET PROFILE FY20

DIRECT AND REIMBURSABLE

ESC TOTAL **\$345,395,000**



161
CIVIL SERVANTS

765
CONTRACTORS

NEAR SPACE COMMUNICATIONS: REIMAGINED

In October 2020, the Exploration and Space Communications (ESC) projects division at Goddard Space Flight Center in Greenbelt, Maryland, reorganized its portfolio to execute the bold commercialization plan set forth by NASA's Space Communications and Navigation (SCaN) program. This plan cements the U.S. government's commitment to engage with private industry to build a commercial space economy.

The reorganization supports SCaN's vision of transferring 100% of Earth-proximity, direct-to-ground communications services to commercial industry. For 60 years, NASA has relied on government-managed infrastructure for space communications, but private industry has now matured to a level where companies can provide robust space communications services to NASA spacecraft. ESC will provide the management and expertise necessary to guide these burgeoning service providers into the space communications marketplace of the future.

Goddard will continue to provide geosynchronous relay services through the Tracking and Data Relay Satellite (TDRS) constellation while SCaN assesses the viability of commercial space relay services. ESC's reorganization places the sustainment of government-owned, contractor-operated network assets like TDRS into one project, while establishing a project that serves as a one-stop shop for seamless network services provided by private companies or NASA-owned infrastructure.

The reorganization also creates a new office responsible for industry outreach and engagement. The office will also identify opportunities for innovation, ushering new ideas from infancy to fruition across government and the private sector.

These new projects and office are comprise ESC's Near Space Network enterprise: the Near Space Network project, the Commercialization, Innovation, and Synergies office, and the Advanced Communications Capabilities for Exploration and Science Systems project.

NEAR SPACE NETWORK

The Near Space Network is a service fulfillment office that connects user missions to essential communications services, enabling the transmission of critical science and exploration data down to Earth. As a single point of contact for missions in the near-space region, from Earth to two million kilometers, the network fulfills essential communications and navigation services through a blend of government and commercial providers.

NSN MANAGEMENT

PROJECT MANAGER:
VIR THANVI

DEPUTY PROJECT MANAGER:
CARRIE WHITE

DEPUTY PROJECT MANAGER/
TECHNICAL:
BRANDON BETHUNE

FINANCIAL MANAGEMENT
SPECIALIST:
LAUREN ADAMS

As a single, Goddard-managed end-to-end network, the Near Space Network orchestrates management of services, ensuring all users have robust and reliable support to meet mission objectives. The Near Space Network alleviates the need for missions to independently research service providers. Missions can rely on the expertise of Goddard Space Flight Center's communications and navigation community.

The Networks Integration Management Office and the Human Space Flight Communications and Tracking Network have joined the Near Space Network team, ensuring continued services and expert support for missions.

COMMERCIALIZATION, INNOVATION, & SYNERGIES

The Commercialization, Innovation, and Synergies (CIS) office identifies opportunities, nurtures diverse relationships, and implements collaborative solutions to enhance capabilities and technologies in support of exploration and space communications. CIS fosters synergistic relationships and accelerates infusion opportunities by leveraging private industry, other government agencies, and international partners.

CIS' commercialization effort is an entirely new strategic function within ESC. The office is dedicated to increasing the industry base for the new Near Space Network. CIS is fostering these partnerships by hosting a series of engagement events that connect experts from industry and government to create a community of providers offering dependable communications, navigation, and data acquisition services. The series of industry engagement events creates a natural flow for companies to learn more about working with NASA and becoming a provider, giving companies a detailed understanding of the role of CIS, the Near Space Network, industry standards, and a timeline for future engagement activities.

CIS also absorbed ESC's Exploration Systems Project and infuses innovative technologies to enable scientific discovery and space exploration. CIS leverages Goddard's rich history in robotic missions and human exploration support, as well as science and technology expertise to help meet agency goals.

