NEN SRR Review

Recommendation

Originator: Scott Shaire	**Recommendation#** 2
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Ref. Slide:	**Date:** 07/08/2015

Short Summary:
Driving Requirements for future missions.

Problem/Comment:
Consider the following driving requirements instead. (1) Find a future mission that agrees to use the NEN (IRIS) Gateway and meet its requirements (e.g. GRACE-FO with SLE, NISAR with 4 Gbps Ka Band) (2) Combine with functionality of other NEN Gateways such as PTP, SAFS, or EDOS to minimize mission unique equipment (3) Enable dual polarization X-band and Ka-band by interfacing with multiple streams simultaneously (i.e. required for NISAR)

Proposed Resolution:

Assigned to: Salem El-Nimri Salem.F.El-Nimri@nasa.gov	**Assigned Date:** 07/13/2015

Resolution:

This recommendations are being acted upon at the current time.

Regarding proposed driving requirement #2. The current NENG Phase II design approach provides a highly flexible platform that can implement added gateway functions, by software module development. This flexible design approach will allow NEN to utilize NENG II in the future rather than costly mission unique hardware gateway solutions.

Regarding proposed driving requirement #1 and #3. Please see the note to reviewer given in the answer to RFA 01 which states.

RFA 01 "Note to reviewer: Since the time of the SRR, expected communication rates have increased. PACE is now planning for code symbol rates of 1.2 Gsps. NISAR a joint mission between NASA and the Indian Space Research Organization, is planning for support from the NEN at even higher code symbol rates; up to 4 Gsps. Because of these large rate increases NEN plans for NENG II are expected to change with a corresponding change in scope and requirements in the near future."

Some NISAR details that will be referenced in the change of scope and requirements.

"There is a clear trend of growing data volume from earth science missions. In response NEN is planning to upgrade the NEN Alaska Station to for Ka-band services. Based on the NEN mission forecast, there is at least one mission with a data rate requirement on the order of 4 Gbps. NISAR, a joint mission between NASA and the Indian Space Research Organization, is currently planning for return link telemetry support from the NEN Alaska Station at code symbol rates up to 4 Gsps at Ka-band. The launch date of NISAR mission is planned in the 2020 time frame. The exact rate will likely vary as the mission matures. The 4 Gsps rate will be achieved using SQPSK with modulation symbol rate of 1 Gsps for each leg of a dual polarized Ka-band radio communication link. Forward error correction (FEC) of 7/8 rate LDPC is planned for because of its high efficiency. A dual pole receiver is needed, producing 2 Gsps of code symbols into the FEC decoder and 2*7/8=1.75 Gbps at each decoder output. The total decoded data rate is 3.5 Gbps.

A coverage analysis has been conducted to determine the total daily volume based on number of passes for the AS station: Passes/Day: 12.17, Average Duration: 5.3 min/pass, Total Daily Coverage: 64.3 minutes = 3858 seconds. This analysis assumes a 10 degree minimum antenna elevation. For 3.5Gbps, the total daily volume will be 13503 Gbit or 13.186 Tbyes. Note: 1Tbyes = 1024 Gbit.

Based on the NISAR mission 4 Gsps requirement and coverage analysis, the NENG storage requirement will be 13.186 Tbyes which is enough. As NISAR launch date is about 2020, the NENG will implement only a 10 TB storage in the 2016 implementation. It will be expanded to 13.186 TB when the AS station NISAR mission support requirement is confirmed and finalized.

Close Authorization:	**Closed Date:** 8/25/16