

Amateur Radio Working Group ARISS-I July 2008 Meeting

ISS Program Amateur Radio Operations Lead - Mark Severance, N5XWF

ISS Program Office, Mission Integration & Operations Office – Code OC7

July 2008



Benefits of Ham Radio on ISS



- **Educational Outreach**

- School contacts for NASA, IP and SFP crew members
- Over 50% US schools
- Exceedingly popular & positive
- High Visibility

- **Public Outreach for NASA & IP Agencies**

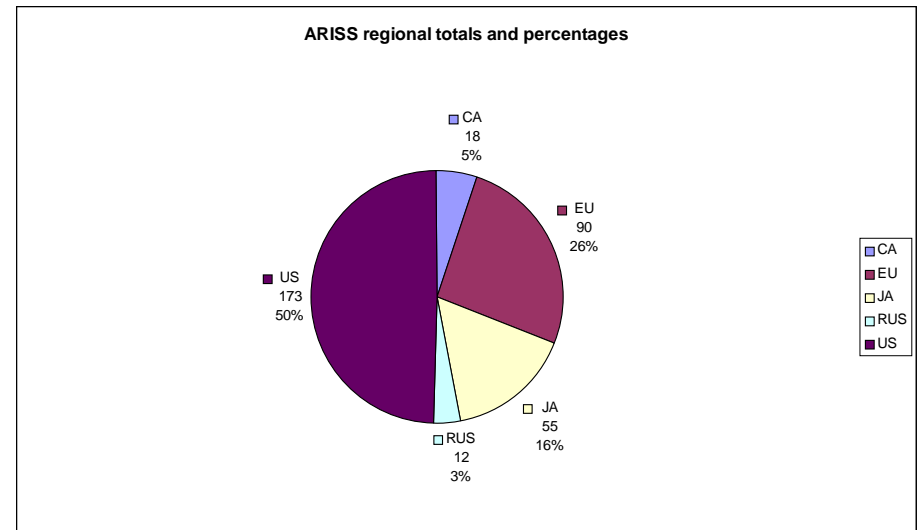
- School contacts as local PAO events
- Public events (NASM, Scouts etc.)
- Ham Radio community world wide
- High Visibility

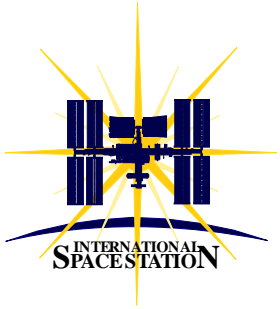
- **Crew Psych Support**

- Some crew enjoy the diversion provided by ham ops

- **Contingency Comm**

- SDTO in work for Exp 18
 - » Comm from ham stations to MCC-H
 - » Comm from ham radio to NASA VHF ground stations
 - > Ham radios can be battery powered





Goals for ARWG

ARWG, IP Space Agency and ARISS Interaction

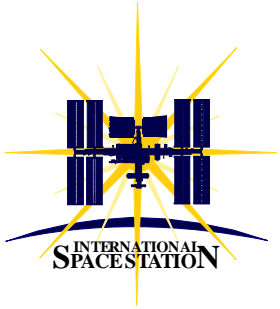


ARWG:

- Sets policy, goals, defines projects and direction for ham radio ops on ISS
 - Educational outreach
 - » Educational experiments
 - Public Outreach
 - Crew Psych Support
 - Contingency Comm
- Maintains documentation on policies and projects, ops concepts, onboard/ground config

IP Space Agencies:

- Provides input on policy, goals, defines projects for ham radio ops on ISS based on agency requirements
- Enables resources from their agencies for support of projects



Goals for ARWG ARWG, IP Space Agency and ARISS Interaction (cont)



ARISS:

- International volunteer team providing:
 - » Educational Outreach Support
 - » Flight Hardware (through AMSAT and ARRL)
 - » Ground Stations
 - » Ops Coordination/Planning/Training
- ARISS has specified International delegates to work with the IP agencies
- ISS Program's single interface the global amateur radio community
- *Coordination & Integration should be top/down and bottom up*
- *IP Agency Interaction with ARISS International delegates is key*
- *Continued ARWG coordination is key*