CIS MANAGEMENT

(ACTING) OFFICE CHIEF:

LANETRA TATE

DEPUTY OFFICE CHIEF:

NEAL BARTHLEME

SENIOR RESOURCES ANALYST:

MISSY RICE

ADVANCED COMMUNICATIONS CAPABILITIES FOR EXPLORATION AND SCIENCE SYSTEMS

ACCESS MANAGEMENT

PROJECT MANAGER:

TED SOBCHAK

DEPUTY PROJECT MANAGER:

RISHA GEORGE

*DEPUTY PROJECT MANAGER/
TECHNICAL:*

DAVE LARSEN

*DEPUTY PROJECT MANAGER/
RESOURCES:*

MICHELLE HAMILTON

The Advanced Communications Capabilities for Exploration and Science Systems (ACCESS) project operates, maintains, and sustains NASA's government owned, contractor operated ground- and flight-based systems. The project leverages NASA's 60 plus years of communications and navigation expertise to ensure that missions can send their data back to Earth for scientific discovery.

The ACCESS project is a service provider to the new Near Space Network, which orchestrates mission communications services through both government and commercial assets. For missions utilizing NASA systems, NSN will connect them to ACCESS. Additionally, the ACCESS project will develop government communications assets and capabilities that are not yet available in the commercial sector.

For increased efficiency, the ACCESS project combined NASA's historic near space networks: the Space Network, a constellation of Tracking and Data Relay Satellites and associated ground stations, and the Near Earth Network, a global fleet of government and commercial direct-to-Earth ground stations.

LASER COMMUNICATIONS RELAY DEMONSTRATION

As the first end-to-end, bidirectional optical relay, the Laser Communications Relay Demonstration (LCRD) will showcase the robust capabilities of optical communications. Optical communications uses infrared lasers to provide missions with increased bandwidth and decreased size, weight, and power requirements over comparable radio communications systems. LCRD will relay data between optical ground stations in Table Mountain, California, and Haleakala, Hawaii. Prior to supporting missions, LCRD will spend two years demonstrating its capabilities with a variety of experiments. Through the LCRD experimenters program, NASA, other government agencies, industry, and academia contributed experiments to test optical communications functionality.

HIGHLIGHTS

- LCRD shipped to Northrop Grumman's facility for integration onto the U.S. Space Force's Space Test Program Satellite 6 (STPSat-6).
- The LCRD team sent and received commands and data through the STPSat-6 space vehicle for the first time. The team remotely controlled the payload from Goddard's Greenbelt, Maryland campus.
- The LCRD team successfully conducted a remote frame modification activity. Three technicians in the Northrop Grumman integration and test facility performed the activity while the Goddard LCRD team observed the progress through iPhones set up around the room. The modification went extremely well and adhered to COVID-19 restrictions.
- LCRD was integrated with STPSat-6. Post integration, the spacecraft went through environmental testing and end-to-end compatibility testing to ensure the spacecraft and payload can properly communicate with one another.

LCRD MANAGEMENT

PROJECT MANAGER:
GLENN JACKSON

DEPUTY PROJECT MANAGER/
TECHNICAL
NIDHIN BABU

DEPUTY PROJECT MANAGER/
RESOURCES:
JONATHAN BRYSON

LCRD: LAUNCHING IN 2021

INTEGRATED LCRD LOW-EARTH ORBIT USER MODEM & AMPLIFIER TERMINAL

NASA's Integrated LCRD Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T), set to launch in 2022, will provide astronauts and experiments aboard the International Space Station with unprecedented data capabilities. The terminal will leverage optical communications to send high-resolution information from the space station to LCRD.

ILLUMA-T will be LCRD's first user, completing an end-to-end optical communications relay system. After collecting data, it will send the information to LCRD over 1.2 gigabits per second optical links. This data will then be beamed down to optical ground stations in Hawaii and California.

Optical communications systems are ideal for missions like the space station because they are smaller, weigh less, and use less power than current radio frequency systems. A smaller size means more room for science instruments. Less weight means a less expensive launch. Less power means less drain on the spacecraft's batteries.

HIGHLIGHTS

- ILLUMA-T successfully passed its critical design review and moved to the implementation phase.
- ILLUMA-T received restart approval to build the Flight Sled and Power Converter Unit (PCU) to ensure the optical terminal is ready for its July 2022 launch.
- Progress on both components has continued throughout the COVID-19 pandemic following social distancing and protective precautions. Now the Flight Sled and PCU are at the Massachusetts Institute of Technology Lincoln Laboratory (MIT-LL) for integration and testing.

