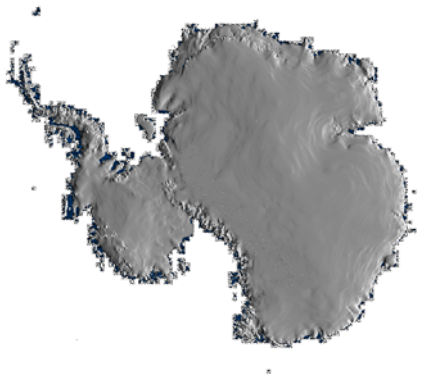


Raytheon Polar Services Company

UNITED STATES ANTARCTIC PROGRAM

SOUTH POLE

SATELLITE COMMUNICATIONS UPDATE

Nicolas S. Powell

15 July 2002

Raytheon Polar Services Company
Denver, Colorado

South Pole SATCOM
LES-9

Raytheon Polar Services Company

- **Service Ends - Message released 7/3/02**
- **Ends 5 hours of early day 38 kbps inter and intra-continental e-mail service (mainly austral summer)**
- **Ends limited internet access possible during pass**
- **Increases dependence on HF radio teletype and data over Iridium (to be deployed this season) for operational message exchange with McMurdo**
- **No affect on science data transmission since LES-9 not used for this purpose**