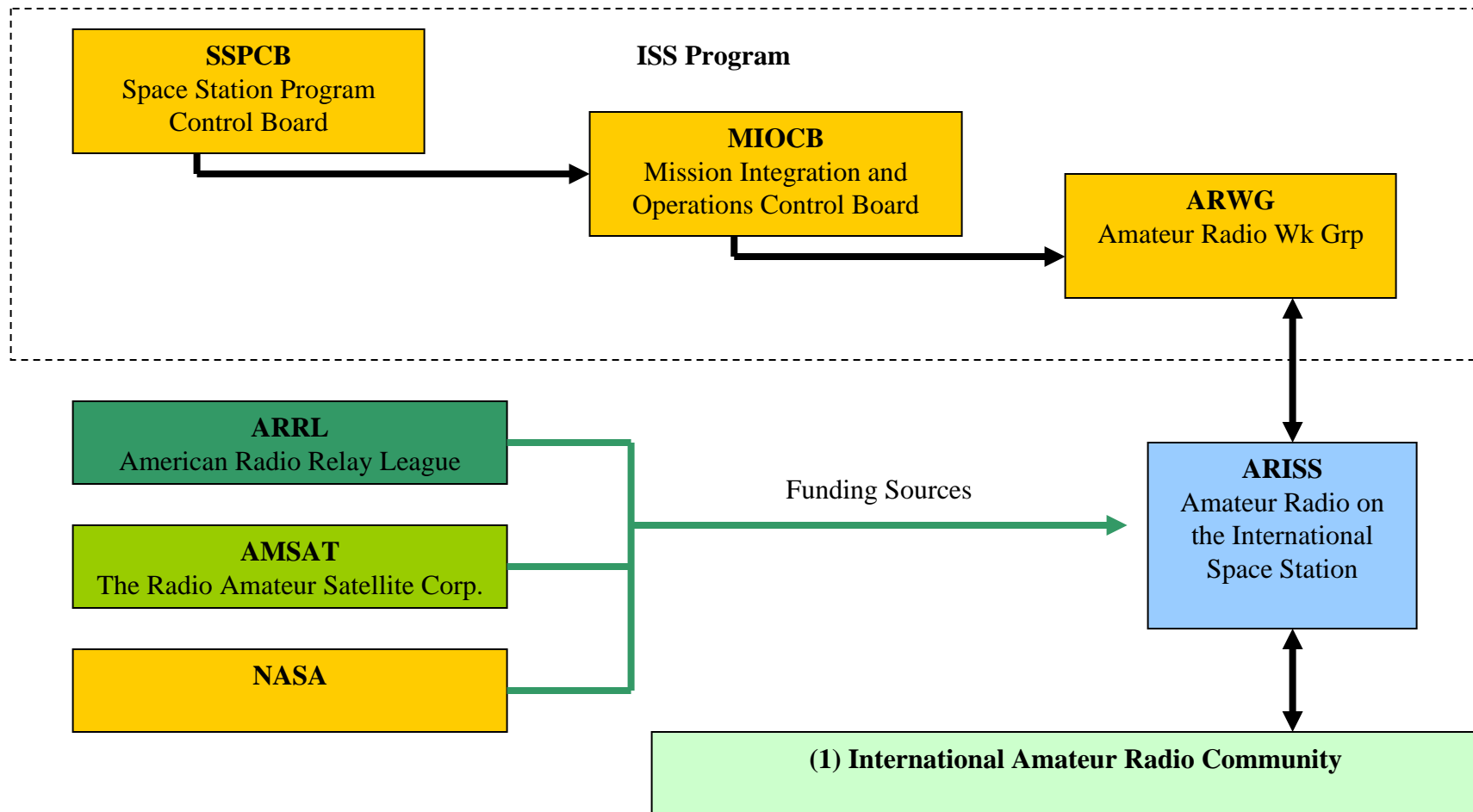
Review of ARWG and ARISS as Components of the ISS Program (con't)

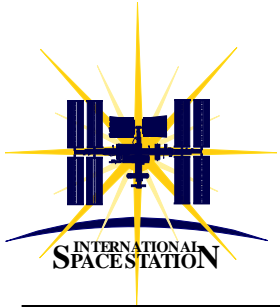


- **ARWG will coordinate all amateur radio equipment integration and operations on ISS**
 - NASA, IPs, SFPs, etc. specific use of amateur radio resources on ISS
- **Specifically:**
 - Implement requirements/flight projects from educational outreach, crew and ARISS partners
 - Determine resource requirements
 - » Manifest opportunities (launch service, mass, stowage)
 - » Onboard resources (storage, power, crew operating time/complexity)
 - Maintain communications and coordinate with the appropriate IP technical organizations and ARISS for issue resolution
 - Specify crew training requirements for ISS ham equipment
 - Monitor the development of ISS ham radio hardware/software and coordinate adherence to flight qualification requirements and approved schedules



Review of ARWG and ARISS as Components of the ISS Program (con't)





Agenda Item 2: Review of ARWG and ARISS as Components of the ISS Program (con't)



