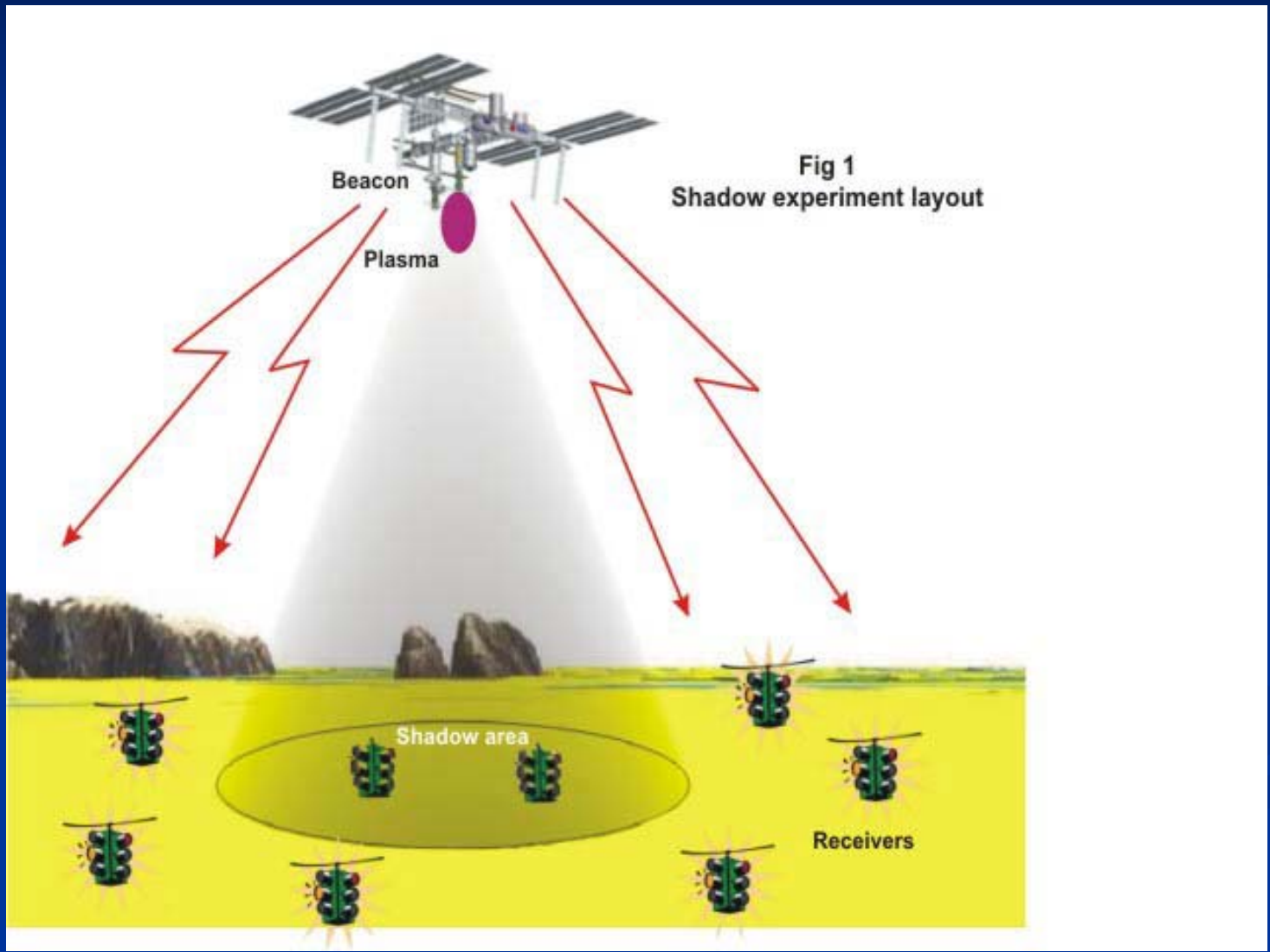
Project of space experiment "Shadow" on ISS

New challenge and new opportunity for Amateur Radio Community

Lay-out


Beacon
Plasma
Fig 1
Shadow experiment layout
Shadow area
Receivers

Tasks

- The task of every individual participant is to register moments of signal cut-off and following signal restore using the Universal Time marks and to address this information along with data on its geographical position to the Information Storing Center. Every operation sequence would take up to 10 min. while the satellite is passing between two opposite points of the local radio horizon.
- The task of the crew will be download the delivered beacon soft (floppy or CD) to the onboard ham gear and to run the beacon 3 - 5 times for each measuring field according to flight schedule.