ILLUMA-T MANAGEMENT

PROJECT MANAGER:
CHETAN SAYAL

DEPUTY PROJECT MANAGER:
CATHY PEDDIE

ILLUMA-T: LAUNCHING IN 2022

LASER-ENHANCED MISSION COMMUNICATIONS NAVIGATION & OPERATIONAL SERVICES

The Laser-Enhanced Mission Communications, Navigation and Operational Services (LEMNOS) pipeline project infuses optical communications on current and future missions. Currently, the LEMNOS team is developing an optical communications terminal for the high-profile Artemis II mission. LEMNOS will furnish the Orion spacecraft with an optical terminal dubbed the Orion Artemis II Optical Communications System (O2O). O2O will enable the astronauts on Artemis II to send high-resolution images and videos back to Earth, enabling new discoveries. Orion Artemis II will ferry astronauts to and from the lunar region in 2023.

LEMNOS MANAGEMENT

PROJECT MANAGER: **STEVE HOROWITZ**

DEPUTY PROJECT MANAGER/TECHNICAL: **RICHARD SLONAKER**

HIGHLIGHTS

- O2O successfully passed its critical design review, moving into the implementation stage of the project.
- After a successful COVID Restart Readiness Review, LEMNOS was granted on-site approval for O2O. The team fabricated a specialized silver composite coating blanket. Goddard is the only place in the world that makes this blanket, which will protect O2O from the Orion spacecraft's plume.
- The team overcame COVID-19 challenges and all O2O flight hardware subsystems moved to assembly and testing. Many subsystems have since been delivered to MIT-LL, including the modem module engineering development unit. All work has been completed while ensuring the safety of O2O's workforce.
- LEMNOS team members participated in an Optical Communications Working Group, which recently provided recommendations for the Consultative Committee for Space Data Systems to publish standards on high photon efficiency. The new standards will be implemented on O2O and will assist the agency and industry in developing more robust and interoperable communications systems.

O2O: LAUNCHING IN 2023

TECHNOLOGY ENTERPRISE & MISSION PATHFINDER OFFICE

The Technology Enterprise and Mission Pathfinder Office (TEMPO) manages ESC's innovation pipeline, enhancing capabilities and infusing new technologies into mission architectures. The office incubates technologies and projects until they are ready to be implemented or enter operations. In addition, the office conducts feasibility studies that showcase how new technologies and capabilities can be employed to meet present and future mission needs.

Currently, TEMPO is working to infuse Delay/Disruption Tolerant Networking (DTN) into NASA's communications architecture. Through this activity, the office is also helping NASA create the LunaNet architecture, which leverages DTN alongside other innovative capabilities to create a flexible and extensible "internet on the Moon."

Early in TEMPO's history, the office helped to advance optical communications technologies. TEMPO is now focused on enabling quantum networking, realizing national strategic goals like intercontinental quantum entanglement distribution to improve security, enhance timing architectures, and serve as key infrastructure for a future quantum internet.

TEMPO MANAGEMENT

OFFICE CHIEF:

KENDALL MAULDIN

FINANCIAL MANAGEMENT

SPECIALIST:

LAUREN TOKARCIK

HIGHLIGHTS

- TEMPO created the "Lunar Network Simulation Tool," which models data flow and potential traffic points within networks. This is the first tool capable of simulating a network to include DTN and relays.
- TEMPO presented at the Quantum Economic Development Consortium Plenary Meeting to discuss the growth of the U.S. quantum industry, its supply chain and to present SCan's vision for quantum communications.
- LunaNet received NASA internal research and development (IRAD) funding, which is designed to develop strategic capabilities for high-impact activities.

SEARCH AND RESCUE

NASA's Search and Rescue (SAR) office has lent NASA's expertise in technology development to Cospas-Sarsat, the international satellite-aided search and rescue program, since its founding. The team designed the ground and space segment of the search and rescue network, as well as prototype beacons that can locate users worldwide. The network saves thousands of lives each year, guiding rescue professionals to people in distress. Currently, the office is working on numerous projects, collaborating with external partners to finalize GPS SAR repeaters as well as collaborating with NASA's Commercial Crew Program and SpaceX to develop an optimized rescue beacon antenna for SpaceX's future crewed vehicles.

