

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

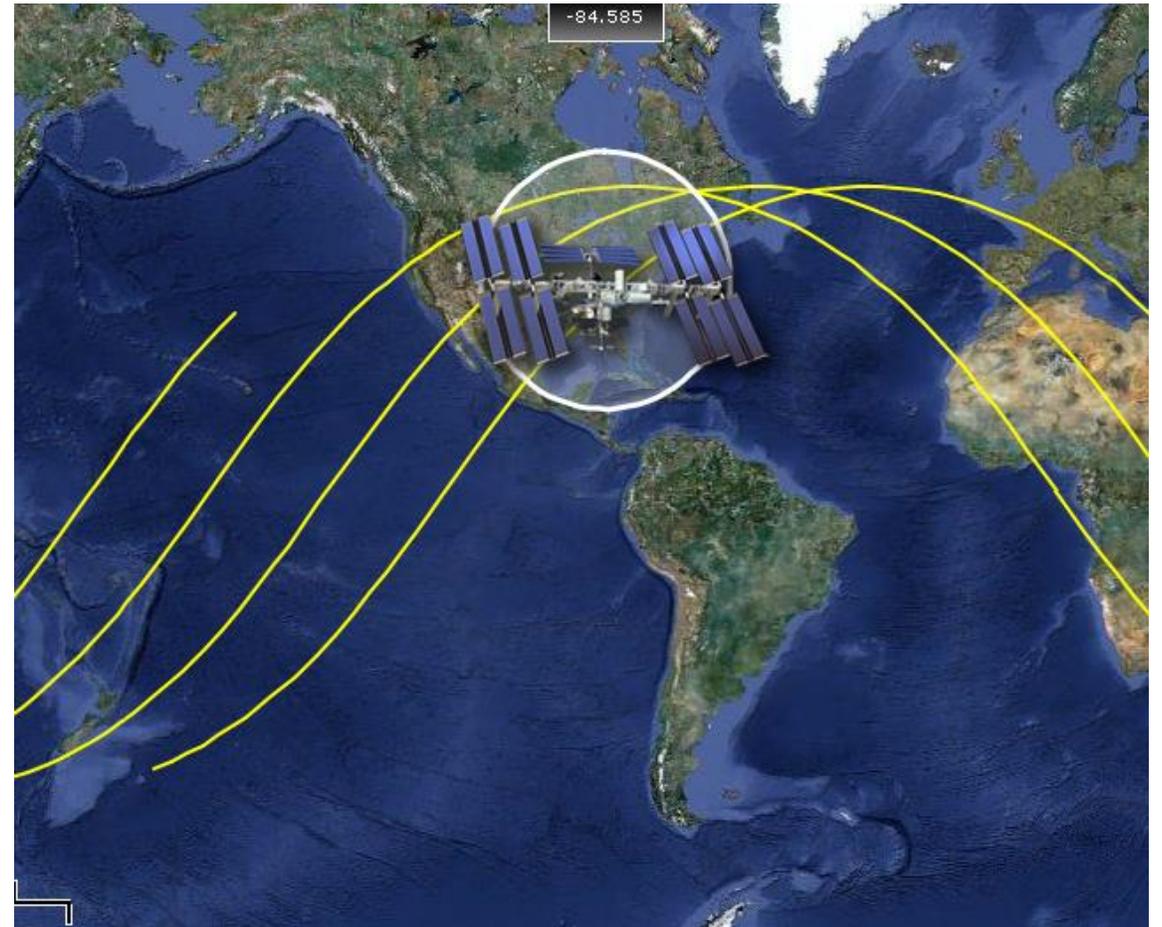
• Proposed New

- Multipoint Telebridge Contact via Amateur Radio

Connecting to the ISS: Radio Direct

Direct radio connection to ISS from your venue

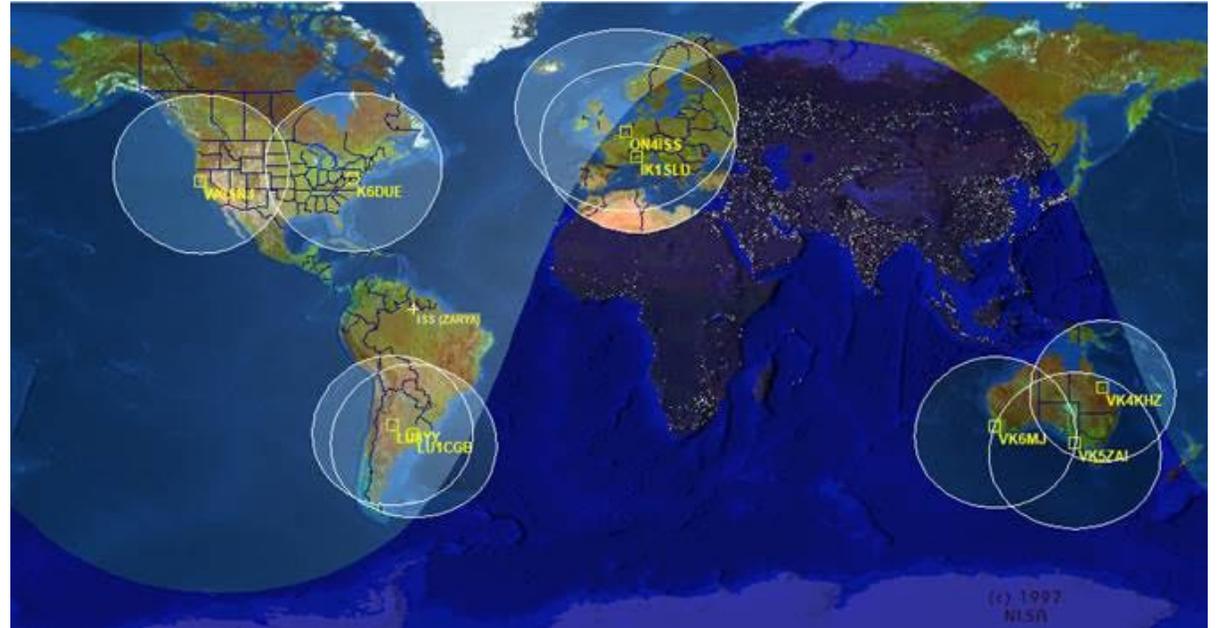
- ISS passing over your venue at the time of the contact
- Requires an amateur radio station at your location
- Provides hands-on radio experience and a one-on-one dialog with ISS crewmember



