Deep Space IP

Congestion Control Discussion

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Congestion Control in Deep Space?

- Congestion control (Internet): detect queuing in the network and source back off by down pacing
- In deep space, because « loong » intermittent links, queuing is a « needed feature ».
- Bundle Protocol
  - does not have any (e2e) congestion control or pacing mechanism
  - RFC9171: « The Bundle Protocol itself does not ensure delivery of a bundle to its destination. Data loss along the path to the destination node can be minimized by utilizing reliable convergence-layer protocols between neighbors on all segments of the end-to-end path; however, for end-to-end bundle delivery assurance it will be necessary to develop extensions to the Bundle Protocol and/or application-layer mechanisms. »
  - With the LTP hop-by-hop « transport » protocol (under BP), forwarding priorities can be set. But only for legs using LTP.
  - BP applications have to implement bundle loss, reorder, duplicate, …
- Deep space links are highly managed and scheduled
  - currently only a single mission uses a link at a specific time.
- Do we need (IP transport) congestion control (as we know it on Internet) in deep space?
  - (Credit to Gorry Fairhurst who asked that question during last deepspace IP meeting IETF in November)
  - Window sizing based on known mission parameters (BDP)?