Packet Ideas For ARISS

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- None of the following experiments require -any- hardware or software mods
- Everything is in place, and ON ORBIT

Now that the new ISS packet radio system (PRS) is running, we should consider the following operating scenarios for best fit with today's amateur satellite and packet radio users

- Packet radio is not OLD
- What is new on the ground is 10,000 or more mobile and HT packet rigs
- Radios with internal TNC's can all hear ISS WELL & display on front panel
- All the world is going wireless
- Hams have the handheld wireless digital radios... Lets use them for space

EXPERIMENT #1:
Add "ARISS" Alias on PCsat

Done!

- ◆ PCsat has added "ARISS" path to its UIDIGI list
- ◆ Users do not have to re-configure between ISS and PCsat
- ◆ This is working well.
- ◆ The UIDIG path uses callsign substitution on the downlink, so these packets appear as either RS0ISS* or PCSAT-1* in the downlink for the users even thought they were transmitted as via "ARISS" on either bird.

EXPERIMENT #2:
Add "APRSAT" Path to MY1ALIAS on ISS

- The long term plan for all amateur satellite UI digipeaters in space should have all such satellites support a common generic path.

- The generic path callsign of APRSAT was coined for this purpose

- Is already in space in PCsat ROMS

- Is also in some of the CUBESATS now in construction.

- "APRSAT" should be added to the ISS MY1ALIAS.

- This makes ISS UI digipeater future compatible.

- End users won't have to re-configure between different satellites...

EXPERIMENT #3:
Add "RELAY" and "WIDE" Paths to MY2/MY3ALIAS on ISS

- Since all terrestrial portable or handheld users of APRS use the UNPROTO path beginning with RELAY or WIDE, these two aliases should also be supported on the ISS.

- Then again, users will not have to reconfigure TNC's to QSY for any Digipeating amateur satellite in view (ISS).

- But since the TNC does callsign substitution, all packets come back down clearly marked as to which satellite (RS0ISS) digipeated them.

ISS As a Constellation Leader

- These MYALIAS changes let both PCsat and ISS (and future satellites) merge into a common multi satellite constellation to serve all users of the UI digipeating mission.

- This constellation concept is both a "first" in amateur satellites, and a great benefit for all users.

- Either temporarily or permanently, this is not just a convenience.

- It makes the satellites transparent to the user and can be considered as a mission multiplier of a constellation of satellites operating in unison to support a single packet mission objective.

EXPERIMENT #4:
QSY ISS UI Packet to 145.825 for a Dual Satellite Test

♦ PCsat operates on 145.825, a recommended low-duty-cycle "builders channel" for simple 1200 baud AX.25 experiments.

♦ ISS could QSY to 145.825 temporarily for a 2 satellite demonstration,

♦ ISS/PCsat could operate synergistically as a multi satellite constellation.

♦ With the same ALIASES, and same FREQUENCY they become identical and mutually supportive to all users...

♦ In the future, such a move can eliminate the 145.990 ISS packet uplink

♦ Interference to UO-14, FO-20, FO-29 and other satellites nearby.

♦ Also a worldwide internet linked system of ground stations on all continents now monitors the 145.825 space-packet-channel and merges all data LIVE for easy access by hams everywhere.

EXPERIMENT #5:
Dual-hop Packet Test

- During the joint operations on 145.825, a dual hop test is possible.
- Dual hop contacts over combined footprints of almost 6000 miles.
- Both on the same frequency, with same path aliases.
- A double hop of WIDE,WIDE could get the double hop!
- This would be an exciting challenge to operators.
- That is what HAM radio is about... Experimentation and fun...
- Also, it would be first satellite-to-satellite system.

EXPERIMENT #6:
Move Old Packet System
To Dedicated Antenna

◆ Can the old ISS UI packet system move to a different ISS antenna for operations on 145.825 simultaneously with the new system on 145.800.?

◆ 145.825 is a 1200 baud builders channel for low dutycycle pkts

◆ Low duty cycle minimizes QRM/desense to other ARISS operartions

◆ 145.825 is widely separated from the 144.49 and most school uplinks.

◆ Being separate from other ARISS experiments, would improve its reliablity in providing a presence in space to all schools on all passes..

◆ The worldwide internet linked ground stations monitor 145.825 24/7.

◆ With 145.825 being supported by 2 satellites 24/7 round the clock, the average utilization would be less stressed after the initial excitement, thus minimizing possible interference with other ARISS experiments.

