ARISS Multipoint Telebridge Contact via Amateur Radio

A Response to COVID-19
and
Beyond
April 15, 2020
Agenda

• Why are we here?
• ARISS Connections
• Current Options
  • Radio Direct Contact
  • Radio Telebridge Contact
• A New Opportunity
  • Multipoint Telebridge Contact via Amateur Radio
    • Students at home
    • Audience at home
• Next Steps
  • Volunteer organizations
Why are We Here?

• All ARISS Contact Host Organizations are impacted by the COVID-19 virus
  • We see, and admire, your outstanding actions to pivot your schools and organizations to continue educating students through distance learning systems and tools
  • ARISS, too is pivoting our program to enable you to get more STEAM education—and a boost of excitement to your students

• The ARISS team is preparing to support the concept of “Distance Learning based School Contacts” for several months into the future
  • Our primary objective is to protect all the students, faculty, astronauts and our volunteer team in all we do
  • The Multipoint Telebridge concept represents the virus infection mitigation ideal—we will do these with “infinite” social distancing. In other words, engaging with each student and educational institution in their home (even quarantined).

• One rationale for ARISS was to help astronauts improve their psychological well-being by allowing them to freely talk to others outside mission control.
  • ARISS wants to do the same for students—providing a psychological well-being STEAM motivation to students, faculty and the local community through ARISS on-orbit connections—virus free!

• Let’s discuss the idea and get your feedback
ARISS Connections

**Traditional**

- Radio Direct Contact
- Radio Telebridge Contact

**Proposed New**

- Multipoint Telebridge Contact via Amateur Radio
Connecting to the ISS: Radio Direct

Direct radio connection to ISS from your venue

• ISS passing over your venue at the time of the contact

• Requires an amateur radio station at your location

• Provides hands-on radio experience and a one-on-one dialog with ISS crewmember
Connecting to the ISS: Radio Telebridge

A telebridge is a remote radio connection to the ISS from your venue

- Radio contact with the ISS is made while the ISS passes over the telebridge station in another part of the world

- You are connected to the remote amateur radio station by telephone line (integrated into your PA system)

- Provides a one-on-one dialog with the ISS crewmember, equivalent to the direct connection
Advantages and Disadvantages of Current Approach

• Advantages
  • Plenty of hands on exposure to radio equipment and procedures
  • Crowd excitement
  • Lends itself well to classroom/ auditorium setting

• Disadvantages
  • Requires students to be physically present
  • May require radio club members to be physically present
  • Not appropriate in today’s COVID-19 environment
  • May represent a challenge in other settings
Scheduling Challenges

• We are dependent on Astronauts volunteering their time

• We are in a transition to commercial crew capabilities
  • As with all new programs we are unsure as to exact dates
  • Astronaut availability is tricky to predict

• Orbital physics are unchanged
  • Direct contact opportunities occur 1 – 3 weeks out of every 8
  • Telebridge opportunities are typically much more frequent

• All things considered we forecast *fewer* opportunities for direct contacts
New ARISS Opportunity:
Multipoint Telebridge Contacts via Amateur Radio

• What is a “Multipoint Telebridge”
  • Use existing telebridge technical infrastructure
  • Add in the ability to tie into that infrastructure from home or “Shelter in place” location
  • Can use streaming to provide visual content (future)

• Process
  • Execution of accepted educational plan to the extent possible—before or after the contact
  • Questions – not more than 12 students asking not more than 20 questions
  • Short Story as always that introduces the organization
  • ARISS provided moderator to coordinate actual contact
What Does A Multipoint Telebridge Contact Look Like?

- **Audience** – ZOOM, GoTo Meeting, YouTube, etc.
- **Verizon Audio Interface**
- **Telebridge Station**
- **Moderator**
- **Teacher**
- **Student 1**
- **Student 12**
- **Student ...**
Roles and Responsibilities

• **Telebridge Station**
  • Connects students with astronauts on ISS via 2-meter amateur radio contact
  • Transitions between talking to astronaut and listening to astronaut

• **Verizon**
  • Connects everyone together; Places all calls; Mutes and Unmutes as is appropriate

• **Moderator**
  • Hosts the event; Provides commentary

• **Teacher**
  • Prompt students for questions: fill in for absent students

• **Students**
  • Ask prearranged questions in order

• **Audience**
  • Listen only
Organization’s Role in Multipoint Telebridge

- Execute Educational Plan
- Generate questions
- Pick students to ask the questions
- Establish the order in which the students will ask questions
- Practice asking questions in order and on cue
- May ask the question for an absent student

- Schedule event for audience
- Use your established distance learning platform to support your audience
- Coordination of event within the distant learning curriculum
- Gather statistics for reporting
- Provide feedback to ARISS on successes and failures
Items of Interest for Distance Learning

• Horizon line and angles above the horizon
• ISS path in relation to local landmarks
• The 10-minute window and its’ origin (250 miles up & 17,500 mph)
• Line of sight communications and 2-meter amateur radio
• Concept of uplink and downlink
• Satellite “footprint” – the piece of the Earth a satellite or the ISS sees
• How the footprint moves – approach, contact, leave
Useful Tools for Distance Learning

- Space Station Explorers (https://www.spacestationexplorers.org/)
  - Learn-At-Home (https://www.issnationallab.org/stem/learn-at-home/)
  - Story Time From Space (https://www.spacestationexplorers.org/educational-programs/storytimefromspace/)
  - ISS Above (http://www.issabove.com/schools/curriculum)

- NASA Resources
  - Spot The Station (https://spotthestation.nasa.gov/)
  - Research on the ISS (https://www.nasa.gov/mission_pages/station/research/experiments_category)
  - STEMonstrations (https://www.nasa.gov/stemonstrations)

- American Radio Relay League (ARRL)
  - “Where’s the Remote – Unit 1 Act 1.5, Unit 2 Act 2.1 (http://www.arrl.org/curriculum-guide)
  - “The Story of Suit-Sat” and “Look Carefully” (http://www.arrl.org/shared-resources-from-other-teachers-ariss)
Our Offer To You: A Multipoint Telebridge

• Several planned contacts are being rescheduled due to the COVID-19 situation
• The Multipoint Telebridge gives you the opportunity to proceed with an ARISS contact within the setting of a distance learning environment
• We are looking for one or more organizations to explore this opportunity with us before the current school year ends
• Should the current situation extend into the summer we are ready to support your ARISS contact using a Multipoint Telebridge Contact via Amateur Radio
• As we go forward, we will continue to support this method for ARISS contacts as the need arises
• Your Technical Mentor can assist you with this opportunity should you desire to proceed.
Questions?