ARWG

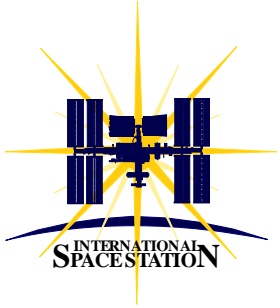
ARISS Rep F. Bauer	CSA Rep. Tony Pellerin Marilyn Steinberg	ESA Rep. Cristina Olivotto Giulio Canovai	NASA Rep. M. Severance Edu Rep?	JAXA Rep. Yoshi Fukuda	Energia Rep. TBD
	Astronaut Rep Ellen Baker	Cosmonaut Rep TBD	HSG Rep As Assigned		



Future ARISS Projects and Capabilities



- **NASA Education believes we have “just scratched the surface” of this outreach resource. The desire is to “go beyond the school contact”**
 - **Crew participating activities**
 - » School contacts
 - » Video transmission of crew activities
 - **Non-crew participating activities**
 - » Automated video transmission
 - » “Student telemetry”
 - » Satellites or Suitsat follow on
- **The IP’s desire expansion**
 - **ESA**
 - » Use the L/S Band antennas for digital television
 - » Possible use of an ARISS antenna as the payload for a prototype EVA attachment mechanism and as a shared resource
 - **CSA**
 - » Desire educational outreach - “What can we do to help?”
 - **JAXA**
 - » Offered HTV upmass and gear from Japanese vendors - “What do you need?”



Near Term Future ARISS Projects and Capabilities

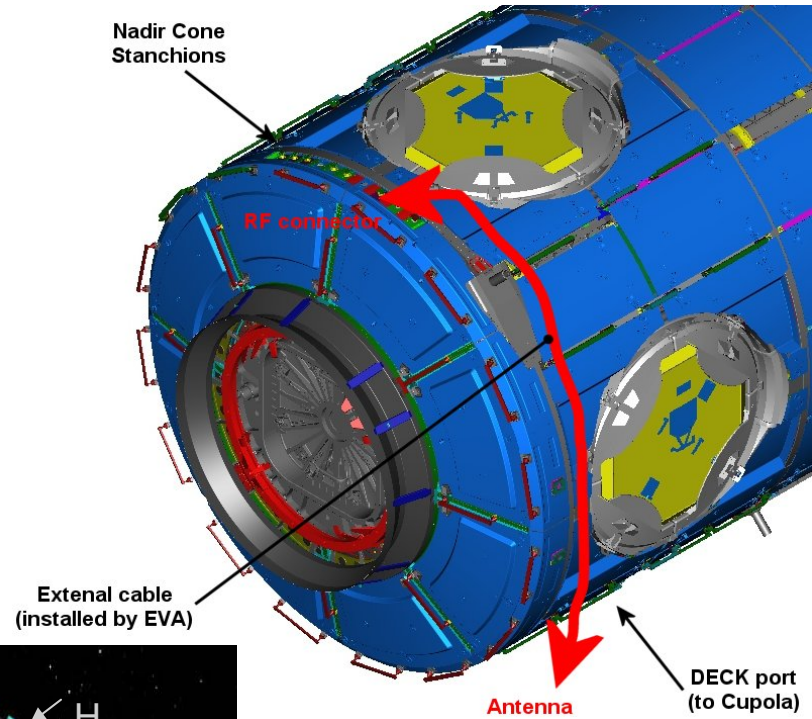
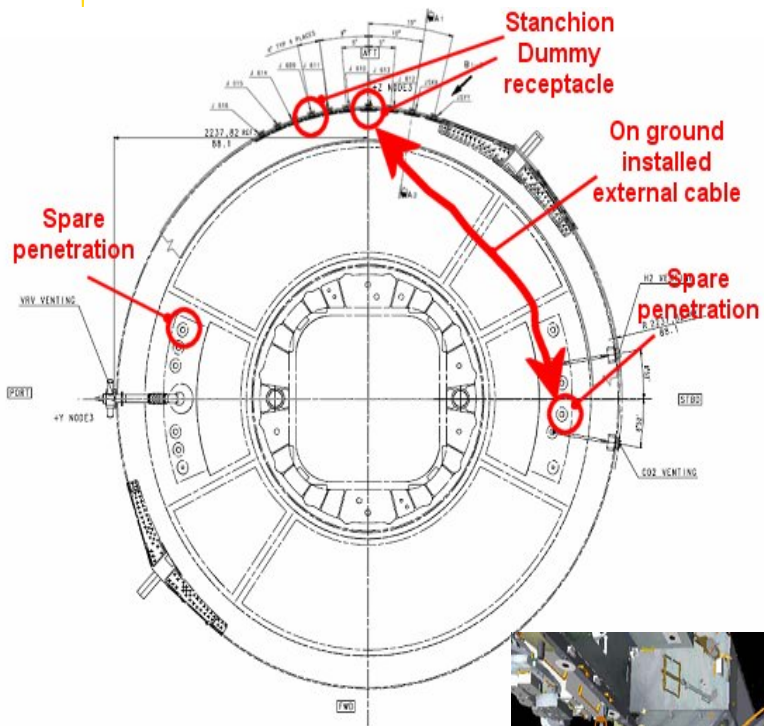