Experiment #7:
ARISS Bulletins From ISS

- Currently the PRS is flying with only one BEACON, the BText.
- There are 4 other BEACON slots. The LT and L1, L2 and L3 buffers.
- These bulletins can be loaded by the REMOTE sysops on the ground.
- The format to make sure they are received in all software including the handheld APRS radios the format should be similar to these:
- LT :BLN0ISS :this is the first bulletin line from ISS
- L1 :BLN1ISS :this is the second bulletin line available
- L2 :BLN2ISS :this is the 3rd line
- L3 :BLN3ISS :this is the 4th such line available
- Setting these to about once every 3 mins is about right to guarantee every HT captures them.

EXPERIMENT #8:
Originate ARISS Position Packets On The Ground

- GPS will not be integrated into the ARISS system any time soon.

- There is never enough time on ISS to keep bulletins updated

Therefore ISS position should be originated on the ground. ISS can already report its position in real time by simply having designated automatic tracking stations digipeat the APRS ISS position from the ground.

- We have been doing this for a year from Maryland by generating moving APRS object reports for ISS and then digipeating them via the ISS digipeater.

- To the users on the ground, it looks like ISS is reporting its own position packets as if flies over.

ISS Position Packet on Mobile

D-700 Front Panel Display of Satellite-in-view

EXPERIMENT #9:
Originating ARISS Bulletins On The Ground

- One ground station in each footprint can originate the "daily" ISS bulletins in the same manner as the positions.

- Offloads any burden from the ISS crew

- Moves burden to the -ground-

- On ground there is an ample supply of ARISS volunteers.

- There are advantages over the remote SYSOP process:

- A connection is not required.

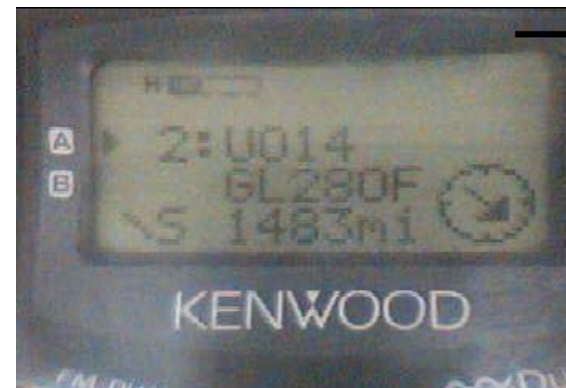- Bulletins can be customized for each footprint.

Satellite Objects on the D7

Satellite Schedule in DX list
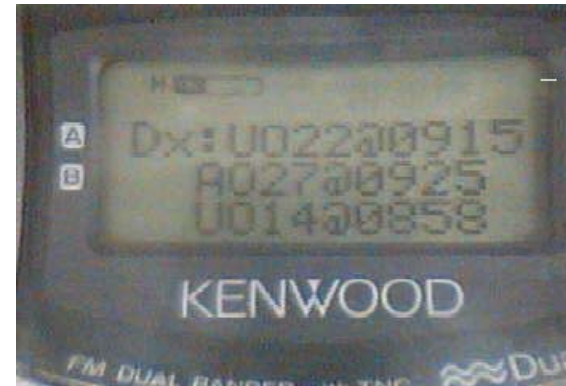
Sat-in-view (pg 2 of 5)

Sat-in-view (pg 3 of 5)

This ground-origination method works

This ground-origination method works, the software exists, the ground stations are in place, the labor is available. And on ISS the UI digipeater is turned "ON". Everything else is on the ground.

The end user with his HT, or mobile, or other packet station will see packets "from ARISS" as if they were originated on ISS, but only for convenience, we are originating them on the ground.

Imagine, real-time-ARISS bulletins about everything pretaining to ISS in - real-time on -every- pass (with no crew involvement, and no need for SYSOP connects to change them).

Conclusion

- All the world is going wireless.

- HAMS with their ht's, Digital assistants, and laptops (or all-in-one Kenwood packet radios) have the ability to receive every packet from ISS when it is in view.

- Unfortunately, we have not fully capatilized on the real potential of this ISS PACKET downlink to show HAM radio to all kids and the rest of the World in living daily updated manner.

- There has been too much emphasis on the ISS crew who are too busy.

- To see packet work on ISS, we must move the operating and maintenance burden to the GROUND and it should be on all the time.

- The experiments outlined herein suggest a coordinated approach to maximizing the utility of this universal AX.25 1200 baud downlink worldwide while minimizing crew maintenance.

Some WEB References

- PCsat WEB: http://www.ew.usna.edu/~bruninga/pcsat.Html
- ISS-APRS FAQ: http://www.ew.usna.edu/~bruninga/iss-faq.Html
- APRS SATELLITES: http://www.ew.usna.edu/~bruninga/astars.Html
- SAT-INFO displays: http://www.ew.usna.edu/~bruninga/satinfo.Html