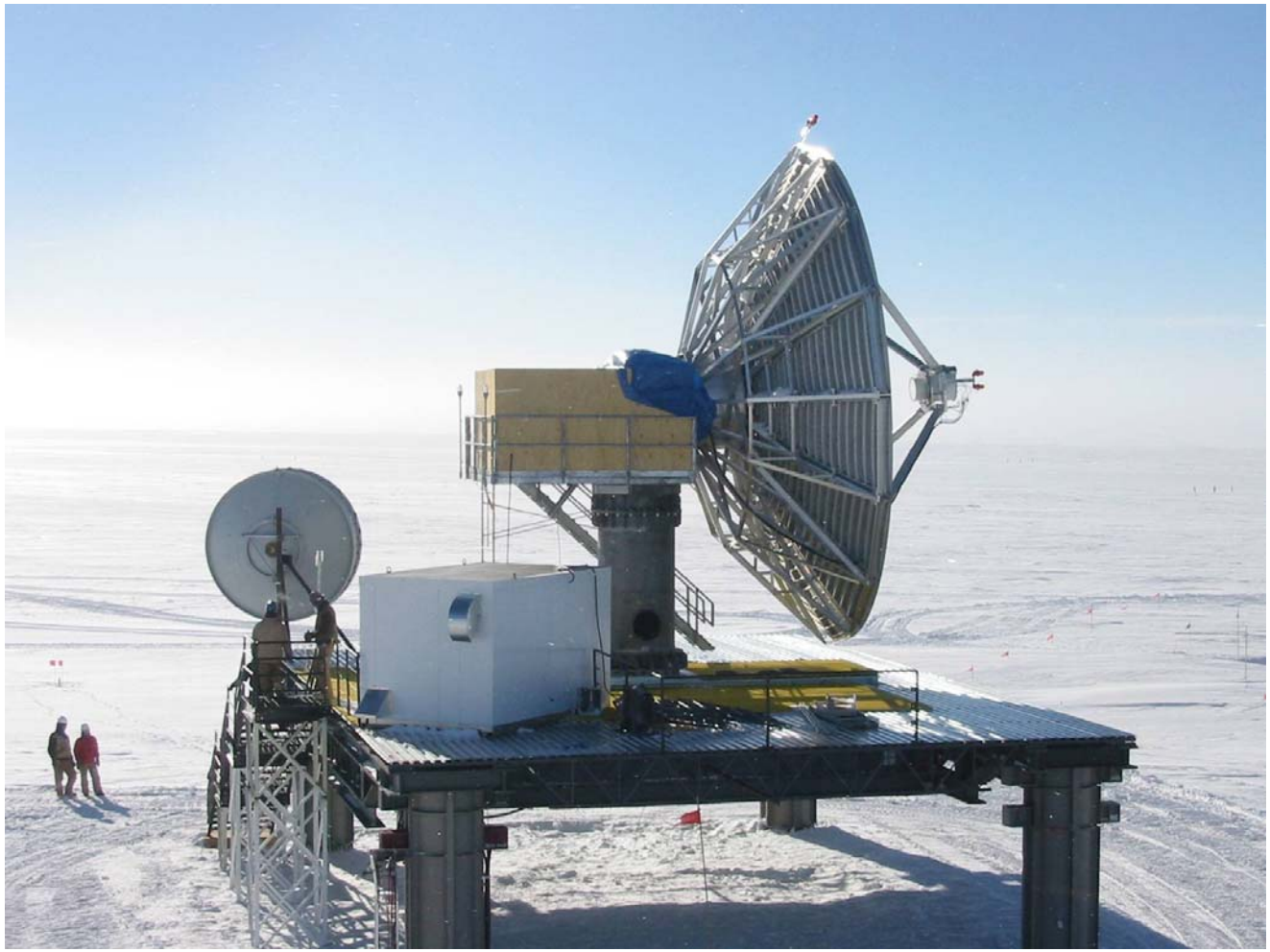
South Pole SATCOM
GOES - Status

Raytheon Polar Services Company

- **Lightning strike 5 Jul at FL teleport caused significant damage**
  - **20 m antenna not operating**
  - **TBD damage to electronics**
  - **Currently using small back-up system - 128kbps out & 176 kbps in**
  - **Restoration to FOC unknown**
- **Currently using 3 m GOES-BA installed last season on SPMGT platform - damaged feed & poor design precludes use of SPMGT**
- **Uses different modem, & SSPA than MARISAT**
- **Original SPMGT Modems to be replaced & incompatible with CONUS modems**
- **SPMGT SSPA can't provide power required to close link using GOES-BA**
  - **May work with SPMGT Antenna (TBD)**
  - **Working with Supplier**
- **FOC GOES-BA data rate 256 kbps out, 512 kbps in**

South Pole SATCOM
GOES - Status

Raytheon Polar Services Company



Advancing Polar Science

South Pole SATCOM
GOES - 2002-03 Plans

Raytheon Polar Services Company

- **Integrate into SPMGT**
  - **Correct SSPA problem**
  - **Replace modems at South Pole and FL Teleport**
  - **Install replacement SPMGT feed**
  - **Install remote SPMGT antenna/GOES-BA switches and controller - integrate into M&C system**
  - **Modify M&C macros**
- **Establish best throughput data rates**

South Pole SATCOM
MARISAT (SPMGT) - Status

Raytheon Polar Services Company

- SPMGT supports MARISAT mission at 768 kbps In/1.544 Mbps out
- Possible periodic terrestrial interference at CONUS ground station
- SPMGT Antenna Feed
  - Design required field modification last summer to eliminate Tx signal coupling/noise into Rx side of feed
    - > Eliminated redundancy
    - > One MARISAT & one GOES LNA string
  - Using “horizontal” feed horn connection only - “vertical” connection damaged and not field repairable precludes use of SPMGT for GOES operations
- Modems
  - Recognized problems with firmware and performance
  - Will not operate at T-1 rate on MARISAT
  - Periodically experiences uncommanded state change

South Pole SATCOM
MARISAT (SPMGT) - Status

Raytheon Polar Services Company

- **Solid State Power Amplifiers (SSPAs)**
  - **Incapable of full power out (250W) at GOES Tx frequency - can only provide 125W**
  - **Work fine at MARISAT Tx frequency**
- **Monitoring & Control System**
  - **Fairly stable**
  - **Device serial interfaces poorly implemented - leads to software conflicts in M&C processor & occasional system crashes or freezes**
- **Antenna Heater Control**
  - **Appears to be in good health**
  - **Fragmented design**
  - **Not integrated into M&C system**

South Pole SATCOM
SPMGT - 2002-03 Plans

Raytheon Polar Services Company

- Integrate GOES into SPMGT
- Replace feed
- Replace modems
- Correct SSPA problems
- Upgrade & modify M&C software
- Install M&C Serial Communication Hardware & Software in Antenna Shelter & RF Bldg - Offloads communication processing from M&C processor
- Establish best throughput data rates

South Pole SATCOM
TDRSS

Raytheon Polar Services Company

- System nominal & stable with few problems
- Planned outage Jul 18-25 for scheduled Ku-band link antenna maintenance
- S-band link will be unaffected
- Latest satellite status report indicates TDRSS F1 still capable of supporting SPTR mission
- White Sands to RPSC HQ Denver private T-1 link to be installed 28 July - should alleviate CONUS terrestrial circuit congestion