Better HiSeasNet Experience

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Existing Problems

- Link saturation = slow links
- Link balance is always a problem for someone ("bandwidth hogging")
- Bad voice quality
- Equipment failures
- Telepresence capabilities are not built-in, require specific expansions
- Expansions and changes take effort from ship techs
- Indian Ocean coverage
- Large antennas desired on small ships

Past Efforts

- Stocking spares on ships and in San Diego depot
- Backup and remote control systems at the earth station for automatic and quick response
- Have used a variety of QoS technologies, total bandwidth still just a little short of needs for real improvement
- Maintenance schedules are focusing on preventative needs (bearings, replacements, upgrades)

Solutions Still Needed

- More bandwidth + enforcement of reasonable policy = less congestion
- Better flexibility for bandwidth in both directions
  - TDMA?
- Better QoS for real-time traffic could involve:
  - More bandwidth (IP layer)
  - Splitting into a paired-carrier architecture (SCPC physical layer)
  - TDMA enforcing split at lower level (TDMA physical layer)
- Remote management of gear
  - New modems
  - Better use of backup links
  - Remote managed antennas (MXP-equipped SeaTels)

Limits

- Never going to squeeze large C-band antennas onto small ships
- Not going to have Indian Ocean coverage from San Diego...need another location for that
- Can only see as many satellites as antennas at the earth station
- Just a HiSeasNet earth station, or take it to other projects?

HiSeasNet Expansion Options

- Just more bandwidth, 2 Mbit shore-to-ship per beam
  - Improves QoS, reduces congestion
  - 4x the bandwidth for 3x the existing cost
- More bandwidth with new equipment
  - More capital expense, reduced monthly expense
  - Could be TDMA for flexibility or SCPC for even better efficiency
  - Could use existing bandwidth, 4x, 10x, or more Mbit shore-to-ship per beam
  - Hardware cost is ballpark of $100k-180k
  - Bandwidth cost is ~$50k/mo for 4x or $96k/mo for 10x current bandwidth
- New modems are remotely manageable for easier transitions, and have extra diagnostic tools for a better experience

The Progression

- A transition/upgrade could happen over time in many steps by:
  - Just upgrading some beams or some ships
  - Integrating new gear with existing gear
  - Gradually trading up-front costs for ongoing costs
  - Using equipment that is upgradable as needs change
- In time, new antennas for dual-banding and even more remote control (between modem and antenna controller, too)