- **Node 3 Installation**

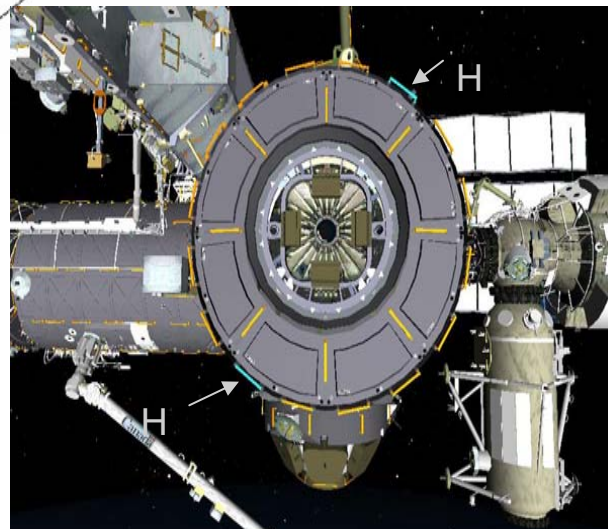
- Relocation/Reclocking of Node 3 presented this possibility
- Alenia ECP for 2 antennas – technically doable
- Offers omni-directional capability for contingency comm
- Crew psych support by operating from Cupola
- Utilizes unused hardware (Ericson VHF & UHF), redeployed to Node 3



Near Term Future ARISS Projects and Capabilities (con't)



External cable (installed by EVA)





Near Term Future ARISS Projects and Capabilities (con't)

- **ESA use of ARISS antenna as for prototype handrail clamp SDTO & AIS experiment**
 - Modified VHF/UHF ARISS antenna offered in exchange for handrail clamps for Node 3
 - I was requested to be a co-sponsor of SDTO
 - Modified antenna currently under test
- **ARISS desire is to use antenna as a shared ARISS/AIS resource**
 - ESA has agreed to shared use with a coaxial switch
- **Schedule is challenging**
- **Delivery of modified ARISS antenna for installation during ESA/Frank DeWinne Increment 20 EVA**
 - Progress launch, delivery dates etc



Goals for ARWG ARWG Controlled ISS Program Documentation



- **Current official ISS Program documentation is currently lacking**
 - ARWG charter revision
 - ARISS charter development
 - » Implement an ARWG/ARISS org structure/hierarchy compatible with NASA SE standards
 - Space Act Agreements for ARISS
 - Con Ops and Configuration documents
- **Sign off of these charters is expected as part of the overall program and board realignment**
- **ARISS SAA is identified as forward work**
- **Concept of Operations, policy and technical configuration documentation for ARISS is also lacking**
- **Proposal for two documents:**
 - ARWG Management Plan & ARISS Concept of Operations
 - ARISS On-Orbit and Ground Station Configurations & Operations



Longer Term IP Agency Goals and Projects for ARISS



- **Mark's unvetted Ideas, "food for thought"**
- **Anything we do must related to the 4 basic tenets**
- **Projects construed as Educational Outreach should have formal educational outreach approval at the ARWG level**
- **Some project ideas ("Going Beyond the School Contact")**
 - **"Student Telemetry"**
 - » VHF and HF transmission
 - **Amateur Video**
 - » SSTV
 - » Fast scan
 - » Internal/external
 - **ARISS-Sats as a follow on to Suitsat**
 - » 6 experiment ports for ARWG IP agencies and AMSAT/ARRL
 - » Cargo vehicle, or Cargo LV deployed



Longer Term IP Agency Goals and Projects for ARISS (con't)



- **Student workforce augmentation:**
 - Engage High School and University level participation for design, fab and test
 - » Be as sophisticated as practical for the student workforce
 - » Hardware and software
 - » On-orbit and ground segments
 - All ARWG IP Agencies participating
 - Retain ARISS and AMSAT expertise as advisors
 - AMSAT IP agency hardware/software integration/validation as in-kind support to ARISS
 - » Student participation as much as possible