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**For more information, contact:**

Sally Koris  
310.812.4721  
[sallykoris@ngc.com](mailto:sallykoris@ngc.com)

## **SafetyNet: Assured Data Delivery for NPOESS**

A key feature of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) is an innovative data routing and retrieval architecture called SafetyNet™. SafetyNet will provide users with cost-effective and near-real time data delivery using commercial data networks developed by the telecommunications industry.

SafetyNet consists of 15 globally distributed ground receptors designed to frequently receive stored mission data from NPOESS satellites. The unmanned ground receptors are linked to central data processing centers in the United States by commercial fiber optic networks. Raw data is delivered to four Weather Centrals — the National Environmental Satellite, Data and Information Service; Air Force Weather Agency; Fleet Numerical Meteorology and Oceanography Center; and Naval Oceanographic Office. The raw data is processed into sensor data records (SDRs) and environmental data records (EDRs) at each Central. The EDRs are then used to provide timely, accurate environment products tailored to the meet the needs of the Weather Centrals' customers.

Placement of the ground receptors provides NPOESS satellites with frequent downlink opportunities and long contact duration, averaging 55 percent of each orbit. Use of Ka-band, operating at frequencies of 20-30 GHz, permits high-speed, high-capacity transmissions of stored mission data. Data is collected and stored on the satellite at approximately 20 Mbps. This data is transmitted to the ground receptors at 150 megabits per second — or 2500 times faster than conventional telephone lines. To ensure data delivery through all atmospheric conditions, NPOESS satellites will downlink stored mission data twice to different receptors.

SafetyNet will deliver NPOESS data to the user in a very timely, reliable, adaptable and cost-effective manner: 77 percent of the environmental data records will be delivered to the Centrals in less than 15 minutes from the time phenomena are observed, and 95 percent will be delivered in less than 28

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minutes. The high capacity and speed of SafetyNet are essential to deliver more than 20 times the current operational environmental satellite system mission data.

The SafetyNet architecture is robust. Single or even multiple receptor outages have only a minor affect on the timeliness of delivery to the Centrals. Additional ground receptors and additional bandwidth can be added cost effectively if users find they need more downlink opportunities or more capacity.

Northrop Grumman has a patent pending for SafetyNet.

### **SafetyNet Key Features**

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|----------------------------------|---|
| <b>Frequency band</b>            | <ul style="list-style-type: none"><li>● Ka-band (26.7 GHz)</li></ul>  |
| <b>Data Storage</b>              | <ul style="list-style-type: none"><li>● Each SafetyNet Receptor designed to store up to 24 hours of mission data</li></ul>  |
| <b>Data Handling</b>             | <ul style="list-style-type: none"><li>● Ka-band downlink data rates at 150 Mbps</li><li>● Transports over two terabits of data per day in near-real time</li></ul>  |
| <b>Satellite Contacts</b>        | <ul style="list-style-type: none"><li>● Each satellite has an average of 6.2 ground receptor site contacts per orbit</li></ul>  |
| <b>Fiber Optic Links</b>         | <ul style="list-style-type: none"><li>● Distribute data to Weather Centrals at 40 Mbps</li></ul>  |
| <b>Ground Receptor Locations</b> | <ul style="list-style-type: none"><li>● India, South Africa, Spain, Svalbard (Norway), Guam, Australia, New Zealand, Alaska, California, Florida, Brazil, Chile, South Korea, McMurdo (Antarctica), Hawaii</li></ul>                            |
| <b>Data Product Latency</b>      | <ul style="list-style-type: none"><li>● Objective 15-minute product latency 77% of the time</li><li>● Delivers 95% of data in less than 28 minutes</li><li>● Provides 99.95% data availability to assure enhanced mission performance</li></ul> |

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