Frequently Asked Questions about GRB Simulator

Updated September 10, 2015

1. **Question:** What is a GRB Simulator?

    Answer: A GOES-R Rebroadcast (GRB) Simulator is a fully self-contained, transportable system that is used to simulate the high-fidelity stream of Consultative Committee of Space Data Systems (CCSDS) formatted GRB packet data that will be downlinked from the GOES-R satellite. The system is comprised of two transit cases that weigh approximately 470 lbs combined. It can be used by end users to test their receiving systems prior to the launch of the GOES-R satellite.

2. **Question:** What are the main components of the GRB Simulator?

    Answer: Transit case 1 contains a 48-port Cisco Network Switch, an 8-port KVM monitor and keyboard, and an IBM 3550 Linux Server for the GRB Simulator software. Transit case 2 contains a Trak Time Code Generator, an RT Logic T500HR Front-End Processor (FEP), and an RT Logic RT400XR Modem.

3. **Question:** What kind of GRB data are generated from the simulator?

    Answer: Level 1b (L1b) imagery data from the Advanced Baseline Imager (ABI) and Solar Ultra Violet Instrument (SUVI) sensors, L1b non-image data from the Space Environment In-Situ Suites (SEISS) sensor, Extreme Ultraviolet Sensor and X-ray Irradiance Sensor (EXIS), and Magnetometer (MAG) sensor, and Level 2 (L2+) non-image data from the Geostationary Lightning Mapper (GLM) sensor.

4. **Question:** Where can I find the downlink specifications for the GRB?

    Answer: You can access it from the GOES-R web site at this link: http://www.goes-r.gov/users/docs/GRB_downlink.pdf.

5. **Question:** Are test patterns provided with the GRB Simulator?

    Answer: Yes, there are a variety of image and non-image test patterns and proxy data that are pre-loaded on the simulator. Also, a CD with the datasets is provided to the borrower in the event some files are inadvertently deleted from the hard drive.

6. **Question:** How does the GRB Simulator software application work?

    Answer: The GRB Simulator application resides on the IBM server on transit case 1. It has a Graphical User Interface (GUI) that is launched from the IBM desktop screen on the KVM monitor and has two modes of operation: offline and online. The offline mode allows the user to add, edit, or delete configurations, scenarios scripts, and test patterns used for running image or non-image GRB simulations. The online mode allows the user to apply various configurations

and run simulations based on scenarios scripts chosen. The output of the simulated GRB data packets are written to port connections which are defined in the applied configuration.

7. **Question:**   Are there pre-loaded configurations and scenario scripts to use with the GRB Simulator?

   Answer: Yes, the GRB Simulator has pre-loaded configurations and scenarios scripts to cover a variety of simulations. However, the end user may need to modify the IP addresses in the configuration file.

8. **Question:** What are the power requirements to support the GRB Simulator operations?

   Answer: Approximately 1065 Watts (single 120 Volt/15 Amp circuit) for transit case 1 and 2110 Watts (two 120 Volt/15 Amp circuits) for transit case 2. NOTE: An UPS system is also recommended to protect the unit from unexpected surges.

9. **Question:** What type of transport protocols can be used?

   Answer: There are three types that can be used: transmission control protocol (TCP) for I/F testing, user datagram protocol (UDP) for digital (Ethernet) testing, and UDP multicast for digital testing.

10. **Question:** What is the normal process for requesting to borrow a GRB Simulator?

    Answer: An end user would go to the Fed Biz Ops posting site: http://go.usa.gov/WvXY where end users can find out how to make a request to borrow a simulator.

11. **Question:** How long can an end user borrow a GRB Simulator?

    Answer: Normally, it is for no more than 90 days. However, you can request an extension of the borrowing period once you have the GRB Simulator in your possession. Depending on future borrower requests, an extension may be granted. Otherwise, you can request to borrow the GRB Simulator again at a later date.

12. **Question:** What are the size dimensions of the GRB Simulator transit cases?

    Answer: 46" length X 27" width X 24½" height

13. **Question:** Is there any training provided to the borrower?

    Answer: Yes, upon borrower's request, there is a 2-day hands-on training course that is conducted at borrower's site by the GOES-R User Outreach person at Harris IT Services in Omaha, NE. The hands-on training can be tailored to a shorter amount of time depending on the interests or time constraints of the borrower. In addition, a CD is delivered to the borrower that includes training materials and user guides.

14. **Question:** Are there any costs for borrowing a GRB Simulator?

Answer: The only costs incurred to the borrower are the shipping, insuring, and handling of the two transit cases to and from the borrower's site.

15. **Question:** What kind of output methods are used for testing the GRB Simulator?

    Answer: There are only two methods: 1) digital transmission for left-hand circular polarization (LHCP) and right-hand circular polarization (RHCP) using RJ45 Ethernet cables and 2) I/F transmission for LHCP and RHCP using RG400 double-shielded coax cables.

16. **Question:** What is the required I/F setting on the GRB Simulator modem for testing I/F output?

    Answer: 70 MHz

17. **Question:** What is the type of connector used on the end of the cable for the output I/F signal?

    Answer: BNC connector

18. **Question:** What type of modulation form is used for I/F simulation?

    Answer: 8PSK is the primary method. QPSK is the alternate method.

19. **Question:** What are the sizes of the transfer frames during the simulation?

    Answer: Each transfer frame has 2048 bytes of GRB data and 14 bytes of Quality of Service (QoS) data for a total of 2062 bytes.

20. **Question:** Are the transfer frames for the GRB packets byte aligned or random?

    Answer: They are random. A GRB Packet may traverse one or more transfer frames. Some transfer frames may contain portions of more than one packet, such as the end of one packet and the beginning of the next packet. The person receiving the data stream cannot rely upon any given starting position for packets within a transfer frame.

21. **Question:** Does the GRB Simulator have the ability to inject errors into the data stream?

    Answer: Yes, there are sample scripts included in the simulator that inject errors for the primary or secondary header fields and cross redundancy checks (CRCs) of the GRB data packet. However, the GRB Simulator cannot inject errors at the DVB-S2 framing path between the FEP and modem.

22. **Question:** When will GOES-R be placed in an operational orbit location and will the location be in the West or East?

    Answer: When GOES-R is launched in 2016 it will be placed in the 89.5° checkout orbit. It has not yet been determined where GOES-R will be placed in operational orbit. The final decision will be based on the health/safety/performance of the GOES constellation. NOAA's Office of

[Satellite and Product Operations](#) will be responsible for determining the operational orbit for GOES-R.

Additional Notes: The GOES-R series satellites in the West position will be at 137W, not 135W (as today's GOES-West). GRB users will want to check out their systems with data from the PLPT (Post Launch Product Test), when GOES-R is at 89.5°W. This should also be a consideration for GRB receiver acquisition and deployment. Being prepared for PLPT requires a pointable receiving system is ready even sooner than the dates in the fly-out chart. Finally, please see the downlink document for additional information: http://www.goes-r.gov/users/docs/GRB_downlink.pdf.

23. **Question:** Who can I contact on the GOES-R program for questions on GRB data or access to GRB Simulator software code?

    Answer: You can contact Matt Seybold at matthew.seybold@noaa.gov or Kathryn Miretzky at kathryn.miretzky@noaa.gov.