SAR MANAGEMENT

SAR MISSION MANAGER:

LISA MAZZUCA

SAR DEPUTY MISSION
MANAGER:

TONY FOSTER

DEPUTY MISSION MANAGER
FOR NATIONAL AFFAIRS:

CODY KELLY

SENIOR RESOURCES ANALYST:

MISSY RICE

HIGHLIGHTS

- The SAR team attended the annual U.S. Coast Guard SAR controller workshop to inform SAR controllers of the latest status and progress of the Sarsat system.
- SAR presented at the Innovation and Collaboration Centre in Australia, focusing on the importance of NASA's international partnerships.
- The SAR team participated in the Rescue Environment ANGEL Compatibility Test at the U.S. Coast Guard Training Facility, evaluating the performance of the Orion Crew survival equipment in highly dynamic environments.
- The office developed a proof of concept interface that will share data from an aircraft in distress between Cospas-Sarsat, the International Civil Aviation Organization, Rescue Coordination Centers, and aircraft operators as part of an ongoing effort to implement a new class of emergency beacons and data sharing capabilities.

327
SAR SAVES

COLLABORATIVE ORGANIZATIONS

NAVIGATION

Goddard's Positioning, Navigation and Timing (PNT) engineers are sought-out experts. They serve on committees and organizations determining the future of space navigation both nationally and internationally. One particular area of focus for the Comm and Nav Community is the use of Global Navigation Satellite System (GNSS) signals in space. GNSS signals, such as those from the GPS, have long been used by spacecraft close to Earth, but navigation engineers are investigating use as far as the Moon.

SMA MANAGEMENT

SAFETY AND MISSION ASSURANCE
LEAD:

SANJEEV SHARMA

SYSTEMS ENGINEERING

Our systems engineers enable scientific discovery and technology advancement by providing end-to-end systems engineering for the NASA exploration and science activities that span the entire life cycle from advanced concepts through implementation.

PNT MANAGEMENT

NAVIGATION LEAD:

CHERYL GRAMLING

FLIGHT DYNAMICS DIRECTOR:

SAM SCHREIBER

SAFETY

Our Safety and Mission Assurance (SMA) colleagues are responsible for supporting the implementation of mission assurance over the entire program life cycle for all Goddard space missions. This ensures each mission is successful and meets all of its performance goals. In addition, SMA contributes to and applies policy guidelines set by NASA Headquarters and the Goddard Center Director for the implementation of mission assurance processes.

SE MANAGEMENT

ESC SYSTEMS ENGINEER:

ERIC POOLE

SPACE NETWORK GROUND SEGMENT SUSTAINMENT

The Space Network Ground Segment Sustainment (SGSS) project manages critical upgrades to space communications infrastructure supporting the TDRS constellation. These upgrades will modernize TDRS ground systems and improve many of its capabilities. This is the first time NASA has performed upgrades of this magnitude while maintaining operations. The upgrades will improve the data rates and extend the longevity of ground systems while making them more cost effective.

The SGSS project is nearing operations, then it will be absorbed by ACCESS.

SGSS MANAGEMENT

PROJECT MANAGER: **DAVID LITTMANN**

DEPUTY PROJECT MANAGER: **CARRIE WHITE**

DEPUTY PROJECT MANAGER/TECHNICAL: **TOM GITLIN**

DEPUTY PROJECT MANAGER/RESOURCES: **BEVERLY THOMAS**

HIGHLIGHTS

- The SGSS project completed all software modifications needed to operate TDRS and verified the update. Additionally, SGSS made its first end-to-end contacts with several missions including FERMI, GPM, Landsat-8, SWIFT and NuSTAR. This is an important step on the road to SGSS's operational readiness planned for spring 2021.
- The SGSS project successfully completed its first Operations Readiness Review (ORR). ORR-1 testing is complete and all open issues have been resolved. This is a major step forward in the modernization of network infrastructure, hardware, and software at White Sands Complex.
- The SGSS team successfully established remote access capability from the General Dynamics Development Facility to the SGSS Maintenance and Training Facility, allowing essential software integration and testing to continue while personnel access to the complex is restricted due to COVID-19.

OPERATIONAL 2021

SPACE NETWORK

NASA's Space Network consisted of a constellation of Tracking and Data Relay Satellites (TDRS) in geosynchronous orbit and the ground stations that support them. The Space Network's architecture allowed it to provide continuous communications services to flagship missions like the International Space Station and the Hubble Space Telescope. The network also provided crucial tracking and telemetry services to launch vehicles. In addition to operating the TDRS constellation, the Space Network embraced new communications technologies, and helped create LCRD's optical ground station in Hawaii.