Actually the SpEx "Shadow" consists of three technically independent parts:

•Programmed plasma injection of about 30 seances up to 10 minutes duration each.

This is responsibility of Tsniimash and funding from Rosaviacosmos.

•Programmed translation of sounding signals by available onboard Amateur gear.

This is responsibility of the crew according to their flight task with technical assistance of ARISS concerning serviceability of available onboard Amateur gear.

•Receiving and processing of sounding signals by available ground mosaics of Amateur radio operators.

This is good will and personal interest of Amateur radio operators with no funding.

During "hot" seances the independent parts of the experiment work simultaneously.

For the "cold" stage no additional certification is required since the available onboard ham gear is planned to be used.

Committee recommendation

- Approval with the provision that the project is approved by the appropriate authorities in the sponsoring country.
- Clarify the packet timing requirements.

A Digital ATV transponder & beacon device

- One or more on-board cameras with a graphic overlay acting as a test card.

  These would drive a
- 2.4GHz ATV transmitter using digital encoding to one of the existing DTV formats
- With a 1.2GHz FM analogue receiver.
- (noting that DATV is a currently emerging technology and that 1.2GHz FM ATV transmitters are already in very common use and 50 watt PA devices are becoming readily available)

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The benefits of an ARISS based DATV transponder & beacon

- Attractive for existing ATV amateurs – a cadre of technically competent amateurs in all three IARU Regions
- Existing ATV operation already uses microwave repeaters both FM and Digital
- Will enlarge the user base for ARISS operations
- Autonomous operation without astronaut intervention
- Will add to the attraction of existing ARISS school contacts
- Good PR value
- Could be used to maintain safety watch of external structure
- Could be used to maintain light pollution watch
- Doppler shift is not relevant
- Full duplex “look thru” is possible for users

Conclusions

- The concept is based upon existing but new technologies
- The “market” for a DATV transponder is already significant.
- Technical support from a new (to satellites) group of technically competent amateurs should be available.
- It would support existing ARISS activities - especially school contacts
- Pictures are worth a thousand words.
- Live pictures from space are probably worth even more!

Committee Recommendation

- Approval of project with the following recommendations
  - Investigate the possibility of deploying via the Express Pallet.
  - Design changes to protect from direct sun exposure to the optics due to unplanned attitudes of the ISS.
  - Consider combining with other Amateur TV projects

CDATV on ISS

Compressed Digital Amateur Radio TV

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MAREXMG

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Goal and Objective

- Install and easy to use CDATV system on ISS.
- Design the system for easy access to experience Amateur Radio Stations.
- Video will be in a Half-Duplex mono band mode.
- Provide live WEB Video

CDATV Satellite System

- Assuming a CDATV 23cm mono band operation. The ISS receiver will include a Doppler correction circuit (AFC). This circuit will be able to compensate for signals errors of less than 10 kHz.
- The CDATV system will use existing ISS antennas.
- Transmitter output: Adjustable from 1-10 watts.
- Controller: A standard grade Lap-Top PC will perform all of the control functions, including Video and Audio Compression and De-compression.

Today's Situation

- Analog FM Satellite video will require too much Satellite band-width.
- It will be easier to find a radio frequency for CDATV (1260 - 1270 Mhz).
- More experienced users will be able to access CDATV.
- CDATV (H.323) is compatible with LAN.

Committee Recommendation

- Re-examine the frequencies to be utilized
- Determine if the protocol is proprietary.
- Consider consolidation with other Amateur TV projects.
- Re submit to the PS&U Committee at the next opportunity.

