

## The South Pole TDRSS Relay (SPTR)

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**Abstract.** During the 1997/1998 season, the NASA Goddard Space Flight Center will be installing the South Pole TDRSS Relay (SPTR) at the South Pole. SPTR will provide high data rate communications with the South Pole using the NASA Tracking and Data Relay Satellite System (TDRSS). The following is a brief description of the SPTR communications services.

### 1. Introduction

During the 1997/1998 season, the NASA Goddard Space Flight Center will be installing the South Pole TDRSS Relay (SPTR) at the South Pole. SPTR will provide high data rate communications with the South Pole using the NASA Tracking and Data Relay Satellite System (TDRSS). Two communications services will be provided: a full-duplex 1.024 Internet link and a 2-10 Mbps file transfer capability.

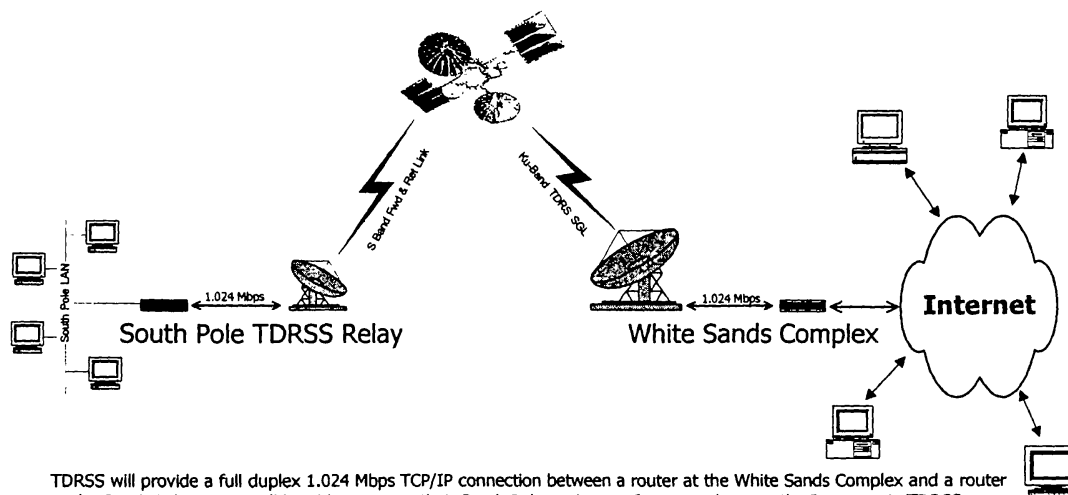
TDRSS uses multiple geosynchronous satellites to provide global communications coverage. The first TDRSS satellite, TDRS-1, has steadily increased its inclination in orbit such that the South Pole is now visible to TDRS-1 for over two hours a day. The inclination will increase over time, thereby increasing the South Pole visibility to over four hours by June 1998. The SPTR is being installed for a one year proof-of-concept test. Following the proof-of-concept phase, a long term plan will be determined by NASA and the National Science Foundation.

SPTR will have both an S-Band and Ku-Band link to TDRS-1. The S-Band link will be used for the TCP/IP connection and the Ku-Band link will be used for the file transfers.

### 2. The SPTR Internet Link

Figure 1 illustrates the TCP/IP connectivity provided by SPTR. A new router will be installed at the South Pole. This router will be connected to an S-Band (2215.0 MHz Transmit/2039.7 MHz Receive) RF system which will transmit the IP packets to TDRS-1 at a 1.024 Mbps rate. The satellite relays the data to WSC, where the data is passed to another router which is also connected to the Internet.

The SPTR link will complement the GOES-3 and LES-9 links already in place. The design allows the routers to direct the Internet traffic to whichever



TDRSS will provide a full duplex 1.024 Mbps TCP/IP connection between a router at the White Sands Complex and a router at the South Pole. Users will be able to access their South Pole equipment from anywhere on the Internet via TDRSS.

The schedule for the TDRSS supports will be distributed via e-mail and a SPTR Website.

The TDRS-1 satellite view periods will fill part of the gap between the current GOES-3 and LES-9 supports.

Predicted TDRS-1 coverage of the South Pole			
Date	Inclination	Max El. Angle	Time > 0 deg
6/97	9.5	0.84	2hr 48min
6/98	10.1	1.43	4hr 5min
6/99	10.7	2.03	4hr 40min
6/00	11.3	2.64	5hr 15min

Figure 1. TCP/IP connectivity provided by SPTR.

satellite link is active. If another satellite link is up simultaneously with the TDRSS link, the TDRSS link will still be chosen, since it is the link with the highest data rate.

### 3. The SPTR High Speed File Transfer

Concurrently with the S-Band link, a separate Ku-Band (15003.4 MHz Transmit) link will be copying files from a South Pole File Server (SPFS) to a White Sands File Server (WSFS) at a data rate of 2-10 Mbps (See Figure 2). Users will place all files to be transferred in a single directory on the SPFS. When the transfer occurs, these files will be duplicated onto the WSFS and deleted from the SPFS. The WSFS will always be accessible via FTP, so users can retrieve their files.

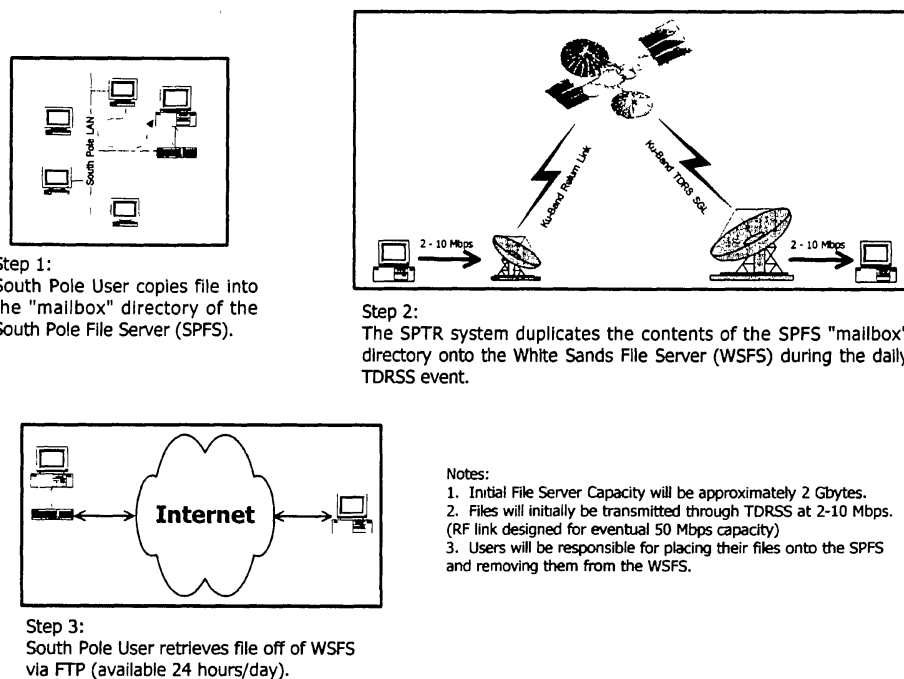


Figure 2. Ku-Band link from South Pole File Server to White Sands File Server.

#### 4. Conclusion

SPTR will significantly increase the amount of communications available to the South Pole. This will enhance the scientific possibilities by enabling scientists to interact more with their experiments and experimenters at the Pole through the whole year.

More information can be found at the SPTR website at:  
<http://www530.gsfc.nasa.gov/SPTR/>.

**Section VIII**  
**Astrophysics in the 21st Century**  
**and the Role of Antarctica**