With the reorganization all of this work will continue but under the new ACCESS project. ACCESS will maintain NASA's constellation of TDRS, providing robust communications and tracking support to missions in addition to managing all government-owned, contractor-operated ground stations.

HIGHLIGHTS

- The SN completed the Transitional Extensible System Leveraging Analog Architectural Components effort, successfully passing their Operations Readiness Review. With these network enhancements, the SN is ready to support the Artemis I mission.
- SN customized the network to support two Northrop Grumman Cygnus spacecraft simultaneously, as part of the spacecraft's extended mission.
- The SN refurbished the Lunar Lasercomm Ground Terminal for use in the O2O ground system. By refurbishing equipment from previous missions, the SN is providing cost savings for the agency.
- The network passed multiple security tests and audits while also assisting the Deep Space Network prepare for a major audit.

PRIOR SN MANAGEMENT

PROJECT MANAGER:

TED SOBCHAK

DEPUTY PROJECT MANAGER/
RESOURCES:

MICHELLE HAMILTON

REALIGNED TO ACCESS

NEAR EARTH NETWORK

NASA's Near Earth Network was comprised of a worldwide network of over 30 commercial and NASA-owned antenna ground systems that provide telemetry, tracking, and command services to spacecraft at a variety of orbits within a million miles of Earth. Using direct-to-Earth radio signals, the network provided communications and tracking services to over 40 NASA missions studying an array of topics from climate change to black holes.

With the reorganization, Near Earth Network efforts will continue but under two different projects. The government-owned, contractor-operated assets have been realigned to the new ACCESS project, which will continue to maintain and operate them. While the commercial segment and ongoing enhancement projects, such as delay/disruption tolerant networking, terrestrial communications, and cloud-based storage efforts, have been realigned to the Near Space Network project.

HIGHLIGHTS

- The Ka-band advancement project completed multiple milestones for its four new global antennas in Alaska, Virginia, Norway, and Chile.
- The NEN enabled our partner, the U.S. Space Force, to begin communications with their new weather satellite by moving two U.S.-based antennas to Dongara, Australia.
- A provisional patent was awarded to the Ka-arraying development team for their High Data Rate Signal Combiner.
- The Launch Communications Segment was unveiled at Kennedy Space Center's Uplink Station. Over 115 people celebrated the critical role it will play in NASA's Artemis missions.

PRIOR NEN MANAGEMENT

PROJECT MANAGER:
DAVID CARTER

DEPUTY PROJECT MANAGER
DAVID LARSEN

DEPUTY PROJECT
MANAGER/RESOURCES:
CRISTY WILSON

REALIGNED TO ACCESS & NSN

EXPLORATION SYSTEMS PROJECT

The Exploration System Project (ESP) leveraged Goddard's rich history in robotic missions, science and technology development to help NASA explore the Moon and journey beyond. ESP was a small advanced concepts formulation and development team dedicated to supporting future exploration efforts by adapting existing technology. The team contributed to 10 or more projects and advanced concept initiatives at a time.

With the reorganization, the project was absorbed by the new CIS office, which is continuing ESP's exploration and technology work with an emphasis on commercialization.

PRIOR ESP MANAGEMENT

(ACTING) PROJECT
MANAGER:
NEAL BARTHELEME

STUDY MANAGER
RUTHAN LEWIS

SENIOR RESOURCES
ANALYST:
MISSY RICE

HIGHLIGHTS

- ESP provided insight into NASA's Human Landing System (HLS), working with each company building HLS landers. ESP participated in Continuation Baseline Reviews and analyzed hundreds of pages of critical design and process documents associated with each partners' concepts and methods.
- ESP, alongside the Software Engineering Division (SED), leveraged award-winning core Flight Software (cfs) for NASA's Gateway - a lunar orbiting platform. ESP and SED are collaborating with NASA's Johnson Space Center to certify it as Class A - suitable for human-rated vehicles. This flight software will be essential to Gateway's operations. It will act as the brains of the spacecraft, allowing all instruments and modules to operate properly.