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

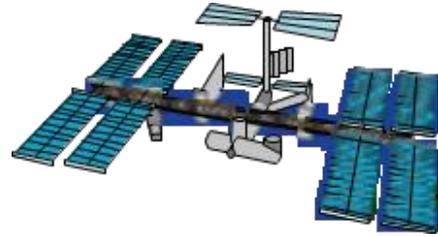
Scheduling Challenges

- 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?



**Telebridge
Station**

**Audience – ZOOM, GoTo
Meeting, YouTube, etc.**

**Verizon
Audio
Interface**

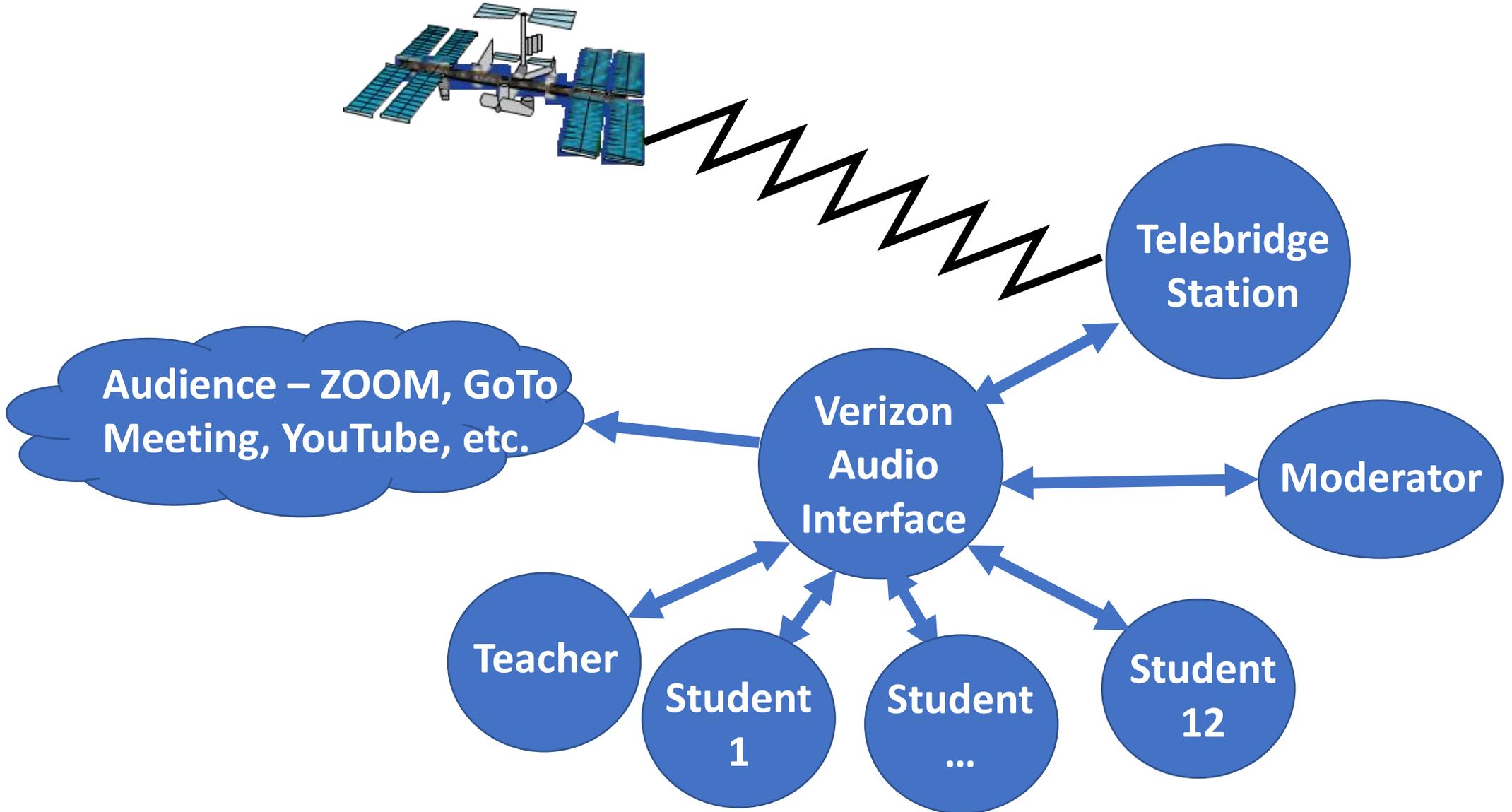
Moderator

Teacher

**Student
1**

**Student
...**

**Student
12**



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?

