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 boos 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

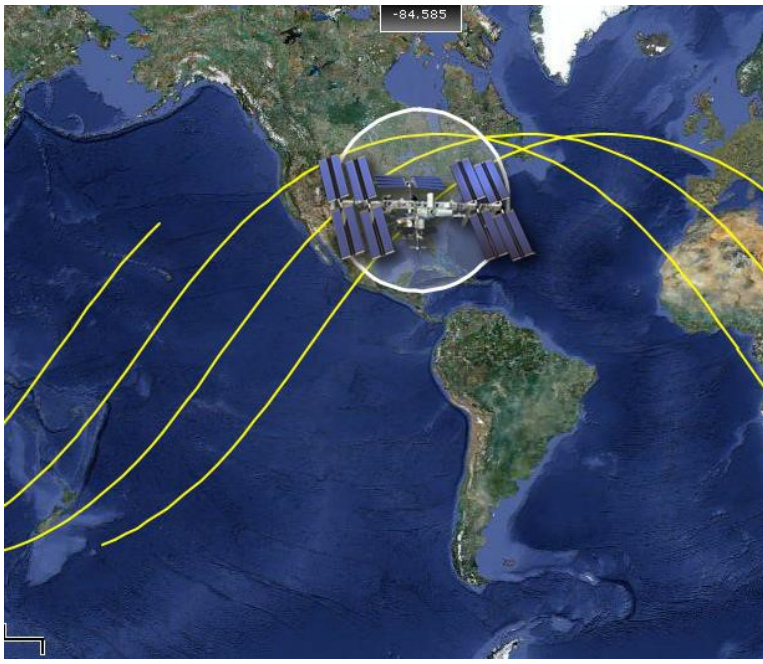
- Radio Direct Contact
- Radio Telebridge Contact

- **Proposed New**
- Multipoint Telebridge Contact via Amateur Radio

Connecting to the ISS: Radio Direct

Direct radio connection to ISS from your venue

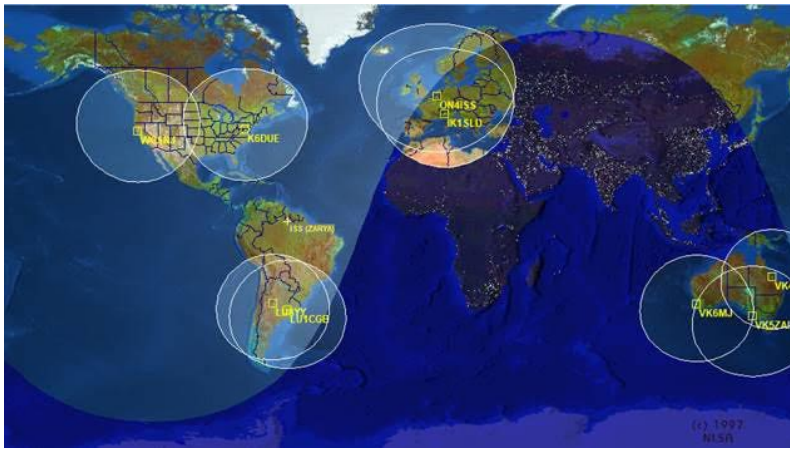
- ISS passing over your venue at the time of the contact
- Requires an amateur radio station at your location
- Provides hands–on radio experience and a one-on- one dialog with ISS crewmember



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

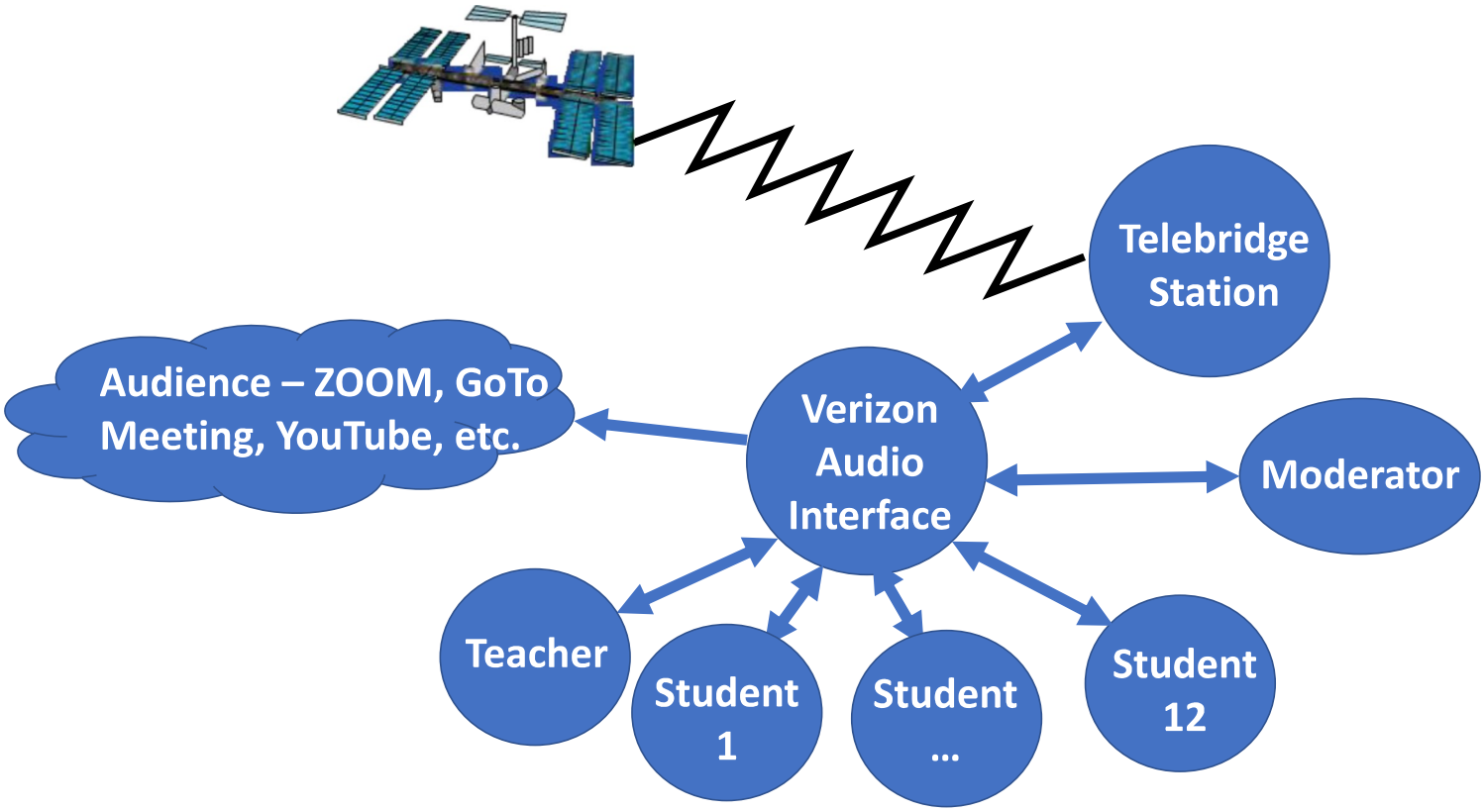
Scheduling Challenges

- 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?



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
  - NASA at Home (https://www.nasa.gov/specials/nasaathome/index.html)
  - 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)
  - NASA Space Communications and Navigation (SCaN) Kids Zone https://www.nasa.gov/directorates/heo/scan/communications/outreach/students/txt_kidszone.html
- 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?
A R
I S S
Amateur Radio on International Space Station