REALIGNED TO CIS

NETWORKS INTEGRATION MANAGEMENT OFFICE

16 LAUNCHES SUPPORTED

CST-100 STARLINER

SPACEX-DM-2

SPACEX - 19

SPACEX- 20

ISS 62S

HTV-9

NG-12

NG-13

NG-14

ICON

H-IIA/EMM

ATLAS V/AEHF-6

ATLAS V/USSF-7

ATLAS V/MARS 2020

ATLAS V/SOLAR ORBITER

ATLAS V/CST-100 STARLINER

The Networks Integration Management Office (NIMO) integrated communications services for missions seeking access to data obtained from space. They offered these services through Goddard's two major networks: the Near Earth Network and the Space Network. The missions they support include launch vehicles, science missions and human exploration missions. NIMO provided customers with communications solutions through the entire mission life cycle including mission planning, compatibility testing and spectrum analysis.

During the reorganization, the NIMO was realigned by the Near Space Network.

PRIOR NIMO MANAGEMENT

OFFICE CHIEF:
JERRY MASON

SCaN CUSTOMER COMMITMENT
MANAGER:
JOHN HUDIBURG

FINANCIAL MANAGEMENT
SPECIALIST:
LAUREN ADAMS

REALIGNED TO NSN

HUMAN SPACE FLIGHT COMM & TRACKING NETWORK

The Human Space Flight Communications and Tracking Network (HSF CTN) integrates network elements into comprehensive services for crewed missions. HSF CTN support enables communications services to the International Space Station and all visiting vehicles. This includes Commercial Crew Program spacecraft like the SpaceX Crew Dragon and the Boeing Starliner.

During the reorganization, the HSF CTN group was absorbed by the Near Space Network.

HSF C&T MANAGEMENT

HSF NETWORK DIRECTOR:
JERRY MASON (ACTING)

HSF MISSION MANAGER:
ROSA AVALOS WARREN

HSF MISSION MANAGER:
DEREK OTERMAT

HSF MISSION MANAGER:
KENT GAYLOR

HIGHLIGHTS

- HSF CTN performed launch and flight operations support for the SpaceX Dragon Demo-2 (DM-2) mission. This historic mission brought two NASA astronauts to the International Space Station from U.S. soil for the first time in a commercial spacecraft. Additionally, the group supported the mission's undocking and journey back to Earth. DM-2 landed in the Gulf of Mexico, marking the first splashdown of an American crewed spacecraft in 45 years.
- HSF CTN successfully supported the Soyuz launch on April 9. The launch placed one astronaut and two cosmonauts on the International Space Station as part of Expedition 63. Our support of this mission enables continued human presence on the station, which has gone uninterrupted since the Expedition 1 crew arrived on November 2, 2000.
- The HSF CTN team maximized TDRS support for the Boeing Starliner Orbital Flight Test mission. Starliner is an important and exciting part of NASA's Commercial Crew Program. NASA's network services operated nominally as the mission worked through challenges.

REALIGNED TO NSN

COMM & NAV OUTREACH AND ENGAGEMENT

11 ARTICLES
PUBLISHED
ON
NASA.GOV

50+
INTERNS & GRANTEES
SUPPORTED

9 TECHNICAL
PAPERS
PUBLISHED

10 INTERNS
TRANSITIONED
TO FULLTIME
WORKFORCE

21 BLOGS
PUBLISHED
ON ESC
WEBSITE

600 EMPLOYEES
ATTENDED
INTERNAL COMM
AND NAV EVENTS

7 MAGAZINE
ARTICLES
PUBLISHED
ONLINE

10,871,663 IMPRESSIONS MADE ON
ESC SOCIAL ACCOUNTS

CONTRIBUTIONS TO NASA'S ARTEMIS PROGRAM

As NASA journeys to the Moon, Mars, and beyond, and establishes a sustained presence among the stars, explorers will need robust communications and navigation capabilities to remain connected and safe. Goddard's Communications and Navigation Community is contributing extensively to Artemis program, investigating new and disruptive technologies while advancing current capabilities. Our current efforts are listed below.

- Crewed Mission Support
- Disruption Tolerant Networking
- Gateway Flight Software
- Launch Communications
- Mission Engagement
- Lunar Search and Rescue
- Lunar GNSS Navigation
- Lunar Site Planning
- Optical Communications
- LunaNet

LOOKING TO THE FUTURE

Our Communications and Navigation Community is poised to support all of NASA's current and future science, robotics, and human endeavors. We will embrace new technologies, advance our current capabilities, and partner with commercial industry to push NASA into the future of exploration.



Exploration
& **SPACE**
Communications



EXPLORATION AND SPACE COMMUNICATIONS PROJECTS DIVISION

FY20 REPORT

esc.gsfc.nasa.gov/