ISS via the Internet

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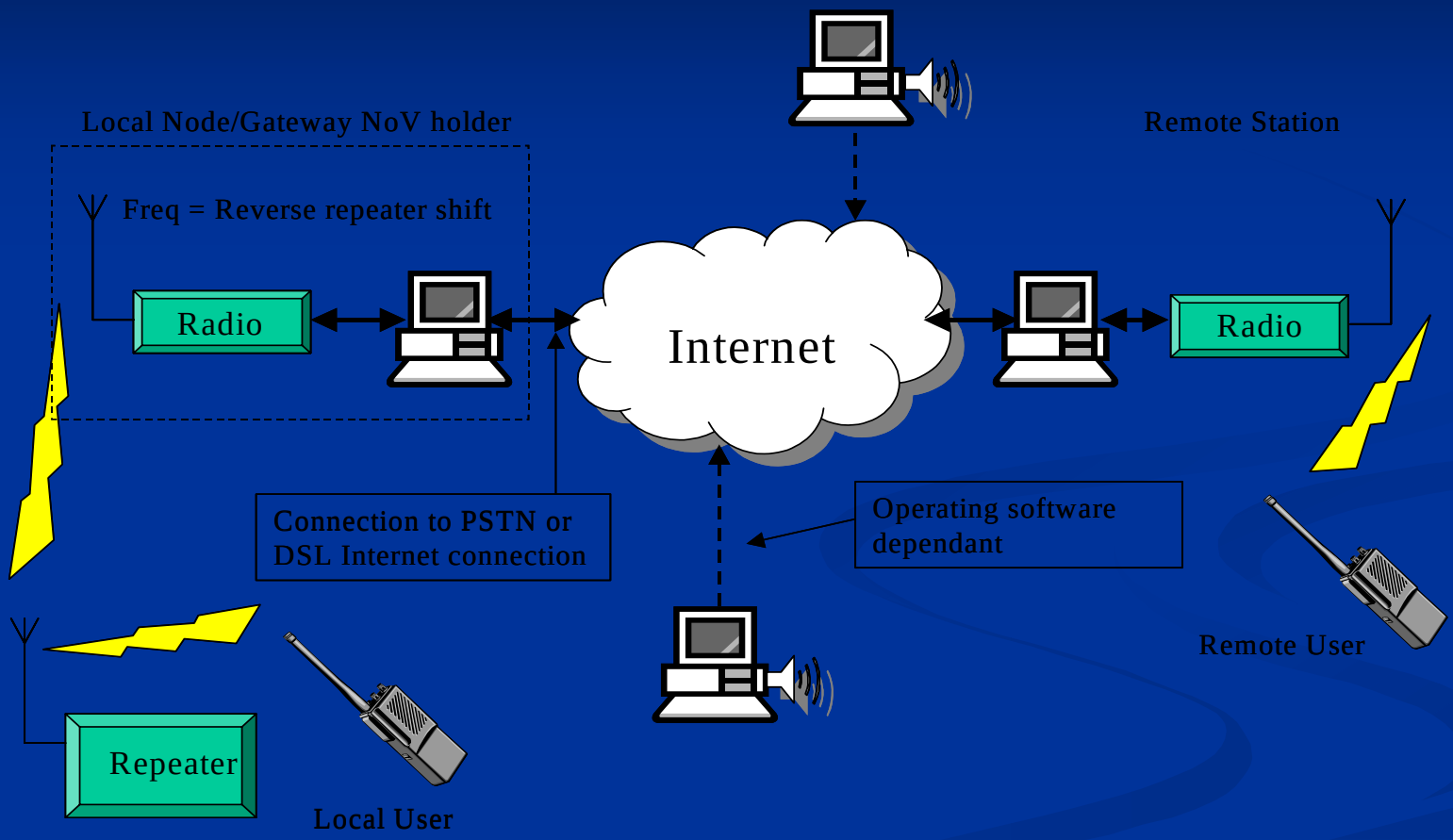

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Graphic courtesy Radiocommunications Agency

Final Thoughts

- EchoLink was used to tie repeaters together during the Space Shuttle disaster recovery operation. EchoLink will no doubt be used in many new and interesting ways in the future.
- Using the Internet for voice communication through applications like EchoLink has generated a considerable amount of discussion in the ham radio community.
- EchoLink provides yet another way we can get new people interested in our wonderful hobby, especially those already well-versed in how to use the Internet. EchoLink
- **Phase 2: EchoLink Software on ISS.**

Committee Recommendations

- Initiator to consult with international partners
- Perform some engineering tests to validate the pros and cons of the various systems.
- Resubmit to the committee when test results are available.
- Project initiator to participate in teleconferences with Project Selection and Use Committee prior to October 2004 meeting

Ionospheric Experiment

Not enough information at this time to make recommendation

Suggestions: Project needs to be more specific as to the source of testing, either via satellites or ISS